

libdwarf

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Chapter 1

A Consumer Library Interface to DWARF

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Date

2025-04-02 v0.12.0

1.1 Suggestions for improvement are welcome.

Your thoughts on the document?

A) Are the section and subsection titles on Main Page meaningful to you?

B) Are the titles on the Modules page meaningful to you?

Anything else you find misleading or confusing? Send suggestions to ([libdwarf-list \(at\) prevanders](mailto:libdwarf-list@prevanders.org) with final characters .org) Sorry about the simple obfuscation to keep bots away. It's actually a simple email address, not a list.

Thanks in advance for any suggestions.

1.2 Introduction

This document describes an interface to *libdwarf*, a library of functions to provide access to DWARF debugging information records, DWARF line number information, DWARF address range and global names information, weak names information, DWARF frame description information, DWARF static function names, DWARF static variables, and DWARF type information. In addition the library provides access to several object sections (created by compiler writers and for debuggers) related to debugging but not mentioned in any DWARF standard.

The DWARF Standard has long mentioned the "Unix International Programming Languages Special Interest Group" (PLSIG), under whose auspices the DWARF committee was formed around 1991. "Unix International" was disbanded in the 1990s and no longer exists.

The DWARF committee published DWARF2 July 27, 1993, DWARF3 in 2005, DWARF4 in 2010, and DWARF5 in 2017.

In the mid 1990s this document and the library it describes (which the committee never endorsed, having decided not to endorse or approve any particular library interface) was made available on the internet by Silicon Graphics, Inc.

In 2005 the DWARF committee began an affiliation with FreeStandards.org. In 2007 FreeStandards.org merged with The Linux Foundation. The DWARF committee dropped its affiliation with FreeStandards.org in 2007 and established the dwarfstd.org website.

See also

<https://www.dwarfstd.org> for current information on standardization activities and a copy of the standard.

1.3 Thread Safety

Libdwarf can safely open multiple Dwarf_Debug pointers simultaneously but all such Dwarf_Debug pointers must be opened within the same thread. And all *libdwarf* calls must be made from within that single (same) thread.

1.4 Error Handling in libdwwarf

Essentially every *libdwwarf* call could involve dealing with an error (possibly data corruption in the object file). Here we explain the two main approaches the library provides (though we think only one of them is truly appropriate except in toy programs). In all cases where the library returns an error code (almost every library function does) the caller should check whether the returned integer is `DW_DLV_OK`, `DW_DLV_ERROR`, or `DW_DLV_NO_ENTRY` and then act accordingly.

A) The recommended approach is to define a `Dwarf_Error` and initialize it to 0.

```
Dwarf_Error error = 0;
```

Then, in every call where there is a `Dwarf_Error` argument pass its address. For example:

```
int res = dwarf_tag(die, DW_TAG_compile_unit, &error);
```

The possible return values to `res` are, in general:

```
DW_DLV_OK
DW_DLV_NO_ENTRY
DW_DLV_ERROR
```

If `DW_DLV_ERROR` is returned then `error` is set (by the library) to a pointer to important details about the error and the library will not pass back any data through other pointer arguments. If `DW_DLV_NO_ENTRY` is returned the error argument is ignored by the library and the library will not pass back any data through pointer arguments. If `DW_DLV_OK` is returned argument pointers that are defined as ways to return data to your code are used and values are set in your data by the library.

Some functions cannot possibly return some of these three values. As defined later for each function.

B) An alternative (not recommended) approach is to pass `NULL` to the error argument.

```
int res = dwarf_tag(die, DW_TAG_compile_unit, NULL);
```

If your initialization provided an 'errhand' function pointer argument (see below) the library will call `errhand` if an error is encountered. (Your `errhand` function could exit if you so choose.)

The library will then return `DW_DLV_ERROR`, though you will have no way to identify what the error was. Could be a malloc fail or data corruption or an invalid argument to the call, or something else.

That is the whole picture. The library never calls `exit()` under any circumstances.

1.4.1 Error Handling at Initialization

Each initialization call (for example)

```
Dwarf_Debug dbg = 0;
const char *path = "myobjectfile";
char *true_path = 0;
unsigned int true_pathlen = 0;
Dwarf_Handler errhand = 0;
Dwarf_Ptr errarg = 0;
Dwarf_Error error = 0;
int res = 0;

res = dwarf_init_path(path, true_path, true_pathlen,
    DW_GROUPNUMBER_ANY, errhand, errarg, &error);
```

has two arguments that appear nowhere else in the library.

```
Dwarf_Handler errhand
Dwarf_Ptr errarg
```

For the **recommended A)** approach:

Just pass `NULL` to both those arguments. If the initialization call returns `DW_DLV_ERROR` you should then call `dwarf_dealloc_error` (`dbg, error`);

to free the Dwarf_Error data because `dwarf_finish()` does not clean up a dwarf-init error. This works even though `dbg` will be NULL.

For the **not recommended B)** approach:

Because `dw_errarg` is a general pointer one could create a struct with data of interest and use a pointer to the struct as the `dw_errarg`. Or one could use an integer or NULL, it just depends what you want to do in the Dwarf_Handler function you write.

If you wish to provide a `dw_errhand`, define a function (this first example is not a good choice as it terminates the application!).

```
void bad_dw_errhandler(Dwarf_Error error, Dwarf_Ptr ptr)
{
    printf("ERROR Exit on %lx due to error 0x%lx %s\n",
        (unsigned long)ptr,
        (unsigned long)dwarf_errno(error),
        dwarf_errmsg(error));
    exit(1)
}
```

and pass `bad_dw_errhandler` (as a function pointer, no parentheses).

The Dwarf_Ptr argument your error handler function receives is the value you passed in as `dw_errarg`, and can be anything, it allows you to associate the callback with a particular `dwarf_init*` call if you wish to make such an association.

By doing an `exit()` you guarantee that your application abruptly stops. This is only acceptable in toy or practice programs.

A better `dw_errhand` function is

```
void my_dw_errhandler(Dwarf_Error error, Dwarf_Ptr ptr)
{
    /* Clearly one could write to a log file or do
       whatever the application finds useful. */
    printf("ERROR on %lx due to error 0x%lx %s\n",
        (unsigned long)ptr,
        (unsigned long)dwarf_errno(error),
        dwarf_errmsg(error));
}
```

because it returns rather than exiting. It is not ideal. The `DW_DLV_ERROR` code is returned from *libdwarf* and your code can do what it likes with the error situation. The library will continue from the error and will return an error code on returning to your `@elibdwarf` call ... but the calling function will not know what the error was.

```
Dwarf_Ptr x = address of some struct I want in the errhandler;
res = dwarf_init_path(..., my_dw_errhandler, x, ... );
if (res == ...)
```

If you do not wish to provide a `dw_errhand`, just pass both arguments as NULL.

1.4.2 Error Handling Everywhere

So let us examine a simple case where anything could happen. We are taking the **recommended A)** method of using a non-null Dwarf_Error*:

```
int func(Dwarf_Dbg dbg, Dwarf_Die die, Dwarf_Error* error) {
    Dwarf_Die newdie = 0;
    int res = 0;

    res = dwarf_siblingof_c(die, &newdie, error);
    if (res != DW_DLV_OK) {
        /* Whether DW_DLV_ERROR or DW_DLV_NO_ENTRY
           (the latter is actually impossible
           for this function) returning res is the
           appropriate default thing to do. */
        return res;
    }
    /* Do something with newdie. */
    dwarf_dealloc_die(newdie);
    newdie = 0; /* A good habit... */
    return DW_DLV_OK;
}
```

1.4.2.1 DW_DLV_OK

When `res == DW_DLV_OK` `newdie` is a valid pointer and when appropriate we should do `dwarf_dealloc_die(newdie)`. For other *libdwarf* calls the meaning depends on the function called, so read the description of the function you called for more information.

1.4.2.2 DW_DLV_NO_ENTRY

When `res == DW_DLV_NO_ENTRY` then `newdie` is not set and there is no error. It means `die` was the last of a siblinglist. For other *libdwarf* calls the meaning depends on the function called, so read the description of the function you called for more information.

1.4.2.3 DW_DLV_ERROR

When `res == DW_DLV_ERROR` Something bad happened. The only way to know what happened is to examine the `*error` as in

```
int ev = dwarf_errno(*error);
or
char * msg = dwarf_errmsg(*error);
```

or both and report that somehow.

The above three values are the only returns possible from the great majority of *libdwarf* functions, and for these functions the return type is always `int`.

If it is a decently large or long-running program then you want to free any local memory you allocated and return `res`. If it is a small or experimental program print something and exit (possibly leaking memory).

If you want to discard the error report from the `dwarf_siblingof_c()` call then possibly do

```
dwarf_dealloc_error(dbg, *error);
*error = 0;
return DW_DLV_OK;
```

Except in a special case involving function `dwarf_set_de_alloc_flag()` (which you will not usually call), any `dwarf_dealloc()` that is needed will happen automatically when you call `dwarf_finish()`.

1.4.2.4 Slight Performance Enhancement

Very long running library access programs using relevant appropriate `dwarf_dealloc` calls should consider calling `dwarf_set_de_alloc_flag(0)`. Using this one could get a performance enhancement of perhaps five percent in *libdwarf* CPU time and a reduction in memory use.

Be sure to test using `valgrind` or `-fsanitize` to ensure your code really does the extra `dwarf_dealloc` calls needed since when using `dwarf_set_de_alloc_flag(0)` `dwarf_finish()` does only limited cleanup.

1.5 Extracting Data Per Compilation Unit

The library is designed to run a single pass through the set of Compilation Units (CUs), via a sequence of calls to [dwarf_next_cu_header_e\(\)](#). ([dwarf_next_cu_header_d\(\)](#) is supported but its use requires that it be immediately followed by a call to [dwarf_siblingof_b\(\)](#). see [dwarf_next_cu_header_d\(\)](#).)

Within a CU opened with [dwarf_next_cu_header_e\(\)](#) do something (if desired) on the CU_DIE returned, and call [dwarf_child\(\)](#) on the CU_DIE to begin recursing through all DIEs. If you save the CU_DIE you can repeat passes beginning with [dwarf_child\(\)](#) on the CU_DIE, though it almost certainly faster to remember, in your data structures, what you need from the first pass.

The general plan:

create your local data structure(s)

- A. Check your local data structures to see **if** you have what you need
- B. If sufficient data present act on it, ensuring your data structures are kept **for** further use.
- C. Otherwise Read a CU, recording relevant data in your structures and loop back to A.

For an example (best approach)

See also

[Example walking CUs\(e\)](#) or (second-best approach)

[Example walking CUs\(d\)](#) Write your code to record relevant (to you) information from each CU as you go so your code has no need for a second pass through the CUs. This is much much faster than allowing multiple passes would be.

1.6 Line Table Registers

Line Table Registers

Please refer to the DWARF5 Standard for details. The line table registers are named in Section 6.2.2 State Machine Registers and are not much changed from DWARF2.

Certain functions on Dwarf_Line data return values for these 'registers' as these are the data available for debuggers and other tools to relate a code address to a source file name and possibly also to a line number and column-number within the source file.

```
address
op_index
file
line
column
is_stmt
basic_block
end_sequence
prologue_end
epilogue_begin
isa
discriminator
```

1.7 Reading Special Sections Independently

DWARF defines (in each version of DWARF) sections which have a somewhat special character. These are referenced from compilation units and other places and the Standard does not forbid blocks of random bytes at the start or end or between the areas referenced from elsewhere.

Sometimes compilers (or linkers) leave trash behind as a result of optimizations. If there is a lot of space wasted that way it is quality of implementation issue. But usually the wasted space, if any, is small.

Compiler writers or others may be interested in looking at these sections independently so *libdwarf* provides functions that allow reading the sections without reference to what references them.

[Abbreviations can be read independently](#)

[Strings can be read independently](#)

[String Offsets can be read independently](#)

[The addr table can be read independently](#)

Those functions allow starting at byte 0 of the section and provide a length so you can calculate the next section offset to call or refer to.

Usually that works fine. If there is some random data somewhere outside of referenced areas or the data format is a gcc extension of an early DWARF version the reader function may fail, returning `DW_DLV_ERROR`. Such an error is neither a compiler bug nor a *libdwarf* bug.

1.8 Special Frame Registers

In dealing with `.debug_frame` or `.eh_frame` there are five values that must be set unless one has relatively few registers in the target ABI (anything under 188 registers, see [dwarf.h](#) `DW_FRAME_LAST_REG_NUM` for this default).

The requirements stem from the design of the section. See the DWARF5 Standard for details. The `.debug_frame` section is basically the same from DWARF2 on. The `.eh_frame` section is similar to `.debug_frame` but is intended to support exception handling and has fields and data not present in `.debug_frame`.

Keep in mind that register values correspond to columns in the theoretical fully complete line table of a row per pc and a column per register.

There is no time or space penalty in setting **Undefined_Value**, **Same_Value**, and **CFA_Column** much larger than the **Table_Size**.

Here are the five values.

Table_Size: This sets the number of columns in the theoretical table. It starts at `DW_FRAME_LAST_REG_NUM` which defaults to 188. This is the only value you might need to change, given the defaults of the others are set reasonably large by default.

Undefined_Value: A register number that means the register value is undefined. For example due to a call clobbering the register. `DW_FRAME_UNDEFINED_VAL` defaults to 12288. There no such column in the table.

Same_Value: A register number that means the register value is the same as the value at the call. Nothing can have clobbered it. `DW_FRAME_SAME_VAL` defaults to 12289. There no such column in the table.

Initial_Value: The value must be either DW_FRAME_UNDEFINED_VAL or DW_FRAME_SAME_VAL to represent how most registers are to be thought of at a function call. This is a property of the ABI and instruction set. Specific frame instructions in the CIE or FDE will override this for registers not matching this value.

CFA_Column: A number for the CFA. Defined so we can use a register number to refer to it. DW_FRAME_CFA_COLUMN defaults to 12290. There no such column in the table. See [libdwarf.h](#) struct [Dwarf_Regtable3_s](#) member [rt3_cfa_rule](#) or function [dwarf_get_fde_info_for_cfa_reg3_b\(\)](#) or function [dwarf_get_fde_info_for_cfa_reg3_c\(\)](#) .

A set of functions allow these to be changed at runtime. The set should be called (if needed) immediately after initializing a Dwarf_Debug and before any other calls on that Dwarf_Debug. If just one value (for example, Table_Size) needs altering, then just call that single function.

For the library accessing frame data to work properly there are certain invariants that must be true once the set of functions have been called.

REQUIRED:

```
Table_Size      > the number of registers in the ABI.
Undefined_Value != Same_Value
CFA_Column      != Undefined_value
CFA_Column      != Same_value
Initial_Value   == Same_Value ||
    (Initial_Value == Undefined_value)
Undefined_Value > Table_Size
Same_Value      > Table_Size
CFA_Column      > Table_Size
```

1.9 .debug_pubnames etc DWARF2-DWARF4

Each section consists of a header for a specific compilation unit (CU) followed by an a set of tuples, each tuple consisting of an offset of a compilation unit followed by a null-terminated namestring. The tuple set is ended by a 0,0 pair. Then followed with the data for the next CU and so on.

The function set provided for each such section allows one to print all the section data as it literally appears in the section (with headers and tuples) or to treat it as a single array with CU data columns.

Each has a set of 6 functions.

Section	typename	Standard
.debug_pubnames	Dwarf_Global	DWARF2-DWARF4
.debug_pubtypes	Dwarf_Global	DWARF3, DWARF4

These sections are accessed calling [dwarf_globals_by_type\(\)](#) using type of DW_GL_GLOBALS or DW_GL_PUBTYPES. Or call [dwarf_get_pubtypes\(\)](#).

The following four were defined in SGI/IRIX compilers in the 1990s but were never part of the DWARF standard. These sections are accessed calling [dwarf_globals_by_type\(\)](#) using type of DW_GL_FUNCS, DW_GL_TYPES, DW_GL_VARS, or DW_GL_WEAKS.

It not likely you will encounter these four sections.

```
.debug_funcs
.debug_typenames
.debug_vars
.debug_weak
```


1.10 Reading DWARF with no object file present

This most commonly happens with just-in-time compilation, and someone working on the code wants to debug this on-the-fly code in a situation where nothing can be written to disc, but DWARF can be constructed in memory.

For a simple example of this

See also

[Demonstrating reading DWARF without a file.](#)

But the *libdwarf* feature can be used in a wide variety of ways.

For example, the DWARF data could be kept in simple files of bytes on the internet. Or on the local net. Or if files can be written locally each section could be kept in a simple stream of bytes in the local file system.

Another example is a non-standard file system, or file format, with the intent of obfuscating the file or the DWARF.

For this to work the code generator must generate standard DWARF.

Overall the idea is a simple one: You write a small handful of functions and supply function pointers and code implementing the functions. These are part of your application or library, not part of *libdwarf*.

You set up a little bit of data with that code (all described below) and then you have essentially written the dwarf↵_init_path equivalent and you can access compilation units, line tables etc and the standard *libdwarf* function calls work.

Data you need to create involves these types. What follows describes how to fill them in and how to make them work for you.

```
typedef struct Dwarf_Obj_Access_Interface_a_s
Dwarf_Obj_Access_Interface_a;
struct Dwarf_Obj_Access_Interface_a_s {
    void*          ai_object;
    const Dwarf_Obj_Access_Methods_a *ai_methods;
};

typedef struct Dwarf_Obj_Access_Methods_a_s
Dwarf_Obj_Access_Methods_a
struct Dwarf_Obj_Access_Methods_a_s {
    int (*om_get_section_info)(void* obj,
        Dwarf_Unsigned section_index,
        Dwarf_Obj_Access_Section_a* return_section,
        int* error);
    Dwarf_Small (*om_get_byte_order)(void* obj);
    Dwarf_Small (*om_get_length_size)(void* obj);
    Dwarf_Small (*om_get_pointer_size)(void* obj);
    Dwarf_Unsigned (*om_get_filesize)(void* obj);

    Dwarf_Unsigned (*om_get_section_count)(void* obj);
    int (*om_load_section)(void* obj,
        Dwarf_Unsigned section_index,
        Dwarf_Small** return_data, int* error);
    int (*om_relocate_a_section)(void* obj,
        Dwarf_Unsigned section_index,
        Dwarf_Debug dbg,
        int* error);
};

typedef struct Dwarf_Obj_Access_Section_a_s
Dwarf_Obj_Access_Section_a
struct Dwarf_Obj_Access_Section_a_s {
    const char* as_name;
    Dwarf_Unsigned as_type;
    Dwarf_Unsigned as_flags;
    Dwarf_Addr as_addr;
    Dwarf_Unsigned as_offset;
    Dwarf_Unsigned as_size;
    Dwarf_Unsigned as_link;
    Dwarf_Unsigned as_info;
    Dwarf_Unsigned as_addralign;
    Dwarf_Unsigned as_entrysize;
```

```
};
```

Dwarf_Obj_Access_Section_a: Your implementation of a `om_get_section_info` must fill in a few fields for *libdwf*. The fields here are standard Elf, but for most you can just use the value zero. We assume here you will not be doing relocations at runtime.

as_name: Here you set a section name via the pointer. The section names must be names as defined in the DWARF standard, so if such do not appear in your data you have to create the strings yourself.

as_type: Fill in zero.

as_flags: Fill in zero.

as_addr: Fill in the address, in local memory, where the bytes of the section are.

as_offset: Fill in zero.

as_size: Fill in the size, in bytes, of the section you are telling *libdwf* about.

as_link: Fill in zero.

as_info: Fill in zero.

as_addralign: Fill in zero.

as_entsize: Fill in one(1).

Dwarf_Obj_Access_Methods_a_s: The functions we need to access object data from *libdwf* are declared here.

In these function pointer declarations 'void *obj' is intended to be a pointer (the object field in `Dwarf_Obj_Access_Interface_s`) that hides the library-specific and object-specific data that makes it possible to handle multiple object formats and multiple libraries. It is not required that one handles multiple such in a single *libdwf* archive/shared-library (but not ruled out either). See `dwarf_elf_object_access_internals_t` and `dwarf_elf_access.c` for an example.

Usually the struct `Dwarf_Obj_Access_Methods_a_s` is statically defined and the function pointers are set at compile time.

The `om_get_filesize` member is new September 4, 2021. Its position is NOT at the end of the list. The member names all now have `om_` prefix.

1.11 Section Groups: Split Dwarf, COMDAT groups

A typical executable or shared object is unlikely to have any section groups, and in that case what follows is irrelevant and unimportant.

COMDAT groups are defined by the Elf ABI and enable compilers and linkers to work together to eliminate blocks of duplicate DWARF and duplicate CODE.

Split Dwarf (sometimes referred to as Debug Fission) allows compilers and linkers to separate large amounts of DWARF from the executable, shrinking disk space needed in the executable while allowing full debugging (also applies to shared objects).

See the DWARF5 Standard, Section E.1 Using Compilation Units page 364.

To name COMDAT groups (defined later here) we add the following defines to `libdwf.h` (the DWARF standard does not specify how to do any of this).

```
/* These support opening DWARF5 split dwarf objects and
   Elf SHT_GROUP blocks of DWARF sections. */
#define DW_GROUPNUMBER_ANY 0
#define DW_GROUPNUMBER_BASE 1
#define DW_GROUPNUMBER_DWO 2
```

The `DW_GROUPNUMBER_` are used in *libdwf* functions `dwarf_init_path()`, `dwarf_init_path_dl()` and `dwarf_init_b()`. In all those cases unless you know there is any complexity in your object file, pass in `DW_GROUPNUMBER_ANY`.

To see section groups usage, see the example source:

See also

[A simple report on section groups.](#)
[Examining Section Group data](#)

The function interface declarations:

See also

[dwarf_sec_group_sizes](#)
[dwarf_sec_group_map](#)

If an object file has multiple groups *libdwarf* will not reveal contents of more than the single requested group with a given [dwarf_init_path\(\)](#) call. One must pass in another groupnumber to another [dwarf_init_path\(\)](#), meaning initialize a new Dwarf_Debug, to get *libdwarf* to access that group.

When opening a Dwarf_Debug the following applies:

If DW_GROUPNUMBER_ANY is passed in *libdwarf* will choose either of DW_GROUPNUMBER_BASE(1) or DW↔_GROUPNUMBER_DWO (2) depending on the object content. If both groups one and two are in the object *libdwarf* will chose DW_GROUPNUMBER_BASE.

If DW_GROUPNUMBER_BASE is passed in *libdwarf* will choose it if non-split DWARF is in the object, else the init call will return DW_DLV_NO_ENTRY.

If DW_GROUPNUMBER_DWO is passed in *libdwarf* will choose it if .dwo sections are in the object, else the init will call return DW_DLV_NO_ENTRY.

If a groupnumber greater than two is passed in *libdwarf* accepts it, whether any sections corresponding to that groupnumber exist or not. If the groupnumber is not an actual group the init will call return DW_DLV_NO_ENTRY.

For information on groups "dwarfdump -i" on an object file will show all section group information **unless** the object file is a simple standard object with no .dwo sections and no COMDAT groups (in which case the output will be silent on groups). Look for **Section Groups data** in the dwarfdump output. The groups information will be appearing very early in the dwarfdump output.

Sections that are part of an Elf COMDAT GROUP are assigned a group number > 2. There can be many such COMDAT groups in an object file (but none in an executable or shared object). Each such COMDAT group will have a small set of sections in it and each section in such a group will be assigned the same group number by *libdwarf*.

Sections that are in a .dwp .dwo object file are assigned to DW_GROUPNUMBER_DWO,

Sections not part of a .dwp package file or a.dwo section, or a COMDAT group are assigned DW↔_GROUPNUMBER_BASE.

At least one compiler relies on relocations to identify COMDAT groups, but the compiler authors do not publicly document how this works so we ignore such (these COMDAT groups will result in *libdwarf* returning DW↔_ERROR).

Popular compilers and tools are using such sections. There is no detailed documentation that we can find (so far) on how the COMDAT section groups are used, so *libdwarf* is based on observations of what compilers generate.

1.12 Details on separate DWARF object access

There are, at present, three distinct approaches in use to put DWARF information into separate objects to significantly shrink the size of the executable. All of them involve identifying a separate file.

Split Dwarf is one method. It defines the attribute **DW_AT_dwo_name** (if present) as having a file-system appropriate name of the split object with most of the DWARF.

The second is MacOS dSYM. It is a convention of placing the DWARF-containing object (separate from the object containing code) in a specific subdirectory tree.

The third involves GNU debuglink and GNU debug_id. These are two distinct ways (outside of DWARF) to provide names of alternative DWARF-containing objects elsewhere in a file system.

If one initializes a Dwarf_Debug object with `dwarf_init_path()` or `dwarf_init_path_dl()` appropriately *libdwarf* will automatically open the alternate dSYM or debuglink/debug_id object on the object with most of the DWARF.

See also

<https://sourceware.org/gdb/onlinedocs/gdb/Separate-Debug-Files.html>

libdwarf provides means to automatically read the alternate object (in place of the one named in the init call) or to suppress that and read the named object file.

```
int dwarf_init_path(const char * dw_path,
char * dw_true_path_out_buffer,
unsigned int dw_true_path_bufferlen,
unsigned int dw_groupnumber,
Dwarf_Handler dw_errhand,
Dwarf_Ptr dw_errarg,
Dwarf_Debug* dw_dbg,
Dwarf_Error* dw_error);

int dwarf_init_path_dl(const char *dw_path,
char * true_path_out_buffer,
unsigned true_path_bufferlen,
unsigned groupnumber,
Dwarf_Handler errhand,
Dwarf_Ptr errarg,
Dwarf_Debug * ret_dbg,
char ** dl_path_array,
unsigned int dl_path_count,
unsigned char * path_source,
Dwarf_Error * error);
```

Case 1:

If `dw_true_path_out_buffer` or `dw_true_path_bufferlen` is passed in as zero then the library will not look for an alternative object.

Case 2:

If `dw_true_path_out_buffer` passes a pointer to space you provide and `dw_true_path_bufferlen` passes in the length, in bytes, of the buffer, *libdwarf* will look for alternate DWARF-containing objects. We advise that the caller zero all the bytes in `dw_true_path_out_buffer` before calling.

If the alternate object name (with its null-terminator) is too long to fit in the buffer the call will return `DW_DLV_ERROR` with `dw_error` providing error code `DW_DLE_PATH_SIZE_TOO_SMALL`.

If the alternate object name fits in the buffer *libdwarf* will open and use that alternate file in the returned `Dwarf_Dbg`.

It is up to callers to notice that `dw_true_path_out_buffer` now contains a string and callers will probably wish to do something with the string.

If the initial byte of `dw_true_path_out_buffer` is a non-null when the call returns then an alternative object was found and opened.

The second function, `dwarf_init_path_dl()`, is the same as `dwarf_init_path()` except the `_dl` version has three additional arguments, as follows:

Pass in `NULL` or `dw_dl_path_array`, an array of pointers to strings with alternate GNU debuglink paths you want searched. For most people, passing in `NULL` suffices.

Pass in `dw_dl_path_array_size`, the number of elements in `dw_dl_path_array`.

Pass in `dw_dl_path_source` as `NULL` or a pointer to `char`. If non-null `libdwarf` will set it to one of three values:

- `DW_PATHSOURCE_basic` which means the original input `dw_path` is the one opened in `dw_dbg`.
- `DW_PATHSOURCE_dsym` which means a MacOS dSYM object was found and is the one opened in `dw_dbg`. `dw_true_path_out_buffer` contains the dSYM object path.
- `DW_PATHSOURCE_debuglink` which means a GNU debuglink or GNU debug-id path was found and names the one opened in `dw_dbg`. `dw_true_path_out_buffer` contains the object path.

1.13 Linking against libdwarf.so (or dll or dylib)

If you wish to do the basic `libdwarf` tests and are linking against a shared library `libdwarf` you must do an install for the tests to succeed (in some environments it is not strictly necessary).

For example, if building with `configure`, do

```
make
make install
make check
```

You can install anywhere, there is no need to install in a system directory! Creating a temporary directory and installing there suffices. If installed in appropriate system directories that works too.

When compiling to link against a shared library `libdwarf` you **must not define** `LIBDWARF_STATIC`.

For examples of this for all three build systems read the project shell script
`scripts/allsimplebuilds.sh`

1.14 Linking against libdwarf.a

- If you are building an application
- And are linking your application against a static library `libdwarf.a`
- Then you must ensure that each source file compilation with an include of `libdwarf.h` has the macro `LIBDWARF_STATIC` defined to your source compilation.
- If `libdwarf` was built with `zlib` and `zstd` decompression library enabled you must add `-lz -lzstd` to the link line of the build of your application.

To pass `LIBDWARF_STATIC` to the preprocessor with Visual Studio:

- Right click on a project name
- In the contextual menu, click on **Properties** at the very bottom.
- In the new window, double click on **C/C++**
- On the right, click on **Preprocessor definitions**
- There is a small down arrow on the right, click on it then click on **Modify**
- Add `LIBDWARF_STATIC` to the values
- Click on **OK** to close the windows

1.15 Suppressing CRC calculation for debuglink

GNU Debuglink-specific issue:

If GNU debuglink is present and considered by `dwarf_init_path()` or `dwarf_init_path_dl()` the library may be required to compute a 32bit crc (Cyclic Redundancy Check) on the file found via GNU debuglink.

See also

https://en.wikipedia.org/wiki/Cyclic_redundancy_check

For people doing repeated builds of objects using such the crc check is a waste of time as they know the crc comparison will pass.

For such situations a special interface function lets the `dwarf_init_path()` or `dwarf_init_path_dl()` caller suppress the crc check without having any effect on anything else in *libdwarf*.

It might be used as follows (the same pattern applies to `dwarf_init_path_dl()`) for any program that might do multiple `dwarf_init_path()` or `dwarf_init_path_dl()` calls in a single program execution.

```
int res      = 0;
int crc_check = 0;

crc_check = dwarf_suppress_debuglink_crc(1);
res = dwarf_init_path(..usual arguments);
/* Reset the crc flag to previous value. */
dwarf_suppress_debuglink_crc(crc_check);
/* Now check res in the usual way. */
```

This pattern ensures the crc check is suppressed for this single `dwarf_init_path()` or `dwarf_init_path_dl()` call while leaving the setting unchanged for further `dwarf_init_path()` or `dwarf_init_path_dl()` calls in the running program.

1.16 dwsec_mmap

As of version 0.12.0 *libdwarf* allows callers to select mmap (instead of malloc/read) to access object section DWARF data. Even if mmap is selected it is possible *libdwarf* will chose to use malloc in specific cases.

If at library build time the required functions/header are not available the following will have no effect.

One way to select mmap is to call

```
dwarf_set_load_preference(Dwarf_Alloc_Mmap);
```

Another way to select mmap is with an environment variable

```
export DWARF_WHICH_ALLOC=mmap
```

so *libdwarf* will see the variable at runtime.

The environment variable overrides the function call.

Calling `dwarf_set_load_preference(0)` will return the current overall preference will return the current overall preference, an instance of

```
enum Dwarf_Sec_Alloc_Pref
```

The new function

```
dwarf_get_mmap_count(Dwarf_Debug dw_dbg)
```

returns the application count and size of allocations for DWARF sections from the open *Dwarf_Debug* pointer.

Each supported build environment has a new build option to prevent *libdwarf* from assuming that things in the build are always present.

1.17 Recent Changes

We list these with newest first.

Changes 0.11.1 to 0.12.0

Released 02 April 2025

To optionally support mmap/munmap of object files sections we read we have added a function prototype for struct [Dwarf_Obj_Access_Methods_a_s](#) function `om_load_section()`. This will help when reading multi gigabyte object files. And we added a function prototype for destructing the object specific data while removing library internal public functions.

If an application does not call any of the functions which are new in v0.12.0 then it will work without recompilation.

Any application calling the new functions (for example, v0.12.0 `dwarfdump`) will only work with a v0.12.0 `libdwarf`.

If one is calling [dwarf_object_init_b\(\)](#) (almost no one ever calls this function) one is therefore instantiating struct [Dwarf_Obj_Access_Methods_a_s](#) oneself, you will surely find that your application will not work with `libdwarf 0.12.0`. Moreover, recompilation will fail unless you update your source to add the two new pointers to your instantiation (typically just add two zeros or NULLs in that struct instance).

Added new API function [dwarf_machine_architecture_a\(\)](#) which has an additional argument added to let `dwarfdump` create a better .text (etc) address-range for the object file being read for improved checking (fewer incorrect error reports) in `dwarfdump -k` output.

Up through December 2024 `libdwarf` could be made to be very very slow (Denial of Service) with calls with thousands of duplicate attributes in an abbreviation list of a specially constructed Compilation Unit.

Beginning 2025 by default that cannot happen as the library quickly notices and returns `DW_DLX_ERROR` with error details noted. Callers should check the return value and act appropriately, as always, when calling the library.

In case one has (and cannot fix) object files with duplicated attributes one can call a new API function [dwarf_library_allow_dup_attr\(\)](#). The library defaults to false (0) meaning the checks are done in `libdwarf` by default. Pass non-zero value to allow duplicate attributes in a Debugging Information Entry through to callers.

Added the ability to select, at runtime, whether `libdwarf` will use `malloc` to load section content from an object file being read (previously the only option) or will use `mmap` instead.

If the build determines `mmap` is unavailable then `malloc` will be used.

Added API function [dwarf_set_load_preference\(\)](#) giving callers the option to choose the default section load functions. `libdwarf` now recognizes the environment variable `DWARF_WHICH_ALLOC` to select whether the library uses `mmap` or `malloc/read` to load object section data, and the environment variable values '`DWARF_WHICH_ALLOC=mmap`' or '`DWARF_WHICH_ALLOC=malloc`' are the only values recognized. A recognized environment variable overrides [dwarf_set_load_preference\(\)](#) values. If the `libdwarf` build determines `mmap` is unavailable then only `malloc` will be used.

Added API function [dwarf_get_mmap_count\(\)](#) giving callers the ability to determine what section loads were used and the total amount of section data loaded.

Added API function `dwarf_get_LANGUAGE_name()` to be able to easily get a string for `DW_LNAME_Ada` etc.

Added API function [dwarf_language_version_string\(\)](#). This returns information defined by DWARF 6 and useful in interpreting DWARF6 language-version strings based on a name accessed from `DW_AT_language_name` attribute.

Changes 0.11.0 to 0.11.1

Corrected handling of DWARF5 `.debug_rnglists` and `.debug_loclists`. No API change, no incompatibilities.

Changes 0.10.1 to 0.11.0

Added function [dwarf_get_ranges_baseaddress\(\)](#) to the api to allow dwarfdump and other library callers to easily derive the (cooked) address from the raw data in the DWARF2, DWARF3, DWARF4 .debug_ranges section. An example of use is in [doc/checkexamples.c](#) (see examplev).

Changes 0.9.2 to 0.10.1

Released 01 July 2024 (Release 0.10.0 was missing a CMakeLists.txt file and is withdrawn).

Added API function [dwarf_get_locdesc_entry_e\(\)](#) to allow dwarfdump to report some data from .debug_loclists more completely – it reports a byte length of each loclist item. This is of little interest to anyone, surely. [dwarf_get_locdesc_entry_d\(\)](#) is still what you should be using.

[dwarf_debug_addr_table\(\)](#) now supports reading the DWARF4 GNU extension .debug_addr table.

A heuristic sanity check for PE object files was too conservative in limiting VirtualSize to 200MB. A library user has an exe with .debug_info size of over 200MB. Increased the limit to be 2000MB and changed the names of the errors for the three heuristic checks to include *HEURISTIC* so it is easier to know the kind of error/failure it is.

When doing a shared-library build with cmake we were not emitting the correct .so version names nor setting SONAME with the correct version name. This long-standing mistake is now fixed.

Changes 0.9.1 to 0.9.2

Version 0.9.2 released 2 April 2024

Vulnerabilities DW202402-001, DW202402-002, DW202402-003, and DW202403-001 could crash *libdwarf* given a carefully corrupted (fuzzed) DWARF object file. Now the library returns an error for these corruptions. DW_CFA↔_high_user (in [dwarf.h](#)) was a misspelling. Added the correct spelling DW_CFA_hi_user and a comment on the incorrect spelling.

Changes 0.9.0 to 0.9.1

Version 0.9.1 released 27 January 2024

The abbreviation code type returned by [dwarf_die_abbrev_code\(\)](#) changed from **int** to **Dwarf_Unsigned** as abbrev codes are not constrained by the DWARF Standard.

The section count returned by [dwarf_get_section_count\(\)](#) is now of type **Dwarf_Unsigned**. The previous type of **int** never made sense in *libdwarf*. Callers will, in practice, see the same value as before.

All type-warnings issued by MSVC have been fixed.

Problems reading Macho (Apple) relocatable object files have been fixed.

Each of the build systems available now has an option which eliminates *libdwarf* references to the object section decompression libraries. See the respective READMEs.

Changes 0.8.0 to 0.9.0

Version 0.9.0 released 8 December 2023

Adding functions (rarely needed) for callers with special requirements. Added [dwarf_get_section_info_by_name_a\(\)](#) and [dwarf_get_section_info_by_index_a\(\)](#) which add dw_section_flags pointer argument to return the object section file flags (whose meaning depends entirely on the object file format), and dw_section_offset pointer argument to return the object-relevant offset of the section (here too the meaning depends on the object format). Also added [dwarf_machine_architecture\(\)](#) which returns a few top level data items about the object *libdwarf* has opened, including the 'machine' and 'flags' from object headers (all supported object types).

This adds new library functions [dwarf_next_cu_header_e\(\)](#) and [dwarf_siblingof_c\(\)](#). Used exactly as documented [dwarf_next_cu_header_d\(\)](#) and [dwarf_siblingof_b\(\)](#) work fine and continue to be supported for the foreseeable future. However it would be easy to misuse as the requirement that [dwarf_siblingof_b\(\)](#) be called immediately after a successful call to [dwarf_next_cu_header_d\(\)](#) was never stated and that dependency was impossible to enforce. The dependency was an API mistake made in 1992.

So [dwarf_next_cu_header_e\(\)](#) now returns the compilation-unit DIE as well as header data and [dwarf_siblingof_c\(\)](#) is not needed except to traverse sibling DIEs. (the compilation-unit DIE by definition has no siblings).

Changes were required to support Mach-O (Apple) universal binaries, which were not readable by earlier versions of the library.

We have new library functions [dwarf_init_path_a\(\)](#), [dwarf_init_path_dl_a\(\)](#), and [dwarf_get_universalbinary_count\(\)](#).

The first two allow a caller to specify which (numbering from zero) object file to report on by adding a new argument `dw_universalnumber`. Passing zero as the `dw_universalnumber` argument is always safe.

The third lets callers retrieve the number being used.

These new calls do not replace anything so existing code will work fine.

Applying the previously existing calls [dwarf_init_path\(\)](#) [dwarf_init_path_dl\(\)](#) to a Mach-O universal binary works, but the library will return data on the first (index zero) as a default since there is no `dw_universalnumber` argument possible.

For improved performance in reading Fde data when iterating though all usable pc values we add [dwarf_get_fde_info_for_all_regs3_b\(\)](#), which returns the next pc value with actual frame data. We retain [dwarf_get_fde_info_for_all_regs3\(\)](#) so existing code need not change.

Changes 0.7.0 to 0.8.0

v0.8.0 released 2023-09-20

New functions [dwarf_get_fde_info_for_reg3_c\(\)](#), [dwarf_get_fde_info_for_cfa_reg3_c\(\)](#) are defined. The advantage of the new versions is they correctly type the `dw_offset` argument return value as `Dwarf_Signed` instead of the earlier and incorrect type `Dwarf_Unsigned`.

The original functions [dwarf_get_fde_info_for_reg3_b\(\)](#) and [dwarf_get_fde_info_for_cfa_reg3_b\(\)](#) continue to exist and work for compatibility with the previous release.

For all `open()` calls for which the `O_CLOEXEC` flag exists we now add that flag to the `open()` call.

Vulnerabilities involving reading corrupt object files (created by fuzzing) have been fixed: DW202308-001 (ossfuzz 59576), DW202307-001 (ossfuzz 60506), DW202306-011 (ossfuzz 59950), DW202306-009 (ossfuzz 59755), DW202306-006 (ossfuzz 59727), DW202306-005 (ossfuzz 59717), DW202306-004 (ossfuzz 59695), DW202306-002 (ossfuzz 59519), DW202306-001 (ossfuzz 59597). DW202305-010 (ossfuzz 59478). DW202305-009 (ossfuzz 56451). DW202305-008 (ossfuzz 56451), DW202305-007 (ossfuzz 56474), DW202305-006 (ossfuzz 56472), DW202305-005 (ossfuzz 56462), DW202305-004 (ossfuzz 56446).

Changes 0.6.0 to 0.7.0

v0.7.0 released 2023-05-20

Elf section counts can exceed 16 bits (on linux see **man 5 elf**) so some function prototype members of struct [Dwarf_Obj_Access_Methods_a_s](#) changed. Specifically, `om_get_section_info()` `om_load_section()`, and `om_relocate_a_section()` now pass section indexes as `Dwarf_Unsigned` instead of `Dwarf_Half`. Without this change executables/objects with more than 64K sections cannot be read by *libdwarf*. This is unlikely to affect your code since for most users *libdwarf* takes care of this and *dwarfdump* is aware of this change.

Two functions have been removed from [libdwarf.h](#) and the library: `dwarf_dnames_abbrev_by_code()` and `dwarf_dnames_abbrev_form_by_index()`.

`dwarf_dnames_abbrev_by_code()` is slow and pointless. Use either [dwarf_dnames_name\(\)](#) or [dwarf_dnames_abbrevtable\(\)](#) instead, depending on what you want to accomplish.

`dwarf_dnames_abbrev_form_by_index()` is not needed, was difficult to call due to argument list requirements, and never worked.

Changes 0.5.0 to 0.6.0

v0.6.0 released 2023-02-20 The dealloc required by [dwarf_offset_list\(\)](#) was wrong. The call could crash *libdwarf* on systems with 32bit pointers. The new and proper dealloc (for all pointer sizes) is `dwarf_dealloc(dbg, offsetlistptr, DW_DLA_UARRAY)`;

A memory leak from [dwarf_load_loclists\(\)](#) and [dwarf_load_rnglists\(\)](#) is fixed and the *libdwarf*-regressiontests error that hid the leak has also been fixed.

A **compatibility** change affects callers of [dwarf_dietype_offset\(\)](#), which on success returns the offset of the target of the DW_AT_type attribute (if such exists in the Dwarf_Die). Added a pointer argument so the function can (when appropriate) return a FALSE argument indicating the offset refers to DWARF4 .debug_types section, rather than TRUE value when .debug_info is the section the offset refers to. If anyone was using this function it would fail badly (while pretending success) with a DWARF4 DW_FORM_ref_sig8 on a DW_AT_type attribute from the Dwarf_Die argument. One will likely encounter DWARF4 content so a single correct function seemed necessary. New regression tests will ensure this will continue to work.

A **compatibility** change affects callers of [dwarf_get_pubtypes\(\)](#). If an application reads .debug_pubtypes there is a **compatibility break**. Such applications must be recompiled with latest *libdwarf*, change Dwarf_Type declarations to use Dwarf_Global, and can only use the latest *libdwarf*. We are correcting a 1993 library design mistake that created extra work and documentation for library users and inflated the *libdwarf* API and documentation for no good reason.

The changes are: the data type Dwarf_Type disappears as do `dwarf_pubtypename()` `dwarf_pubtype_die_offset()`, `dwarf_pubtype_cu_offset()`, `dwarf_pubtype_name_offsets()` and `dwarf_pubtypes_dealloc()`. Instead the type is Dwarf_Global, the type and functions used for [dwarf_get_globals\(\)](#). The existing read/dealloc functions for Dwarf_Global apply to pubtypes data too.

No one should be referring to the 1990s SGI/IRIX sections .debug_weaknames, .debug_funcnames, .debug_varnames, or .debug_tynames as they are not emitted by any compiler except from SGI/IRIX/MIPS in that period. There is (revised) support in *libdwarf* to read these sections, but we will not mention details here.

Any use of DW_FORM_strx3 or DW_FORM_addrx3 in DWARF would, in 0.5.0 and earlier, result in *libdwarf* reporting erroneous data. A copy-paste error in *libdwarf*/dwarf_util.c was noticed and fixed 24 January 2023 for 0.6.0. Bug **DW202301-001**.

Changes 0.4.2 to 0.5.0

v0.5.0 released 2022-11-22 The handling of the .debug_abbrev data in *libdwarf* is now more cpu-efficient (measurably faster) so access to DIEs and attribute lists is faster. The changes are library-internal so are not visible in the API.

Corrects CU and TU indexes in the .debug_names (fast access) section to be zero-based. The code for that section was previously unusable as it did not follow the DWARF5 documentation.

[dwarf_get_globals\(\)](#) now returns a list of Dwarf_Global names and DIE offsets whether such are defined in the .debug_names or .debug_pubnames section or both. Previously it only read .debug_pubnames.

A new function, [dwarf_global_tag_number\(\)](#), returns the DW_TAG of any Dwarf_Global that was derived from the .debug_names section.

Three new functions enable printing of the `.debug_addr` table. `dwarf_debug_addr_table()`, `dwarf_debug_addr_by_index()`, and `dwarf_dealloc_debug_addr_table()`. Actual use of the table(s) in `.debug_addr` is handled for you when an attribute invoking such is encountered (see `DW_FORM_addrx`, `DW_FORM_addrx1` etc).

Added `doc/libdwarf.dox` to the distribution (left out by accident earlier).

Changes 0.4.1 to 0.4.2

0.4.2 released 2022-09-13. No API changes. No API additions. Corrected a bug in `dwarf_tsearchhash.c` where a delete request was accidentally assumed in all hash tree searches. It was invisible to *libdwarf* uses. Vulnerabilities DW202207-001 and DW202208-001 were fixed so error conditions when reading fuzzed object files can no longer crash *libdwarf* (the crash was possible but not certain before the fixes). In this release we believe neither *libdwarf* nor *dwarfdump* leak memory even when there are malloc failures. Any GNU debuglink or build-id section contents were not being properly freed (if malloced, meaning a compressed section) until 9 September 2022.

It is now possible to run the build sanity tests in all three build mechanisms (`configure`, `cmake`, `meson`) on linux, MacOS, FreeBSD, and mingw msys2 (windows). *libdwarf* README.md (or README) and README.cmake document how to do builds for each supported platform and build mechanism.

Changes 0.4.0 to 0.4.1

Reading a carefully corrupted DIE with form `DW_FORM_ref_sig8` could result in reading memory outside any section, possibly leading to a segmentation violation or other crash. Fixed.

See also

<https://www.prevanders.net/dwarfbug.xml> DW202206-001

Reading a carefully corrupted `.debug_pubnames/.debug_pubtypes` could lead to reading memory outside the section being read, possibly leading to a segmentation violation or other crash. Fixed.

See also

<https://www.prevanders.net/dwarfbug.xml> DW202205-001

libdwarf accepts `DW_AT_entry_pc` in a compilation unit DIE as a base address for location lists (though it will prefer `DW_AT_low_pc` if present, per DWARF3). A particular compiler emits `DW_AT_entry_pc` in a DWARF2 object, requiring this change.

libdwarf adds `dwarf_suppress_debuglink_crc()` so that library callers can suppress crc calculations. (useful to save the time of crc when building and testing the same thing(s) over and over; it just loses a little checking.) Additionally, *libdwarf* now properly handles objects with only GNU debug-id or only GNU debuglink.

dwarfdump adds `--show-args`, an option to print its arguments and version. Without that new option the version and arguments are not shown. The output of `-v` (`--version`) is a little more complete.

dwarfdump adds `--suppress-debuglink-crc`, an option to avoid crc calculations when rebuilding and rerunning tests depending on GNU `.note.gnu.buildid` or `.gnu_debuglink` sections. The help text and the *dwarfdump.1* man page are more specific documenting `--suppress-debuglink-crc` and `--no-follow-debuglink`

Changes 0.3.4 to 0.4.0

Removed the unused `Dwarf_Error` argument from `dwarf_return_empty_pubnames()` as the function can only return `DW_DLX_OK`. `dwarf_xu_header_free()` renamed to `dwarf_dealloc_xu_header()`. `dwarf_gdbindex_free()` renamed to `dwarf_dealloc_gdbindex()`. `dwarf_loc_head_c_dealloc` renamed to `dwarf_dealloc_loc_head_c()`.

`dwarf_get_location_op_value_d()` renamed to `dwarf_get_location_op_value_c()`, and 3 pointless arguments removed. The `dwarf_get_location_op_value_d` version and the three arguments were added for DWARF5 in `libdwarf-20210528` but the change was a mistake. Now reverted to the previous version.

The `.debug_names` section interfaces have changed. Added `dwarf_dnames_offsets()` to provide details of facts useful in problems reading the section. `dwarf_dnames_name()` now does work and the interface was changed to make it easier to use.

Changes 0.3.3 to 0.3.4

Replaced the groff -mm based `libdwarf.pdf` with a `libdwarf.pdf` generated by doxygen and latex.

Added support for the meson build system.

Updated an include in `libdwarfp` source files. Improved doxygen documentation of *libdwarf*. Now 'make check -j8' and the like works correctly. Fixed a bug where reading a PE (Windows) object could fail for certain section virtual size values. Added initializers to two uninitialized local variables in `dwarfdump` source so a compiler warning cannot not kill a `--enable-wall` build.

Added `src/bin/dwarfexample/showsectiongroups.c` so it is easy to see what groups are present in an object without all the other `dwarfdump` output.

Changes 20210528 to 0.3.3 (28 January 2022)

There were major revisions in going from date versioning to Semantic Versioning. Many functions were deleted and various functions changed their list of arguments. Many many filenames changed. Include lists were simplified. Far too much changed to list here.

Chapter 2

JIT and special case DWARF

html 2

2.1 Reading DWARF not in an object file

If the DWARF you work with is in standard object files (Elf, PE, MacOS) then you can ignore this section entirely. All that this section describes is used, but it's already done for you in functions in the library:

See also

[dwarf_init_path](#) [dwarf_init_path_dl](#)
[dwarf_init_b](#) and
[dwarf_finish](#) .

This section describes how to use calls

See also

[dwarf_object_init_b](#)
[dwarf_object_finish](#) .

These functions are useful if someone is doing just-in-time compilation, and someone working on the code wants to debug this on-the-fly code in a situation where nothing can be written to disc, but DWARF can be constructed in memory.

For a simple example of this with DWARF in local arrays

See also

[Demonstrating reading DWARF without a file.](#)

But the *libdwarf* feature can be useful in a variety of circumstances.

For example, the DWARF data were kept in simple files of bytes on the internet. Or on the local net. Or if files can be written locally each section could be kept in a simple stream of bytes in the local file system.

Another example is a non-standard file system, or file format, with the intent of obfuscating the file or the DWARF.

For this to work the code generator must generate standard DWARF.

Overall the idea is a simple one: You write a small handful of functions and supply function pointers and code implementing the functions. These are part of your application or library, not part of *libdwarf*. Your code accesses the data in whatever way applies and you write code that provides the interfaces so standard *libdwarf* can access your DWARF content.

You set up a little bit of data with that code (described below) and then you have essentially written the dwarf_↵ init_path equivalent and you can access compilation units, line tables etc and the standard *libdwarf* function calls simply work.

Data you need to create involves the following types. What follows describes how to fill them in and how to make them work for you.

```
typedef struct Dwarf_Obj_Access_Interface_a_s
    Dwarf_Obj_Access_Interface_a;
struct Dwarf_Obj_Access_Interface_a_s {
    void                *ai_object;
    const Dwarf_Obj_Access_Methods_a *ai_methods;
};

typedef struct Dwarf_Obj_Access_Methods_a_s
    Dwarf_Obj_Access_Methods_a
struct Dwarf_Obj_Access_Methods_a_s {
    int                (*om_get_section_info)(void* obj,
        Dwarf_Half      section_index,
        Dwarf_Obj_Access_Section_a* return_section,
        int              * error);
    Dwarf_Small        (*om_get_byte_order)(void* obj);
    Dwarf_Small        (*om_get_length_size)(void* obj);
    Dwarf_Small        (*om_get_pointer_size)(void* obj);
    Dwarf_Unsigned     (*om_get_filesize)(void* obj);
    Dwarf_Unsigned     (*om_get_section_count)(void* obj);
    int                (*om_load_section)(void* obj,
        Dwarf_Half      section_index,
        Dwarf_Small**   return_data,
        int              * error);
    int                (*om_relocate_a_section)(void* obj,
        Dwarf_Half      section_index,
        Dwarf_Debug      dbg,
        int              *error);
};

typedef struct Dwarf_Obj_Access_Section_a_s
    Dwarf_Obj_Access_Section_a
struct Dwarf_Obj_Access_Section_a_s {
    const char*        as_name;
    Dwarf_Unsigned     as_type;
    Dwarf_Unsigned     as_flags;
    Dwarf_Addr         as_addr;
    Dwarf_Unsigned     as_offset;
    Dwarf_Unsigned     as_size;
    Dwarf_Unsigned     as_link;
    Dwarf_Unsigned     as_info;
    Dwarf_Unsigned     as_addralign;
    Dwarf_Unsigned     as_entrysize;
};
```

2.1.1 Describing the Interface

struct struct Dwarf_Obj_Access_Interface_a_s

Your code must create and fill in this struct's two pointer members. Libdwarf needs these to access your DWARF data. You pass a pointer to this filled-in struct to **dwarf_object_init_b**. When it is time to conclude all access to the created Dwarf_Debug call **dwarf_object_finish**. Any allocations you made in setting these things up you must then free after calling **dwarf_object_finish**.

ai_object

Allocate a local struct (*libdwarf* will not touch this struct and will not know anything of its contents). You will need one of these for each Dwarf_Debug you open. Put a pointer to this into **ai_object**. Then fill in all the data you need to access information you will pass back via the **ai_methods** functions. In the description of the methods functions described later here, this pointer is named **obj**.

ai_methods

Usually you allocate a static structure and fill it in with function pointers (to functions you write). Then put a pointer to the static structure into this field.

2.1.2 Describing A Section

Dwarf_Obj_Access_Section_a:

The set of fields here is a set that is sufficient to describe a single object section to *libdwarf*. Your implementation of a **om_get_section_info** must simply fill in a few fields (leaving most zero) for *libdwarf* for the section indexed. The fields here are standard Elf, and for most you can just fill in the value zero. For section index zero **as_name** should be set to an empty string (see below about section index numbers).

as_name: Here you set a section name via the pointer. The section names must be names as defined in the DWARF standard, so if such do not appear in your data you have to create the strings yourself.

as_type: Just fill in zero.

as_flags: Just fill in zero.

as_addr: Fill in the address, in local memory, where the bytes of the section are.

as_offset: Just fill in zero.

as_size: Fill in the size, in bytes, of the section you are telling *libdwarf* about.

as_link: Just fill in zero.

as_info: Just fill in zero.

as_addralign: Just fill in zero.

as_entrysize: Just fill in one.

2.1.3 Function Pointers

struct Dwarf_Obj_Access_Methods_a_s:

The functions *libdwarf* needs to access object data are declared here. Usually the struct is statically defined and the function pointers are set at compile time. You must implement these functions based on your knowledge of how the actual data is represented and where to get it.

Each has a first-parameter of **obj** which is a struct you define to hold data you need to implement this set of functions. You refer to it When *libdwarf* calls your set of functions (these described now) it passes the *ai_object* pointer you provided to these functions as **obj** parameter .

This is the final part of your work for *libdwarf*. In the source file with your code you will be allocating data, making a provision for an array (real or conceptual) for per-section data, and returning values *libdwarf* needs. Note that the section array should include an index zero with all zero field values. That means interesting fields start with index one. This special case of index zero Elf is required and matches the standard Elf object format.

Notice that the **error** argument, where applicable, is an `int*` . Error codes passed back are DW_DLE codes and **dwarf_errmsg_by_number** may be used (by your code) to get the standard error string for that error.

om_get_section_info

Get address, size, and name info about a section.

```
Parameters
obj          - Your data
section_index - Zero-based index.
return_section - Pointer to a structure in which
                section info will be placed. Caller must
                provide a valid pointer to a structure area.
                The structure's contents will be overwritten
                by the call to get_section_info.
error        - A pointer to an integer in which an error
                code may be stored.

Return
DW_DLV_OK      - Everything ok.
DW_DLV_ERROR   - Error occurred. Use 'error' to determine the
                @e libdwarf defined error.
DW_DLV_NO_ENTRY - No such section.
```

om_get_byte_order

This retrieves data you put into your **ai_object** struct that you filled out.

Get from your @b *ai_object* whether the object file represented by this *interface* is big-endian (DW_END_big) or little endian (DW_END_little).

```
Parameters
obj - Your data

Return
Endianness of object, DW_END_big or DW_END_little.
```

om_get_length_size

This retrieves data you put into your **ai_object** struct that you filled out.

Get the size of a length field in the underlying object file.
@e *libdwarf* currently supports * 4 and 8 byte sizes, but may support larger in the future.
Perhaps the *return* type should be an enumeration?

```
Parameters
obj - Your data

Return
Size of length. Cannot fail.
```

om_get_pointer_size

This retrieves data you put into your **ai_object** struct that you filled out.

Get the size of a pointer field in the underlying object file.

@e libdwarf currently supports 4 and 8 byte sizes.
Perhaps the `return` type should be an enumeration?

Return
Size of pointer. Cannot fail. */

om_get_filesize

This retrieves data you put into your `ai_object` struct that you filled out.

Parameters
obj - Your data

Return
Must `return` a value at least as large as any section @e libdwarf might read. Returns a value that is a sanity check on offsets @e libdwarf reads `for this` DWARF set. It need not be a tight bound.

om_get_section_count

This retrieves data you put into your `ai_object` struct that you filled out.

Get the number of sections in the `object` file, including the index zero section with no content.

Parameters
obj - Your data

Return
Number of sections.

om_load_section

This retrieves data you put into your `ai_object` struct that you filled out.

Get a pointer to an array of bytes that are the section content.

Get a pointer to an array of bytes that represent the section.

Parameters
obj - Your data
section_index - Zero-based section index.
return_data - Place the address of `this` section content into `*return_data`.
error - Pointer to an integer `for` returning libdwarf-defined error numbers.

Return
DW_DLV_OK - No error.
DW_DLV_ERROR - Error. Use 'error' to indicate a libdwarf-defined error number.
DW_DLV_NO_ENTRY - No such section. */

om_relocate_a_section

Leave `this` pointer NULL.
If relocations are required it is probably simpler `for` you `do` to them yourself in your implementation of @b `om_load_section`.
Any relocations `this` function pointer is to use must be in standard Elf relocation (32 or 64 bit) form and must be in an appropriately named Elf relocation section.

Parameters
obj - Your data
section_index - Zero-based index of the section to be relocated.
error - Pointer to an integer `for` returning libdwarf-defined error numbers.

Return
DW_DLV_OK - No error.
DW_DLV_ERROR - Error. Use 'error' to indicate a libdwarf-defined error number.
DW_DLV_NO_ENTRY - No such section.

Chapter 3

dwarf.h

[dwarf.h](#) contains all the identifiers such as `DW_TAG_compile_unit` etc from the various versions of the DWARF Standard beginning with DWARF2 and containing all later Dwarf Standard identifiers.

In addition, it contains all user-defined identifiers that we have been able to find.

All identifiers here are C defines with the prefix `"DW_"`.

Chapter 4

libdwarf.h

[libdwarf.h](#) contains all the type declarations and function declarations needed to use the library. It is essential that coders include [dwarf.h](#) before including [libdwarf.h](#).

All identifiers here in the public namespace begin with DW_ or Dwarf_ or dwarf_ . All function argument names declared here begin with dw_ .

Chapter 5

checkexamples.c

[checkexamples.c](#) contains what user code should be. Hence the code typed in [checkexamples.c](#) is PUBLIC DOMAIN and may be copied, used, and altered without any restrictions.

[checkexamples.c](#) need not be compiled routinely nor should it ever be executed.

To verify syntactic correctness compile in the libdwarf-code/doc directory with:

```
cc -c -Wall -O0 -Wpointer-arith \
-Wdeclaration-after-statement \
-Wextra -Wcomment -Wformat -Wpedantic -Wuninitialized \
-Wno-long-long -Wshadow -Wbad-function-cast \
-Wmissing-parameter-type -Wnested-externs \
-I../src/lib/libdwarf checkexamples.c
```


Chapter 6

Topic Index

6.1 Topics

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Chapter 7

Data Structure Index

7.1 Data Structures

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File Index

8.1 File List

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Chapter 9

Topic Documentation

9.1 Basic Library Datatypes Group

Typedefs

- typedef unsigned long long [Dwarf_Unsigned](#)
- typedef signed long long [Dwarf_Signed](#)
- typedef unsigned long long [Dwarf_Off](#)
- typedef unsigned long long [Dwarf_Addr](#)
- typedef int [Dwarf_Bool](#)
- typedef unsigned short [Dwarf_Half](#)
- typedef unsigned char [Dwarf_Small](#)
- typedef void * [Dwarf_Ptr](#)

9.1.1 Detailed Description

9.1.2 Typedef Documentation

9.1.2.1 Dwarf_Unsigned

[Dwarf_Unsigned](#)

The basic unsigned data type. Intended to be an unsigned 64bit value.

9.1.2.2 Dwarf_Signed

[Dwarf_Signed](#)

The basic signed data type. Intended to be a signed 64bit value.

9.1.2.3 Dwarf_Off

[Dwarf_Off](#)

Used for offsets. It should be same size as Dwarf_Unsigned.

9.1.2.4 Dwarf_Addr

`Dwarf_Addr`

Used when a data item is a an address represented in DWARF. 64 bits. Must be as large as the largest object address size.

9.1.2.5 Dwarf_Bool

`Dwarf_Bool`

A TRUE(non-zero)/FALSE(zero) data item.

9.1.2.6 Dwarf_Half

`Dwarf_Half`

Many libdwarf values (attribute codes, for example) are defined by the standard to be 16 bits, and this datatype reflects that (the type must be at least 16 bits wide).

9.1.2.7 Dwarf_Small

`Dwarf_Small`

Used for small unsigned integers and used as Dwarf_Small* for pointers and it supports pointer addition and subtraction conveniently.

9.1.2.8 Dwarf_Ptr

`Dwarf_Ptr`

A generic pointer type. It uses void * so it cannot be added-to or subtracted-from.

9.2 Enumerators with various purposes

Enumerations

- enum `Dwarf_Ranges_Entry_Type` { `DW_RANGES_ENTRY` , `DW_RANGES_ADDRESS_SELECTION` , `DW_RANGES_END` }
- enum `Dwarf_Form_Class` {
`DW_FORM_CLASS_UNKNOWN` = 0 , `DW_FORM_CLASS_ADDRESS` = 1 , `DW_FORM_CLASS_BLOCK` = 2 , `DW_FORM_CLASS_CONSTANT` =3 ,
`DW_FORM_CLASS_EXPRLOC` = 4 , `DW_FORM_CLASS_FLAG` = 5 , `DW_FORM_CLASS_LINEPTR` = 6 ,
`DW_FORM_CLASS_LOCLISTPTR` =7 ,
`DW_FORM_CLASS_MACPTR` = 8 , `DW_FORM_CLASS_RANGELISTPTR` =9 , `DW_FORM_CLASS_REFERENCE` =10 , `DW_FORM_CLASS_STRING` = 11 ,
`DW_FORM_CLASS_FRAMEPTR` = 12 , `DW_FORM_CLASS_MACROPTR` = 13 , `DW_FORM_CLASS_ADDRPTR` = 14 , `DW_FORM_CLASS_LOCLIST` = 15 ,
`DW_FORM_CLASS_LOCLISTSPTR` =16 , `DW_FORM_CLASS_RNGLIST` =17 , `DW_FORM_CLASS_RNGLISTSPTR` =18 , `DW_FORM_CLASS_STROFFSETSPTR` =19 }

9.2.1 Detailed Description

9.2.2 Enumeration Type Documentation

9.2.2.1 Dwarf_Ranges_Entry_Type

```
enum Dwarf_Ranges_Entry_Type
```

The `dwr_addr1/addr2` data is either pair of offsets of a base pc address (`DW_RANGES_ENTRY`) or a base pc address (`dwr_addr2` in `DW_RANGES_ADDRESS_SELECTION`) or both are zero (end of list, `DW_RANGES_END`) or both non-zero but identical (means an empty range, `DW_RANGES_ENTRY`). These are for use with DWARF 2,3,4.

`DW_RANGES_ADDRESS_SELECTION` should have been spelled `DW_RANGES_BASE_ADDRESS`. but it is not worth changing as it is widely used.

The `DW_RANGES_ENTRY` values are raw pc offset data recorded in the section, not addresses.

See also

[Example getting .debug_ranges data](#)

`Dwarf_Ranges*` apply to DWARF2,3, and 4. Not to DWARF5 (the data is different and in a new DWARF5 section).

9.2.2.2 Dwarf_Form_Class

```
enum Dwarf_Form_Class
```

The dwarf specification separates FORMs into different classes. To do the separation properly requires 4 pieces of data as of DWARF4 (thus the function arguments listed here). The DWARF4 specification class definition suffices to describe all DWARF versions. See section 7.5.4, Attribute Encodings. A return of `DW_FORM_CLASS_UNKNOWN` means the library could not properly figure out what form-class it is.

`DW_FORM_CLASS_FRAMEPTR` is MIPS/IRIX only, and refers to the `DW_AT_MIPS_fde` attribute (a reference to the `.debug_frame` section).

DWARF5: `DW_FORM_CLASS_LOCLISTSPTR` is like `DW_FORM_CLASS_LOCLIST` except that `LOCLISTSPTR` is always a section offset, never an index, and `LOCLISTSPTR` is only referenced by `DW_AT_loclists_base`. Note `DW_FORM_CLASS_LOCLISTSPTR` spelling to distinguish from `DW_FORM_CLASS_LOCLISTPTR`.

DWARF5: `DW_FORM_CLASS_RNGLISTSPTR` is like `DW_FORM_CLASS_RNGLIST` except that `RNGLISTSPTR` is always a section offset, never an index. `DW_FORM_CLASS_RNGLISTSPTR` is only referenced by `DW_AT_rnglists_base`.

9.3 Defined and Opaque Structs

Data Structures

- struct [Dwarf_Form_Data16_s](#)
- struct [Dwarf_Sig8_s](#)
- struct [Dwarf_Block_s](#)
- struct [Dwarf_Printf_Callback_Info_s](#)
- struct [Dwarf_Cmdline_Options_s](#)
- struct [Dwarf_Ranges_s](#)
- struct [Dwarf_Regtable_Entry3_s](#)
- struct [Dwarf_Regtable3_s](#)
- struct [Dwarf_Macro_Details_s](#)
- struct [Dwarf_Obj_Access_Section_a_s](#)
- struct [Dwarf_Obj_Access_Methods_a_s](#)
- struct [Dwarf_Obj_Access_Interface_a_s](#)
- struct [Dwarf_Debug_Fission_Per_CU_s](#)

Typedefs

- typedef struct [Dwarf_Form_Data16_s](#) Dwarf_Form_Data16
- typedef struct [Dwarf_Sig8_s](#) Dwarf_Sig8
- typedef struct [Dwarf_Block_s](#) Dwarf_Block
- typedef struct Dwarf_Locdesc_c_s * Dwarf_Locdesc_c
- typedef struct Dwarf_Loc_Head_c_s * Dwarf_Loc_Head_c
- typedef struct Dwarf_Gnu_Index_Head_s * Dwarf_Gnu_Index_Head
- typedef struct Dwarf_Dsc_Head_s * Dwarf_Dsc_Head
- typedef struct Dwarf_Frame_Instr_Head_s * Dwarf_Frame_Instr_Head
- typedef void(* [dwarf_printf_callback_function_type](#)) (void *dw_user_pointer, const char *dw_linecontent)
- typedef struct [Dwarf_Cmdline_Options_s](#) Dwarf_Cmdline_Options
- typedef struct Dwarf_Str_Offsets_Table_s * Dwarf_Str_Offsets_Table
- typedef struct [Dwarf_Ranges_s](#) Dwarf_Ranges
- typedef struct [Dwarf_Regtable_Entry3_s](#) Dwarf_Regtable_Entry3
- typedef struct [Dwarf_Regtable3_s](#) Dwarf_Regtable3
- typedef struct Dwarf_Error_s * Dwarf_Error
- typedef struct Dwarf_Debug_s * Dwarf_Debug
- typedef struct Dwarf_Section_s * Dwarf_Section
- typedef struct Dwarf_Die_s * Dwarf_Die
- typedef struct Dwarf_Debug_Addr_Table_s * Dwarf_Debug_Addr_Table
- typedef struct Dwarf_Line_s * Dwarf_Line
- typedef struct Dwarf_Global_s * Dwarf_Global
- typedef struct Dwarf_Type_s * Dwarf_Type
- typedef struct Dwarf_Func_s * Dwarf_Func
- typedef struct Dwarf_Var_s * Dwarf_Var
- typedef struct Dwarf_Weak_s * Dwarf_Weak
- typedef struct Dwarf_Attribute_s * Dwarf_Attribute
- typedef struct Dwarf_Abbrev_s * Dwarf_Abbrev
- typedef struct Dwarf_Fde_s * Dwarf_Fde
- typedef struct Dwarf_Cie_s * Dwarf_Cie
- typedef struct Dwarf_Arange_s * Dwarf_Arange
- typedef struct Dwarf_Gdbindex_s * Dwarf_Gdbindex
- typedef struct Dwarf_Xu_Index_Header_s * Dwarf_Xu_Index_Header
- typedef struct Dwarf_Line_Context_s * Dwarf_Line_Context

- typedef struct Dwarf_Macro_Context_s * [Dwarf_Macro_Context](#)
- typedef struct Dwarf_Dnames_Head_s * [Dwarf_Dnames_Head](#)
- typedef void(* [Dwarf_Handler](#)) ([Dwarf_Error](#) dw_error, [Dwarf_Ptr](#) dw_errarg)
- typedef struct [Dwarf_Macro_Details_s](#) [Dwarf_Macro_Details](#)
- typedef struct [Dwarf_Debug_Fission_Per_CU_s](#) [Dwarf_Debug_Fission_Per_CU](#)
- typedef struct [Dwarf_Obj_Access_Interface_a_s](#) [Dwarf_Obj_Access_Interface_a](#)
- typedef struct [Dwarf_Obj_Access_Methods_a_s](#) [Dwarf_Obj_Access_Methods_a](#)
- typedef struct [Dwarf_Obj_Access_Section_a_s](#) [Dwarf_Obj_Access_Section_a](#)
- typedef struct Dwarf_Rnglists_Head_s * [Dwarf_Rnglists_Head](#)

Enumerations

- enum [Dwarf_Sec_Alloc_Pref](#) { [Dwarf_Alloc_None](#) =0 , [Dwarf_Alloc_Malloc](#) =1 , [Dwarf_Alloc_Mmap](#) =2 }

9.3.1 Detailed Description

9.3.2 Typedef Documentation

9.3.2.1 Dwarf_Form_Data16

[Dwarf_Form_Data16](#)

a container for a DW_FORM_data16 data item. We have no integer types suitable so this special struct is used instead. It is up to consumers/producers to deal with the contents.

9.3.2.2 Dwarf_Sig8

[Dwarf_Sig8](#)

Used for signatures where ever they appear. It is not a string, it is 8 bytes of a signature one would use to find a type unit.

See also

[dwarf_formsig8](#)

9.3.2.3 Dwarf_Block

[Dwarf_Block](#)

Used to hold uninterpreted blocks of data. bl_data refers to on an uninterpreted block of data Used with certain location information functions, a frame expression function, expanded frame instructions, and DW_FORM_block functions.

See also

[dwarf_formblock](#)

[Documenting Form_Block](#)

9.3.2.4 Dwarf_Locdesc_c

[Dwarf_Locdesc_c](#)

Provides access to Dwarf_Locdesc_c, a single location description

9.3.2.5 Dwarf_Loc_Head_c

[Dwarf_Loc_Head_c](#)

provides access to any sort of location description for DWARF2,3,4, or 5.

9.3.2.6 Dwarf_Gnu_Index_Head

[Dwarf_Gnu_Index_Head](#)

A pointer to a struct Dwarf_Gnu_Index_Head_s for sections .debug_gnu_pubtypes or .debug_gnu_pubnames. These are not standard DWARF, and can appear with gcc -gdwarf-5

9.3.2.7 Dwarf_Dsc_Head

[Dwarf_Dsc_Head](#)

Access to DW_AT_discr_list array of discriminant values.

9.3.2.8 Dwarf_Frame_Instr_Head

[Dwarf_Frame_Instr_Head](#)

The basis for access to DWARF frame instructions (FDE or CIE) in full detail.

9.3.2.9 dwarf_printf_callback_function_type

`dwarf_printf_callback_function_type`

Used as a function pointer to a user-written callback function. This provides a detailed content of line table data.

The default contents of the callback data are all zero bytes. So no callbacks involving this data will be done.

See [dwarf_register_printf_callback\(\)](#)

Parameters

<i>dw_user_pointer</i>	Passes your callback a pointer to space you allocated as an identifier of some kind in calling dwarf_register_printf_callback..
<i>dw_linecontent</i>	Passes your callback null-terminated string with one line of detailed line table content.

9.3.2.10 Dwarf_Str_Offsets_Table

Dwarf_Str_Offsets_Table

Provides an access to the .debug_str_offsets section independently of other DWARF sections. Mainly of use in examining the .debug_str_offsets section content for problems.

9.3.2.11 Dwarf_Ranges

Dwarf_Ranges

Details of of non-contiguous address ranges of DIEs for DWARF2, DWARF3, and DWARF4. Sufficient for older dwarf.

dwr_addr1 and dwr_addr2 in the struct are offsets from a base address in the CU involved. To calculate actual range pc addresses see the example:

See also

[Example getting .debug_ranges data](#)

9.3.2.12 Dwarf_Regtable_Entry3

Dwarf_Regtable_Entry3

For each index i (naming a hardware register with dwarf number i) the following is true and defines the value of that register:

```
If dw_regnum is Register DW_FRAME_UNDEFINED_VAL
    it is not DWARF register number but
    a place holder indicating the register
    has no defined value.
If dw_regnum is Register DW_FRAME_SAME_VAL
    it is not DWARF register number but
    a place holder indicating the register has the same
    value in the previous frame.
```

```
DW_FRAME_UNDEFINED_VAL, DW_FRAME_SAME_VAL and
DW_FRAME_CFA_COL are only present at libdwarf runtime.
Never on disk.
DW_FRAME_* Values present on disk are in dwarf.h
Because DW_FRAME_SAME_VAL and DW_FRAME_UNDEFINED_VAL
and DW_FRAME_CFA_COL are definable at runtime
consider the names symbolic in this comment,
not absolute.
```

```
Otherwise: the register number is a DWARF register number
(see ABI documents for how this translates to hardware/
software register numbers in the machine hardware)
and the following applies:
```

```
In a cfa-defining entry (rt3_cfa_rule) the regnum is the
CFA 'register number'. Which is some 'normal' register,
not DW_FRAME_CFA_COL, nor DW_FRAME_SAME_VAL, nor
DW_FRAME_UNDEFINED_VAL.
```

```
If dw_value_type == DW_EXPR_OFFSET (the only
possible case for dwarf2):
    If dw_offset_relevant is non-zero, then
        the value is stored at at the address
```

```

    CFA+N where N (dw_offset) is a signed offset,
    (not unsigned) and must be cast to Dwarf_Signed
    before use.
    dw_regnum is the cfa register rule which means
    one ignores dw_regnum and uses the CFA appropriately.
    Rule: Offset(N)
    If dw_offset_relevant is zero, then the
    value of the register
    is the value of (DWARF) register number dw_regnum.
    Rule: register(R)
    If dw_value_type == DW_EXPR_VAL_OFFSET
    the value of this register is CFA +N where
    N (dw_offset) is a signed offset (not unsigned)
    and must be cast to Dwarf_Signed before use.
    dw_regnum is the cfa register rule which means
    one ignores dw_regnum and uses the CFA appropriately.
    Rule: val_offset(N)
    If dw_value_type == DW_EXPR_EXPRESSION
    The value of the register is the value at the address
    computed by evaluating the DWARF expression E.
    Rule: expression(E)
    The expression E byte stream is pointed to by
    block.bl_data.
    The expression length in bytes is given by
    block.bl_len.
    If dw_value_type == DW_EXPR_VAL_EXPRESSION
    The value of the register is the value
    computed by evaluating the DWARF expression E.
    Rule: val_expression(E)
    The expression E byte stream is pointed to
    by block.bl_data.
    The expression length in bytes is given by
    block.bl_len.
    Other values of dw_value_type are an error.

```

Note that this definition can only deal correctly with register numbers that fit in a 16 bit unsigned value. Removing this restriction would force an incompatible change to several functions in the libdwarf API.

9.3.2.13 Dwarf_Regtable3

[Dwarf_Regtable3](#)

This struct provides a way for applications to select the number of frame registers and to select names for them.

rt3_rules and rt3_reg_table_size must be filled in before calling libdwarf. Filled in with a pointer to an array (pointer and array set up by the calling application) of rt3_reg_table_size [Dwarf_Regtable_Entry3_s](#) structs. libdwarf does not allocate or deallocate space for the rules, you must do so. libdwarf will initialize the contents rules array, you do not need to do so (though if you choose to initialize the array somehow that is ok: libdwarf will overwrite your initializations with its own).

Note that this definition can only deal correctly with register table size that fits in a 16 bit unsigned value.

9.3.2.14 Dwarf_Error

```

Dwarf_Error
Dwarf_Error error = 0;
dres = dwarf_siblingof_c(in_die,&return_sib, &error);

```

&error is used in calls to return error details when the call returns DW_DLV_ERROR.

9.3.2.15 Dwarf_Debug

`Dwarf_Debug`

An open `Dwarf_Debug` points to data that libdwarf maintains to support libdwarf calls.

9.3.2.16 Dwarf_Section

`Dwarf_Section`

An open `Dwarf_Section` points to data that libdwarf maintains to record object section data.

9.3.2.17 Dwarf_Die

`Dwarf_Die`

Used to reference a DWARF Debugging Information Entry.

9.3.2.18 Dwarf_Debug_Adr_Table

`Dwarf_Debug_Adr_Table`

Used to reference a table in section `.debug_addr`

9.3.2.19 Dwarf_Line

`Dwarf_Line`

Used to reference a line reference from the `.debug_line` section.

9.3.2.20 Dwarf_Global

`Dwarf_Global`

Used to reference a reference to an entry in the `.debug_pubnames` section.

9.3.2.21 Dwarf_Type

`Dwarf_Type`

Before release 0.6.0 used to reference a reference to an entry in the `.debug_pubtypes` section (as well as the SGI-only extension `.debug_types`). However, we use `Dwarf_Global` instead now.

9.3.2.22 Dwarf_Func

`Dwarf_Func`

An SGI extension type which is no longer used at all. As of release 0.6.0 use Dwarf_Global instead.

9.3.2.23 Dwarf_Var

`Dwarf_Var`

An SGI extension type which is no longer used at all. As of release 0.6.0 use Dwarf_Global instead.

9.3.2.24 Dwarf_Weak

`Dwarf_Weak`

An SGI extension type which is no longer used at all. As of release 0.6.0 use Dwarf_Global instead.

9.3.2.25 Dwarf_Attribute

`Dwarf_Attribute`

Used to reference a Dwarf_Die attribute

9.3.2.26 Dwarf_Abbrev

`Dwarf_Abbrev`

Used to reference a Dwarf_Abbrev. Usually Dwarf_Abbrev are fully handled inside the library so one rarely needs to declare the type.

9.3.2.27 Dwarf_Fde

`Dwarf_Fde`

Used to reference .debug_frame or .eh_frame FDE.

9.3.2.28 Dwarf_Cie

`Dwarf_Cie`

Used to reference .debug_frame or .eh_frame CIE.

9.3.2.29 Dwarf_Arange

`Dwarf_Arange`

Used to reference a code address range in a section such as `.debug_info`.

9.3.2.30 Dwarf_Gdbindex

`Dwarf_Gdbindex`

Used to reference `.gdb_index` section data which is a fast-access section by and for gdb.

9.3.2.31 Dwarf_Xu_Index_Header

`Dwarf_Xu_Index_Header`

Used to reference `.debug_cu_index` or `.debug_tu_index` sections in a split-dwarf package file.

9.3.2.32 Dwarf_Line_Context

`Dwarf_Line_Context`

Used as the general reference line data (`.debug_line`).

9.3.2.33 Dwarf_Macro_Context

`Dwarf_Macro_Context`

Used as the general reference to DWARF5 `.debug_macro` data.

9.3.2.34 Dwarf_Dnames_Head

`Dwarf_Dnames_Head`

Used as the general reference to the DWARF5 `.debug_names` section.

9.3.2.35 Dwarf_Handler

`Dwarf_Handler`

Used in rare cases (mainly tiny programs) with `dwarf_init_path()` etc initialization calls to provide a pointer to a generic-error-handler function you write.

9.3.2.36 Dwarf_Macro_Details

[Dwarf_Macro_Details](#)

A handy short name for a Dwarf_Macro_Details_S struct.

9.3.2.37 Dwarf_Debug_Fission_Per_CU

[Dwarf_Debug_Fission_Per_CU](#)

A handy short name for a [Dwarf_Debug_Fission_Per_CU_s](#) struct.

9.3.2.38 Dwarf_Obj_Access_Interface_a

[Dwarf_Obj_Access_Interface_a](#)

Used for access to and setting up special data allowing access to DWARF even with no object files present

9.3.2.39 Dwarf_Obj_Access_Methods_a

[Dwarf_Obj_Access_Methods_a](#)

Used for access to and setting up special data allowing access to DWARF even with no object files present

9.3.2.40 Dwarf_Obj_Access_Section_a

[Dwarf_Obj_Access_Section_a](#)

Used for access to and setting up special data allowing access to DWARF even with no object files present. The fields match up with Elf section headers, but for non-Elf many of the fields can be set to zero.

9.3.2.41 Dwarf_Rnglists_Head

[Dwarf_Rnglists_Head](#)

Used for access to a set of DWARF5 debug_rnglists entries.

9.3.3 Enumeration Type Documentation

9.3.3.1 Dwarf_Sec_Alloc_Pref

enum [Dwarf_Sec_Alloc_Pref](#)

Since

{0.12.0}

This is part of the allowance of mmap for loading sections of an object file.

The option of using mmap() only applies to Elf object files in this release.

See also

[dwarf_set_load_preference\(\)](#)

9.4 Default stack frame macros

Macros

- `#define DW_DLX_NO_EH_OFFSET (-1LL)`
- `#define DW_DLX_EH_OFFSET_UNAVAILABLE (-2LL)`
- `#define DW_CIE_AUGMENTER_STRING_V0 "z"`
- `#define DW_REG_TABLE_SIZE DW_FRAME_LAST_REG_NUM`
- `#define DW_FRAME_REG_INITIAL_VALUE DW_FRAME_SAME_VAL`
- `#define DW_EXPR_OFFSET 0 /* offset is from CFA reg */`
- `#define DW_EXPR_VAL_OFFSET 1`
- `#define DW_EXPR_EXPRESSION 2`
- `#define DW_EXPR_VAL_EXPRESSION 3`

9.4.1 Detailed Description

9.5 DW_DLA alloc/dealloc typename&number

Macros

- `#define DW_DLA_STRING 0x01 /* char* */`
- `#define DW_DLA_LOC 0x02 /* Dwarf_Loc */`
- `#define DW_DLA_LOCDISC 0x03 /* Dwarf_Locdesc */`
- `#define DW_DLA_ELLIST 0x04 /* Dwarf_Ellist (not used) */`
- `#define DW_DLA_BOUNDS 0x05 /* Dwarf_Bounds (not used) */`
- `#define DW_DLA_BLOCK 0x06 /* Dwarf_Block */`
- `#define DW_DLA_DEBUG 0x07 /* Dwarf_Debug */`
- `#define DW_DLA_DIE 0x08 /* Dwarf_Die */`
- `#define DW_DLA_LINE 0x09 /* Dwarf_Line */`
- `#define DW_DLA_ATTR 0x0a /* Dwarf_Attribute */`
- `#define DW_DLA_TYPE 0x0b /* Dwarf_Type (not used) */`
- `#define DW_DLA_SUBSCR 0x0c /* Dwarf_Subscr (not used) */`
- `#define DW_DLA_GLOBAL 0x0d /* Dwarf_Global */`
- `#define DW_DLA_ERROR 0x0e /* Dwarf_Error */`
- `#define DW_DLA_LIST 0x0f /* a list */`
- `#define DW_DLA_LINEBUF 0x10 /* Dwarf_Line* (not used) */`
- `#define DW_DLA_ARANGE 0x11 /* Dwarf_Arange */`
- `#define DW_DLA_ABBREV 0x12 /* Dwarf_Abbrev */`
- `#define DW_DLA_FRAME_INSTR_HEAD 0x13 /* Dwarf_Frame_Instr_Head */`
- `#define DW_DLA_CIE 0x14 /* Dwarf_Cie */`
- `#define DW_DLA_FDE 0x15 /* Dwarf_Fde */`
- `#define DW_DLA_LOC_BLOCK 0x16 /* Dwarf_Loc */`
- `#define DW_DLA_FRAME_OP 0x17 /* Dwarf_Frame_Op (not used) */`
- `#define DW_DLA_FUNC 0x18 /* Dwarf_Func */`
- `#define DW_DLA_UARRAY 0x19 /* Array of Dwarf_Off:Jan2023 */`
- `#define DW_DLA_VAR 0x1a /* Dwarf_Var */`
- `#define DW_DLA_WEAK 0x1b /* Dwarf_Weak */`
- `#define DW_DLA_ADDR 0x1c /* Dwarf_Addr sized entries */`
- `#define DW_DLA_RANGES 0x1d /* Dwarf_Ranges */`
- `#define DW_DLA_GNU_INDEX_HEAD 0x35`
- `#define DW_DLA_RNGLISTS_HEAD 0x36 /* .debug_rnglists DW5 */`
- `#define DW_DLA_GDBINDEX 0x37 /* Dwarf_Gdbindex */`

- `#define DW_DLA_XU_INDEX 0x38 /* Dwarf_Xu_Index_Header */`
- `#define DW_DLA_LOC_BLOCK_C 0x39 /* Dwarf_Loc_c */`
- `#define DW_DLA_LOCDISC_C 0x3a /* Dwarf_Locdesc_c */`
- `#define DW_DLA_LOC_HEAD_C 0x3b /* Dwarf_Loc_Head_c */`
- `#define DW_DLA_MACRO_CONTEXT 0x3c /* Dwarf_Macro_Context */`
- `#define DW_DLA_DSC_HEAD 0x3e /* Dwarf_Dsc_Head */`
- `#define DW_DLA_DNAMES_HEAD 0x3f /* Dwarf_Dnames_Head */`
- `#define DW_DLA_STR_OFFSETS 0x40`
- `#define DW_DLA_DEBUG_ADDR 0x41`

9.5.1 Detailed Description

These identify the various allocate/dealloc types. The allocation happens within libdwf, and the deallocation is usually done by user code.

9.6 DW_DLE Dwarf_Error numbers

Macros

- `#define DW_DLE_NE 0 /* no error */`
- `#define DW_DLE_VMM 1 /* dwarf format/library version mismatch */`
- `#define DW_DLE_MAP 2 /* memory map failure */`
- `#define DW_DLE_LEE 3 /* libelf error */`
- `#define DW_DLE_NDS 4 /* no debug section */`
- `#define DW_DLE_NLS 5 /* no line section */`
- `#define DW_DLE_ID 6 /* invalid descriptor for query */`
- `#define DW_DLE_IOF 7 /* I/O failure */`
- `#define DW_DLE_MAF 8 /* memory allocation failure */`
- `#define DW_DLE_IA 9 /* invalid argument */`
- `#define DW_DLE_MDE 10 /* mangled debugging entry */`
- `#define DW_DLE_MLE 11 /* mangled line number entry */`
- `#define DW_DLE_FNO 12 /* file not open */`
- `#define DW_DLE_FNR 13 /* file not a regular file */`
- `#define DW_DLE_FWA 14 /* file open with wrong access */`
- `#define DW_DLE_NOB 15 /* not an object file */`
- `#define DW_DLE_MOF 16 /* mangled object file header */`
- `#define DW_DLE_EOLL 17 /* end of location list entries */`
- `#define DW_DLE_NOLL 18 /* no location list section */`
- `#define DW_DLE_BADOFF 19 /* Invalid offset */`
- `#define DW_DLE_EOS 20 /* end of section */`
- `#define DW_DLE_ATRUNC 21 /* abbreviations section appears truncated */`
- `#define DW_DLE_BADBITC 22 /* Address size passed to dwarf bad */`
- `#define DW_DLE_DBG_ALLOC 23`
- `#define DW_DLE_FSTAT_ERROR 24`
- `#define DW_DLE_FSTAT_MODE_ERROR 25`
- `#define DW_DLE_INIT_ACCESS_WRONG 26`
- `#define DW_DLE_ELF_BEGIN_ERROR 27`
- `#define DW_DLE_ELF_GETEHDR_ERROR 28`
- `#define DW_DLE_ELF_GETSHDR_ERROR 29`
- `#define DW_DLE_ELF_STRPTR_ERROR 30`
- `#define DW_DLE_DEBUG_INFO_DUPLICATE 31`

- #define DW_DLE_DEBUG_INFO_NULL 32
- #define DW_DLE_DEBUG_ABBREV_DUPLICATE 33
- #define DW_DLE_DEBUG_ABBREV_NULL 34
- #define DW_DLE_DEBUG_ARANGES_DUPLICATE 35
- #define DW_DLE_DEBUG_ARANGES_NULL 36
- #define DW_DLE_DEBUG_LINE_DUPLICATE 37
- #define DW_DLE_DEBUG_LINE_NULL 38
- #define DW_DLE_DEBUG_LOC_DUPLICATE 39
- #define DW_DLE_DEBUG_LOC_NULL 40
- #define DW_DLE_DEBUG_MACINFO_DUPLICATE 41
- #define DW_DLE_DEBUG_MACINFO_NULL 42
- #define DW_DLE_DEBUG_PUBNAMES_DUPLICATE 43
- #define DW_DLE_DEBUG_PUBNAMES_NULL 44
- #define DW_DLE_DEBUG_STR_DUPLICATE 45
- #define DW_DLE_DEBUG_STR_NULL 46
- #define DW_DLE_CU_LENGTH_ERROR 47
- #define DW_DLE_VERSION_STAMP_ERROR 48
- #define DW_DLE_ABBREV_OFFSET_ERROR 49
- #define DW_DLE_ADDRESS_SIZE_ERROR 50
- #define DW_DLE_DEBUG_INFO_PTR_NULL 51
- #define DW_DLE_DIE_NULL 52
- #define DW_DLE_STRING_OFFSET_BAD 53
- #define DW_DLE_DEBUG_LINE_LENGTH_BAD 54
- #define DW_DLE_LINE_PROLOG_LENGTH_BAD 55
- #define DW_DLE_LINE_NUM_OPERANDS_BAD 56
- #define DW_DLE_LINE_SET_ADDR_ERROR 57
- #define DW_DLE_LINE_EXT_OPCODE_BAD 58
- #define DW_DLE_DWARF_LINE_NULL 59
- #define DW_DLE_INCL_DIR_NUM_BAD 60
- #define DW_DLE_LINE_FILE_NUM_BAD 61
- #define DW_DLE_ALLOC_FAIL 62
- #define DW_DLE_NO_CALLBACK_FUNC 63
- #define DW_DLE_SECT_ALLOC 64
- #define DW_DLE_FILE_ENTRY_ALLOC 65
- #define DW_DLE_LINE_ALLOC 66
- #define DW_DLE_FPGM_ALLOC 67
- #define DW_DLE_INCDIR_ALLOC 68
- #define DW_DLE_STRING_ALLOC 69
- #define DW_DLE_CHUNK_ALLOC 70
- #define DW_DLE_BYTEOFF_ERR 71
- #define DW_DLE_CIE_ALLOC 72
- #define DW_DLE_FDE_ALLOC 73
- #define DW_DLE_REGNO_OVFL 74
- #define DW_DLE_CIE_OFFS_ALLOC 75
- #define DW_DLE_WRONG_ADDRESS 76
- #define DW_DLE_EXTRA_NEIGHBORS 77
- #define DW_DLE_WRONG_TAG 78
- #define DW_DLE_DIE_ALLOC 79
- #define DW_DLE_PARENT_EXISTS 80
- #define DW_DLE_DBG_NULL 81
- #define DW_DLE_DEBUGLINE_ERROR 82
- #define DW_DLE_DEBUGFRAME_ERROR 83
- #define DW_DLE_DEBUGINFO_ERROR 84
- #define DW_DLE_ATTR_ALLOC 85
- #define DW_DLE_ABBREV_ALLOC 86

- `#define DW_DLE_OFFSET_UFLW` 87
- `#define DW_DLE_ELF_SECT_ERR` 88
- `#define DW_DLE_DEBUG_FRAME_LENGTH_BAD` 89
- `#define DW_DLE_FRAME_VERSION_BAD` 90
- `#define DW_DLE_CIE_RET_ADDR_REG_ERROR` 91
- `#define DW_DLE_FDE_NULL` 92
- `#define DW_DLE_FDE_DBG_NULL` 93
- `#define DW_DLE_CIE_NULL` 94
- `#define DW_DLE_CIE_DBG_NULL` 95
- `#define DW_DLE_FRAME_TABLE_COL_BAD` 96
- `#define DW_DLE_PC_NOT_IN_FDE_RANGE` 97
- `#define DW_DLE_CIE_INSTR_EXEC_ERROR` 98
- `#define DW_DLE_FRAME_INSTR_EXEC_ERROR` 99
- `#define DW_DLE_FDE_PTR_NULL` 100
- `#define DW_DLE_RET_OP_LIST_NULL` 101
- `#define DW_DLE_LINE_CONTEXT_NULL` 102
- `#define DW_DLE_DBG_NO_CU_CONTEXT` 103
- `#define DW_DLE_DIE_NO_CU_CONTEXT` 104
- `#define DW_DLE_FIRST_DIE_NOT_CU` 105
- `#define DW_DLE_NEXT_DIE_PTR_NULL` 106
- `#define DW_DLE_DEBUG_FRAME_DUPLICATE` 107
- `#define DW_DLE_DEBUG_FRAME_NULL` 108
- `#define DW_DLE_ABBREV_DECODE_ERROR` 109
- `#define DW_DLE_DWARF_ABBREV_NULL` 110
- `#define DW_DLE_ATTR_NULL` 111
- `#define DW_DLE_DIE_BAD` 112
- `#define DW_DLE_DIE_ABBREV_BAD` 113
- `#define DW_DLE_ATTR_FORM_BAD` 114
- `#define DW_DLE_ATTR_NO_CU_CONTEXT` 115
- `#define DW_DLE_ATTR_FORM_SIZE_BAD` 116
- `#define DW_DLE_ATTR_DBG_NULL` 117
- `#define DW_DLE_BAD_REF_FORM` 118
- `#define DW_DLE_ATTR_FORM_OFFSET_BAD` 119
- `#define DW_DLE_LINE_OFFSET_BAD` 120
- `#define DW_DLE_DEBUG_STR_OFFSET_BAD` 121
- `#define DW_DLE_STRING_PTR_NULL` 122
- `#define DW_DLE_PUBNAMES_VERSION_ERROR` 123
- `#define DW_DLE_PUBNAMES_LENGTH_BAD` 124
- `#define DW_DLE_GLOBAL_NULL` 125
- `#define DW_DLE_GLOBAL_CONTEXT_NULL` 126
- `#define DW_DLE_DIR_INDEX_BAD` 127
- `#define DW_DLE_LOC_EXPR_BAD` 128
- `#define DW_DLE_DIE_LOC_EXPR_BAD` 129
- `#define DW_DLE_ADDR_ALLOC` 130
- `#define DW_DLE_OFFSET_BAD` 131
- `#define DW_DLE_MAKE_CU_CONTEXT_FAIL` 132
- `#define DW_DLE_REL_ALLOC` 133
- `#define DW_DLE_ARANGE_OFFSET_BAD` 134
- `#define DW_DLE_SEGMENT_SIZE_BAD` 135
- `#define DW_DLE_ARANGE_LENGTH_BAD` 136
- `#define DW_DLE_ARANGE_DECODE_ERROR` 137
- `#define DW_DLE_ARANGES_NULL` 138
- `#define DW_DLE_ARANGE_NULL` 139
- `#define DW_DLE_NO_FILE_NAME` 140
- `#define DW_DLE_NO_COMP_DIR` 141

- #define DW_DLE_CU_ADDRESS_SIZE_BAD 142
- #define DW_DLE_INPUT_ATTR_BAD 143
- #define DW_DLE_EXPR_NULL 144
- #define DW_DLE_BAD_EXPR_OPCODE 145
- #define DW_DLE_EXPR_LENGTH_BAD 146
- #define DW_DLE_MULTIPLE_RELOC_IN_EXPR 147
- #define DW_DLE_ELF_GETIDENT_ERROR 148
- #define DW_DLE_NO_AT_MIPS_FDE 149
- #define DW_DLE_NO_CIE_FOR_FDE 150
- #define DW_DLE_DIE_ABBREV_LIST_NULL 151
- #define DW_DLE_DEBUG_FUNCNAMES_DUPLICATE 152
- #define DW_DLE_DEBUG_FUNCNAMES_NULL 153
- #define DW_DLE_DEBUG_FUNCNAMES_VERSION_ERROR 154
- #define DW_DLE_DEBUG_FUNCNAMES_LENGTH_BAD 155
- #define DW_DLE_FUNC_NULL 156
- #define DW_DLE_FUNC_CONTEXT_NULL 157
- #define DW_DLE_DEBUG_TYPENAMES_DUPLICATE 158
- #define DW_DLE_DEBUG_TYPENAMES_NULL 159
- #define DW_DLE_DEBUG_TYPENAMES_VERSION_ERROR 160
- #define DW_DLE_DEBUG_TYPENAMES_LENGTH_BAD 161
- #define DW_DLE_TYPE_NULL 162
- #define DW_DLE_TYPE_CONTEXT_NULL 163
- #define DW_DLE_DEBUG_VARNAMES_DUPLICATE 164
- #define DW_DLE_DEBUG_VARNAMES_NULL 165
- #define DW_DLE_DEBUG_VARNAMES_VERSION_ERROR 166
- #define DW_DLE_DEBUG_VARNAMES_LENGTH_BAD 167
- #define DW_DLE_VAR_NULL 168
- #define DW_DLE_VAR_CONTEXT_NULL 169
- #define DW_DLE_DEBUG_WEAKNAMES_DUPLICATE 170
- #define DW_DLE_DEBUG_WEAKNAMES_NULL 171
- #define DW_DLE_DEBUG_WEAKNAMES_VERSION_ERROR 172
- #define DW_DLE_DEBUG_WEAKNAMES_LENGTH_BAD 173
- #define DW_DLE_WEAK_NULL 174
- #define DW_DLE_WEAK_CONTEXT_NULL 175
- #define DW_DLE_LOCDISC_COUNT_WRONG 176
- #define DW_DLE_MACINFO_STRING_NULL 177
- #define DW_DLE_MACINFO_STRING_EMPTY 178
- #define DW_DLE_MACINFO_INTERNAL_ERROR_SPACE 179
- #define DW_DLE_MACINFO_MALLOC_FAIL 180
- #define DW_DLE_DEBUGMACINFO_ERROR 181
- #define DW_DLE_DEBUG_MACRO_LENGTH_BAD 182
- #define DW_DLE_DEBUG_MACRO_MAX_BAD 183
- #define DW_DLE_DEBUG_MACRO_INTERNAL_ERR 184
- #define DW_DLE_DEBUG_MACRO_MALLOC_SPACE 185
- #define DW_DLE_DEBUG_MACRO_INCONSISTENT 186
- #define DW_DLE_DF_NO_CIE_AUGMENTATION 187
- #define DW_DLE_DF_REG_NUM_TOO_HIGH 188
- #define DW_DLE_DF_MAKE_INSTR_NO_INIT 189
- #define DW_DLE_DF_NEW_LOC_LESS_OLD_LOC 190
- #define DW_DLE_DF_POP_EMPTY_STACK 191
- #define DW_DLE_DF_ALLOC_FAIL 192
- #define DW_DLE_DF_FRAME_DECODING_ERROR 193
- #define DW_DLE_DEBUG_LOC_SECTION_SHORT 194
- #define DW_DLE_FRAME_AUGMENTATION_UNKNOWN 195
- #define DW_DLE_PUBTYPE_CONTEXT 196 /* Unused. */

- `#define DW_DLE_DEBUG_PUBTYPES_LENGTH_BAD` 197
- `#define DW_DLE_DEBUG_PUBTYPES_VERSION_ERROR` 198
- `#define DW_DLE_DEBUG_PUBTYPES_DUPLICATE` 199
- `#define DW_DLE_FRAME_CIE_DECODE_ERROR` 200
- `#define DW_DLE_FRAME_REGISTER_UNREPRESENTABLE` 201
- `#define DW_DLE_FRAME_REGISTER_COUNT_MISMATCH` 202
- `#define DW_DLE_LINK_LOOP` 203
- `#define DW_DLE_STRP_OFFSET_BAD` 204
- `#define DW_DLE_DEBUG_RANGES_DUPLICATE` 205
- `#define DW_DLE_DEBUG_RANGES_OFFSET_BAD` 206
- `#define DW_DLE_DEBUG_RANGES_MISSING_END` 207
- `#define DW_DLE_DEBUG_RANGES_OUT_OF_MEM` 208
- `#define DW_DLE_DEBUG_SYMTAB_ERR` 209
- `#define DW_DLE_DEBUG_STRTAB_ERR` 210
- `#define DW_DLE_RELOC_MISMATCH_INDEX` 211
- `#define DW_DLE_RELOC_MISMATCH_RELOC_INDEX` 212
- `#define DW_DLE_RELOC_MISMATCH_STRTAB_INDEX` 213
- `#define DW_DLE_RELOC_SECTION_MISMATCH` 214
- `#define DW_DLE_RELOC_SECTION_MISSING_INDEX` 215
- `#define DW_DLE_RELOC_SECTION_LENGTH_ODD` 216
- `#define DW_DLE_RELOC_SECTION_PTR_NULL` 217
- `#define DW_DLE_RELOC_SECTION_MALLOC_FAIL` 218
- `#define DW_DLE_NO_ELF64_SUPPORT` 219
- `#define DW_DLE_MISSING_ELF64_SUPPORT` 220
- `#define DW_DLE_ORPHAN_FDE` 221
- `#define DW_DLE_DUPLICATE_INST_BLOCK` 222
- `#define DW_DLE_BAD_REF_SIG8_FORM` 223
- `#define DW_DLE_ATTR_EXPRLOC_FORM_BAD` 224
- `#define DW_DLE_FORM_SEC_OFFSET_LENGTH_BAD` 225
- `#define DW_DLE_NOT_REF_FORM` 226
- `#define DW_DLE_DEBUG_FRAME_LENGTH_NOT_MULTIPLE` 227
- `#define DW_DLE_REF_SIG8_NOT_HANDLED` 228
- `#define DW_DLE_DEBUG_FRAME_POSSIBLE_ADDRESS_BOTCH` 229
- `#define DW_DLE_LOC_BAD_TERMINATION` 230
- `#define DW_DLE_SYMTAB_SECTION_LENGTH_ODD` 231
- `#define DW_DLE_RELOC_SECTION_SYMBOL_INDEX_BAD` 232
- `#define DW_DLE_RELOC_SECTION_RELOC_TARGET_SIZE_UNKNOWN` 233
- `#define DW_DLE_SYMTAB_SECTION_ENTRYSIZE_ZERO` 234
- `#define DW_DLE_LINE_NUMBER_HEADER_ERROR` 235
- `#define DW_DLE_DEBUG_TYPES_NULL` 236
- `#define DW_DLE_DEBUG_TYPES_DUPLICATE` 237
- `#define DW_DLE_DEBUG_TYPES_ONLY_DWARF4` 238
- `#define DW_DLE_DEBUG_TYPEOFFSET_BAD` 239
- `#define DW_DLE_GNU_OPCODE_ERROR` 240
- `#define DW_DLE_DEBUGPUBTYPES_ERROR` 241
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- `#define DW_DLE_AT_FIXUP_DUP` 243
- `#define DW_DLE_BAD_ABINAME` 244
- `#define DW_DLE_TOO_MANY_DEBUG` 245
- `#define DW_DLE_DEBUG_STR_OFFSETS_DUPLICATE` 246
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- `#define DW_DLE_SECTION_ERROR` 248
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- `#define DW_DLE_DEBUG_CU_UNAVAILABLE_FOR_FORM` 250
- `#define DW_DLE_DEBUG_FORM_HANDLING_INCOMPLETE` 251

- `#define DW_DLE_NEXT_DIE_PAST_END` 252
- `#define DW_DLE_NEXT_DIE_WRONG_FORM` 253
- `#define DW_DLE_NEXT_DIE_NO_ABBREV_LIST` 254
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- `#define DW_DLE_GDB_INDEX_COUNT_ADDR_ERROR` 263
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- `#define DW_DLE_NO_SUCH_SIGNATURE_FOUND` 286
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- `#define DW_DLE_SIG_TYPE_WRONG_STRING` 289
- `#define DW_DLE_MISSING_REQUIRED_TU_OFFSET_HASH` 290
- `#define DW_DLE_MISSING_REQUIRED_CU_OFFSET_HASH` 291
- `#define DW_DLE_DWP_MISSING_DWO_ID` 292
- `#define DW_DLE_DWP_SIBLING_ERROR` 293
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- `#define DW_DLE_LINE_CONTEXT_BOTCH` 305
- `#define DW_DLE_LINE_CONTEXT_INDEX_WRONG` 306

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- `#define DW_DLE_NO_TIED_FILE_AVAILABLE` 308
- `#define DW_DLE_CU_TYPE_MISSING` 309
- `#define DW_DLE_LLE_CODE_UNKNOWN` 310
- `#define DW_DLE_LOCLIST_INTERFACE_ERROR` 311
- `#define DW_DLE_LOCLIST_INDEX_ERROR` 312
- `#define DW_DLE_INTERFACE_NOT_SUPPORTED` 313
- `#define DW_DLE_ZDEBUG_REQUIRES_ZLIB` 314
- `#define DW_DLE_ZDEBUG_INPUT_FORMAT_ODD` 315
- `#define DW_DLE_ZLIB_BUF_ERROR` 316
- `#define DW_DLE_ZLIB_DATA_ERROR` 317
- `#define DW_DLE_MACRO_OFFSET_BAD` 318
- `#define DW_DLE_MACRO_OPCODE_BAD` 319
- `#define DW_DLE_MACRO_OPCODE_FORM_BAD` 320
- `#define DW_DLE_UNKNOWN_FORM` 321
- `#define DW_DLE_BAD_MACRO_HEADER_POINTER` 322
- `#define DW_DLE_BAD_MACRO_INDEX` 323
- `#define DW_DLE_MACRO_OP_UNHANDLED` 324
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- `#define DW_DLE_STRING_FORM_IMPROPER` 327
- `#define DW_DLE_ELF_FLAGS_NOT_AVAILABLE` 328
- `#define DW_DLE_LEB_IMPROPER` 329
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- `#define DW_DLE_ARANGES_HEADER_ERROR` 335
- `#define DW_DLE_LINE_OFFSET_WRONG_FORM` 336
- `#define DW_DLE_FORM_BLOCK_LENGTH_ERROR` 337
- `#define DW_DLE_ZLIB_SECTION_SHORT` 338
- `#define DW_DLE_CIE_INSTR_PTR_ERROR` 339
- `#define DW_DLE_FDE_INSTR_PTR_ERROR` 340
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- `#define DW_DLE_LOCEXPR_OFF_SECTION_END` 343
- `#define DW_DLE_POINTER_SECTION_UNKNOWN` 344
- `#define DW_DLE_ERRONEOUS_XU_INDEX_SECTION` 345
- `#define DW_DLE_DIRECTORY_FORMAT_COUNT_VS_DIRECTORIES_MISMATCH` 346
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- `#define DW_DLE_SIZE_WRAPAROUND` 348
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- `#define DW_DLE_LOCLIST_OFFSET_BAD` 356
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- `#define DW_DLE_DEBUG_LOCIISTS_DUPLICATE` 358
- `#define DW_DLE_DEBUG_RNGLISTS_DUPLICATE` 359
- `#define DW_DLE_ABBREV_OFF_END` 360
- `#define DW_DLE_FORM_STRING_BAD_STRING` 361

- `#define DW_DLE_AUGMENTATION_STRING_OFF_END` 362
- `#define DW_DLE_STRING_OFF_END_PUBNAMES_LIKE` 363
- `#define DW_DLE_LINE_STRING_BAD` 364
- `#define DW_DLE_DEFINE_FILE_STRING_BAD` 365
- `#define DW_DLE_MACRO_STRING_BAD` 366
- `#define DW_DLE_MACINFO_STRING_BAD` 367
- `#define DW_DLE_ZLIB_UNCOMPRESS_ERROR` 368
- `#define DW_DLE_IMPROPER_DWO_ID` 369
- `#define DW_DLE_GROUPNUMBER_ERROR` 370
- `#define DW_DLE_ADDRESS_SIZE_ZERO` 371
- `#define DW_DLE_DEBUG_NAMES_HEADER_ERROR` 372
- `#define DW_DLE_DEBUG_NAMES_AUG_STRING_ERROR` 373
- `#define DW_DLE_DEBUG_NAMES_PAD_NON_ZERO` 374
- `#define DW_DLE_DEBUG_NAMES_OFF_END` 375
- `#define DW_DLE_DEBUG_NAMES_ABBREV_OVERFLOW` 376
- `#define DW_DLE_DEBUG_NAMES_ABBREV_CORRUPTION` 377
- `#define DW_DLE_DEBUG_NAMES_NULL_POINTER` 378
- `#define DW_DLE_DEBUG_NAMES_BAD_INDEX_ARG` 379
- `#define DW_DLE_DEBUG_NAMES_ENTRYPOOL_OFFSET` 380
- `#define DW_DLE_DEBUG_NAMES_UNHANDLED_FORM` 381
- `#define DW_DLE_LNCT_CODE_UNKNOWN` 382
- `#define DW_DLE_LNCT_FORM_CODE_NOT_HANDLED` 383
- `#define DW_DLE_LINE_HEADER_LENGTH_BOTCH` 384
- `#define DW_DLE_STRING_HASHTAB_IDENTITY_ERROR` 385
- `#define DW_DLE_UNIT_TYPE_NOT_HANDLED` 386
- `#define DW_DLE_GROUP_MAP_ALLOC` 387
- `#define DW_DLE_GROUP_MAP_DUPLICATE` 388
- `#define DW_DLE_GROUP_COUNT_ERROR` 389
- `#define DW_DLE_GROUP_INTERNAL_ERROR` 390
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- `#define DW_DLE_LOWPC_WRONG_CLASS` 396
- `#define DW_DLE_HIGHPC_WRONG_FORM` 397
- `#define DW_DLE_STR_OFFSETS_BASE_WRONG_FORM` 398
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- `#define DW_DLE_STR_OFFSETS_NO_MAGIC` 404
- `#define DW_DLE_STR_OFFSETS_ARRAY_SIZE` 405
- `#define DW_DLE_STR_OFFSETS_VERSION_WRONG` 406
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- `#define DW_DLE_SECTION_NAME_BIG` 410
- `#define DW_DLE_FILE_UNAVAILABLE` 411
- `#define DW_DLE_FILE_WRONG_TYPE` 412
- `#define DW_DLE_SIBLING_OFFSET_WRONG` 413
- `#define DW_DLE_OPEN_FAIL` 414
- `#define DW_DLE_OFFSET_SIZE` 415
- `#define DW_DLE_MACH_O_SEGOFFSET_BAD` 416

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- `#define DW_DLE_READ_ERROR` 419
- `#define DW_DLE_ELF_CLASS_BAD` 420
- `#define DW_DLE_ELF_ENDIAN_BAD` 421
- `#define DW_DLE_ELF_VERSION_BAD` 422
- `#define DW_DLE_FILE_TOO_SMALL` 423
- `#define DW_DLE_PATH_SIZE_TOO_SMALL` 424
- `#define DW_DLE_BAD_TYPE_SIZE` 425
- `#define DW_DLE_PE_SIZE_SMALL` 426
- `#define DW_DLE_PE_OFFSET_BAD` 427
- `#define DW_DLE_PE_STRING_TOO_LONG` 428
- `#define DW_DLE_IMAGE_FILE_UNKNOWN_TYPE` 429
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- `#define DW_DLE_PRODUCER_CODE_NOT_AVAILABLE` 431
- `#define DW_DLE_NO_ELF_SUPPORT` 432
- `#define DW_DLE_NO_STREAM_RELOC_SUPPORT` 433
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- `#define DW_DLE_SECTION_SIZE_ERROR` 435
- `#define DW_DLE_INTERNAL_NULL_POINTER` 436
- `#define DW_DLE_SECTION_STRING_OFFSET_BAD` 437
- `#define DW_DLE_SECTION_INDEX_BAD` 438
- `#define DW_DLE_INTEGER_TOO_SMALL` 439
- `#define DW_DLE_ELF_SECTION_LINK_ERROR` 440
- `#define DW_DLE_ELF_SECTION_GROUP_ERROR` 441
- `#define DW_DLE_ELF_SECTION_COUNT_MISMATCH` 442
- `#define DW_DLE_ELF_STRING_SECTION_MISSING` 443
- `#define DW_DLE_SEEK_OFF_END` 444
- `#define DW_DLE_READ_OFF_END` 445
- `#define DW_DLE_ELF_SECTION_ERROR` 446
- `#define DW_DLE_ELF_STRING_SECTION_ERROR` 447
- `#define DW_DLE_MIXING_SPLIT_DWARF_VERSIONS` 448
- `#define DW_DLE_TAG_CORRUPT` 449
- `#define DW_DLE_FORM_CORRUPT` 450
- `#define DW_DLE_ATTR_CORRUPT` 451
- `#define DW_DLE_ABBREV_ATTR_DUPLICATION` 452
- `#define DW_DLE_DWP_SIGNATURE_MISMATCH` 453
- `#define DW_DLE_CU_UT_TYPE_VALUE` 454
- `#define DW_DLE_DUPLICATE_GNU_DEBUGLINK` 455
- `#define DW_DLE_CORRUPT_GNU_DEBUGLINK` 456
- `#define DW_DLE_CORRUPT_NOTE_GNU_DEBUGID` 457
- `#define DW_DLE_CORRUPT_GNU_DEBUGID_SIZE` 458
- `#define DW_DLE_CORRUPT_GNU_DEBUGID_STRING` 459
- `#define DW_DLE_HEX_STRING_ERROR` 460
- `#define DW_DLE_DECIMAL_STRING_ERROR` 461
- `#define DW_DLE_PRO_INIT_EXTRAS_UNKNOWN` 462
- `#define DW_DLE_PRO_INIT_EXTRAS_ERR` 463
- `#define DW_DLE_NULL_ARGS_DWARF_ADD_PATH` 464
- `#define DW_DLE_DWARF_INIT_DBG_NULL` 465
- `#define DW_DLE_ELF_RELOC_SECTION_ERROR` 466
- `#define DW_DLE_USER_DECLARED_ERROR` 467
- `#define DW_DLE_RNGLISTS_ERROR` 468
- `#define DW_DLE_LOCLISTS_ERROR` 469
- `#define DW_DLE_SECTION_SIZE_OR_OFFSET_LARGE` 470
- `#define DW_DLE_GDBINDEX_STRING_ERROR` 471

- `#define DW_DLE_GNU_PUBNAMES_ERROR 472`
- `#define DW_DLE_GNU_PUBTYPES_ERROR 473`
- `#define DW_DLE_DUPLICATE_GNU_DEBUG_PUBNAMES 474`
- `#define DW_DLE_DUPLICATE_GNU_DEBUG_PUBTYPES 475`
- `#define DW_DLE_DEBUG_SUP_STRING_ERROR 476`
- `#define DW_DLE_DEBUG_SUP_ERROR 477`
- `#define DW_DLE_LOCATION_ERROR 478`
- `#define DW_DLE_DEBUGLINK_PATH_SHORT 479`
- `#define DW_DLE_SIGNATURE_MISMATCH 480`
- `#define DW_DLE_MACRO_VERSION_ERROR 481`
- `#define DW_DLE_NEGATIVE_SIZE 482`
- `#define DW_DLE_UDATA_VALUE_NEGATIVE 483`
- `#define DW_DLE_DEBUG_NAMES_ERROR 484`
- `#define DW_DLE_CFA_INSTRUCTION_ERROR 485`
- `#define DW_DLE_MACHO_CORRUPT_HEADER 486`
- `#define DW_DLE_MACHO_CORRUPT_COMMAND 487`
- `#define DW_DLE_MACHO_CORRUPT_SECTIONDETAILS 488`
- `#define DW_DLE_RELOCATION_SECTION_SIZE_ERROR 489`
- `#define DW_DLE_SYMBOL_SECTION_SIZE_ERROR 490`
- `#define DW_DLE_PE_SECTION_SIZE_ERROR 491`
- `#define DW_DLE_DEBUG_ADDR_ERROR 492`
- `#define DW_DLE_NO_SECT_STRINGS 493`
- `#define DW_DLE_TOO_FEW_SECTIONS 494`
- `#define DW_DLE_BUILD_ID_DESCRIPTION_SIZE 495`
- `#define DW_DLE_BAD_SECTION_FLAGS 496`
- `#define DW_DLE_IMPROPER_SECTION_ZERO 497`
- `#define DW_DLE_INVALID_NULL_ARGUMENT 498`
- `#define DW_DLE_LINE_INDEX_WRONG 499`
- `#define DW_DLE_LINE_COUNT_WRONG 500`
- `#define DW_DLE_ARITHMETIC_OVERFLOW 501`
- `#define DW_DLE_UNIVERSAL_BINARY_ERROR 502`
- `#define DW_DLE_UNIV_BIN_OFFSET_SIZE_ERROR 503`
- `#define DW_DLE_PE_SECTION_SIZE_HEURISTIC_FAIL 504`
- `#define DW_DLE_LLE_ERROR 505`
- `#define DW_DLE_RLE_ERROR 506`
- `#define DW_DLE_MACHO_SEGMENT_COUNT_HEURISTIC_FAIL 507`
- `#define DW_DLE_LAST 507`
- `#define DW_DLE_LO_USER 0x10000`

9.6.1 Detailed Description

These identify the various error codes that have been used. Not all of them are still use. We do not recycle obsolete codes into new uses. The codes 1 through 22 are historic and it is unlikely they are used anywhere in the library.

9.6.2 Macro Definition Documentation

9.6.2.1 DW_DLE_LAST

```
#define DW_DLE_LAST 507
```

Note

DW_DLE_LAST MUST EQUAL LAST ERROR NUMBER

9.7 Libdwarf Initialization Functions

Functions

- int [dwarf_init_path](#) (const char *dw_path, char *dw_true_path_out_buffer, unsigned int dw_true_path_↵
bufferlen, unsigned int dw_groupnumber, [Dwarf_Handler](#) dw_errhand, [Dwarf_Ptr](#) dw_errarg, [Dwarf_Debug](#)
*dw_dbg, [Dwarf_Error](#) *dw_error)
Initialization based on path, the most common initialization.
- int [dwarf_init_path_a](#) (const char *dw_path, char *dw_true_path_out_buffer, unsigned int dw_true_path_↵
bufferlen, unsigned int dw_groupnumber, unsigned int dw_universalnumber, [Dwarf_Handler](#) dw_errhand,
[Dwarf_Ptr](#) dw_errarg, [Dwarf_Debug](#) *dw_dbg, [Dwarf_Error](#) *dw_error)
Initialization based on path.
- int [dwarf_init_path_dl](#) (const char *dw_path, char *dw_true_path_out_buffer, unsigned int dw_true_path_↵
bufferlen, unsigned int dw_groupnumber, [Dwarf_Handler](#) dw_errhand, [Dwarf_Ptr](#) dw_errarg, [Dwarf_Debug](#)
*dw_dbg, char **dw_dl_path_array, unsigned int dw_dl_path_array_size, unsigned char *dw_dl_path_↵
source, [Dwarf_Error](#) *dw_error)
Initialization following GNU debuglink section data.
- int [dwarf_init_path_dl_a](#) (const char *dw_path, char *dw_true_path_out_buffer, unsigned int dw_true_path_↵
bufferlen, unsigned int dw_groupnumber, unsigned int dw_universalnumber, [Dwarf_Handler](#) dw_errhand,
[Dwarf_Ptr](#) dw_errarg, [Dwarf_Debug](#) *dw_dbg, char **dw_dl_path_array, unsigned int dw_dl_path_array_↵
size, unsigned char *dw_dl_path_source, [Dwarf_Error](#) *dw_error)
Initialization based on path with debuglink.
- int [dwarf_init_b](#) (int dw_fd, unsigned int dw_groupnumber, [Dwarf_Handler](#) dw_errhand, [Dwarf_Ptr](#) dw_errarg,
[Dwarf_Debug](#) *dw_dbg, [Dwarf_Error](#) *dw_error)
Initialization based on Unix/Linux (etc) fd.
- int [dwarf_finish](#) ([Dwarf_Debug](#) dw_dbg)
Close the initialized dw_dbg and free all data libdwarf has for this dw_dbg.
- int [dwarf_object_init_b](#) ([Dwarf_Obj_Access_Interface_a](#) *dw_obj, [Dwarf_Handler](#) dw_errhand, [Dwarf_Ptr](#)
dw_errarg, unsigned int dw_groupnumber, [Dwarf_Debug](#) *dw_dbg, [Dwarf_Error](#) *dw_error)
Used to access DWARF information in memory or in an object format unknown to libdwarf.
- int [dwarf_object_finish](#) ([Dwarf_Debug](#) dw_dbg)
Used to close the object_init dw_dbg.
- int [dwarf_set_tied_dbg](#) ([Dwarf_Debug](#) dw_split_dbg, [Dwarf_Debug](#) dw_tied_dbg, [Dwarf_Error](#) *dw_error)
Use with split dwarf.
- int [dwarf_get_tied_dbg](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Debug](#) *dw_tieddbg_out, [Dwarf_Error](#) *dw_error)
Use with split dwarf.

9.7.1 Detailed Description

9.7.2 Initialization And Finish Operations

Opening and closing libdwarf on object files.

9.7.3 Function Documentation

9.7.3.1 dwarf_init_path()

```
int dwarf_init_path (
    const char * dw_path,
    char * dw_true_path_out_buffer,
    unsigned int dw_true_path_bufferlen,
    unsigned int dw_groupnumber,
    Dwarf_Handler dw_errhand,
    Dwarf_Ptr dw_errarg,
    Dwarf_Debug * dw_dbg,
    Dwarf_Error * dw_error )
```

On a Mach-O universal binary this function can only return information about the first (zero index) object in the universal binary.

Parameters

<i>dw_path</i>	Pass in the path to the object file to open.
<i>dw_true_path_out_buffer</i>	Pass in NULL or the name of a string buffer (The buffer should be initialized with an initial NUL byte) The returned string will be null-terminated. The path actually used is copied to true_path_out. If true_path_buffer len is zero or true_path_out_buffer is zero then the Special MacOS processing will not occur, nor will the GNU_debuglink processing occur. In case GNU debuglink data was followed or MacOS dSYM applies the true_path_out will not match path and the initial byte will be non-null. The value put in true_path_out is the actual file name.
<i>dw_true_path_bufferlen</i>	Pass in the length in bytes of the buffer.
<i>dw_groupnumber</i>	The value passed in should be DW_GROUPNUMBER_ANY unless one wishes to other than a standard group.
<i>dw_errhand</i>	Pass in NULL unless one wishes libdwarf to call this error handling function (which you must write) instead of passing meaningful values to the dw_error argument.
<i>dw_errarg</i>	If dw_errhand is non-null, then this value (a pointer or integer that means something to you) is passed to the dw_errhand function in case that is helpful to you.
<i>dw_dbg</i>	On success, *dw_dbg is set to a pointer to a new Dwarf_Debug structure to be used in calls to libdwarf functions.
<i>dw_error</i>	In case return is DW_DLV_ERROR dw_error is set to point to the error details.

Returns

DW_DLV_OK etc.

[Details on separate DWARF object access](#)

See also

[dwarf_init_path_dl](#) [dwarf_init_b](#)

[Using dwarf_init_path\(\)](#)

9.7.3.2 dwarf_init_path_a()

```
int dwarf_init_path_a (
    const char * dw_path,
    char * dw_true_path_out_buffer,
    unsigned int dw_true_path_bufferlen,
    unsigned int dw_groupnumber,
    unsigned int dw_universalnumber,
    Dwarf_Handler dw_errhand,
    Dwarf_Ptr dw_errarg,
    Dwarf_Debug * dw_dbg,
    Dwarf_Error * dw_error )
```

This is identical to [dwarf_init_path\(\)](#) except that it adds a new argument, `dw_universalnumber`, with which you can specify which object in a Mach-O universal binary you wish to open.

It is always safe and appropriate to pass zero as the `dw_universalnumber`. Elf and PE and (non-universal) Mach-O object files ignore the value of `dw_universalnumber`.

9.7.3.3 dwarf_init_path_dl()

```
int dwarf_init_path_dl (
    const char * dw_path,
    char * dw_true_path_out_buffer,
    unsigned int dw_true_path_bufferlen,
    unsigned int dw_groupnumber,
    Dwarf_Handler dw_errhand,
    Dwarf_Ptr dw_errarg,
    Dwarf_Debug * dw_dbg,
    char ** dw_dl_path_array,
    unsigned int dw_dl_path_array_size,
    unsigned char * dw_dl_path_source,
    Dwarf_Error * dw_error )
```

Sets the true-path with DWARF if there is appropriate debuglink data available.

In case `DW_DLV_ERROR` returned be sure to call `dwarf_dealloc_error` even though the returned `Dwarf_Debug` is `NULL`.

Parameters

<i>dw_path</i>	Pass in the path to the object file to open.
<i>dw_true_path_out_buffer</i>	Pass in <code>NULL</code> or the name of a string buffer.
<i>dw_true_path_bufferlen</i>	Pass in the length in bytes of the buffer.
<i>dw_groupnumber</i>	The value passed in should be <code>DW_GROUPNUMBER_ANY</code> unless one wishes to other than a standard group.
<i>dw_errhand</i>	Pass in <code>NULL</code> , normally. If non-null one wishes libdwarf to call this error handling function (which you must write) instead of passing meaningful values to the <code>dw_error</code> argument.
<i>dw_errarg</i>	Pass in <code>NULL</code> , normally. If <code>dw_errhand</code> is non-null, then this value (a pointer or integer that means something to you) is passed to the <code>dw_errhand</code> function in case that is helpful to you.
<i>dw_dbg</i>	On success, <code>*dw_dbg</code> is set to a pointer to a new <code>Dwarf_Debug</code> structure to be used in calls to libdwarf functions.

Parameters

<i>dw_dl_path_array</i>	debuglink processing allows a user-specified set of file paths and this argument allows one to specify these. Pass in a pointer to array of pointers to strings which you, the caller, have filled in. The strings should be alternate paths (see the GNU debuglink documentation.)
<i>dw_dl_path_array_size</i>	Specify the size of the <i>dw_dl_path_array</i> .
<i>dw_dl_path_source</i>	returns DW_PATHSOURCE_basic or other such value so the caller can know how the true-path was resolved.
<i>dw_error</i>	In case return is DW_DLV_ERROR <i>dw_error</i> is set to point to the error details.

Returns

DW_DLV_OK etc.

[Details on separate DWARF object access](#)

See also

[Using dwarf_init_path_dl\(\)](#)

9.7.3.4 dwarf_init_path_dl_a()

```
int dwarf_init_path_dl_a (
    const char * dw_path,
    char * dw_true_path_out_buffer,
    unsigned int dw_true_path_bufferlen,
    unsigned int dw_groupnumber,
    unsigned int dw_universalnumber,
    Dwarf_Handler dw_errhand,
    Dwarf_Ptr dw_errarg,
    Dwarf_Debug * dw_dbg,
    char ** dw_dl_path_array,
    unsigned int dw_dl_path_array_size,
    unsigned char * dw_dl_path_source,
    Dwarf_Error * dw_error )
```

This identical to [dwarf_init_path_dl\(\)](#) except that it adds a new argument, *dw_universalnumber*, with which you can specify which object in a Mach-O universal binary you wish to open.

It is always safe and appropriate to pass zero as the *dw_universalnumber*. Elf and PE and (non-universal) Mach-O object files ignore the value of *dw_universalnumber*.

Mach-O objects do not contain or use debuglink data.

9.7.3.5 dwarf_init_b()

```
int dwarf_init_b (
    int dw_fd,
    unsigned int dw_groupnumber,
    Dwarf_Handler dw_errhand,
    Dwarf_Ptr dw_errarg,
    Dwarf_Debug * dw_dbg,
    Dwarf_Error * dw_error )
```

In case DW_DLV_ERROR returned be sure to call [dwarf_dealloc_error](#) even though the returned *Dwarf_Debug* is NULL.

Parameters

<i>dw_fd</i>	An open Unix/Linux/etc fd on the object file.
<i>dw_groupnumber</i>	The value passed in should be DW_GROUPNUMBER_ANY unless one wishes to other than a standard group.
<i>dw_errhand</i>	Pass in NULL unless one wishes libdwarf to call this error handling function (which you must write) instead of passing meaningful values to the dw_error argument.
<i>dw_errarg</i>	If dw_errhand is non-null, then this value (a pointer or integer that means something to you) is passed to the dw_errhand function in case that is helpful to you.
<i>dw_dbg</i>	On success, *dw_dbg is set to a pointer to a new Dwarf_Debug structure to be used in calls to libdwarf functions.
<i>dw_error</i>	In case return is DW_DLV_ERROR dw_error is set to point to the error details.

Returns

DW_DLV_OK etc.

9.7.3.6 dwarf_finish()

```
int dwarf_finish (
    Dwarf_Debug dw_dbg )
```

Parameters

<i>dw_dbg</i>	Close the dbg.
---------------	----------------

Returns

May return DW_DLV_ERROR if something is very wrong: no further information is available.. May return DW_DLV_NO_ENTRY but no further information is available. Normally returns DW_DLV_OK.

There is nothing the caller can do with the return value except report it somehow. Most callers ignore the return value.

9.7.3.7 dwarf_object_init_b()

```
int dwarf_object_init_b (
    Dwarf_Obj_Access_Interface_a * dw_obj,
    Dwarf_Handler dw_errhand,
    Dwarf_Ptr dw_errarg,
    unsigned int dw_groupnumber,
    Dwarf_Debug * dw_dbg,
    Dwarf_Error * dw_error )
```

In case DW_DLV_ERROR returned be sure to call dwarf_dealloc_error even though the returned Dwarf_Debug is NULL.

See also

[Demonstrating reading DWARF without a file.](#)

and

See also

[dw_noobject](#) Reading DWARF not in object file

Parameters

<i>dw_obj</i>	A data structure filled out by the caller so libdwarf can access DWARF data not in a supported object file format.
<i>dw_errhand</i>	Pass in NULL normally.
<i>dw_errarg</i>	Pass in NULL normally.
<i>dw_groupnumber</i>	The value passed in should be DW_GROUPNUMBER_ANY unless one wishes to other than a standard group (quite unlikely for this interface).
<i>dw_dbg</i>	On success, *dw_dbg is set to a pointer to a new Dwarf_Debug structure to be used in calls to libdwarf functions.
<i>dw_error</i>	In case return is DW_DLV_ERROR dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.7.3.8 dwarf_object_finish()

```
int dwarf_object_finish (
    Dwarf_Debug dw_dbg )
```

Close the dw_dbg opened by [dwarf_object_init_b\(\)](#).

Parameters

<i>dw_dbg</i>	Must be an open Dwarf_Debug opened by dwarf_object_init_b() . The init call dw_obj data is not freed by the call to dwarf_object_finish.
---------------	--

Returns

The return value DW_DLV_OK etc is useless, one could possibly report it somehow. Callers usually ignore the return value.

9.7.3.9 dwarf_set_tied_dbg()

```
int dwarf_set_tied_dbg (
    Dwarf_Debug dw_split_dbg,
    Dwarf_Debug dw_tied_dbg,
    Dwarf_Error * dw_error )
```

In libdwarf usage the object file being reported on [a] is opened with [dwarf_init_path\(\)](#) or the like. If that object file [a] is a split-dwarf object then important data needed to report all of what is in the object file [a] needs an open Dwarf_Debug on the base object file [b] (usually the base executable object). Here we call that executable object file [b] the *tied* object.

See DWARF5 Appendix F.

Parameters

<i>dw_split_dbg</i>	Pass in an open dbg, on a split-dwarf object file with (normally) lots of DWARF but no executable code.
<i>dw_tied_dbg</i>	Pass in an open dbg on an executable (we call it a <i>tied</i> dbg here) which has minimal DWARF (to save space in the executable).
<i>dw_error</i>	In case return is DW_DLV_ERROR <i>dw_error</i> is set to point to the error details.

Returns

DW_DLV_OK etc.

See also

[Attaching a tied dbg](#)

[Detaching a tied dbg](#)

9.7.3.10 dwarf_get_tied_dbg()

```
int dwarf_get_tied_dbg (
    Dwarf_Debug dw_dbg,
    Dwarf_Debug * dw_tieddbg_out,
    Dwarf_Error * dw_error )
```

Given a main Dwarf_Debug this returns the tied Dwarf_Debug if there is one or else returns null(0).

Before v0.11.0 it was not defined what this returned if the tied-Dwarf_Debug was passed in, but it would have returned null(0) in that case. Unlikely anyone uses this call as callers had the tied and base dbg when calling [dwarf_set_tied_dbg\(\)](#).

Parameters

<i>dw_dbg</i>	Pass in a non-null Dwarf_Debug which is either a main-Dwarf_Debug or a tied-Dwarf_Debug.
<i>dw_tieddbg_out</i>	On success returns the applicable tied-Dwarf_Debug through the pointer. If <i>dw_dbg</i> is a tied-Dwarf_Debug the function returns null(0) through the pointer. If there is no tied-Dwarf_Debug (meaning there is just a main-Dwarf_Debug) the function returns null (0) through the pointer.
<i>dw_error</i>	If the <i>dw_dbg</i> is invalid or damaged then the function returns DW_DLV_ERROR and <i>dw_error</i> is set to point to the error details.

Returns

DW_DLV_OK or DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY.

9.8 Compilation Unit (CU) Access

Functions

- `int dwarf_next_cu_header_e (Dwarf_Debug dw_dbg, Dwarf_Bool dw_is_info, Dwarf_Die *dw_cu_die, Dwarf_Unsigned *dw_cu_header_length, Dwarf_Half *dw_version_stamp, Dwarf_Off *dw_abbrev_offset, Dwarf_Half *dw_address_size, Dwarf_Half *dw_length_size, Dwarf_Half *dw_extension_size, Dwarf_Sig8 *dw_type_signature, Dwarf_Unsigned *dw_typeoffset, Dwarf_Unsigned *dw_next_cu_header_offset, Dwarf_Half *dw_header_cu_type, Dwarf_Error *dw_error)`
Return information on the next CU header(e).
- `int dwarf_next_cu_header_d (Dwarf_Debug dw_dbg, Dwarf_Bool dw_is_info, Dwarf_Unsigned *dw_cu_header_length, Dwarf_Half *dw_version_stamp, Dwarf_Off *dw_abbrev_offset, Dwarf_Half *dw_address_size, Dwarf_Half *dw_length_size, Dwarf_Half *dw_extension_size, Dwarf_Sig8 *dw_type_signature, Dwarf_Unsigned *dw_typeoffset, Dwarf_Unsigned *dw_next_cu_header_offset, Dwarf_Half *dw_header_cu_type, Dwarf_Error *dw_error)`
Return information on the next CU header(d).
- `int dwarf_siblingof_c (Dwarf_Die dw_die, Dwarf_Die *dw_return_siblingdie, Dwarf_Error *dw_error)`
Return the next sibling DIE.
- `int dwarf_siblingof_b (Dwarf_Debug dw_dbg, Dwarf_Die dw_die, Dwarf_Bool dw_is_info, Dwarf_Die *dw_return_siblingdie, Dwarf_Error *dw_error)`
Return the first DIE or the next sibling DIE.
- `int dwarf_cu_header_basics (Dwarf_Die dw_die, Dwarf_Half *dw_version, Dwarf_Bool *dw_is_info, Dwarf_Bool *dw_is_dwo, Dwarf_Half *dw_offset_size, Dwarf_Half *dw_address_size, Dwarf_Half *dw_extension_size, Dwarf_Sig8 **dw_signature, Dwarf_Off *dw_offset_of_length, Dwarf_Unsigned *dw_total_byte_length, Dwarf_Error *dw_error)`
Return some CU-relative facts.
- `int dwarf_child (Dwarf_Die dw_die, Dwarf_Die *dw_return_childdie, Dwarf_Error *dw_error)`
Return the child DIE, if any. The child may be the first of a list of sibling DIEs.
- `void dwarf_dealloc_die (Dwarf_Die dw_die)`
Deallocate (free) a DIE.
- `int dwarf_die_from_hash_signature (Dwarf_Debug dw_dbg, Dwarf_Sig8 *dw_hash_sig, const char *dw_sig_type, Dwarf_Die *dw_returned_CU_die, Dwarf_Error *dw_error)`
Return a CU DIE given a has signature.
- `int dwarf_offdie_b (Dwarf_Debug dw_dbg, Dwarf_Off dw_offset, Dwarf_Bool dw_is_info, Dwarf_Die *dw_return_die, Dwarf_Error *dw_error)`
Return DIE given global (not CU-relative) offset.
- `int dwarf_find_die_given_sig8 (Dwarf_Debug dw_dbg, Dwarf_Sig8 *dw_ref, Dwarf_Die *dw_die_out, Dwarf_Bool *dw_is_info, Dwarf_Error *dw_error)`
Return a DIE given a Dwarf_Sig8 hash.
- `Dwarf_Bool dwarf_get_die_infotypes_flag (Dwarf_Die dw_die)`
Return the is_info flag.

9.8.1 Detailed Description

9.8.2 Function Documentation

9.8.2.1 dwarf_next_cu_header_e()

```
int dwarf_next_cu_header_e (
    Dwarf_Debug dw_dbg,
    Dwarf_Bool dw_is_info,
```

```

Dwarf_Die * dw_cu_die,
Dwarf_Unsigned * dw_cu_header_length,
Dwarf_Half * dw_version_stamp,
Dwarf_Off * dw_abbrev_offset,
Dwarf_Half * dw_address_size,
Dwarf_Half * dw_length_size,
Dwarf_Half * dw_extension_size,
Dwarf_Sig8 * dw_type_signature,
Dwarf_Unsigned * dw_typeoffset,
Dwarf_Unsigned * dw_next_cu_header_offset,
Dwarf_Half * dw_header_cu_type,
Dwarf_Error * dw_error )

```

New in v0.9.0 November 2023.

The library keeps track of where it is in the object file and it knows where to find 'next'.

It returns the CU_DIE pointer through `dw_cu_die`;

`dwarf_next_cu_header_e()` is preferred over `dwarf_next_cu_header_d()` as the latter requires a second (immediate) step to access the CU-DIE of the CU.

With the CU-DIE returned by `dwarf_next_cu_header_e()` one calls `dwarf_child()` first (the CU-DIE has no siblings) and then one calls `dwarf_siblingof_c()` and `dwarf_child()` appropriately to descend the tree of DIEs.

Parameters

<code>dw_dbg</code>	The Dwarf_Debug of interest.
<code>dw_is_info</code>	Pass in TRUE if reading through <code>.debug_info</code> Pass in FALSE if reading through DWARF4 <code>.debug_types</code> .
<code>dw_cu_die</code>	Pass in a pointer to a Dwarf_Die. the call sets the passed-in pointer to be a Compilation Unit Die for use with <code>dwarf_child()</code> or any other call requiring a Dwarf_Die argument.
<code>dw_cu_header_length</code>	Returns the length of the just-read CU header.
<code>dw_version_stamp</code>	Returns the version number (2 to 5) of the CU header just read.
<code>dw_abbrev_offset</code>	Returns the <code>.debug_abbrev</code> offset from the the CU header just read.
<code>dw_address_size</code>	Returns the address size specified for this CU, usually either 4 or 8.
<code>dw_length_size</code>	Returns the offset size (the length of the size field from the header) specified for this CU, either 4 or 4.
<code>dw_extension_size</code>	If the section is standard 64bit DWARF then this value is 4. Else the value is zero.
<code>dw_type_signature</code>	If the CU is DW_UT_skeleton DW_UT_split_compile, DW_UT_split_type or DW_UT_type this is the type signature from the CU_header compiled into this field.
<code>dw_typeoffset</code>	For DW_UT_split_type or DW_UT_type this is the type offset from the CU header.
<code>dw_next_cu_header_offset</code>	The offset in the section of the next CU (unless there is a compiler bug this is rarely of interest).
<code>dw_header_cu_type</code>	Returns DW_UT_compile, or other DW_UT value.
<code>dw_error</code>	In case return is DW_DLV_ERROR <code>dw_error</code> is set to point to the error details.

Returns

Returns DW_DLV_OK on success. Returns DW_DLV_NO_ENTRY if all CUs have been read.

See also

[Example walking CUs\(e\)](#)

9.8.2.2 dwarf_next_cu_header_d()

```
int dwarf_next_cu_header_d (
    Dwarf_Debug dw_dbg,
    Dwarf_Bool dw_is_info,
    Dwarf_Unsigned * dw_cu_header_length,
    Dwarf_Half * dw_version_stamp,
    Dwarf_Off * dw_abbrev_offset,
    Dwarf_Half * dw_address_size,
    Dwarf_Half * dw_length_size,
    Dwarf_Half * dw_extension_size,
    Dwarf_Sig8 * dw_type_signature,
    Dwarf_Unsigned * dw_typeoffset,
    Dwarf_Unsigned * dw_next_cu_header_offset,
    Dwarf_Half * dw_header_cu_type,
    Dwarf_Error * dw_error )
```

This is the version to use for linking against libdwarf v0.8.0 and earlier (and it also works for later versions).

This version will eventually be deprecated.

The library keeps track of where it is in the object file and it knows where to find 'next'.

In order to read the DIE tree of the CU this records information in the dw_dbg data and after a successful call to [dwarf_next_cu_header_d\(\)](#) only an immediate call to [dwarf_siblingof_b\(dw_dbg, NULL, dw_is_info, &cu_die, ...\)](#) is guaranteed to return the correct DIE (a Compilation Unit DIE).

Avoid any call to libdwarf between a successful call to [dwarf_next_cu_header_d\(\)](#) and [dwarf_siblingof_b\(dw_dbg, NULL, dw_is_info, &cu_die, ...\)](#) to ensure the intended and correct Dwarf_Die is returned.

See also

[Example walking CUs\(d\)](#)

All arguments are the same as [dwarf_next_cu_header_e\(\)](#) except that there is no dw_cu_die argument here.

9.8.2.3 dwarf_siblingof_c()

```
int dwarf_siblingof_c (
    Dwarf_Die dw_die,
    Dwarf_Die * dw_return_siblingdie,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_die</i>	Pass in a known DIE and this will retrieve the next sibling in the chain.
<i>dw_return_siblingdie</i>	The DIE returned through the pointer.
<i>dw_error</i>	The usual error information, if any.

Returns

Returns DW_DLV_OK etc.

See also

example4

dwarf_get_die_infotypes

9.8.2.4 dwarf_siblingof_b()

```
int dwarf_siblingof_b (
    Dwarf_Debug dw_dbg,
    Dwarf_Die dw_die,
    Dwarf_Bool dw_is_info,
    Dwarf_Die * dw_return_siblingdie,
    Dwarf_Error * dw_error )
```

This function follows [dwarf_next_cu_header_d\(\)](#) to return the CU-DIE that [dwarf_next_cu_header_d\(\)](#) implies but does not reveal.

Aside from the special case required use of [dwarf_siblingof_b\(\)](#) immediately following [dwarf_next_cu_header_d\(\)](#), [dwarf_siblingof_c\(\)](#) is the faster function.

This function will eventually be deprecated.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug one is operating on.
<i>dw_die</i>	Immediately after calling dwarf_next_cu_header_d pass in NULL to retrieve the CU DIE. Or pass in a known DIE and this will retrieve the next sibling in the chain.
<i>dw_is_info</i>	Pass TRUE or FALSE to match the applicable dwarf_next_cu_header_d call.
<i>dw_return_siblingdie</i>	The DIE returned through the pointer.
<i>dw_error</i>	The usual error information, if any.

Returns

Returns DW_DLV_OK etc.

See also

example4

dwarf_get_die_infotypes

9.8.2.5 dwarf_cu_header_basics()

```
int dwarf_cu_header_basics (
    Dwarf_Die dw_die,
    Dwarf_Half * dw_version,
```



```

Dwarf_Bool * dw_is_info,
Dwarf_Bool * dw_is_dwo,
Dwarf_Half * dw_offset_size,
Dwarf_Half * dw_address_size,
Dwarf_Half * dw_extension_size,
Dwarf_Sig8 ** dw_signature,
Dwarf_Off * dw_offset_of_length,
Dwarf_Unsigned * dw_total_byte_length,
Dwarf_Error * dw_error )

```

Any Dwarf_Die will work. The values returned through the pointers are about the CU for a DIE

Parameters

<i>dw_die</i>	Some open Dwarf_Die.
<i>dw_version</i>	Returns the DWARF version: 2,3,4, or 5
<i>dw_is_info</i>	Returns non-zero if the CU is .debug_info. Returns zero if the CU is .debug_types (DWARF4).
<i>dw_is_dwo</i>	Returns non-zero if the CU is a dwo/dwp object and zero if it is a standard object.
<i>dw_offset_size</i>	Returns offset size, 4 and 8 are possible.
<i>dw_address_size</i>	Almost always returns 4 or 8. Could be 2 in unusual circumstances.
<i>dw_extension_size</i>	The sum of <i>dw_offset_size</i> and <i>dw_extension_size</i> are the count of the initial bytes of the CU. Standard lengths are 4 and 12. For 1990's SGI objects the length could be 8.
<i>dw_signature</i>	Returns a pointer to an 8 byte signature.
<i>dw_offset_of_length</i>	Returns the section offset of the initial byte of the CU.
<i>dw_total_byte_length</i>	Returns the total length of the CU including the length field and the content of the CU.
<i>dw_error</i>	The usual Dwarf_Error*.

Returns

Returns DW_DLV_OK etc.

9.8.2.6 dwarf_child()

```

int dwarf_child (
    Dwarf_Die dw_die,
    Dwarf_Die * dw_return_chiddie,
    Dwarf_Error * dw_error )

```

Parameters

<i>dw_die</i>	We will return the first child of this DIE.
<i>dw_return_chiddie</i>	Returns the first child through the pointer. For subsequent dies siblings of the first, use dwarf_siblingof_c() .
<i>dw_error</i>	The usual Dwarf_Error*.

Returns

Returns DW_DLV_OK etc. Returns DW_DLV_NO_ENTRY if *dw_die* has no children.

See also

[Using dwarf_child\(\)](#)

9.8.2.7 dwarf_dealloc_die()

```
void dwarf_dealloc_die (
    Dwarf_Die dw_die )
```

Parameters

<i>dw_die</i>	Frees (deallocs) memory associated with this Dwarf_Die.
---------------	---

DIEs not freed explicitly will be freed by [dwarf_finish\(\)](#).

9.8.2.8 dwarf_die_from_hash_signature()

```
int dwarf_die_from_hash_signature (
    Dwarf_Debug dw_dbg,
    Dwarf_Sig8 * dw_hash_sig,
    const char * dw_sig_type,
    Dwarf_Die * dw_returned_CU_die,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_dbg</i>	
<i>dw_hash_sig</i>	A pointer to an 8 byte signature to be looked up. in .debug_names.
<i>dw_sig_type</i>	Valid type requests are "cu" and "tu"
<i>dw_returned_CU_die</i>	Returns the found CU DIE if one is found.
<i>dw_error</i>	The usual Dwarf_Error*.

Returns

DW_DLV_OK means *dw_returned_CU_die* was set. DW_DLV_NO_ENTRY means the signature could not be found.

9.8.2.9 dwarf_offdie_b()

```
int dwarf_offdie_b (
    Dwarf_Debug dw_dbg,
    Dwarf_Off dw_offset,
    Dwarf_Bool dw_is_info,
    Dwarf_Die * dw_return_die,
    Dwarf_Error * dw_error )
```

This works whether or not the target section has had [dwarf_next_cu_header_d\(\)](#) applied, the CU the offset exists in has been seen at all, or the target offset is one libdwarf has seen before.

Parameters

<i>dw_dbg</i>	The applicable Dwarf_Debug
<i>dw_offset</i>	The global offset of the DIE in the appropriate section.
<i>dw_is_info</i>	Pass TRUE if the target is .debug_info. Pass FALSE if the target is .debug_types.
<i>dw_return_die</i>	On success this returns a DIE pointer to the found DIE.
<i>dw_error</i>	The usual Dwarf_Error*.

Returns

DW_DLV_OK means *dw_returned_die* was found DW_DLV_NO_ENTRY is only possible if the offset is to a null DIE, and that is very unusual. Otherwise expect DW_DLV_ERROR.

See also

[Using dwarf_offdie_b\(\)](#)

9.8.2.10 dwarf_find_die_given_sig8()

```
int dwarf_find_die_given_sig8 (
    Dwarf_Debug dw_dbg,
    Dwarf_Sig8 * dw_ref,
    Dwarf_Die * dw_die_out,
    Dwarf_Bool * dw_is_info,
    Dwarf_Error * dw_error )
```

Returns DIE and *is_info* flag if it finds the hash signature of a DIE. Often will be the CU DIE of DW_UT_split_type or DW_UT_type CU.

Parameters

<i>dw_dbg</i>	The applicable Dwarf_Debug
<i>dw_ref</i>	A pointer to a Dwarf_Sig8 struct whose content defines what is being searched for.
<i>dw_die_out</i>	If found, this returns the found DIE itself.
<i>dw_is_info</i>	If found, this returns section (.debug_info or .debug_types).
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.8.2.11 dwarf_get_die_infotypes_flag()

```
Dwarf_Bool dwarf_get_die_infotypes_flag (
    Dwarf_Die dw_die )
```

So client software knows if a DIE is in debug_info or (DWARF4-only) debug_types.

Parameters

<code>dw_die</code>	The DIE being queried.
---------------------	------------------------

Returns

If non-zero the flag means the DIE is in `.debug_info`. Otherwise it means the DIE is in `.debug_types`.

9.9 Debugging Information Entry (DIE) content

Functions

- `int dwarf_die_abbrev_global_offset (Dwarf_Die dw_die, Dwarf_Off *dw_abbrev_offset, Dwarf_Unsigned *dw_abbrev_count, Dwarf_Error *dw_error)`
Return the abbrev section offset of a DIE's abbrevs.
- `int dwarf_tag (Dwarf_Die dw_die, Dwarf_Half *dw_return_tag, Dwarf_Error *dw_error)`
Get TAG value of DIE.
- `int dwarf_dieoffset (Dwarf_Die dw_die, Dwarf_Off *dw_return_offset, Dwarf_Error *dw_error)`
Return the global section offset of the DIE.
- `int dwarf_debug_addr_index_to_addr (Dwarf_Die dw_die, Dwarf_Unsigned dw_index, Dwarf_Addr *dw_return_addr, Dwarf_Error *dw_error)`
Extract address given address index. DWARF5.
- `Dwarf_Bool dwarf_addr_form_is_indexed (int dw_form)`
Informs if a DW_FORM is an indexed form.
- `int dwarf_CU_dieoffset_given_die (Dwarf_Die dw_die, Dwarf_Off *dw_return_offset, Dwarf_Error *dw_error)`
Return the CU DIE offset given any DIE.
- `int dwarf_get_cu_die_offset_given_cu_header_offset_b (Dwarf_Debug dw_dbg, Dwarf_Off dw_in_cu_header_offset, Dwarf_Bool dw_is_info, Dwarf_Off *dw_out_cu_die_offset, Dwarf_Error *dw_error)`
Return the CU DIE section offset given CU header offset.
- `int dwarf_die_CU_offset (Dwarf_Die dw_die, Dwarf_Off *dw_return_offset, Dwarf_Error *dw_error)`
returns the CU relative offset of the DIE.
- `int dwarf_die_CU_offset_range (Dwarf_Die dw_die, Dwarf_Off *dw_return_CU_header_offset, Dwarf_Off *dw_return_CU_length_bytes, Dwarf_Error *dw_error)`
Return the offset length of the entire CU of a DIE.
- `int dwarf_attr (Dwarf_Die dw_die, Dwarf_Half dw_attrnum, Dwarf_Attribute *dw_returned_attr, Dwarf_Error *dw_error)`
Given DIE and attribute number return a Dwarf_attribute.
- `int dwarf_die_text (Dwarf_Die dw_die, Dwarf_Half dw_attrnum, char **dw_ret_name, Dwarf_Error *dw_error)`
Given DIE and attribute number return a string.
- `int dwarf_diename (Dwarf_Die dw_die, char **dw_diename, Dwarf_Error *dw_error)`
Return the string from a DW_AT_name attribute.
- `Dwarf_Unsigned dwarf_die_abbrev_code (Dwarf_Die dw_die)`
Return the DIE abbrev code.
- `int dwarf_die_abbrev_children_flag (Dwarf_Die dw_die, Dwarf_Half *dw_ab_has_child)`
Return TRUE if the DIE has children.
- `int dwarf_validate_die_sibling (Dwarf_Die dw_sibling, Dwarf_Off *dw_offset)`
Validate a sibling DIE.
- `int dwarf_hasattr (Dwarf_Die dw_die, Dwarf_Half dw_attrnum, Dwarf_Bool *dw_returned_bool, Dwarf_Error *dw_error)`

- Tells whether a DIE has a particular attribute.*
- int `dwarf_offset_list` (`Dwarf_Debug` dw_dbg, `Dwarf_Off` dw_offset, `Dwarf_Bool` dw_is_info, `Dwarf_Off` **dw_offbuf, `Dwarf_Unsigned` *dw_offcount, `Dwarf_Error` *dw_error)
- Return an array of DIE children offsets.*
- int `dwarf_get_die_address_size` (`Dwarf_Die` dw_die, `Dwarf_Half` *dw_addr_size, `Dwarf_Error` *dw_error)
- Get the address size applying to a DIE.*
- int `dwarf_die_offsets` (`Dwarf_Die` dw_die, `Dwarf_Off` *dw_global_offset, `Dwarf_Off` *dw_local_offset, `Dwarf_Error` *dw_error)
- Return section and CU-local offsets of a DIE.*
- int `dwarf_get_version_of_die` (`Dwarf_Die` dw_die, `Dwarf_Half` *dw_version, `Dwarf_Half` *dw_offset_size)
- Get the version and offset size.*
- int `dwarf_lowpc` (`Dwarf_Die` dw_die, `Dwarf_Addr` *dw_returned_addr, `Dwarf_Error` *dw_error)
- Return the DW_AT_low_pc value.*
- int `dwarf_highpc_b` (`Dwarf_Die` dw_die, `Dwarf_Addr` *dw_return_addr, `Dwarf_Half` *dw_return_form, enum `Dwarf_Form_Class` *dw_return_class, `Dwarf_Error` *dw_error)
- Return the DW_AT_highpc address value.*
- int `dwarf_dietype_offset` (`Dwarf_Die` dw_die, `Dwarf_Off` *dw_return_offset, `Dwarf_Bool` *dw_is_info, `Dwarf_Error` *dw_error)
- Return the offset from the DW_AT_type attribute.*
- int `dwarf_bytesize` (`Dwarf_Die` dw_die, `Dwarf_Unsigned` *dw_returned_size, `Dwarf_Error` *dw_error)
- Return the value of the attribute DW_AT_byte_size.*
- int `dwarf_bitsize` (`Dwarf_Die` dw_die, `Dwarf_Unsigned` *dw_returned_size, `Dwarf_Error` *dw_error)
- Return the value of the attribute DW_AT_bitsize.*
- int `dwarf_bitoffset` (`Dwarf_Die` dw_die, `Dwarf_Half` *dw_attrnum, `Dwarf_Unsigned` *dw_returned_offset, `Dwarf_Error` *dw_error)
- Return the bit offset attribute of a DIE.*
- int `dwarf_srclang` (`Dwarf_Die` dw_die, `Dwarf_Unsigned` *dw_returned_lang, `Dwarf_Error` *dw_error)
- Return the value of the DW_AT_language attribute.*
- int `dwarf_language_version_string` (`Dwarf_Unsigned` dw_lang_name, int *dw_default_lower_bound, const char **dw_version_string)
- Return the value of the DW_AT_language_version attribute.*
- int `dwarf_arrayorder` (`Dwarf_Die` dw_die, `Dwarf_Unsigned` *dw_returned_order, `Dwarf_Error` *dw_error)
- Return the value of the DW_AT_ordering attribute.*

9.9.1 Detailed Description

This is the main interface to attributes of a DIE.

9.9.2 Function Documentation

9.9.2.1 dwarf_die_abbrev_global_offset()

```
int dwarf_die_abbrev_global_offset (
    Dwarf_Die dw_die,
    Dwarf_Off * dw_abbrev_offset,
    Dwarf_Unsigned * dw_abbrev_count,
    Dwarf_Error * dw_error )
```

So we can associate a DIE's abbreviations with the contents the abbreviations section. Useful for detailed printing and analysis of abbreviations.

Parameters

<i>dw_die</i>	The DIE of interest
<i>dw_abbrev_offset</i>	On success is set to the global offset in the .debug_abbrev section of the abbreviations for the DIE.
<i>dw_abbrev_count</i>	On success is set to the count of abbreviations in the .debug_abbrev section of the abbreviations for the DIE.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.2 dwarf_tag()

```
int dwarf_tag (
    Dwarf_Die dw_die,
    Dwarf_Half * dw_return_tag,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_die</i>	The DIE of interest
<i>dw_return_tag</i>	On success, set to the DW_TAG value of the DIE.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.3 dwarf_dieoffset()

```
int dwarf_dieoffset (
    Dwarf_Die dw_die,
    Dwarf_Off * dw_return_offset,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_die</i>	The DIE of interest
<i>dw_return_offset</i>	On success the offset refers to the section of the DIE itself, which may be .debug_offset or .debug_types.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.4 dwarf_debug_addr_index_to_addr()

```
int dwarf_debug_addr_index_to_addr (
    Dwarf_Die dw_die,
    Dwarf_Unsigned dw_index,
    Dwarf_Addr * dw_return_addr,
    Dwarf_Error * dw_error )
```

Useful for checking for compiler/linker errors in the creation of DWARF5.

Parameters

<i>dw_die</i>	The DIE of interest
<i>dw_index</i>	An index into .debug_addr. This will look first for .debug_addr in the dbg object DIE and if not there will look in the tied object if that is available.
<i>dw_return_addr</i>	On success the address is returned through the pointer.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.5 dwarf_addr_form_is_indexed()

```
Dwarf_Bool dwarf_addr_form_is_indexed (
    int dw_form )
```

Reading a CU DIE with DW_AT_low_pc an indexed value can be problematic as several different FORMs are indexed. Some in DWARF5 others being extensions to DWARF4 and DWARF5. Indexed forms interact with DW_AT_addr_base in a DIE making this a very relevant distinction.

9.9.2.6 dwarf_CU_dieoffset_given_die()

```
int dwarf_CU_dieoffset_given_die (
    Dwarf_Die dw_die,
    Dwarf_Off * dw_return_offset,
    Dwarf_Error * dw_error )
```

Returns the global debug_info section offset of the CU DIE in the CU containing the given_die (the passed in DIE can be any DIE).

This does not identify whether the section is .debug_info or .debug_types, use [dwarf_get_die_infotypes_flag\(\)](#) to determine the section.

See also

[dwarf_get_cu_die_offset_given_cu_header_offset_b](#)
[Using dwarf_offset_given_die\(\)](#)

Parameters

<i>dw_die</i>	The DIE being queried.
<i>dw_return_offset</i>	Returns the section offset of the CU DIE for <i>dw_die</i> .
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.7 dwarf_get_cu_die_offset_given_cu_header_offset_b()

```
int dwarf_get_cu_die_offset_given_cu_header_offset_b (
    Dwarf_Debug dw_dbg,
    Dwarf_Off dw_in_cu_header_offset,
    Dwarf_Bool dw_is_info,
    Dwarf_Off * dw_out_cu_die_offset,
    Dwarf_Error * dw_error )
```

Returns the CU DIE global offset if one knows the CU header global offset.

See also

[dwarf_CU_dieoffset_given_die](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_in_cu_header_offset</i>	The CU header offset.
<i>dw_is_info</i>	If TRUE the CU header offset is in .debug_info. Otherwise the CU header offset is in .debug_types.
<i>dw_out_cu_die_offset</i>	The CU DIE offset returned through this pointer.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.8 dwarf_die_CU_offset()

```
int dwarf_die_CU_offset (
    Dwarf_Die dw_die,
    Dwarf_Off * dw_return_offset,
    Dwarf_Error * dw_error )
```

See also

[dwarf_CU_dieoffset_given_die](#)

This does not identify whether the section is .debug_info or .debug_types, use [dwarf_get_die_infotypes_flag\(\)](#) to determine the section.

Parameters

<i>dw_die</i>	The DIE being queried.
<i>dw_return_offset</i>	Returns the CU relative offset of this DIE.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.9 dwarf_die_CU_offset_range()

```
int dwarf_die_CU_offset_range (
    Dwarf_Die dw_die,
    Dwarf_Off * dw_return_CU_header_offset,
    Dwarf_Off * dw_return_CU_length_bytes,
    Dwarf_Error * dw_error )
```

This does not identify whether the section is .debug_info or .debug_types, use [dwarf_get_die_infotypes_flag\(\)](#) to determine the section.

Parameters

<i>dw_die</i>	The DIE being queried.
<i>dw_return_CU_header_offset</i>	On success returns the section offset of the CU this DIE is in.
<i>dw_return_CU_length_bytes</i>	On success returns the CU length of the CU this DIE is in, including the CU length, header, and all DIEs.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.10 dwarf_attr()

```
int dwarf_attr (
    Dwarf_Die dw_die,
    Dwarf_Half dw_attrnum,
    Dwarf_Attribute * dw_returned_attr,
    Dwarf_Error * dw_error )
```

Returns DW_DLV_NO_ENTRY if the DIE has no attribute *dw_attrnum*.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_attrnum</i>	An attribute number, for example DW_AT_name.
<i>dw_returned_attr</i>	On success a Dwarf_Attribute pointer is returned and it should eventually be deallocated.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.11 dwarf_die_text()

```
int dwarf_die_text (
    Dwarf_Die dw_die,
    Dwarf_Half dw_attrnum,
    char ** dw_ret_name,
    Dwarf_Error * dw_error )
```

Returns DW_DLV_NO_ENTRY if the DIE has no attribute dw_attrnum.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_attrnum</i>	An attribute number, for example DW_AT_name.
<i>dw_ret_name</i>	On success a pointer to the string is returned. Do not free the string. Many attributes allow various forms that directly or indirectly contain strings and this returns the string.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.12 dwarf_diename()

```
int dwarf_diename (
    Dwarf_Die dw_die,
    char ** dw_diename,
    Dwarf_Error * dw_error )
```

Returns DW_DLV_NO_ENTRY if the DIE has no attribute DW_AT_name

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_diename</i>	On success a pointer to the string is returned. Do not free the string. Various forms directly or indirectly contain strings and this follows all of them to their string.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.13 dwarf_die_abbrev_code()

```
Dwarf_Unsigned dwarf_die_abbrev_code (
    Dwarf_Die dw_die )
```

The Abbrev code for a DIE is a positive integer assigned by the compiler within a particular CU. For `.debug_names` abbreviations the situation is conceptually similar. The code values are arbitrary but compilers are motivated to make them small so the object size is as small as possible.

Returns the abbrev code of the die. Cannot fail.

Parameters

<code>dw_die</code>	The DIE of interest.
---------------------	----------------------

Returns

The abbrev code. of the DIE.

9.9.2.14 `dwarf_die_abbrev_children_flag()`

```
int dwarf_die_abbrev_children_flag (
    Dwarf_Die dw_die,
    Dwarf_Half * dw_ab_has_child )
```

Parameters

<code>dw_die</code>	A valid DIE pointer (not NULL).
<code>dw_ab_has_child</code>	Sets TRUE though the pointer if the DIE has children. Otherwise sets FALSE.

Returns

Returns TRUE if the DIE has a child DIE. Else returns FALSE.

9.9.2.15 `dwarf_validate_die_sibling()`

```
int dwarf_validate_die_sibling (
    Dwarf_Die dw_sibling,
    Dwarf_Off * dw_offset )
```

This is used by `dwarfdump` (when `dwarfdump` is checking for valid DWARF) to try to catch a corrupt DIE tree.

This does not identify whether the section is `.debug_info` or `.debug_types`, use `dwarf_get_die_infotypes_flag()` to determine the section.

See also

[using dwarf_validate_die_sibling](#)

Parameters

<code>dw_sibling</code>	Pass in a DIE returned by <code>dwarf_siblingof_b()</code> .
<code>dw_offset</code>	Set to zero through the pointer.

Returns

Returns DW_DLV_OK if the sibling is at an appropriate place in the section. Otherwise it returns DW_DLV_ERROR indicating the DIE tree is corrupt.

9.9.2.16 dwarf_hasattr()

```
int dwarf_hasattr (
    Dwarf_Die dw_die,
    Dwarf_Half dw_attrnum,
    Dwarf_Bool * dw_returned_bool,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_attrnum</i>	The attribute number we are asking about, DW_AT_name for example.
<i>dw_returned_bool</i>	On success is set TRUE if dw_die has dw_attrnum and FALSE otherwise.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Never returns DW_DLV_NO_ENTRY. Returns DW_DLV_OK unless there is an error, in which case it returns DW_DLV_ERROR and sets dw_error to the error details.

9.9.2.17 dwarf_offset_list()

```
int dwarf_offset_list (
    Dwarf_Debug dw_dbg,
    Dwarf_Off dw_offset,
    Dwarf_Bool dw_is_info,
    Dwarf_Off ** dw_offbuf,
    Dwarf_Unsigned * dw_offcount,
    Dwarf_Error * dw_error )
```

Given a DIE section offset and dw_is_info, returns an array of DIE global [section] offsets of the children of DIE.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_offset</i>	A DIE offset.
<i>dw_is_info</i>	If TRUE says to use the offset in .debug_info. Else use the offset in .debug_types.
<i>dw_offbuf</i>	A pointer to an array of children DIE global [section] offsets is returned through the pointer.
<i>dw_offcount</i>	The number of elements in dw_offbuf. If the DIE has no children it could be zero, in which case dw_offbuf and dw_offcount are not touched.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. DW_DLV_NO_ENTRY means there are no children of the DIE, hence no list of child offsets.

On successful return, use `dwarf_dealloc(dbg, dw_offbuf, DW_DLA_UARRAY)`; to dealloc the allocated space.

See also

[Using dwarf_offset_list\(\)](#)

9.9.2.18 dwarf_get_die_address_size()

```
int dwarf_get_die_address_size (
    Dwarf_Die dw_die,
    Dwarf_Half * dw_addr_size,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_addr_size</i>	On success, returns the address size that applies to dw_die. Normally 4 or 8.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.19 dwarf_die_offsets()

```
int dwarf_die_offsets (
    Dwarf_Die dw_die,
    Dwarf_Off * dw_global_offset,
    Dwarf_Off * dw_local_offset,
    Dwarf_Error * dw_error )
```

This does not identify whether the section is `.debug_info` or `.debug_types`, use [dwarf_get_die_infotypes_flag\(\)](#) to determine the section.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_global_offset</i>	On success returns the offset of the DIE in its section.
<i>dw_local_offset</i>	On success returns the offset of the DIE within its CU.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.20 dwarf_get_version_of_die()

```
int dwarf_get_version_of_die (
    Dwarf_Die dw_die,
    Dwarf_Half * dw_version,
    Dwarf_Half * dw_offset_size )
```

The values returned apply to the CU this DIE belongs to. This is useful as preparation for calling `dwarf_get_form_class`

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_version</i>	Returns the version of the CU this DIE is contained in. Standard version numbers are 2 through 5.
<i>dw_offset_size</i>	Returns the <i>offset_size</i> (4 or 8) of the CU this DIE is contained in.

9.9.2.21 dwarf_lowpc()

```
int dwarf_lowpc (
    Dwarf_Die dw_die,
    Dwarf_Addr * dw_returned_addr,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_returned_addr</i>	On success returns, through the pointer, the address DW_AT_low_pc defines.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.22 dwarf_highpc_b()

```
int dwarf_highpc_b (
    Dwarf_Die dw_die,
    Dwarf_Addr * dw_return_addr,
    Dwarf_Half * dw_return_form,
    enum Dwarf_Form_Class * dw_return_class,
    Dwarf_Error * dw_error )
```

This is accessing the DW_AT_high_pc attribute. Calculating the high pc involves elements which we don't describe here, but which are shown in the example. See the DWARF5 standard.

See also

[Reading high pc from a DIE.](#)

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_return_addr</i>	On success returns the high-pc address for this DIE. If the high-pc is a not DW_FORM_addr and is a non-indexed constant form one must add the value of the DW_AT_low_pc to this to get the true high-pc value as the value returned is an unsigned offset of the associated low-pc value.
<i>dw_return_form</i>	On success returns the actual FORM for this attribute. Needed for certain cases to calculate the true dw_return_addr;
<i>dw_return_class</i>	On success returns the FORM CLASS for this attribute. Needed for certain cases to calculate the true dw_return_addr;
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.23 dwarf_dietype_offset()

```
int dwarf_dietype_offset (
    Dwarf_Die dw_die,
    Dwarf_Off * dw_return_offset,
    Dwarf_Bool * dw_is_info,
    Dwarf_Error * dw_error )
```

The offset returned is is a global offset from the DW_AT_type of the DIE passed in. If this CU is DWARF4 the offset could be in .debug_types, otherwise it is in .debug_info Check the section of the DIE to know which it is, [dwarf_cu_header_basics\(\)](#) will return that.

Added pointer argument to return the section the offset applies to. December 2022.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_return_offset</i>	If successful, returns the offset through the pointer.
<i>dw_is_info</i>	If successful, set to TRUE if the dw_return_offset is in .debug_info and FALSE if the dw_return_offset is in .debug_types.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.24 dwarf_bytesize()

```
int dwarf_bytesize (
    Dwarf_Die dw_die,
    Dwarf_Unsigned * dw_returned_size,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_returned_size</i>	If successful, returns the size through the pointer.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.25 dwarf_bitsize()

```
int dwarf_bitsize (
    Dwarf_Die dw_die,
    Dwarf_Unsigned * dw_returned_size,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_returned_size</i>	If successful, returns the size through the pointer.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.26 dwarf_bitoffset()

```
int dwarf_bitoffset (
    Dwarf_Die dw_die,
    Dwarf_Half * dw_attrnum,
    Dwarf_Unsigned * dw_returned_offset,
    Dwarf_Error * dw_error )
```

If the attribute is DW_AT_data_bit_offset (DWARF4, DWARF5) the returned bit offset has one meaning. If the attribute is DW_AT_bit_offset (DWARF2, DWARF3) the meaning is quite different.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_attrnum</i>	If successful, returns the number of the attribute (DW_AT_data_bit_offset or DW_AT_bit_offset)
<i>dw_returned_offset</i>	If successful, returns the bit offset value.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.27 dwarf_srclang()

```
int dwarf_srclang (
    Dwarf_Die dw_die,
    Dwarf_Unsigned * dw_returned_lang,
    Dwarf_Error * dw_error )
```

The DIE should be a CU DIE.

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_returned_lang</i>	On success returns the language code (normally only found on a CU DIE). For example DW_LANG_C
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.9.2.28 dwarf_language_version_string()

```
int dwarf_language_version_string (
    Dwarf_Unsigned dw_lang_name,
    int * dw_default_lower_bound,
    const char ** dw_version_string )
```

Parameters

<i>dw_lang_name</i>	Pass in a DW_LNAME value, for example DW_LNAME_C.
<i>dw_default_lower_bound</i>	On success returns the language code (normally only found on a CU DIE). For example DW_LANG_C has a default lower bound of zero (0) that will be returned through the pointer.
<i>dw_version_scheme</i>	On success, return the version scheme, For DW_LNAME_C the string returned would be "YYYYMM". If there is no version scheme defined, return a NULL through the pointer. Never dealloc or free() any returned value as it is a static constant string.

Returns

Returns DW_DLV_OK or the dw_lang_name is unknown, returns DW_DLV_NO_ENTRY. Never returns DW_DLV_ERROR;

9.9.2.29 dwarf_arrayorder()

```
int dwarf_arrayorder (
```

```
Dwarf_Die dw_die,
Dwarf_Unsigned * dw_returned_order,
Dwarf_Error * dw_error )
```

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_returned_order</i>	On success returns the ordering value. For example DW_ORD_row_major
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.10 DIE Attribute and Attribute-Form Details

Functions

- int `dwarf_attrlist` (`Dwarf_Die` dw_die, `Dwarf_Attribute` **dw_attrbuf, `Dwarf_Signed` *dw_attrcount, `Dwarf_Error` *dw_error)
Gets the full list of attributes.
- int `dwarf_hasform` (`Dwarf_Attribute` dw_attr, `Dwarf_Half` dw_form, `Dwarf_Bool` *dw_returned_bool, `Dwarf_Error` *dw_error)
Sets TRUE if a Dwarf_Attribute has the indicated FORM.
- int `dwarf_whatform` (`Dwarf_Attribute` dw_attr, `Dwarf_Half` *dw_returned_final_form, `Dwarf_Error` *dw_error)
Return the form of the Dwarf_Attribute.
- int `dwarf_whatform_direct` (`Dwarf_Attribute` dw_attr, `Dwarf_Half` *dw_returned_initial_form, `Dwarf_Error` *dw_error)
Return the initial form of the Dwarf_Attribute.
- int `dwarf_whatattr` (`Dwarf_Attribute` dw_attr, `Dwarf_Half` *dw_returned_attrnum, `Dwarf_Error` *dw_error)
Return the attribute number of the Dwarf_Attribute.
- int `dwarf_formref` (`Dwarf_Attribute` dw_attr, `Dwarf_Off` *dw_return_offset, `Dwarf_Bool` *dw_is_info, `Dwarf_Error` *dw_error)
Retrieve the CU-relative offset of a reference.
- int `dwarf_global_formref_b` (`Dwarf_Attribute` dw_attr, `Dwarf_Off` *dw_return_offset, `Dwarf_Bool` *dw_offset↵_is_info, `Dwarf_Error` *dw_error)
Return the section-relative offset of a Dwarf_Attribute.
- int `dwarf_global_formref` (`Dwarf_Attribute` dw_attr, `Dwarf_Off` *dw_return_offset, `Dwarf_Error` *dw_error)
Same as dwarf_global_formref_b except...
- int `dwarf_formsig8` (`Dwarf_Attribute` dw_attr, `Dwarf_Sig8` *dw_returned_sig_bytes, `Dwarf_Error` *dw_error)
Return an 8 byte reference form for DW_FORM_ref_sig8.
- int `dwarf_formsig8_const` (`Dwarf_Attribute` dw_attr, `Dwarf_Sig8` *dw_returned_sig_bytes, `Dwarf_Error` *dw↵_error)
Return an 8 byte reference form for DW_FORM_data8.
- int `dwarf_formaddr` (`Dwarf_Attribute` dw_attr, `Dwarf_Addr` *dw_returned_addr, `Dwarf_Error` *dw_error)
Return the address when the attribute has form address.
- int `dwarf_get_debug_addr_index` (`Dwarf_Attribute` dw_attr, `Dwarf_Unsigned` *dw_return_index, `Dwarf_Error` *dw_error)
Get the addr index of a Dwarf_Attribute.
- int `dwarf_formflag` (`Dwarf_Attribute` dw_attr, `Dwarf_Bool` *dw_returned_bool, `Dwarf_Error` *dw_error)

- Return the flag value of a flag form.*

 - int `dwarf_formudata` (`Dwarf_Attribute` dw_attr, `Dwarf_Unsigned` *dw_returned_val, `Dwarf_Error` *dw_error)

Return an unsigned value.
- int `dwarf_formsdata` (`Dwarf_Attribute` dw_attr, `Dwarf_Signed` *dw_returned_val, `Dwarf_Error` *dw_error)

Return a signed value.
- int `dwarf_formdata16` (`Dwarf_Attribute` dw_attr, `Dwarf_Form_Data16` *dw_returned_val, `Dwarf_Error` *dw_error)

Return a 16 byte Dwarf_Form_Data16 value.
- int `dwarf_formblock` (`Dwarf_Attribute` dw_attr, `Dwarf_Block` **dw_returned_block, `Dwarf_Error` *dw_error)

Return an allocated filled-in Form_Block.
- int `dwarf_formstring` (`Dwarf_Attribute` dw_attr, char **dw_returned_string, `Dwarf_Error` *dw_error)

Return a pointer to a string.
- int `dwarf_get_debug_str_index` (`Dwarf_Attribute` dw_attr, `Dwarf_Unsigned` *dw_return_index, `Dwarf_Error` *dw_error)

Return a string index.
- int `dwarf_formexprloc` (`Dwarf_Attribute` dw_attr, `Dwarf_Unsigned` *dw_return_exprlen, `Dwarf_Ptr` *dw_block_ptr, `Dwarf_Error` *dw_error)

Return a pointer-to and length-of a block of data.
- enum `Dwarf_Form_Class` `dwarf_get_form_class` (`Dwarf_Half` dw_version, `Dwarf_Half` dw_attrnum, `Dwarf_Half` dw_offset_size, `Dwarf_Half` dw_form)

Return the FORM_CLASS applicable. Four pieces of information are necessary to get the correct FORM_CLASS.
- int `dwarf_attr_offset` (`Dwarf_Die` dw_die, `Dwarf_Attribute` dw_attr, `Dwarf_Off` *dw_return_offset, `Dwarf_Error` *dw_error)

Return the offset of an attribute in its section.
- int `dwarf_uncompress_integer_block_a` (`Dwarf_Debug` dw_dbg, `Dwarf_Unsigned` dw_input_length_in_bytes, void *dw_input_block, `Dwarf_Unsigned` *dw_value_count, `Dwarf_Signed` **dw_value_array, `Dwarf_Error` *dw_error)

Uncompress a block of sleb numbers It's not much of a compression so not much of an uncompression. Developed by Sun Microsystems and it is unclear if it was ever used.
- void `dwarf_dealloc_uncompressed_block` (`Dwarf_Debug` dw_dbg, void *dw_value_array)

Dealloc what dwarf_uncompress_integer_block_a allocated.
- int `dwarf_convert_to_global_offset` (`Dwarf_Attribute` dw_attr, `Dwarf_Off` dw_offset, `Dwarf_Off` *dw_return_offset, `Dwarf_Error` *dw_error)

Convert local offset to global offset.
- void `dwarf_dealloc_attribute` (`Dwarf_Attribute` dw_attr)

Dealloc a Dwarf_Attribute When this call returns the dw_attr is a stale pointer.
- int `dwarf_discr_list` (`Dwarf_Debug` dw_dbg, `Dwarf_Small` *dw_blockpointer, `Dwarf_Unsigned` dw_blocklen, `Dwarf_Dsc_Head` *dw_dsc_head_out, `Dwarf_Unsigned` *dw_dsc_array_length_out, `Dwarf_Error` *dw_error)

Return an array of discriminant values.
- int `dwarf_discr_entry_u` (`Dwarf_Dsc_Head` dw_dsc, `Dwarf_Unsigned` dw_entrynum, `Dwarf_Half` *dw_out_type, `Dwarf_Unsigned` *dw_out_discr_low, `Dwarf_Unsigned` *dw_out_discr_high, `Dwarf_Error` *dw_error)

Access a single unsigned discriminant list entry.
- int `dwarf_discr_entry_s` (`Dwarf_Dsc_Head` dw_dsc, `Dwarf_Unsigned` dw_entrynum, `Dwarf_Half` *dw_out_type, `Dwarf_Signed` *dw_out_discr_low, `Dwarf_Signed` *dw_out_discr_high, `Dwarf_Error` *dw_error)

Access to a single signed discriminant list entry.

9.10.1 Detailed Description

Access to the details of DIEs

9.10.2 Function Documentation

9.10.2.1 dwarf_attrlist()

```
int dwarf_attrlist (
    Dwarf_Die dw_die,
    Dwarf_Attribute ** dw_attrbuf,
    Dwarf_Signed * dw_attrcount,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_die</i>	The DIE from which to pull attributes.
<i>dw_attrbuf</i>	The pointer is set to point to an array of Dwarf_Attribute (pointers to attribute data). This array must eventually be deallocated.
<i>dw_attrcount</i>	The number of entries in the array of pointers. There is no null-pointer to terminate the list, use this count.
<i>dw_error</i>	A place to return error details.

Returns

If it returns DW_DLV_ERROR and dw_error is non-null it creates an Dwarf_Error and places it in this argument. Usually returns DW_DLV_OK.

See also

[Using dwarf_attrlist\(\)](#)

[Using dwarf_attrlist\(\)](#)

9.10.2.2 dwarf_hasform()

```
int dwarf_hasform (
    Dwarf_Attribute dw_attr,
    Dwarf_Half dw_form,
    Dwarf_Bool * dw_returned_bool,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_form</i>	The DW_FORM you are asking about, DW_FORM_strp for example.
<i>dw_returned_bool</i>	The pointer passed in must be a valid non-null pointer to a Dwarf_Bool. On success, sets the value to TRUE or FALSE.
<i>dw_error</i>	A place to return error details.

Returns

Returns DW_DLV_OK and sets dw_returned_bool. If attribute is passed in NULL or the attribute is badly broken the call returns DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY;

9.10.2.3 dwarf_whatform()

```
int dwarf_whatform (
    Dwarf_Attribute dw_attr,
    Dwarf_Half * dw_returned_final_form,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_final_form</i>	The form of the item is returned through the pointer. If the base form is DW_FORM_indirect the function resolves the final form and returns that final form.
<i>dw_error</i>	A place to return error details.

Returns

Returns DW_DLV_OK and sets dw_returned_final_form. If attribute is passed in NULL or the attribute is badly broken the call returns DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY;

9.10.2.4 dwarf_whatform_direct()

```
int dwarf_whatform_direct (
    Dwarf_Attribute dw_attr,
    Dwarf_Half * dw_returned_initial_form,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_initial_form</i>	The form of the item is returned through the pointer. If the base form is DW_FORM_indirect the value set is DW_FORM_indirect.
<i>dw_error</i>	A place to return error details.

Returns

Returns DW_DLV_OK and sets dw_returned_initial_form. If attribute is passed in NULL or the attribute is badly broken the call returns DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY;

9.10.2.5 dwarf_whatattr()

```
int dwarf_whatattr (
    Dwarf_Attribute dw_attr,
    Dwarf_Half * dw_returned_attnum,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_attnum</i>	The attribute number of the attribute is returned through the pointer. For example, DW_AT_name
<i>dw_error</i>	A place to return error details.

Returns

Returns DW_DLV_OK and sets dw_returned_attrnum If attribute is passed in NULL or the attribute is badly broken the call returns DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY;

9.10.2.6 dwarf_formref()

```
int dwarf_formref (
    Dwarf_Attribute dw_attr,
    Dwarf_Off * dw_return_offset,
    Dwarf_Bool * dw_is_info,
    Dwarf_Error * dw_error )
```

The DW_FORM of the attribute must be one of a small set of local reference forms: DW_FORM_ref<n> or DW_FORM_uda.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_return_offset</i>	Returns the CU-relative offset through the pointer.
<i>dw_is_info</i>	Returns a flag through the pointer. TRUE if the offset is in .debug_info, FALSE if it is in .debug_types
<i>dw_error</i>	A place to return error details.

Returns

Returns DW_DLV_OK and sets dw_returned_attrnum If attribute is passed in NULL or the attribute is badly broken or the FORM of this attribute is not one of the small set of local references the call returns DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY;

9.10.2.7 dwarf_global_formref_b()

```
int dwarf_global_formref_b (
    Dwarf_Attribute dw_attr,
    Dwarf_Off * dw_return_offset,
    Dwarf_Bool * dw_offset_is_info,
    Dwarf_Error * dw_error )
```

The target section of the returned offset can be in various sections depending on the FORM. Only a DW_FORM_ref_sig8 can change the returned offset of a .debug_info DIE via a lookup into .debug_types by changing dw_offset_is_info to FALSE (DWARF4).

The caller must determine the target section from the FORM.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_return_offset</i>	Returns the CU-relative offset through the pointer.
<i>dw_offset_is_info</i>	For references to DIEs this informs whether the target DIE (the target the offset refers to) is in .debug_info or .debug_types. For non-DIE targets this field is not meaningful. Refer to the attribute FORM to determine the target section of the offset.
<i>dw_error</i>	A place to return error details.

Returns

Returns DW_DLV_OK and sets dw_return_offset and dw_offset_is_info. If attribute is passed in NULL or the attribute is badly broken or the FORM of this attribute is not one of the many reference types the call returns DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY;

9.10.2.8 dwarf_global_formref()

```
int dwarf_global_formref (
    Dwarf_Attribute dw_attr,
    Dwarf_Off * dw_return_offset,
    Dwarf_Error * dw_error )
```

See also

[dwarf_global_formref_b](#)

This is the same, except there is no dw_offset_is_info pointer so in the case of DWARF4 and DW_FORM_ref_sig8 it is not possible to determine which section the offset applies to!

9.10.2.9 dwarf_formsig8()

```
int dwarf_formsig8 (
    Dwarf_Attribute dw_attr,
    Dwarf_Sig8 * dw_returned_sig_bytes,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_sig_bytes</i>	On success returns DW_DLV_OK and copies the 8 bytes into dw_returned_sig_bytes.
<i>dw_error</i>	A place to return error details.

Returns

On success returns DW_DLV_OK and copies the 8 bytes into dw_returned_sig_bytes. If attribute is passed in NULL or the attribute is badly broken the call returns DW_DLV_ERROR. If the dw_attr has a form other than DW_FORM_ref_sig8 the function returns DW_DLV_NO_ENTRY

9.10.2.10 dwarf_formsig8_const()

```
int dwarf_formsig8_const (
    Dwarf_Attribute dw_attr,
    Dwarf_Sig8 * dw_returned_sig_bytes,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_sig_bytes</i>	On success Returns DW_DLV_OK and copies the 8 bytes into dw_returned_sig_bytes.
<i>dw_error</i>	A place to return error details.

Returns

On success returns DW_DLV_OK and copies the 8 bytes into dw_returned_sig_bytes. If attribute is passed in NULL or the attribute is badly broken the call returns DW_DLV_ERROR. If the dw_attr has a form other than DW_FORM_data8 the function returns DW_DLV_NO_ENTRY

9.10.2.11 dwarf_formaddr()

```
int dwarf_formaddr (
    Dwarf_Attribute dw_attr,
    Dwarf_Addr * dw_returned_addr,
    Dwarf_Error * dw_error )
```

There are several address forms, some of them indexed.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_addr</i>	On success this set through the pointer to the address in the attribute.
<i>dw_error</i>	A place to return error details.

Returns

On success returns DW_DLV_OK sets dw_returned_addr . If attribute is passed in NULL or the attribute is badly broken or the address cannot be retrieved the call returns DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY.

9.10.2.12 dwarf_get_debug_addr_index()

```
int dwarf_get_debug_addr_index (
    Dwarf_Attribute dw_attr,
    Dwarf_Unsigned * dw_return_index,
    Dwarf_Error * dw_error )
```

So a consumer can get the index when the object with the actual .debug_addr section is elsewhere (Debug Fission). Or if the caller just wants the index. Only call it when you know it should does have an index address FORM such as DW_FORM_addrx1 or one of the GNU address index forms.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_return_index</i>	If successful it returns the index through the pointer.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. Never returns DW_DLV_NO_ENTRY.

9.10.2.13 dwarf_formflag()

```
int dwarf_formflag (
    Dwarf_Attribute dw_attr,
    Dwarf_Bool * dw_returned_bool,
    Dwarf_Error * dw_error )
```

It is an error if the FORM is not a flag form.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_bool</i>	Returns either TRUE or FALSE through the pointer.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. Never returns DW_DLV_NO_ENTRY.

9.10.2.14 dwarf_formudata()

```
int dwarf_formudata (
    Dwarf_Attribute dw_attr,
    Dwarf_Unsigned * dw_returned_val,
    Dwarf_Error * dw_error )
```

The form can be an unsigned or signed integral type but if it is a signed type the value must be non-negative. It is an error otherwise.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_val</i>	On success returns the unsigned value through the pointer.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. Never returns DW_DLV_NO_ENTRY.

9.10.2.15 dwarf_formsdata()

```
int dwarf_formsdata (
    Dwarf_Attribute dw_attr,
    Dwarf_Signed * dw_returned_val,
    Dwarf_Error * dw_error )
```

The form must be a signed integral type. It is an error otherwise.

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_val</i>	On success returns the signed value through the pointer.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. Never returns DW_DLV_NO_ENTRY.

9.10.2.16 dwarf_formdata16()

```
int dwarf_formdata16 (
    Dwarf_Attribute dw_attr,
    Dwarf_Form_Data16 * dw_returned_val,
    Dwarf_Error * dw_error )
```

We just store the bytes in a struct, we have no 16 byte integer type. It is an error if the FORM is not DW_FORM_↔data16

See also

[Dwarf_Form_Data16](#)

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_val</i>	Copies the 16 byte value into the pointed to area.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. Never returns DW_DLV_NO_ENTRY.

9.10.2.17 dwarf_formblock()

```
int dwarf_formblock (
    Dwarf_Attribute dw_attr,
    Dwarf_Block ** dw_returned_block,
    Dwarf_Error * dw_error )
```

It is an error if the DW_FORM in the attribute is not a block form. DW_FORM_block2 is an example of a block form.

See also

[Dwarf_Block](#)

[Using dwarf_discr_list\(\)](#)

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_block</i>	Allocates a Dwarf_Block and returns a pointer to the filled-in block.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. Never returns DW_DLV_NO_ENTRY.

9.10.2.18 dwarf_formstring()

```
int dwarf_formstring (
    Dwarf_Attribute dw_attr,
    char ** dw_returned_string,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_string</i>	On success puts a pointer to a string existing in an appropriate DWARF section into dw_returned_string. Never free() or dealloc the returned string.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.10.2.19 dwarf_get_debug_str_index()

```
int dwarf_get_debug_str_index (
    Dwarf_Attribute dw_attr,
    Dwarf_Unsigned * dw_return_index,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_return_index</i>	If the form is a string index form (for example DW_FORM_strx) the string index value is returned via the pointer.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. If the attribute form is not one of the string index forms it returns DW_DLV_ERROR and sets dw_error to point to the error details.

9.10.2.20 dwarf_formexprloc()

```
int dwarf_formexprloc (
    Dwarf_Attribute dw_attr,
    Dwarf_Unsigned * dw_return_exprlen,
    Dwarf_Ptr * dw_block_ptr,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_return_exprlen</i>	Returns the length in bytes of the block if it succeeds.
<i>dw_block_ptr</i>	Returns a pointer to the first byte of the block of data if it succeeds.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. If the attribute form is not DW_FORM_exprloc it returns DW_DLV_ERROR and sets dw_error to point to the error details.

9.10.2.21 dwarf_get_form_class()

```
enum Dwarf_Form_Class dwarf_get_form_class (
    Dwarf_Half dw_version,
    Dwarf_Half dw_attrnum,
    Dwarf_Half dw_offset_size,
    Dwarf_Half dw_form )
```

Parameters

<i>dw_version</i>	The CU's DWARF version. Standard numbers are 2,3,4, or 5.
<i>dw_attrnum</i>	For example DW_AT_name
<i>dw_offset_size</i>	The offset size applicable to the compilation unit relevant to the attribute and form.
<i>dw_form</i>	The FORM number, for example DW_FORM_data4

Returns

Returns a form class, for example DW_FORM_CLASS_CONSTANT. The FORM_CLASS names are mentioned (for example as 'address' in Table 2.3 of DWARF5) but are not assigned formal names & numbers in the standard.

9.10.2.22 dwarf_attr_offset()

```
int dwarf_attr_offset (
    Dwarf_Die dw_die,
    Dwarf_Attribute dw_attr,
    Dwarf_Off * dw_return_offset,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_die</i>	The DIE of interest.
<i>dw_attr</i>	A Dwarf_Attribute of interest in this DIE
<i>dw_return_offset</i>	The offset is in .debug_info if the DIE is there. The offset is in .debug_types if the DIE is there.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. DW_DLV_NO_ENTRY is impossible.

9.10.2.23 dwarf_uncompress_integer_block_a()

```
int dwarf_uncompress_integer_block_a (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_input_length_in_bytes,
    void * dw_input_block,
    Dwarf_Unsigned * dw_value_count,
    Dwarf_Signed ** dw_value_array,
    Dwarf_Error * dw_error )
```

See also

[dwarf_dealloc_uncompressed_block](#)

9.10.2.24 dwarf_dealloc_uncompressed_block()

```
void dwarf_dealloc_uncompressed_block (
    Dwarf_Debug dw_dbg,
    void * dw_value_array )
```

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest
<i>dw_value_array</i>	The array was called an array of Dwarf_Signed. We dealloc all of it without needing dw_value_count.

9.10.2.25 dwarf_convert_to_global_offset()

```
int dwarf_convert_to_global_offset (
    Dwarf_Attribute dw_attr,
    Dwarf_Off dw_offset,
    Dwarf_Off * dw_return_offset,
    Dwarf_Error * dw_error )
```

Uses the DW_FORM of the attribute to determine if the dw_offset is local, and if so, adds the CU base offset to adjust dw_offset.

Parameters

<i>dw_attr</i>	The attribute the local offset was extracted from.
<i>dw_offset</i>	The global offset of the attribute.
<i>dw_return_offset</i>	The returned section (global) offset.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds. Returns DW_DLV_ERROR if the *dw_attr* form is not an offset form (for example, DW_FORM_ref_ufdata).

9.10.2.26 dwarf_dealloc_attribute()

```
void dwarf_dealloc_attribute (
    Dwarf_Attribute dw_attr )
```

Parameters

<i>dw_attr</i>	The attribute to dealloc.
----------------	---------------------------

9.10.2.27 dwarf_discr_list()

```
int dwarf_discr_list (
    Dwarf_Debug dw_dbg,
    Dwarf_Small * dw_blockpointer,
    Dwarf_Unsigned dw_blocklen,
    Dwarf_Dsc_Head * dw_dsc_head_out,
    Dwarf_Unsigned * dw_dsc_array_length_out,
    Dwarf_Error * dw_error )
```

This applies if a DW_TAG_variant has one of the DW_FORM_block forms.

See also

[dwarf_formblock](#)

For an example of use and dealloc:

See also

[Using dwarf_discr_list\(\)](#)

Parameters

<i>dw_dbg</i>	The applicable Dwarf_Debug
<i>dw_blockpointer</i>	The bl_data value from a Dwarf_Block.
<i>dw_blocklen</i>	The bl_len value from a Dwarf_Block.
<i>dw_dsc_head_out</i>	On success returns a pointer to an array of discriminant values in an opaque struct.
<i>dw_dsc_array_length_out</i>	On success returns the number of entries in the <i>dw_dsc_head_out</i> array.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.10.2.28 dwarf_discr_entry_u()

```
int dwarf_discr_entry_u (
    Dwarf_Dsc_Head dw_dsc,
    Dwarf_Unsigned dw_entrynum,
    Dwarf_Half * dw_out_type,
    Dwarf_Unsigned * dw_out_discr_low,
    Dwarf_Unsigned * dw_out_discr_high,
    Dwarf_Error * dw_error )
```

It is up to the caller to know whether the discriminant values are signed or unsigned (therefore to know whether this or dwarf_discr_entry_s. should be called)

Parameters

<i>dw_dsc</i>	The Dwarf_Dsc_Head applicable.
<i>dw_entrynum</i>	Valid values are zero to dw_dsc_array_length_out-1
<i>dw_out_type</i>	On success is set to either DW_DSC_label or DW_DSC_range through the pointer.
<i>dw_out_discr_low</i>	On success set to the lowest in this discriminant range
<i>dw_out_discr_high</i>	On success set to the highest in this discriminant range
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.10.2.29 dwarf_discr_entry_s()

```
int dwarf_discr_entry_s (
    Dwarf_Dsc_Head dw_dsc,
    Dwarf_Unsigned dw_entrynum,
    Dwarf_Half * dw_out_type,
    Dwarf_Signed * dw_out_discr_low,
    Dwarf_Signed * dw_out_discr_high,
    Dwarf_Error * dw_error )
```

The same as dwarf_discr_entry_u except here the values are signed.

9.11 Line Table For a CU

Functions

- int [dwarf_srcfiles](#) (Dwarf_Die dw_cu_die, char ***dw_srcfiles, Dwarf_Signed *dw_filecount, Dwarf_Error *dw_error)

The list of source files from the line table header.

- int [dwarf_srclines_b](#) ([Dwarf_Die](#) dw_cudie, [Dwarf_Unsigned](#) *dw_version_out, [Dwarf_Small](#) *dw_table_count, [Dwarf_Line_Context](#) *dw_linecontext, [Dwarf_Error](#) *dw_error)
Initialize Dwarf_Line_Context for line table access.
- int [dwarf_srclines_from_linecontext](#) ([Dwarf_Line_Context](#) dw_linecontext, [Dwarf_Line](#) **dw_linebuf, [Dwarf_Signed](#) *dw_linecount, [Dwarf_Error](#) *dw_error)
Access source lines from line context.
- int [dwarf_srclines_two_level_from_linecontext](#) ([Dwarf_Line_Context](#) dw_context, [Dwarf_Line](#) **dw_linebuf, [Dwarf_Signed](#) *dw_linecount, [Dwarf_Line](#) **dw_linebuf_actuals, [Dwarf_Signed](#) *dw_linecount_actuals, [Dwarf_Error](#) *dw_error)
Returns line table counts and data.
- void [dwarf_srclines_dealloc_b](#) ([Dwarf_Line_Context](#) dw_context)
Dealloc the memory allocated by dwarf_srclines_b.
- int [dwarf_srclines_table_offset](#) ([Dwarf_Line_Context](#) dw_context, [Dwarf_Unsigned](#) *dw_offset, [Dwarf_Error](#) *dw_error)
Return the srclines table offset.
- int [dwarf_srclines_comp_dir](#) ([Dwarf_Line_Context](#) dw_context, const char **dw_compilation_directory, [Dwarf_Error](#) *dw_error)
Compilation Directory name for the CU.
- int [dwarf_srclines_subprog_count](#) ([Dwarf_Line_Context](#) dw_context, [Dwarf_Signed](#) *dw_count, [Dwarf_Error](#) *dw_error)
Subprog count: Part of the two-level line table extension.
- int [dwarf_srclines_subprog_data](#) ([Dwarf_Line_Context](#) dw_context, [Dwarf_Signed](#) dw_index, const char **dw_name, [Dwarf_Unsigned](#) *dw_decl_file, [Dwarf_Unsigned](#) *dw_decl_line, [Dwarf_Error](#) *dw_error)
Retrieve data from the line table subprog array.
- int [dwarf_srclines_files_indexes](#) ([Dwarf_Line_Context](#) dw_context, [Dwarf_Signed](#) *dw_baseindex, [Dwarf_Signed](#) *dw_count, [Dwarf_Signed](#) *dw_endindex, [Dwarf_Error](#) *dw_error)
Return values easing indexing line table file numbers. Count is the real count of files array entries. Since DWARF 2,3,4 are zero origin indexes and DWARF5 and later are one origin, this function replaces dwarf_srclines_files_count().
- int [dwarf_srclines_files_data_b](#) ([Dwarf_Line_Context](#) dw_context, [Dwarf_Signed](#) dw_index_in, const char **dw_name, [Dwarf_Unsigned](#) *dw_directory_index, [Dwarf_Unsigned](#) *dw_last_mod_time, [Dwarf_Unsigned](#) *dw_file_length, [Dwarf_Form_Data16](#) **dw_md5ptr, [Dwarf_Error](#) *dw_error)
Access data for each line table file.
- int [dwarf_srclines_include_dir_count](#) ([Dwarf_Line_Context](#) dw_line_context, [Dwarf_Signed](#) *dw_count, [Dwarf_Error](#) *dw_error)
Return the number of include directories in the Line Table.
- int [dwarf_srclines_include_dir_data](#) ([Dwarf_Line_Context](#) dw_line_context, [Dwarf_Signed](#) dw_index, const char **dw_name, [Dwarf_Error](#) *dw_error)
Return the include directories in the Line Table.
- int [dwarf_srclines_version](#) ([Dwarf_Line_Context](#) dw_line_context, [Dwarf_Unsigned](#) *dw_version, [Dwarf_Small](#) *dw_table_count, [Dwarf_Error](#) *dw_error)
The DWARF version number of this compile-unit.
- int [dwarf_linebeginstatement](#) ([Dwarf_Line](#) dw_line, [Dwarf_Bool](#) *dw_returned_bool, [Dwarf_Error](#) *dw_error)
Read Line beginstatement register.
- int [dwarf_lineendsequence](#) ([Dwarf_Line](#) dw_line, [Dwarf_Bool](#) *dw_returned_bool, [Dwarf_Error](#) *dw_error)
Read Line endsequence register flag.
- int [dwarf_lineno](#) ([Dwarf_Line](#) dw_line, [Dwarf_Unsigned](#) *dw_returned_linenum, [Dwarf_Error](#) *dw_error)
Read Line line register.
- int [dwarf_line_srcfileno](#) ([Dwarf_Line](#) dw_line, [Dwarf_Unsigned](#) *dw_returned_filenum, [Dwarf_Error](#) *dw_error)
Read Line file register.
- int [dwarf_line_is_addr_set](#) ([Dwarf_Line](#) dw_line, [Dwarf_Bool](#) *dw_is_addr_set, [Dwarf_Error](#) *dw_error)
Is the Dwarf_Line address from DW_LNS_set_address? This is not a line register, but it is a flag set by the library in each Dwarf_Line, and it is derived from reading the line table.

- int `dwarf_lineaddr` (`Dwarf_Line` dw_line, `Dwarf_Addr` *dw_returned_addr, `Dwarf_Error` *dw_error)
Return the address of the Dwarf_Line.
- int `dwarf_lineoff_b` (`Dwarf_Line` dw_line, `Dwarf_Unsigned` *dw_returned_lineoffset, `Dwarf_Error` *dw_error)
Return a column number through the pointer.
- int `dwarf_linesrc` (`Dwarf_Line` dw_line, char **dw_returned_name, `Dwarf_Error` *dw_error)
Return the file name applicable to the Dwarf_Line.
- int `dwarf_lineblock` (`Dwarf_Line` dw_line, `Dwarf_Bool` *dw_returned_bool, `Dwarf_Error` *dw_error)
Return the basic_block line register.
- int `dwarf_prologue_end_etc` (`Dwarf_Line` dw_line, `Dwarf_Bool` *dw_prologue_end, `Dwarf_Bool` *dw_↵
epilogue_begin, `Dwarf_Unsigned` *dw_isa, `Dwarf_Unsigned` *dw_discriminator, `Dwarf_Error` *dw_error)
Return various line table registers in one call.
- int `dwarf_linelogical` (`Dwarf_Line` dw_line, `Dwarf_Unsigned` *dw_returned_logical, `Dwarf_Error` *dw_error)
Experimental Two-level logical Row Number Experimental two level line tables. Not explained here. When reading from an actuals table, dwarf_line_logical() returns the logical row number for the line.
- int `dwarf_linecontext` (`Dwarf_Line` dw_line, `Dwarf_Unsigned` *dw_returned_context, `Dwarf_Error` *dw_↵
error)
Experimental Two-level line tables call contexts Experimental two level line tables. Not explained here. When reading from a logicals table, dwarf_linecontext() returns the logical row number corresponding the the calling context for an inlined call.
- int `dwarf_line_subprogno` (`Dwarf_Line`, `Dwarf_Unsigned` *, `Dwarf_Error` *)
Two-level line tables get subprogram number Experimental two level line tables. Not explained here. When reading from a logicals table, dwarf_line_subprogno() returns the index in the subprograms table of the inlined subprogram. Currently this always returns zero through the pointer as the relevant field is never updated from the default of zero.
- int `dwarf_line_subprog` (`Dwarf_Line`, char **, char **, `Dwarf_Unsigned` *, `Dwarf_Error` *)
Two-level line tables get subprog, file, line Experimental two level line tables. Not explained here. When reading from a logicals table, dwarf_line_subprog() returns the name of the inlined subprogram, its declaration filename, and its declaration line number, if available.
- int `dwarf_check_lineheader_b` (`Dwarf_Die` dw_cu_die, int *dw_errcount_out, `Dwarf_Error` *dw_error)
Access to detailed line table header issues.
- int `dwarf_print_lines` (`Dwarf_Die` dw_cu_die, `Dwarf_Error` *dw_error, int *dw_errorcount_out)
Print line information in great detail.
- struct `Dwarf_Printf_Callback_Info_s` `dwarf_register_printf_callback` (`Dwarf_Debug` dw_dbg, struct
`Dwarf_Printf_Callback_Info_s` *dw_callbackinfo)
For line details this records callback details.

9.11.1 Detailed Description

Access to all the line table details.

9.11.2 Function Documentation

9.11.2.1 dwarf_srcfiles()

```
int dwarf_srcfiles (
    Dwarf_Die dw_cu_die,
    char *** dw_srcfiles,
    Dwarf_Signed * dw_filecount,
    Dwarf_Error * dw_error )
```

The array returned by this function applies to a single compilation unit (CU).

The returned array is indexed from 0 (zero) to `dw_filecount-1` when the function returns `DW_DLV_OK`.

In referencing the array via a file-number from a **DW_AT_decl_file** or **DW_AT_call_file** attribute one needs to know if the CU is DWARF5 or not.

Line Table Version numbers match compilation unit version numbers except that an experimental line table with line table version 0xfe06 has sometimes been used with DWARF4.

For DWARF5:

The file-number from a **DW_AT_decl_file** or **DW_AT_call_file** is the proper index into the array of string pointers.

For DWARF2,3,4, including experimental line table version 0xfe06 and a file-number from a **DW_AT_decl_file** or **DW_AT_call_file**:

1. If the file-number is zero there is no file name to find.
2. Otherwise subtract one(1) from the file-number and use the new value as the index into the array of string pointers.

The name strings returned are each assembled in the following way by `dwarf_srcfiles()`:

1. The file number denotes a name in the line table header.
2. If the name is not a full path (i.e. not starting with / in posix/linux/MacOS) then prepend the appropriate directory string from the line table header.
3. If the name is still not a full path then prepend the content of the `DW_AT_comp_dir` attribute of the CU DIE.

To retrieve the line table version call `dwarf_srclines_b()` and `dwarf_srclines_version()`.

See also

[Using dwarf_srclines_b\(\)](#)

Parameters

<i>dw_cu_die</i>	The CU DIE in this CU.
<i>dw_srcfiles</i>	On success allocates an array of pointers to strings and for each such, computes the fullest path possible given the CU DIE data for each file name listed in the line table header.
<i>dw_filecount</i>	On success returns the number of entries in the array of pointers to strings. The number returned is non-negative.
<i>dw_error</i>	The usual error pointer.

Returns

`DW_DLV_OK` if it succeeds. If there is no `.debug_line[.dwo]` returns `DW_DLV_NO_ENTRY`.

See also

[Using dwarf_srcfiles\(\)](#)

9.11.2.2 dwarf_srclines_b()

```
int dwarf_srclines_b (
    Dwarf_Die dw_cudie,
    Dwarf_Unsigned * dw_version_out,
    Dwarf_Small * dw_table_count,
    Dwarf_Line_Context * dw_linecontext,
    Dwarf_Error * dw_error )
```

Returns Dwarf_Line_Context pointer, needed for access to line table data. Returns the line table version number (needed to use [dwarf_srcfiles\(\)](#) properly).

See also

[Using dwarf_srclines_b\(\)](#)

[Using dwarf_srclines_b\(\) and linecontext](#)

Parameters

<i>dw_cudie</i>	The Compilation Unit (CU) DIE of interest.
<i>dw_version_out</i>	The DWARF Line Table version number (Standard: 2,3,4, or 5) Version 0xf006 is an experimental (two-level) line table.
<i>dw_table_count</i>	Zero or one means this is a normal DWARF line table. Two means this is an experimental two-level line table.
<i>dw_linecontext</i>	On success sets the pointer to point to an opaque structure usable for further queries.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.3 dwarf_srclines_from_linecontext()

```
int dwarf_srclines_from_linecontext (
    Dwarf_Line_Context dw_linecontext,
    Dwarf_Line ** dw_linebuf,
    Dwarf_Signed * dw_linecount,
    Dwarf_Error * dw_error )
```

Provides access to Dwarf_Line data from a Dwarf_Line_Context on a standard line table.

Parameters

<i>dw_linecontext</i>	The line context of interest.
<i>dw_linebuf</i>	On success returns an array of pointers to Dwarf_Line.
<i>dw_linecount</i>	On success returns the count of entries in dw_linebuf. If dw_linecount is returned as zero this is a line table with no lines.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.4 dwarf_srclines_two_level_from_linecontext()

```
int dwarf_srclines_two_level_from_linecontext (
    Dwarf_Line_Context dw_context,
    Dwarf_Line ** dw_linebuf,
    Dwarf_Signed * dw_linecount,
    Dwarf_Line ** dw_linebuf_actuais,
    Dwarf_Signed * dw_linecount_actuais,
    Dwarf_Error * dw_error )
```

Works for DWARF2,3,4,5 and for experimental two-level line tables. A single level table will have *linebuf_actuais and *linecount_actuais set to 0.

Two-level line tables are non-standard and not documented further. For standard (one-level) tables, it will return the single table through dw_linebuf, and the value returned through dw_linecount_actuais will be 0.

People not using these two-level tables should dwarf_srclines_from_linecontext instead.

9.11.2.5 dwarf_srclines_dealloc_b()

```
void dwarf_srclines_dealloc_b (
    Dwarf_Line_Context dw_context )
```

The way to deallocate (free) a Dwarf_Line_Context

Parameters

<i>dw_context</i>	The context to be deallocated (freed). On return the pointer passed in is stale and calling applications should zero the pointer.
-------------------	---

9.11.2.6 dwarf_srclines_table_offset()

```
int dwarf_srclines_table_offset (
    Dwarf_Line_Context dw_context,
    Dwarf_Unsigned * dw_offset,
    Dwarf_Error * dw_error )
```

The offset is in the relevant .debug_line or .debug_line.dwo section (and in a split dwarf package file includes the base line table offset).

Parameters

<i>dw_context</i>	
<i>dw_offset</i>	On success returns the section offset of the dw_context.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.7 dwarf_srclines_comp_dir()

```
int dwarf_srclines_comp_dir (
    Dwarf_Line_Context dw_context,
    const char ** dw_compilation_directory,
    Dwarf_Error * dw_error )
```

Do not free() or dealloc the string, it is in a dwarf section.

Parameters

<i>dw_context</i>	The Line Context of interest.
<i>dw_compilation_directory</i>	On success returns a pointer to a string identifying the compilation directory of the CU.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.8 dwarf_srclines_subprog_count()

```
int dwarf_srclines_subprog_count (
    Dwarf_Line_Context dw_context,
    Dwarf_Signed * dw_count,
    Dwarf_Error * dw_error )
```

A non-standard table. The actual meaning of subprog count left undefined here.

Parameters

<i>dw_context</i>	The Dwarf_Line_Context of interest.
<i>dw_count</i>	On success returns the two-level line table subprogram array size in this line context.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.9 dwarf_srclines_subprog_data()

```
int dwarf_srclines_subprog_data (
    Dwarf_Line_Context dw_context,
    Dwarf_Signed dw_index,
```

```

const char ** dw_name,
Dwarf_Unsigned * dw_decl_file,
Dwarf_Unsigned * dw_decl_line,
Dwarf_Error * dw_error )

```

A non-standard table. Not defined here.

Parameters

<i>dw_context</i>	The Dwarf_Line_Context of interest.
<i>dw_index</i>	The item to retrieve. Valid indexes are 1 through dw_count.
<i>dw_name</i>	On success returns a pointer to the subprog name.
<i>dw_decl_file</i>	On success returns a file number through the pointer.
<i>dw_decl_line</i>	On success returns a line number through the pointer.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.10 dwarf_srclines_files_indexes()

```

int dwarf_srclines_files_indexes (
    Dwarf_Line_Context dw_context,
    Dwarf_Signed * dw_baseindex,
    Dwarf_Signed * dw_count,
    Dwarf_Signed * dw_endindex,
    Dwarf_Error * dw_error )

```

Parameters

<i>dw_context</i>	The line context of interest.
<i>dw_baseindex</i>	On success returns the base index of valid file indexes. With DWARF2,3,4 the value is 1. With DWARF5 the value is 0.
<i>dw_count</i>	On success returns the real count of entries.
<i>dw_endindex</i>	On success returns value such that callers should index as dw_baseindex through dw_endindex-1.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

See also

[Using dwarf_srclines_b\(\)](#)

9.11.2.11 dwarf_srclines_files_data_b()

```
int dwarf_srclines_files_data_b (
    Dwarf_Line_Context dw_context,
    Dwarf_Signed dw_index_in,
    const char ** dw_name,
    Dwarf_Unsigned * dw_directory_index,
    Dwarf_Unsigned * dw_last_mod_time,
    Dwarf_Unsigned * dw_file_length,
    Dwarf_Form_Data16 ** dw_md5ptr,
    Dwarf_Error * dw_error )
```

Has the md5ptr field so cases where DW_LNCT_MD5 is present can return pointer to the MD5 value. With DWARF 5 index starts with 0. [dwarf_srclines_files_indexes\(\)](#) makes indexing through the files easy.

See also

[dwarf_srclines_files_indexes](#)

[Using dwarf_srclines_b\(\)](#)

Parameters

<i>dw_context</i>	The line context of interest.
<i>dw_index_in</i>	The entry of interest. Callers should index as dw_baseindex through dw_endindex-1.
<i>dw_name</i>	If dw_name non-null on success returns The file name in the line table header through the pointer.
<i>dw_directory_index</i>	If dw_directory_index non-null on success returns the directory number in the line table header through the pointer.
<i>dw_last_mod_time</i>	If dw_last_mod_time non-null on success returns the directory last modification date/time through the pointer.
<i>dw_file_length</i>	If dw_file_length non-null on success returns the file length recorded in the line table through the pointer.
<i>dw_md5ptr</i>	If dw_md5ptr non-null on success returns a pointer to the 16byte MD5 hash of the file through the pointer. If there is no md5 value present it returns 0 through the pointer.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.12 dwarf_srclines_include_dir_count()

```
int dwarf_srclines_include_dir_count (
    Dwarf_Line_Context dw_line_context,
    Dwarf_Signed * dw_count,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_line_context</i>	The line context of interest.
<i>dw_count</i>	On success returns the count of directories. How to use this depends on the line table version number.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

See also

[dwarf_srclines_include_dir_data](#)

9.11.2.13 dwarf_srclines_include_dir_data()

```
int dwarf_srclines_include_dir_data (
    Dwarf_Line_Context dw_line_context,
    Dwarf_Signed dw_index,
    const char ** dw_name,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_line_context</i>	The line context of interest.
<i>dw_index</i>	Pass in an index to the line context list of include directories. If the line table is version 2,3, or 4, the valid indexes are 1 through dw_count. If the line table is version 5 the valid indexes are 0 through dw_count-1.
<i>dw_name</i>	On success it returns a pointer to a directory name. Do not free/deallocate the string.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

See also

[dwarf_srclines_include_dir_count](#)

9.11.2.14 dwarf_srclines_version()

```
int dwarf_srclines_version (
    Dwarf_Line_Context dw_line_context,
    Dwarf_Unsigned * dw_version,
    Dwarf_Small * dw_table_count,
    Dwarf_Error * dw_error )
```

The `.debug_lines[.dwo]` table count informs about the line table version and the type of line table involved.

Meaning of the value returned via `dw_table_count`:

- 0 The table is a header with no lines.
- 1 The table is a standard line table.
- 2 The table is an experimental line table.

Parameters

<i>dw_line_context</i>	The Line Context of interest.
<i>dw_version</i>	On success, returns the line table version through the pointer.
<i>dw_table_count</i>	On success, returns the tablecount through the pointer. If the table count is zero the line table is a header with no lines. If the table count is 1 this is a standard line table. If the table count is this is an experimental two-level line table.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.15 dwarf_linebeginstatement()

```
int dwarf_linebeginstatement (
    Dwarf_Line dw_line,
    Dwarf_Bool * dw_returned_bool,
    Dwarf_Error * dw_error )
```

Line Table Registers

Parameters

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_returned_bool</i>	On success it sets the value TRUE (if the dw_line has the is_stmt register set) and FALSE if is_stmt is not set.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.16 dwarf_lineendsequence()

```
int dwarf_lineendsequence (
    Dwarf_Line dw_line,
    Dwarf_Bool * dw_returned_bool,
    Dwarf_Error * dw_error )
```

Line Table Registers

Parameters

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_returned_bool</i>	On success it sets the value TRUE (if the dw_line has the end_sequence register set) and FALSE if end_sequence is not set.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.17 dwarf_lineno()

```
int dwarf_lineno (
    Dwarf_Line dw_line,
    Dwarf_Unsigned * dw_returned_linenum,
    Dwarf_Error * dw_error )
```

Line Table Registers**Parameters**

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_returned_linenum</i>	On success it sets the value to the line number from the Dwarf_Line line register
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.18 dwarf_line_srcfileno()

```
int dwarf_line_srcfileno (
    Dwarf_Line dw_line,
    Dwarf_Unsigned * dw_returned_filenum,
    Dwarf_Error * dw_error )
```

Line Table Registers**Parameters**

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_returned_filenum</i>	On success it sets the value to the file number from the Dwarf_Line file register
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.19 dwarf_line_is_addr_set()

```
int dwarf_line_is_addr_set (
    Dwarf_Line dw_line,
    Dwarf_Bool * dw_is_addr_set,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_is_addr_set</i>	On success it sets the flag to TRUE or FALSE.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.20 dwarf_lineaddr()

```
int dwarf_lineaddr (
    Dwarf_Line dw_line,
    Dwarf_Addr * dw_returned_addr,
    Dwarf_Error * dw_error )
```

[Line Table Registers](#)

Parameters

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_returned_addr</i>	On success it sets the value to the value of the address register in the Dwarf_Line.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.21 dwarf_lineoff_b()

```
int dwarf_lineoff_b (
    Dwarf_Line dw_line,
    Dwarf_Unsigned * dw_returned_lineoffset,
    Dwarf_Error * dw_error )
```

[Line Table Registers](#)

Parameters

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_returned_lineoffset</i>	On success it sets the value to the column register from the Dwarf_Line.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.22 dwarf_linesrc()

```
int dwarf_linesrc (
    Dwarf_Line dw_line,
    char ** dw_returned_name,
    Dwarf_Error * dw_error )
```

Line Table Registers

Parameters

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_returned_name</i>	On success it reads the file register and finds constructs a file name from a directory and filename there and and returns a pointer to that string through the pointer. It is necessary to deallocthe returned string with dwarf_dealloc (dbg, lsrc_filename, DW_DLA_STRING) ; (Older versions of this function incorrectly said not to free() or dwarf_dealloc().)
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

See also

[Using dwarf_srclines_b\(\) and linecontext](#)

9.11.2.23 dwarf_lineblock()

```
int dwarf_lineblock (
    Dwarf_Line dw_line,
    Dwarf_Bool * dw_returned_bool,
    Dwarf_Error * dw_error )
```

Line Table Registers

Parameters

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_returned_bool</i>	On success it sets the flag to TRUE or FALSE from the basic_block register in the line table.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.24 dwarf_prologue_end_etc()

```
int dwarf_prologue_end_etc (
    Dwarf_Line dw_line,
```

```

Dwarf_Bool * dw_prologue_end,
Dwarf_Bool * dw_epilogue_begin,
Dwarf_Unsigned * dw_isa,
Dwarf_Unsigned * dw_discriminator,
Dwarf_Error * dw_error )

```

Line Table Registers

Parameters

<i>dw_line</i>	The Dwarf_Line of interest.
<i>dw_prologue_end</i>	On success it sets the flag to TRUE or FALSE from the prologue_end register in the line table.
<i>dw_epilogue_begin</i>	On success it sets the flag to TRUE or FALSE from the epilogue_begin register in the line table.
<i>dw_isa</i>	On success it sets the value to the value of from the isa register in the line table.
<i>dw_discriminator</i>	On success it sets the value to the value of from the discriminator register in the line table.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLV_OK if it succeeds.

9.11.2.25 dwarf_check_lineheader_b()

```

int dwarf_check_lineheader_b (
    Dwarf_Die dw_cu_die,
    int * dw_errcount_out,
    Dwarf_Error * dw_error )

```

Lets the caller get detailed messages about some compiler errors we detect. Calls back, the caller should do something with the messages (likely just print them). The lines passed back already have newlines.

See also

dwarf_check_lineheader(b)
[Dwarf_Printf_Callback_Info_s](#)

Parameters

<i>dw_cu_die</i>	The CU DIE of interest
<i>dw_error</i>	If DW_DLV_ERROR this shows one error encountered.
<i>dw_errcount_out</i>	Returns the count of detected errors through the pointer.

Returns

DW_DLV_OK etc.

9.11.2.26 dwarf_print_lines()

```
int dwarf_print_lines (
    Dwarf_Die dw_cu_die,
    Dwarf_Error * dw_error,
    int * dw_errorcount_out )
```

`dwarf_print_lines` lets the caller prints line information for a CU in great detail. Does not use `printf`. Instead it calls back to the application using a function pointer once per line-to-print. The lines passed back already have any needed newlines.

`dwarfdump` uses this function for verbose printing of line table data.

Failing to call the `dwarf_register_printf_callback()` function will prevent the lines from being passed back but such omission is not an error. The same function, but focused on checking for errors is `dwarf_check_lineheader_b()`.

See also

[Dwarf_Printf_Callback_Info_s](#)

Parameters

<i>dw_cu_die</i>	The CU DIE of interest
<i>dw_error</i>	
<i>dw_errorcount_out</i>	

Returns

DW_DLV_OK etc.

9.11.2.27 dwarf_register_printf_callback()

```
struct Dwarf_Printf_Callback_Info_s dwarf_register_printf_callback (
    Dwarf_Debug dw_dbg,
    struct Dwarf_Printf_Callback_Info_s * dw_callbackinfo )
```

Not usually needed. It is a way to check (while using the library) what callback data is in use or to update that callback data.

See also

[Dwarf_Printf_Callback_Info_s](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_callbackinfo</i>	If non-NULL pass in a pointer to your instance of struct Dwarf_Printf_Callback_Info_s with all the fields filled in.

Returns

If `dw_callbackinfo` NULL it returns a copy of the current [Dwarf_Printf_Callback_Info_s](#) for `dw_dbg`. Otherwise it returns the previous contents of the struct.

9.12 Ranges: code addresses in DWARF3-4

Functions

- int [dwarf_get_ranges_b](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Off](#) dw_rangesoffset, [Dwarf_Die](#) dw_die, [Dwarf_Off](#) *dw_return_realoffset, [Dwarf_Ranges](#) **dw_rangesbuf, [Dwarf_Signed](#) *dw_rangecount, [Dwarf_Unsigned](#) *dw_bytecount, [Dwarf_Error](#) *dw_error)
Access to code ranges from a CU or just reading through the raw .debug_ranges section.
- void [dwarf_dealloc_ranges](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Ranges](#) *dw_rangesbuf, [Dwarf_Signed](#) dw_↵rangecount)
Dealloc the array dw_rangesbuf.
- int [dwarf_get_ranges_baseaddress](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Die](#) dw_die, [Dwarf_Bool](#) *dw_known↵_base, [Dwarf_Unsigned](#) *dw_baseaddress, [Dwarf_Bool](#) *dw_at_ranges_offset_present, [Dwarf_Unsigned](#) *dw_at_ranges_offset, [Dwarf_Error](#) *dw_error)
Find ranges base address.

9.12.1 Detailed Description

In DWARF3 and DWARF4 the DW_AT_ranges attribute provides an offset into the .debug_ranges section, which contains code address ranges.

See also

[Dwarf_Ranges](#)

DWARF3 and DWARF4. DW_AT_ranges with an unsigned constant FORM (DWARF3) or DW_FORM_sec_offset(↵DWARF4).

9.12.2 Function Documentation

9.12.2.1 dwarf_get_ranges_b()

```
int dwarf_get_ranges_b (
    Dwarf_Debug dw_dbg,
    Dwarf_Off dw_rangesoffset,
    Dwarf_Die dw_die,
    Dwarf_Off * dw_return_realoffset,
    Dwarf_Ranges ** dw_rangesbuf,
    Dwarf_Signed * dw_rangecount,
    Dwarf_Unsigned * dw_bytecount,
    Dwarf_Error * dw_error )
```

Adds return of the `dw_realoffset` to accommodate DWARF4 GNU split-dwarf, where the ranges could be in the `tiendbg` (meaning the real executable, `a.out`, not in a `dwp`). DWARF4 split-dwarf is an extension, not standard DWARF4.

If printing all entries in the section pass in an initial `dw_rangesoffset` of zero and `dw_die` of NULL. Then increment `dw_rangesoffset` by `dw_bytecount` and call again to get the next batch of ranges. With a specific option `dwarfdump` can do this. This not a normal thing to do!

See also

[Example getting .debug_ranges data](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest
<i>dw_rangesoffset</i>	The offset to read from in the section.
<i>dw_die</i>	Pass in the DIE whose DW_AT_ranges brought us to ranges.
<i>dw_return_realoffset</i>	The actual offset in the section actually read. In a tieddbg dwp DWARF4 extension object the base offset is added to dw_rangesoffset and returned here.
<i>dw_rangesbuf</i>	A pointer to an array of structs is returned here. The struct contents are the raw values in the section.
<i>dw_rangecount</i>	The count of structs in the array is returned here.
<i>dw_bytecount</i>	The number of bytes in the .debug_ranges section applying to the returned array. This makes possible just marching through the section by offset.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.12.2.2 dwarf_dealloc_ranges()

```
void dwarf_dealloc_ranges (
    Dwarf_Debug dw_dbg,
    Dwarf_Ranges * dw_rangesbuf,
    Dwarf_Signed dw_rangecount )
```

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_rangesbuf</i>	The dw_rangesbuf pointer returned by dwarf_get_ranges_b
<i>dw_rangecount</i>	The dw_rangecount returned by dwarf_get_ranges_b

9.12.2.3 dwarf_get_ranges_baseaddress()

```
int dwarf_get_ranges_baseaddress (
    Dwarf_Debug dw_dbg,
    Dwarf_Die dw_die,
    Dwarf_Bool * dw_known_base,
    Dwarf_Unsigned * dw_baseaddress,
    Dwarf_Bool * dw_at_ranges_offset_present,
    Dwarf_Unsigned * dw_at_ranges_offset,
    Dwarf_Error * dw_error )
```

The function allows callers to calculate actual address from .debug_ranges data in a simple and efficient way.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_die</i>	Pass in any non-null valid Dwarf_Die to find the applicable .debug_ranges base address. The dw_die need not be a CU-DIE. A null dw_die is allowed.

Parameters

<i>dw_known_base</i>	if <i>dw_die</i> is non-null and there is a known base address for the CU DIE that (a <i>DW_at_low_pc</i> in the CU DIE) <i>dw_known_base</i> will be set TRUE, Otherwise the value FALSE will be returned through <i>dw_known_base</i> .
<i>dw_baseaddress</i>	if <i>dw_known_base</i> is returned as TRUE then <i>dw_baseaddress</i> will be set with the correct pc value. Otherwise zero will be set through <i>dw_baseaddress</i> .
<i>dw_at_ranges_offset_present</i>	Set to 1 (TRUE) if the <i>dw_die</i> has the attribute <i>DW_AT_ranges</i> , otherwise set to zero (FALSE).
<i>dw_at_ranges_offset</i>	Set to the value of <i>dw_die</i> <i>DW_AT_ranges</i> attribute of <i>dw_die</i> if and only iff <i>dw_at_ranges_offset_present</i> was set to 1.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK or DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY.

9.13 Rnglists: code addresses in DWARF5

Functions

- int [dwarf_rnglists_get_rle_head](#) ([Dwarf_Attribute](#) dw_attr, [Dwarf_Half](#) dw_theform, [Dwarf_Unsigned](#) dw_index_or_offset_value, [Dwarf_Rnglists_Head](#) *dw_head_out, [Dwarf_Unsigned](#) *dw_count_of_entries_in_head, [Dwarf_Unsigned](#) *dw_global_offset_of_rle_set, [Dwarf_Error](#) *dw_error)

Get Access to DWARF5 rnglists.

- int [dwarf_get_rnglists_entry_fields_a](#) ([Dwarf_Rnglists_Head](#) dw_head, [Dwarf_Unsigned](#) dw_entrynum, unsigned int *dw_entrylen, unsigned int *dw_rle_value_out, [Dwarf_Unsigned](#) *dw_raw1, [Dwarf_Unsigned](#) *dw_raw2, [Dwarf_Bool](#) *dw_debug_addr_unavailable, [Dwarf_Unsigned](#) *dw_cooked1, [Dwarf_Unsigned](#) *dw_cooked2, [Dwarf_Error](#) *dw_error)

Access rnglist entry details.

- void [dwarf_dealloc_rnglists_head](#) ([Dwarf_Rnglists_Head](#) dw_head)

Dealloc a Dwarf_Rnglists_Head.

- int [dwarf_load_rnglists](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Unsigned](#) *dw_rnglists_count, [Dwarf_Error](#) *dw_error)

Loads all .debug_rnglists headers.

- int [dwarf_get_rnglist_offset_index_value](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Unsigned](#) dw_context_index, [Dwarf_Unsigned](#) dw_offsetentry_index, [Dwarf_Unsigned](#) *dw_offset_value_out, [Dwarf_Unsigned](#) *dw_global_offset_value_out, [Dwarf_Error](#) *dw_error)

Retrieve the section offset of a rnglist.

- int [dwarf_get_rnglist_head_basics](#) ([Dwarf_Rnglists_Head](#) dw_head, [Dwarf_Unsigned](#) *dw_rle_count, [Dwarf_Unsigned](#) *dw_rnglists_version, [Dwarf_Unsigned](#) *dw_rnglists_index_returned, [Dwarf_Unsigned](#) *dw_bytes_total_in_rle, [Dwarf_Half](#) *dw_offset_size, [Dwarf_Half](#) *dw_address_size, [Dwarf_Half](#) *dw_segment_selector_size, [Dwarf_Unsigned](#) *dw_overall_offset_of_this_context, [Dwarf_Unsigned](#) *dw_total_length_of_this_context, [Dwarf_Unsigned](#) *dw_offset_table_offset, [Dwarf_Unsigned](#) *dw_offset_table_entrycount, [Dwarf_Bool](#) *dw_rnglists_base_present, [Dwarf_Unsigned](#) *dw_rnglists_base, [Dwarf_Bool](#) *dw_rnglists_base_address_present, [Dwarf_Unsigned](#) *dw_rnglists_base_address, [Dwarf_Bool](#) *dw_rnglists_debug_addr_base_present, [Dwarf_Unsigned](#) *dw_rnglists_debug_addr_base, [Dwarf_Error](#) *dw_error)

Access to internal data on rngelists.

- int [dwarf_get_rnglist_context_basics](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Unsigned](#) dw_index, [Dwarf_Unsigned](#) *dw_header_offset, [Dwarf_Small](#) *dw_offset_size, [Dwarf_Small](#) *dw_extension_size, unsigned int *dw_version, [Dwarf_Small](#) *dw_address_size, [Dwarf_Small](#) *dw_segment_selector_size, [Dwarf_Unsigned](#) *dw_offset_entry_count, [Dwarf_Unsigned](#) *dw_offset_of_offset_array, [Dwarf_Unsigned](#) *dw_offset_of_first_rangeentry, [Dwarf_Unsigned](#) *dw_offset_past_last_rangeentry, [Dwarf_Error](#) *dw_error)

Access to rnglists header data.

- int [dwarf_get_rnglist_rle](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Unsigned](#) dw_contextnumber, [Dwarf_Unsigned](#) *dw_entry_offset, [Dwarf_Unsigned](#) dw_endoffset, unsigned int *dw_entrylen, unsigned int *dw_entry_kind, [Dwarf_Unsigned](#) *dw_entry_operand1, [Dwarf_Unsigned](#) *dw_entry_operand2, [Dwarf_Error](#) *dw_error)

Access to raw rnglists range data.

9.13.1 Detailed Description

Used in DWARF5 to define valid address ranges for code.

DW_FORM_rnglistx or DW_AT_ranges with DW_FORM_sec_offset

9.13.2 Function Documentation

9.13.2.1 dwarf_rnglists_get_rle_head()

```
int dwarf_rnglists_get_rle_head (
    Dwarf_Attribute dw_attr,
    Dwarf_Half dw_theform,
    Dwarf_Unsigned dw_index_or_offset_value,
    Dwarf_Rnglists_Head * dw_head_out,
    Dwarf_Unsigned * dw_count_of_entries_in_head,
    Dwarf_Unsigned * dw_global_offset_of_rle_set,
    Dwarf_Error * dw_error )
```

Opens a Dwarf_Rnglists_Head to access a set of DWARF5 rnglists .debug_rnglists DW_FORM_sec_offset DW_FORM_rnglistx (DW_AT_ranges in DWARF5).

See also

[Accessing rnglists section](#)

Parameters

<i>dw_attr</i>	The attribute referring to .debug_rnglists
<i>dw_theform</i>	The form number, DW_FORM_sec_offset or DW_FORM_rnglistx.
<i>dw_index_or_offset_value</i>	If the form is an index, pass it here. If the form is an offset, pass that here.
<i>dw_head_out</i>	On success creates a record owning the rnglists data for this attribute.
<i>dw_count_of_entries_in_head</i>	On success this is set to the number of entry in the rnglists for this attribute.
<i>dw_global_offset_of_rle_set</i>	On success set to the global offset of the rnglists in the rnglists section.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.13.2.2 dwarf_get_rnglists_entry_fields_a()

```
int dwarf_get_rnglists_entry_fields_a (
    Dwarf_Rnglists_Head dw_head,
    Dwarf_Unsigned dw_entrynum,
    unsigned int * dw_entrylen,
    unsigned int * dw_rle_value_out,
    Dwarf_Unsigned * dw_raw1,
    Dwarf_Unsigned * dw_raw2,
    Dwarf_Bool * dw_debug_addr_unavailable,
    Dwarf_Unsigned * dw_cooked1,
    Dwarf_Unsigned * dw_cooked2,
    Dwarf_Error * dw_error )
```

See also

[Accessing rnglists section](#)

Parameters

<i>dw_head</i>	The Dwarf_Rnglists_Head of interest.
<i>dw_entrynum</i>	Valid values are 0 through dw_count_of_entries_in_head-1.
<i>dw_entrylen</i>	On success returns the length in bytes of this individual entry.
<i>dw_rle_value_out</i>	On success returns the RLE value of the entry, such as DW_RLE_startx_endx. This determines which of dw_raw1 and dw_raw2 contain meaningful data.
<i>dw_raw1</i>	On success returns a value directly recorded in the rangelist entry if that applies to this rle.
<i>dw_raw2</i>	On success returns a value directly recorded in the rangelist entry if that applies to this rle.
<i>dw_debug_addr_unavailable</i>	On success returns a flag. If the .debug_addr section is required but absent or unavailable the flag is set to TRUE. Otherwise sets the flag FALSE.
<i>dw_cooked1</i>	On success returns (if appropriate) the dw_raw1 value turned into a valid address.
<i>dw_cooked2</i>	On success returns (if appropriate) the dw_raw2 value turned into a valid address. Ignore the value if dw_debug_addr_unavailable is set.
<i>dw_error</i>	The usual error detail return pointer. Ignore the value if dw_debug_addr_unavailable is set.

Returns

Returns DW_DLV_OK etc.

9.13.2.3 dwarf_dealloc_rnglists_head()

```
void dwarf_dealloc_rnglists_head (
    Dwarf_Rnglists_Head dw_head )
```

Parameters

<i>dw_head</i>	dealloc all the memory associated with <i>dw_head</i> . The caller should then immediately set the pointer to zero/NULL as it is stale.
----------------	---

9.13.2.4 dwarf_load_rnglists()

```
int dwarf_load_rnglists (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned * dw_rnglists_count,
    Dwarf_Error * dw_error )
```

Loads all the rnglists headers and returns DW_DLV_NO_ENTRY if the section is missing or empty. Intended to be done quite early. It is automatically done if anything needing CU or DIE information is called, so it is not necessary for you to call this in any normal situation.

See also

[Accessing accessing raw rnglist](#)

Doing it more than once is never necessary or harmful. There is no deallocation call made visible, deallocation happens when [dwarf_finish\(\)](#) is called.

Parameters

<i>dw_dbg</i>	
<i>dw_rnglists_count</i>	On success it returns the number of rnglists headers in the section through <i>dw_rnglists_count</i> .
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. If the section does not exist the function returns DW_DLV_OK.

9.13.2.5 dwarf_get_rnglist_offset_index_value()

```
int dwarf_get_rnglist_offset_index_value (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_context_index,
    Dwarf_Unsigned dw_offsetentry_index,
    Dwarf_Unsigned * dw_offset_value_out,
    Dwarf_Unsigned * dw_global_offset_value_out,
    Dwarf_Error * dw_error )
```

Can be used to access raw rnglist data. Not used by most callers. See DWARF5 Section 7.28 Range List Table Page 242

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
---------------	------------------------------

Parameters

<i>dw_context_index</i>	Begin this at zero.
<i>dw_offsetentry_index</i>	Begin this at zero.
<i>dw_offset_value_out</i>	On success returns the rangelist entry offset within the rangelist set.
<i>dw_global_offset_value_out</i>	On success returns the rangelist entry offset within rnglist section.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. If there are no rnglists at all, or if one of the above index values is too high to be valid it returns DW_DLV_NO_ENTRY.

9.13.2.6 dwarf_get_rnglist_head_basics()

```
int dwarf_get_rnglist_head_basics (
    Dwarf_Rnglists_Head dw_head,
    Dwarf_Unsigned * dw_rle_count,
    Dwarf_Unsigned * dw_rnglists_version,
    Dwarf_Unsigned * dw_rnglists_index_returned,
    Dwarf_Unsigned * dw_bytes_total_in_rle,
    Dwarf_Half * dw_offset_size,
    Dwarf_Half * dw_address_size,
    Dwarf_Half * dw_segment_selector_size,
    Dwarf_Unsigned * dw_overall_offset_of_this_context,
    Dwarf_Unsigned * dw_total_length_of_this_context,
    Dwarf_Unsigned * dw_offset_table_offset,
    Dwarf_Unsigned * dw_offset_table_entrycount,
    Dwarf_Bool * dw_rnglists_base_present,
    Dwarf_Unsigned * dw_rnglists_base,
    Dwarf_Bool * dw_rnglists_base_address_present,
    Dwarf_Unsigned * dw_rnglists_base_address,
    Dwarf_Bool * dw_rnglists_debug_addr_base_present,
    Dwarf_Unsigned * dw_rnglists_debug_addr_base,
    Dwarf_Error * dw_error )
```

Returns detailed data from a Dwarf_Rnglists_Head Since this is primarily internal data we don't describe the details of the returned fields here.

9.13.2.7 dwarf_get_rnglist_context_basics()

```
int dwarf_get_rnglist_context_basics (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_index,
    Dwarf_Unsigned * dw_header_offset,
    Dwarf_Small * dw_offset_size,
    Dwarf_Small * dw_extension_size,
    unsigned int * dw_version,
    Dwarf_Small * dw_address_size,
    Dwarf_Small * dw_segment_selector_size,
    Dwarf_Unsigned * dw_offset_entry_count,
    Dwarf_Unsigned * dw_offset_of_offset_array,
```

```
Dwarf_Unsigned * dw_offset_of_first_rangeentry,
Dwarf_Unsigned * dw_offset_past_last_rangeentry,
Dwarf_Error * dw_error )
```

This returns, independent of any DIEs or CUs information on the .debug_rnglists headers present in the section.

We do not document the details here. See the DWARF5 standard.

Enables printing of details about the Range List Table Headers, one header per call. Index starting at 0. Returns DW_DLV_NO_ENTRY if index is too high for the table. A .debug_rnglists section may contain any number of Range List Table Headers with their details.

9.13.2.8 dwarf_get_rnglist_rle()

```
int dwarf_get_rnglist_rle (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_contextnumber,
    Dwarf_Unsigned dw_entry_offset,
    Dwarf_Unsigned dw_endoffset,
    unsigned int * dw_entrylen,
    unsigned int * dw_entry_kind,
    Dwarf_Unsigned * dw_entry_operand1,
    Dwarf_Unsigned * dw_entry_operand2,
    Dwarf_Error * dw_error )
```

Describes the actual raw data recorded in a particular range entry.

We do not describe all these fields for now, the raw values are mostly useful for people debugging compiler-generated DWARF.

9.14 Locations of data: DWARF2-DWARF5

Macros

- #define DW_LKIND_expression 0 /* DWARF2,3,4,5 */
- #define DW_LKIND_loclist 1 /* DWARF 2,3,4 */
- #define DW_LKIND_GNU_exp_list 2 /* GNU DWARF4 .dwo extension */
- #define DW_LKIND_loclists 5 /* DWARF5 loclists */
- #define DW_LKIND_unknown 99

Functions

- int dwarf_get_loclist_c (Dwarf_Attribute dw_attr, Dwarf_Loc_Head_c *dw_loclist_head, Dwarf_Unsigned *dw_locentry_count, Dwarf_Error *dw_error)
Location Lists and Expressions.
- int dwarf_get_loclist_head_kind (Dwarf_Loc_Head_c dw_loclist_head, unsigned int *dw_lkind, Dwarf_Error *dw_error)
Know what kind of location data it is.

- int `dwarf_get_locdesc_entry_d` (`Dwarf_Loc_Head_c` dw_loclist_head, `Dwarf_Unsigned` dw_index, `Dwarf_Small` *dw_lle_value_out, `Dwarf_Unsigned` *dw_rawlowpc, `Dwarf_Unsigned` *dw_rawhipc, `Dwarf_Bool` *dw_debug_addr_unavailable, `Dwarf_Addr` *dw_lowpc_cooked, `Dwarf_Addr` *dw_hipc_cooked, `Dwarf_Unsigned` *dw_locexpr_op_count_out, `Dwarf_Locdesc_c` *dw_locentry_out, `Dwarf_Small` *dw_loclist_source_out, `Dwarf_Unsigned` *dw_expression_offset_out, `Dwarf_Unsigned` *dw_locdesc_offset_out, `Dwarf_Error` *dw_error)

Retrieve the details(_d) of a location expression.

- int `dwarf_get_locdesc_entry_e` (`Dwarf_Loc_Head_c` dw_loclist_head, `Dwarf_Unsigned` dw_index, `Dwarf_Small` *dw_lle_value_out, `Dwarf_Unsigned` *dw_rawlowpc, `Dwarf_Unsigned` *dw_rawhipc, `Dwarf_Bool` *dw_debug_addr_unavailable, `Dwarf_Addr` *dw_lowpc_cooked, `Dwarf_Addr` *dw_hipc_cooked, `Dwarf_Unsigned` *dw_locexpr_op_count_out, `Dwarf_Unsigned` *dw_lle_bytecount, `Dwarf_Locdesc_c` *dw_locentry_out, `Dwarf_Small` *dw_loclist_source_out, `Dwarf_Unsigned` *dw_expression_offset_out, `Dwarf_Unsigned` *dw_locdesc_offset_out, `Dwarf_Error` *dw_error)

Retrieve the details(_e) of a location expression.

- int `dwarf_get_location_op_value_c` (`Dwarf_Locdesc_c` dw_locdesc, `Dwarf_Unsigned` dw_index, `Dwarf_Small` *dw_operator_out, `Dwarf_Unsigned` *dw_operand1, `Dwarf_Unsigned` *dw_operand2, `Dwarf_Unsigned` *dw_operand3, `Dwarf_Unsigned` *dw_offset_for_branch, `Dwarf_Error` *dw_error)

Get the raw values from a single location operation.

- int `dwarf_loclist_from_expr_c` (`Dwarf_Debug` dw_dbg, `Dwarf_Ptr` dw_expression_in, `Dwarf_Unsigned` dw_expression_length, `Dwarf_Half` dw_address_size, `Dwarf_Half` dw_offset_size, `Dwarf_Half` dw_dwarf_version, `Dwarf_Loc_Head_c` *dw_loc_head, `Dwarf_Unsigned` *dw_listlen, `Dwarf_Error` *dw_error)

Generate a Dwarf_Loc_Head_c from an expression block.

- void `dwarf_dealloc_loc_head_c` (`Dwarf_Loc_Head_c` dw_head)

Dealloc (free) all memory allocated for Dwarf_Loc_Head_c.

- int `dwarf_load_loclists` (`Dwarf_Debug` dw_dbg, `Dwarf_Unsigned` *dw_loclists_count, `Dwarf_Error` *dw_error)

Load Loclists.

- int `dwarf_get_loclist_offset_index_value` (`Dwarf_Debug` dw_dbg, `Dwarf_Unsigned` dw_context_index, `Dwarf_Unsigned` dw_offsetentry_index, `Dwarf_Unsigned` *dw_offset_value_out, `Dwarf_Unsigned` *dw_global_offset_value_out, `Dwarf_Error` *dw_error)

Return certain loclists offsets.

- int `dwarf_get_loclist_head_basics` (`Dwarf_Loc_Head_c` dw_head, `Dwarf_Small` *dw_lkind, `Dwarf_Unsigned` *dw_lle_count, `Dwarf_Unsigned` *dw_loclists_version, `Dwarf_Unsigned` *dw_loclists_index_returned, `Dwarf_Unsigned` *dw_bytes_total_in_rle, `Dwarf_Half` *dw_offset_size, `Dwarf_Half` *dw_address_size, `Dwarf_Half` *dw_segment_selector_size, `Dwarf_Unsigned` *dw_overall_offset_of_this_context, `Dwarf_Unsigned` *dw_total_length_of_this_context, `Dwarf_Unsigned` *dw_offset_table_offset, `Dwarf_Unsigned` *dw_offset_table_entrycount, `Dwarf_Bool` *dw_loclists_base_present, `Dwarf_Unsigned` *dw_loclists_base, `Dwarf_Bool` *dw_loclists_base_address_present, `Dwarf_Unsigned` *dw_loclists_base_address, `Dwarf_Bool` *dw_loclists_debug_addr_base_present, `Dwarf_Unsigned` *dw_loclists_debug_addr_base, `Dwarf_Unsigned` *dw_offset_this_lle_area, `Dwarf_Error` *dw_error)

Return basic data about a loclists head.

- int `dwarf_get_loclist_context_basics` (`Dwarf_Debug` dw_dbg, `Dwarf_Unsigned` dw_index, `Dwarf_Unsigned` *dw_header_offset, `Dwarf_Small` *dw_offset_size, `Dwarf_Small` *dw_extension_size, unsigned int *dw_version, `Dwarf_Small` *dw_address_size, `Dwarf_Small` *dw_segment_selector_size, `Dwarf_Unsigned` *dw_offset_entry_count, `Dwarf_Unsigned` *dw_offset_of_offset_array, `Dwarf_Unsigned` *dw_offset_of_first_locentry, `Dwarf_Unsigned` *dw_offset_past_last_locentry, `Dwarf_Error` *dw_error)

Return basic data about a loclists context.

- int `dwarf_get_loclist_lle` (`Dwarf_Debug` dw_dbg, `Dwarf_Unsigned` dw_contextnumber, `Dwarf_Unsigned` *dw_entry_offset, `Dwarf_Unsigned` *dw_endoffset, unsigned int *dw_entrylen, unsigned int *dw_entry_kind, `Dwarf_Unsigned` *dw_entry_operand1, `Dwarf_Unsigned` *dw_entry_operand2, `Dwarf_Unsigned` *dw_expr_ops_blocksize, `Dwarf_Unsigned` *dw_expr_ops_offset, `Dwarf_Small` **dw_expr_opsdata, `Dwarf_Error` *dw_error)

Return basic data about a loclists context entry.

9.14.1 Detailed Description

9.14.2 Function Documentation

9.14.2.1 dwarf_get_loclist_c()

```
int dwarf_get_loclist_c (
    Dwarf_Attribute dw_attr,
    Dwarf_Loc_Head_c * dw_loclist_head,
    Dwarf_Unsigned * dw_locentry_count,
    Dwarf_Error * dw_error )
```

This works on DWARF2 through DWARF5.

See also

[Location/expression access](#)

Parameters

<i>dw_attr</i>	The attribute must refer to a location expression or a location list, so must be DW_FORM_block, DW_FORM_exprloc, or a loclist reference form..
<i>dw_loclist_head</i>	On success returns a pointer to the created loclist head record.
<i>dw_locentry_count</i>	On success returns the count of records. For an expression it will be one.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.14.2.2 dwarf_get_loclist_head_kind()

```
int dwarf_get_loclist_head_kind (
    Dwarf_Loc_Head_c dw_loclist_head,
    unsigned int * dw_lkind,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_loclist_head</i>	Pass in a loclist head pointer.
<i>dw_lkind</i>	On success returns the loclist kind through the pointer. For example DW_LKIND_expression.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.14.2.3 dwarf_get_locdesc_entry_d()

```
int dwarf_get_locdesc_entry_d (
    Dwarf_Loc_Head_c dw_loclist_head,
    Dwarf_Unsigned dw_index,
    Dwarf_Small * dw_lle_value_out,
    Dwarf_Unsigned * dw_rawlowpc,
    Dwarf_Unsigned * dw_rawhipc,
    Dwarf_Bool * dw_debug_addr_unavailable,
    Dwarf_Addr * dw_lowpc_cooked,
    Dwarf_Addr * dw_hipc_cooked,
    Dwarf_Unsigned * dw_locexpr_op_count_out,
    Dwarf_Locdesc_c * dw_locentry_out,
    Dwarf_Small * dw_loclist_source_out,
    Dwarf_Unsigned * dw_expression_offset_out,
    Dwarf_Unsigned * dw_locdesc_offset_out,
    Dwarf_Error * dw_error )
```

Cooked value means the addresses from the location description after base values applied, so they are actual addresses. `debug_addr_unavailable` non-zero means the record from a Split Dwarf skeleton unit could not be accessed from the .dwo section or dwp object so the cooked values could not be calculated.

Parameters

<i>dw_loclist_head</i>	A loclist head pointer.
<i>dw_index</i>	Pass in an index value less than <code>dw_locentry_count</code> .
<i>dw_lle_value_out</i>	On success returns the DW_LLE value applicable, such as DW_LLE_start_end .
<i>dw_rawlowpc</i>	On success returns the first operand in the expression (if the expression has an operand).
<i>dw_rawhipc</i>	On success returns the second operand in the expression. (if the expression has a second operand).
<i>dw_debug_addr_unavailable</i>	On success returns FALSE if the data required to calculate <code>dw_lowpc_cooked</code> or <code>dw_hipc_cooked</code> was present or TRUE if some required data was missing (for example in split dwarf).
<i>dw_lowpc_cooked</i>	On success and if <code>dw_debug_addr_unavailable</code> FALSE returns the true low address.
<i>dw_hipc_cooked</i>	On success and if <code>dw_debug_addr_unavailable</code> FALSE returns the true high address.
<i>dw_locexpr_op_count_out</i>	On success returns the count of operations in the expression.
<i>dw_locentry_out</i>	On success returns a pointer to a specific location description.
<i>dw_loclist_source_out</i>	On success returns the applicable DW_LKIND value.
<i>dw_expression_offset_out</i>	On success returns the offset of the expression in the applicable section.
<i>dw_locdesc_offset_out</i>	On return sets the offset to the location description offset (if that is meaningful) or zero for simple location expressions.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.14.2.4 dwarf_get_locdesc_entry_e()

```
int dwarf_get_locdesc_entry_e (
```

```

Dwarf_Loc_Head_c dw_loclist_head,
Dwarf_Unsigned dw_index,
Dwarf_Small * dw_lle_value_out,
Dwarf_Unsigned * dw_rawlowpc,
Dwarf_Unsigned * dw_rawhipc,
Dwarf_Bool * dw_debug_addr_unavailable,
Dwarf_Addr * dw_lowpc_cooked,
Dwarf_Addr * dw_hipc_cooked,
Dwarf_Unsigned * dw_locexpr_op_count_out,
Dwarf_Unsigned * dw_lle_bytecount,
Dwarf_Locdesc_c * dw_locentry_out,
Dwarf_Small * dw_loclist_source_out,
Dwarf_Unsigned * dw_expression_offset_out,
Dwarf_Unsigned * dw_locdesc_offset_out,
Dwarf_Error * dw_error )

```

Cooked value means the addresses from the location description after base values applied, so they are actual addresses. `debug_addr_unavailable` non-zero means the record from a Split Dwarf skeleton unit could not be accessed from the `.dwo` section or `dwp` object so the cooked values could not be calculated.

This is identical to `dwarf_get_locdesc_entry_d` except that it adds a pointer argument so the caller can know the size, in bytes, of the loclist `DW_LLE` operation itself.

It's used by `dwarfdump` but it is unlikely to be of interest to most callers..

9.14.2.5 dwarf_get_location_op_value_c()

```

int dwarf_get_location_op_value_c (
    Dwarf_Locdesc_c dw_locdesc,
    Dwarf_Unsigned dw_index,
    Dwarf_Small * dw_operator_out,
    Dwarf_Unsigned * dw_operand1,
    Dwarf_Unsigned * dw_operand2,
    Dwarf_Unsigned * dw_operand3,
    Dwarf_Unsigned * dw_offset_for_branch,
    Dwarf_Error * dw_error )

```

Parameters

<i>dw_locdesc</i>	Pass in a valid <code>Dwarf_Locdesc_c</code> .
<i>dw_index</i>	Pass in the operator index. zero through <code>dw_locexpr_op_count_out-1</code> .
<i>dw_operator_out</i>	On success returns the <code>DW_OP</code> operator, such as <code>DW_OP_plus</code> .
<i>dw_operand1</i>	On success returns the value of the operand or zero.
<i>dw_operand2</i>	On success returns the value of the operand or zero.
<i>dw_operand3</i>	On success returns the value of the operand or zero.
<i>dw_offset_for_branch</i>	On success returns The byte offset of the operator within the entire expression. Useful for checking the correctness of operators that branch..
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns `DW_DLV_OK` etc.

9.14.2.6 dwarf_loclist_from_expr_c()

```
int dwarf_loclist_from_expr_c (
    Dwarf_Debug dw_dbg,
    Dwarf_Ptr dw_expression_in,
    Dwarf_Unsigned dw_expression_length,
    Dwarf_Half dw_address_size,
    Dwarf_Half dw_offset_size,
    Dwarf_Half dw_dwarf_version,
    Dwarf_Loc_Head_c * dw_loc_head,
    Dwarf_Unsigned * dw_listlen,
    Dwarf_Error * dw_error )
```

Useful if you have an expression block (from somewhere), do not have a Dwarf_Attribute available, and wish to deal with the expression.

See also

[Reading a location expression](#)

Parameters

<i>dw_dbg</i>	The applicable Dwarf_Debug
<i>dw_expression_in</i>	Pass in a pointer to the expression bytes.
<i>dw_expression_length</i>	Pass in the length, in bytes, of the expression.
<i>dw_address_size</i>	Pass in the applicable address_size.
<i>dw_offset_size</i>	Pass in the applicable offset size.
<i>dw_dwarf_version</i>	Pass in the applicable dwarf version.
<i>dw_loc_head</i>	On success returns a pointer to a dwarf location head record for use in getting to the details of the expression.
<i>dw_listlen</i>	On success, sets the listlen to one.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.14.2.7 dwarf_dealloc_loc_head_c()

```
void dwarf_dealloc_loc_head_c (
    Dwarf_Loc_Head_c dw_head )
```

Parameters

<i>dw_head</i>	A head pointer.
----------------	-----------------

The caller should zero the passed-in pointer on return as it is stale at that point.

9.14.2.8 dwarf_load_loclists()

```
int dwarf_load_loclists (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned * dw_loclists_count,
    Dwarf_Error * dw_error )
```

This loads raw .debug_loclists (DWARF5). It is unlikely you have a reason to use this function. If CUs or DIES have been referenced in any way loading is already done. A duplicate loading attempt returns DW_DLV_OK immediately, returning dw_loclists_count filled in and does nothing else.

Doing it more than once is never necessary or harmful. There is no deallocation call made visible, deallocation happens when [dwarf_finish\(\)](#) is called.

Parameters

<i>dw_dbg</i>	The applicable Dwarf_Debug.
<i>dw_loclists_count</i>	On success, returns the number of DWARF5 loclists contexts in the section, whether this is the first or a duplicate load.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK if it loaded successfully or if it is a duplicate load. If no .debug_loclists present returns DW_DLV_NO_ENTRY.

9.14.2.9 dwarf_get_loclist_offset_index_value()

```
int dwarf_get_loclist_offset_index_value (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_context_index,
    Dwarf_Unsigned dw_offsetentry_index,
    Dwarf_Unsigned * dw_offset_value_out,
    Dwarf_Unsigned * dw_global_offset_value_out,
    Dwarf_Error * dw_error )
```

Useful with the DWARF5 .debug_loclists section.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_context_index</i>	Pass in the loclists context index.
<i>dw_offsetentry_index</i>	Pass in the offset array index.
<i>dw_offset_value_out</i>	On success returns the offset value at offset table[dw_offsetentry_index], an offset local to this context.
<i>dw_global_offset_value_out</i>	On success returns the same offset value but with the offset of the table added in to form a section offset.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. If one of the indexes passed in is out of range it returns DW_DLV_NO_ENTRY.

9.14.2.10 dwarf_get_loclist_head_basics()

```
int dwarf_get_loclist_head_basics (
    Dwarf_Loc_Head_c dw_head,
    Dwarf_Small * dw_lkind,
    Dwarf_Unsigned * dw_lle_count,
    Dwarf_Unsigned * dw_loclists_version,
    Dwarf_Unsigned * dw_loclists_index_returned,
    Dwarf_Unsigned * dw_bytes_total_in_rle,
    Dwarf_Half * dw_offset_size,
    Dwarf_Half * dw_address_size,
    Dwarf_Half * dw_segment_selector_size,
    Dwarf_Unsigned * dw_overall_offset_of_this_context,
    Dwarf_Unsigned * dw_total_length_of_this_context,
    Dwarf_Unsigned * dw_offset_table_offset,
    Dwarf_Unsigned * dw_offset_table_entrycount,
    Dwarf_Bool * dw_loclists_base_present,
    Dwarf_Unsigned * dw_loclists_base,
    Dwarf_Bool * dw_loclists_base_address_present,
    Dwarf_Unsigned * dw_loclists_base_address,
    Dwarf_Bool * dw_loclists_debug_addr_base_present,
    Dwarf_Unsigned * dw_loclists_debug_addr_base,
    Dwarf_Unsigned * dw_offset_this_lle_area,
    Dwarf_Error * dw_error )
```

Used by dwarfdump to print basic data from the data generated to look at a specific loclist context as returned by dwarf_loclists_index_get_lle_head() or dwarf_loclists_offset_get_lle_head. Here we know there was a Dwarf↵_Attribute so additional things are known as compared to calling dwarf_get_loclist_context_basics See DWARF5 Section 7.20 Location List Table page 243.

9.14.2.11 dwarf_get_loclist_context_basics()

```
int dwarf_get_loclist_context_basics (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_index,
    Dwarf_Unsigned * dw_header_offset,
    Dwarf_Small * dw_offset_size,
    Dwarf_Small * dw_extension_size,
    unsigned int * dw_version,
    Dwarf_Small * dw_address_size,
    Dwarf_Small * dw_segment_selector_size,
    Dwarf_Unsigned * dw_offset_entry_count,
    Dwarf_Unsigned * dw_offset_of_offset_array,
    Dwarf_Unsigned * dw_offset_of_first_locentry,
    Dwarf_Unsigned * dw_offset_past_last_locentry,
    Dwarf_Error * dw_error )
```

Some of the same values as from dwarf_get_loclist_head_basics but here without any dependence on data derived from a CU context. Useful to print raw loclist data.

9.14.2.12 dwarf_get_loclist_lle()

```
int dwarf_get_loclist_lle (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_contextnumber,
    Dwarf_Unsigned dw_entry_offset,
    Dwarf_Unsigned dw_endoffset,
    unsigned int * dw_entrylen,
    unsigned int * dw_entry_kind,
    Dwarf_Unsigned * dw_entry_operand1,
    Dwarf_Unsigned * dw_entry_operand2,
    Dwarf_Unsigned * dw_expr_ops_blocksize,
    Dwarf_Unsigned * dw_expr_ops_offset,
    Dwarf_Small ** dw_expr_opsdata,
    Dwarf_Error * dw_error )
```

Useful to print raw loclist data.

9.15 .debug_addr access: DWARF5

Functions

- int `dwarf_debug_addr_table` (`Dwarf_Debug` dw_dbg, `Dwarf_Unsigned` dw_section_offset, `Dwarf_Debug_Addr_Table` *dw_table_header, `Dwarf_Unsigned` *dw_length, `Dwarf_Half` *dw_version, `Dwarf_Small` *dw_address_size, `Dwarf_Unsigned` *dw_at_addr_base, `Dwarf_Unsigned` *dw_entry_count, `Dwarf_Unsigned` *dw_next_table_offset, `Dwarf_Error` *dw_error)
- *Return a .debug_addr table.*
- int `dwarf_debug_addr_by_index` (`Dwarf_Debug_Addr_Table` dw_dat, `Dwarf_Unsigned` dw_entry_index, `Dwarf_Unsigned` *dw_address, `Dwarf_Error` *dw_error)
- *Return .debug_addr address given table index.*
- void `dwarf_dealloc_debug_addr_table` (`Dwarf_Debug_Addr_Table` dw_dat)
- *dealloc (free) a Dwarf_Attr_Table record.*

9.15.1 Detailed Description

Reading just the .debug_addr section.

These functions solely useful for reading that section. It seems unlikely you would have a reason to call these. The functions getting attribute values use the section when appropriate without using these functions.

9.15.2 Function Documentation

9.15.2.1 dwarf_debug_addr_table()

```
int dwarf_debug_addr_table (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_section_offset,
    Dwarf_Debug_Addr_Table * dw_table_header,
    Dwarf_Unsigned * dw_length,
    Dwarf_Half * dw_version,
```

```

Dwarf_Small * dw_address_size,
Dwarf_Unsigned * dw_at_addr_base,
Dwarf_Unsigned * dw_entry_count,
Dwarf_Unsigned * dw_next_table_offset,
Dwarf_Error * dw_error )

```

Allocates and returns a pointer to a Dwarf_Debug_Addr_Table as well as the contents of the record.

Other than dw_debug and dw_error and dw_table_header a NULL passed in as a pointer argument means the return value will not be set through the pointer, so a caller can pass NULL for return values of no immediate interest.

It is only intended to enable printing of the simple DWARF5 .debug_addr section (by dwarfdump).

When emitting DWARF4, gcc may emit a GNU-specified .debug_addr format. If some CU has been opened then this call will work, but the single table will have all the entries for all CUs.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_section_offset</i>	Pass in the section offset of a table header. Start with zero. If the passed-in offset is past the last byte of the table the function returns DW_DLV_NO_ENTRY.
<i>dw_table_header</i>	On success Returns a pointer to a Dwarf_Debug_Addr_Table for use with dwarf_get_attr_by_index().
<i>dw_length</i>	On success Returns the length in bytes of this contribution to .debug_addr from the table header, including the table length field and the array of addresses.
<i>dw_version</i>	On success returns the version number, which should be 5.
<i>dw_address_size</i>	On success returns the address size of the address entries in this table.
<i>dw_at_addr_base</i>	On success returns the value that will appear in some DW_AT_addr_base attribute.
<i>dw_entry_count</i>	On success returns the number of table entries in this table instance.
<i>dw_next_table_offset</i>	On success returns the offset of the next table in the section. Use the offset returned in the next call to this function.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. If the dw_section_offset passed in is out of range it returns DW_DLV_NO_ENTRY. If it returns DW_DLV_ERROR only dw_error is set, none of the other return values are set through the pointers.

9.15.2.2 dwarf_debug_addr_by_index()

```

int dwarf_debug_addr_by_index (
    Dwarf_Debug_Addr_Table dw_dat,
    Dwarf_Unsigned dw_entry_index,
    Dwarf_Unsigned * dw_address,
    Dwarf_Error * dw_error )

```

Parameters

<i>dw_dat</i>	Pass in a Dwarf_Debug_Addr_Table pointer.
<i>dw_entry_index</i>	Pass in a Dwarf_Debug_Addr_Table index to an address. If out of the valid range 0 through dw_entry_count-1 the function returns DW_DLV_NO_ENTRY.
<i>dw_address</i>	Returns an address in the program through the pointer.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. If the dw_section_offset passed in is out of range it returns DW_DLV_NO_ENTRY. If it returns DW_DLV_ERROR only dw_error is set, dw_address is not set.

9.15.2.3 dwarf_dealloc_debug_addr_table()

```
void dwarf_dealloc_debug_addr_table (
    Dwarf_Debug_Addr_Table dw_dat )
```

Parameters

<i>dw_dat</i>	Pass in a valid Dwarf_Debug_Addr_Table pointer. Does nothing if the dw_dat field is NULL.
---------------	---

9.16 Macro Access: DWARF5

Functions

- int `dwarf_get_macro_context` (`Dwarf_Die` dw_die, `Dwarf_Unsigned` *dw_version_out, `Dwarf_Macro_Context` *dw_macro_context, `Dwarf_Unsigned` *dw_macro_unit_offset_out, `Dwarf_Unsigned` *dw_macro_ops_count_out, `Dwarf_Unsigned` *dw_macro_ops_data_length_out, `Dwarf_Error` *dw_error)
DWARF5 .debug_macro access via Dwarf_Die.
- int `dwarf_get_macro_context_by_offset` (`Dwarf_Die` dw_die, `Dwarf_Unsigned` dw_offset, `Dwarf_Unsigned` *dw_version_out, `Dwarf_Macro_Context` *dw_macro_context, `Dwarf_Unsigned` *dw_macro_ops_count_out, `Dwarf_Unsigned` *dw_macro_ops_data_length, `Dwarf_Error` *dw_error)
DWARF5 .debug_macro access via Dwarf_Die and an offset.
- int `dwarf_macro_context_total_length` (`Dwarf_Macro_Context` dw_context, `Dwarf_Unsigned` *dw_macro_total_len, `Dwarf_Error` *dw_error)
Return a macro context total length.
- void `dwarf_dealloc_macro_context` (`Dwarf_Macro_Context` dw_mc)
Dealloc a macro context.
- int `dwarf_macro_context_head` (`Dwarf_Macro_Context` dw_mc, `Dwarf_Half` *dw_version, `Dwarf_Unsigned` *dw_macro_offset, `Dwarf_Unsigned` *dw_macro_len, `Dwarf_Unsigned` *dw_macro_header_len, unsigned int *dw_flags, `Dwarf_Bool` *dw_has_line_offset, `Dwarf_Unsigned` *dw_line_offset, `Dwarf_Bool` *dw_has_offset_size_64, `Dwarf_Bool` *dw_has_operands_table, `Dwarf_Half` *dw_opcode_count, `Dwarf_Error` *dw_error)
Access the internal details of a Dwarf_Macro_Context.
- int `dwarf_macro_operands_table` (`Dwarf_Macro_Context` dw_mc, `Dwarf_Half` dw_index, `Dwarf_Half` *dw_opcode_number, `Dwarf_Half` *dw_operand_count, const `Dwarf_Small` **dw_operand_array, `Dwarf_Error` *dw_error)
Access to the details of the opcode operands table.
- int `dwarf_get_macro_op` (`Dwarf_Macro_Context` dw_macro_context, `Dwarf_Unsigned` dw_op_number, `Dwarf_Unsigned` *dw_op_start_section_offset, `Dwarf_Half` *dw_macro_operator, `Dwarf_Half` *dw_forms_count, const `Dwarf_Small` **dw_formcode_array, `Dwarf_Error` *dw_error)
Access macro operation details of a single operation.
- int `dwarf_get_macro_defundef` (`Dwarf_Macro_Context` dw_macro_context, `Dwarf_Unsigned` dw_op_number, `Dwarf_Unsigned` *dw_line_number, `Dwarf_Unsigned` *dw_index, `Dwarf_Unsigned` *dw_offset, `Dwarf_Half` *dw_forms_count, const char **dw_macro_string, `Dwarf_Error` *dw_error)
Get Macro defundef.

- int `dwarf_get_macro_startend_file` (`Dwarf_Macro_Context` dw_macro_context, `Dwarf_Unsigned` dw_op_number, `Dwarf_Unsigned` *dw_line_number, `Dwarf_Unsigned` *dw_name_index_to_line_tab, const char **dw_src_file_name, `Dwarf_Error` *dw_error)
Get Macro start end.
- int `dwarf_get_macro_import` (`Dwarf_Macro_Context` dw_macro_context, `Dwarf_Unsigned` dw_op_number, `Dwarf_Unsigned` *dw_target_offset, `Dwarf_Error` *dw_error)
Get Macro import.

9.16.1 Detailed Description

Reading the .debug_macro section.

See also

[Reading .debug_macro data \(DWARF5\)](#) An example reading .debug_macro

9.16.2 Function Documentation

9.16.2.1 dwarf_get_macro_context()

```
int dwarf_get_macro_context (
    Dwarf_Die dw_die,
    Dwarf_Unsigned * dw_version_out,
    Dwarf_Macro_Context * dw_macro_context,
    Dwarf_Unsigned * dw_macro_unit_offset_out,
    Dwarf_Unsigned * dw_macro_ops_count_out,
    Dwarf_Unsigned * dw_macro_ops_data_length_out,
    Dwarf_Error * dw_error )
```

See also

[Reading .debug_macro data \(DWARF5\)](#)

Parameters

<code>dw_die</code>	The CU DIE of interest.
<code>dw_version_out</code>	On success returns the macro context version (5)
<code>dw_macro_context</code>	On success returns a pointer to a macro context which allows access to the context content.
<code>dw_macro_unit_offset_out</code>	On success returns the offset of the macro context.
<code>dw_macro_ops_count_out</code>	On success returns the number of macro operations in the context.
<code>dw_macro_ops_data_length_out</code>	On success returns the length in bytes of the operations in the context.
<code>dw_error</code>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. If no .debug_macro section exists for the CU it returns DW_DLV_NO_ENTRY.

9.16.2.2 dwarf_get_macro_context_by_offset()

```
int dwarf_get_macro_context_by_offset (
    Dwarf_Die dw_die,
    Dwarf_Unsigned dw_offset,
    Dwarf_Unsigned * dw_version_out,
    Dwarf_Macro_Context * dw_macro_context,
    Dwarf_Unsigned * dw_macro_ops_count_out,
    Dwarf_Unsigned * dw_macro_ops_data_length,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_die</i>	The CU DIE of interest.
<i>dw_offset</i>	The offset in the section to begin reading.
<i>dw_version_out</i>	On success returns the macro context version (5)
<i>dw_macro_context</i>	On success returns a pointer to a macro context which allows access to the context content.
<i>dw_macro_ops_count_out</i>	On success returns the number of macro operations in the context.
<i>dw_macro_ops_data_length</i>	On success returns the length in bytes of the macro context, starting at the offset of the first byte of the context.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. If no .debug_macro section exists for the CU it returns DW_DLV_NO_ENTRY. If the dw_offset is outside the section it returns DW_DLV_ERROR.

9.16.2.3 dwarf_macro_context_total_length()

```
int dwarf_macro_context_total_length (
    Dwarf_Macro_Context dw_context,
    Dwarf_Unsigned * dw_mac_total_len,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_context</i>	A pointer to the macro context of interest.
<i>dw_mac_total_len</i>	On success returns the length in bytes of the macro context.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.16.2.4 dwarf_dealloc_macro_context()

```
void dwarf_dealloc_macro_context (
    Dwarf_Macro_Context dw_mc )
```

Parameters

<i>dw_mc</i>	A pointer to the macro context of interest. On return the caller should zero the pointer as the pointer is then stale.
--------------	--

9.16.2.5 dwarf_macro_context_head()

```
int dwarf_macro_context_head (
    Dwarf_Macro_Context dw_mc,
    Dwarf_Half * dw_version,
    Dwarf_Unsigned * dw_mac_offset,
    Dwarf_Unsigned * dw_mac_len,
    Dwarf_Unsigned * dw_mac_header_len,
    unsigned int * dw_flags,
    Dwarf_Bool * dw_has_line_offset,
    Dwarf_Unsigned * dw_line_offset,
    Dwarf_Bool * dw_has_offset_size_64,
    Dwarf_Bool * dw_has_operands_table,
    Dwarf_Half * dw_opcode_count,
    Dwarf_Error * dw_error )
```

Not described in detail here. See DWARF5 Standard Section 6.3.1 Macro Information Header page 166.

9.16.2.6 dwarf_macro_operands_table()

```
int dwarf_macro_operands_table (
    Dwarf_Macro_Context dw_mc,
    Dwarf_Half dw_index,
    Dwarf_Half * dw_opcode_number,
    Dwarf_Half * dw_operand_count,
    const Dwarf_Small ** dw_operand_array,
    Dwarf_Error * dw_error )
```

Not of much interest to most libdwarf users.

Parameters

<i>dw_mc</i>	The macro context of interest.
<i>dw_index</i>	The opcode operands table index. 0 through <i>dw_opcode_count</i> -1.
<i>dw_opcode_number</i>	On success returns the opcode number in the table.
<i>dw_operand_count</i>	On success returns the number of forms for that <i>dw_index</i> .
<i>dw_operand_array</i>	On success returns the array of op operand forms
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.16.2.7 dwarf_get_macro_op()

```
int dwarf_get_macro_op (
```

```

Dwarf_Macro_Context dw_macro_context,
Dwarf_Unsigned dw_op_number,
Dwarf_Unsigned * dw_op_start_section_offset,
Dwarf_Half * dw_macro_operator,
Dwarf_Half * dw_forms_count,
const Dwarf_Small ** dw_formcode_array,
Dwarf_Error * dw_error )

```

Useful for printing basic data about the operation.

Parameters

<i>dw_macro_context</i>	The macro context of interest.
<i>dw_op_number</i>	valid values are 0 through dw_macro_ops_count_out-1.
<i>dw_op_start_section_offset</i>	On success returns the section offset of this operator.
<i>dw_macro_operator</i>	On success returns the the macro operator itself, for example DW_MACRO_define.
<i>dw_forms_count</i>	On success returns the number of forms in the formcode array.
<i>dw_formcode_array</i>	On success returns a pointer to the formcode array of operand forms.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.16.2.8 dwarf_get_macro_defundef()

```

int dwarf_get_macro_defundef (
    Dwarf_Macro_Context dw_macro_context,
    Dwarf_Unsigned dw_op_number,
    Dwarf_Unsigned * dw_line_number,
    Dwarf_Unsigned * dw_index,
    Dwarf_Unsigned * dw_offset,
    Dwarf_Half * dw_forms_count,
    const char ** dw_macro_string,
    Dwarf_Error * dw_error )

```

To extract the value portion of a macro define:

See also

[dwarf_find_macro_value_start](#)

Parameters

<i>dw_macro_context</i>	The macro context of interest.
<i>dw_op_number</i>	valid values are 0 through dw_macro_ops_count_out-1. The op number must be for a def/undef.
<i>dw_line_number</i>	The line number in the user source for this define/undef
<i>dw_index</i>	On success if the macro is an strx form the value returned is the string index in the record, otherwise zero is returned.
<i>dw_offset</i>	On success if the macro is an strp or sup form the value returned is the string offset in the appropriate section, otherwise zero is returned.
<i>dw_forms_count</i>	On success the value 2 is returned.
<i>dw_macro_string</i>	On success a pointer to a null-terminated string is returned. Do not deallocate the string.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. It is an error if operator `dw_op_number` is not a DW_MACRO_define, DW_MACRO_undef, DW_MACRO_define_strp, DW_MACRO_undef_strp, DW_MACRO_undef_sup, DW_MACRO_undef_sup, DW_MACRO_define_strx, or DW_MACRO_undef_strx,

9.16.2.9 dwarf_get_macro_startend_file()

```
int dwarf_get_macro_startend_file (
    Dwarf_Macro_Context dw_macro_context,
    Dwarf_Unsigned dw_op_number,
    Dwarf_Unsigned * dw_line_number,
    Dwarf_Unsigned * dw_name_index_to_line_tab,
    const char ** dw_src_file_name,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_macro_context</i>	The macro context of interest.
<i>dw_op_number</i>	Valid values are 0 through <code>dw_macro_ops_count_out-1</code> . The op number must be for a start/end.
<i>dw_line_number</i>	If <code>end_file</code> nothing is returned here. If <code>start_file</code> on success returns the line number of the source line of the include directive.
<i>dw_name_index_to_line_tab</i>	If <code>end_file</code> nothing is returned here. If <code>start_file</code> on success returns the file name index in the line table file names table.
<i>dw_src_file_name</i>	If <code>end_file</code> nothing is returned here. If <code>start_file</code> on success returns a pointer to the null-terminated source file name. Do not free or dealloc this string.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. It is an error if the operator is not DW_MACRO_start_file or DW_MACRO_end_file.

9.16.2.10 dwarf_get_macro_import()

```
int dwarf_get_macro_import (
    Dwarf_Macro_Context dw_macro_context,
    Dwarf_Unsigned dw_op_number,
    Dwarf_Unsigned * dw_target_offset,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_macro_context</i>	The macro context of interest.
<i>dw_op_number</i>	Valid values are 0 through <code>dw_macro_ops_count_out-1</code> .
<i>dw_target_offset</i>	Returns the offset in the imported section.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. It is an error if the operator is not DW_MACRO_import or DW_MACRO_import_↵
sup.

9.17 Macro Access: DWARF2-4

Functions

- char * [dwarf_find_macro_value_start](#) (char *dw_macro_string)
Return a pointer to the value part of a macro.
- int [dwarf_get_macro_details](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Off](#) dw_macro_offset, [Dwarf_Unsigned](#) dw_↵
maximum_count, [Dwarf_Signed](#) *dw_entry_count, [Dwarf_Macro_Details](#) **dw_details, [Dwarf_Error](#) *dw_↵
error)
Getting .debug_macinfo macro details.

9.17.1 Detailed Description

Reading the .debug_macinfo section.

The section is rarely used since it takes a lot of disk space. DWARF5 has much more compact macro data (in section .debug_macro).

For an example see

See also

[Reading .debug_macinfo \(DWARF2-4\)](#) An example reading .debug_macinfo

9.17.2 Function Documentation

9.17.2.1 dwarf_find_macro_value_start()

```
char * dwarf_find_macro_value_start (
    char * dw_macro_string )
```

This function Works for all versions, DWARF2-DWARF5

Parameters

<i>dw_macro_string</i>	The macro string passed in should be properly formatted with a name, a space, and then the value portion (whether a function-like macro or not function-like).
------------------------	--

Returns

On success it returns a pointer to the value portion of the macro. On failure it returns a pointer to a NUL byte (so a zero-length string).

9.17.2.2 dwarf_get_macro_details()

```
int dwarf_get_macro_details (
    Dwarf_Debug dw_dbg,
    Dwarf_Off dw_macro_offset,
    Dwarf_Unsigned dw_maximum_count,
    Dwarf_Signed * dw_entry_count,
    Dwarf_Macro_Details ** dw_details,
    Dwarf_Error * dw_error )
```

An example calling this function

See also

[Reading .debug_macinfo \(DWARF2-4\)](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_macro_offset</i>	The offset in the section you wish to start from.
<i>dw_maximum_count</i>	Pass in a count to ensure we will not allocate an excessive amount (guarding against a
<i>dw_entry_count</i>	On success returns a count of the macro operations in a CU macro set.
<i>dw_details</i>	On success returns a pointer to an array of struct DW_Macro_Details_s .
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.18 Stack Frame Access

Functions

- int [dwarf_get_fde_list](#) (Dwarf_Debug dw_dbg, Dwarf_Cie **dw_cie_data, Dwarf_Signed *dw_cie_element_count, Dwarf_Fde **dw_fde_data, Dwarf_Signed *dw_fde_element_count, Dwarf_Error *dw_error)
Get lists of .debug_frame FDEs and CIEs.
- int [dwarf_get_fde_list_eh](#) (Dwarf_Debug dw_dbg, Dwarf_Cie **dw_cie_data, Dwarf_Signed *dw_cie_element_count, Dwarf_Fde **dw_fde_data, Dwarf_Signed *dw_fde_element_count, Dwarf_Error *dw_error)
Get lists of .eh_frame FDEs and CIEs.
- void [dwarf_dealloc_fde_cie_list](#) (Dwarf_Debug dw_dbg, Dwarf_Cie *dw_cie_data, Dwarf_Signed dw_cie_element_count, Dwarf_Fde *dw_fde_data, Dwarf_Signed dw_fde_element_count)
Release storage associated with FDE and CIE arrays.
- int [dwarf_get_fde_range](#) (Dwarf_Fde dw_fde, Dwarf_Addr *dw_low_pc, Dwarf_Unsigned *dw_func_length, Dwarf_Small **dw_fde_bytes, Dwarf_Unsigned *dw_fde_byte_length, Dwarf_Off *dw_cie_offset, Dwarf_Signed *dw_cie_index, Dwarf_Off *dw_fde_offset, Dwarf_Error *dw_error)
Return the FDE data for a single FDE.
- int [dwarf_get_fde_exception_info](#) (Dwarf_Fde dw_fde, Dwarf_Signed *dw_offset_into_exception_tables, Dwarf_Error *dw_error)
IRIX only access to C++ destructor tables.
- int [dwarf_get_cie_of_fde](#) (Dwarf_Fde dw_fde, Dwarf_Cie *dw_cie_returned, Dwarf_Error *dw_error)

Given FDE get CIE.

- int `dwarf_get_cie_info_b` (Dwarf_Cie dw_cie, Dwarf_Unsigned *dw_bytes_in_cie, Dwarf_Small *dw_↵
version, char **dw_augmenter, Dwarf_Unsigned *dw_code_alignment_factor, Dwarf_Signed *dw_data_↵
_alignment_factor, Dwarf_Half *dw_return_address_register_rule, Dwarf_Small **dw_initial_instructions,
Dwarf_Unsigned *dw_initial_instructions_length, Dwarf_Half *dw_offset_size, Dwarf_Error *dw_error)

Given a CIE get access to its content.

- int `dwarf_get_cie_index` (Dwarf_Cie dw_cie, Dwarf_Signed *dw_index, Dwarf_Error *dw_error)

Return CIE index given CIE.

- int `dwarf_get_fde_instr_bytes` (Dwarf_Fde dw_fde, Dwarf_Small **dw_outinstrs, Dwarf_Unsigned *dw_↵
outlen, Dwarf_Error *dw_error)

Return length and pointer to access frame instructions.

- int `dwarf_get_fde_info_for_all_regs3_b` (Dwarf_Fde dw_fde, Dwarf_Addr dw_pc_requested, Dwarf_Regtable3
*dw_reg_table, Dwarf_Addr *dw_row_pc, Dwarf_Bool *dw_has_more_rows, Dwarf_Addr *dw_↵
subsequent_pc, Dwarf_Error *dw_error)

Return information on frame registers at a given pc value.

- int `dwarf_get_fde_info_for_all_regs3` (Dwarf_Fde dw_fde, Dwarf_Addr dw_pc_requested, Dwarf_Regtable3
*dw_reg_table, Dwarf_Addr *dw_row_pc, Dwarf_Error *dw_error)

Return information on frame registers at a given pc value.

- int `dwarf_get_fde_info_for_reg3_c` (Dwarf_Fde dw_fde, Dwarf_Half dw_table_column, Dwarf_Addr dw_↵
_pc_requested, Dwarf_Small *dw_value_type, Dwarf_Unsigned *dw_offset_relevant, Dwarf_Unsigned
*dw_register, Dwarf_Signed *dw_offset, Dwarf_Block *dw_block_content, Dwarf_Addr *dw_row_pc_out,
Dwarf_Bool *dw_has_more_rows, Dwarf_Addr *dw_subsequent_pc, Dwarf_Error *dw_error)

Return details about a particular pc and register.

- int `dwarf_get_fde_info_for_reg3_b` (Dwarf_Fde dw_fde, Dwarf_Half dw_table_column, Dwarf_Addr dw_pc_↵
_requested, Dwarf_Small *dw_value_type, Dwarf_Unsigned *dw_offset_relevant, Dwarf_Unsigned *dw_↵
_register, Dwarf_Unsigned *dw_offset, Dwarf_Block *dw_block_content, Dwarf_Addr *dw_row_pc_out,
Dwarf_Bool *dw_has_more_rows, Dwarf_Addr *dw_subsequent_pc, Dwarf_Error *dw_error)

Return details about a particular pc and register.

- int `dwarf_get_fde_info_for_cfa_reg3_c` (Dwarf_Fde dw_fde, Dwarf_Addr dw_pc_requested, Dwarf_Small
*dw_value_type, Dwarf_Unsigned *dw_offset_relevant, Dwarf_Unsigned *dw_register, Dwarf_Signed
*dw_offset, Dwarf_Block *dw_block, Dwarf_Addr *dw_row_pc_out, Dwarf_Bool *dw_has_more_rows,
Dwarf_Addr *dw_subsequent_pc, Dwarf_Error *dw_error)

Get the value of the CFA for a particular pc value.

- int `dwarf_get_fde_info_for_cfa_reg3_b` (Dwarf_Fde dw_fde, Dwarf_Addr dw_pc_requested, Dwarf_Small
*dw_value_type, Dwarf_Unsigned *dw_offset_relevant, Dwarf_Unsigned *dw_register, Dwarf_Unsigned
*dw_offset, Dwarf_Block *dw_block, Dwarf_Addr *dw_row_pc_out, Dwarf_Bool *dw_has_more_rows,
Dwarf_Addr *dw_subsequent_pc, Dwarf_Error *dw_error)

Get the value of the CFA for a particular pc value.

- int `dwarf_get_fde_for_die` (Dwarf_Debug dw_dbg, Dwarf_Die dw_subr_die, Dwarf_Fde *dw_returned_fde,
Dwarf_Error *dw_error)

Get the fde given DW_AT_MIPS_fde in a DIE.

- int `dwarf_get_fde_n` (Dwarf_Fde *dw_fde_data, Dwarf_Unsigned dw_fde_index, Dwarf_Fde *dw_returned_↵
_fde, Dwarf_Error *dw_error)

Retrieve an FDE from an FDE table.

- int `dwarf_get_fde_at_pc` (Dwarf_Fde *dw_fde_data, Dwarf_Addr dw_pc_of_interest, Dwarf_Fde *dw_↵
returned_fde, Dwarf_Addr *dw_lopc, Dwarf_Addr *dw_hipc, Dwarf_Error *dw_error)

Retrieve an FDE given a pc.

- int `dwarf_get_cie_augmentation_data` (Dwarf_Cie dw_cie, Dwarf_Small **dw_augdata, Dwarf_Unsigned
*dw_augdata_len, Dwarf_Error *dw_error)

Return .eh_frame CIE augmentation data.

- int `dwarf_get_fde_augmentation_data` (Dwarf_Fde dw_fde, Dwarf_Small **dw_augdata, Dwarf_Unsigned
*dw_augdata_len, Dwarf_Error *dw_error)

Return .eh_frame FDE augmentation data.

- int `dwarf_expand_frame_instructions` (`Dwarf_Cie` dw_cie, `Dwarf_Small` *dw_instructionspointer, `Dwarf_Unsigned` dw_length_in_bytes, `Dwarf_Frame_Instr_Head` *dw_head, `Dwarf_Unsigned` *dw_instr_count, `Dwarf_Error` *dw_error)

Expands CIE or FDE instructions for detailed examination. Called for CIE initial instructions and FDE instructions. Call `dwarf_get_fde_instr_bytes()` or `dwarf_get_cie_info_b()` to get the initial instruction bytes and instructions byte count you wish to expand.

- int `dwarf_get_frame_instruction` (`Dwarf_Frame_Instr_Head` dw_head, `Dwarf_Unsigned` dw_instr_index, `Dwarf_Unsigned` *dw_instr_offset_in_instrs, `Dwarf_Small` *dw_cfa_operation, const char **dw_fields_↵ description, `Dwarf_Unsigned` *dw_u0, `Dwarf_Unsigned` *dw_u1, `Dwarf_Signed` *dw_s0, `Dwarf_Signed` *dw_s1, `Dwarf_Unsigned` *dw_code_alignment_factor, `Dwarf_Signed` *dw_data_alignment_factor, `Dwarf_Block` *dw_expression_block, `Dwarf_Error` *dw_error)

Return information about a single instruction Fields_description means a sequence of up to three letters including u,s,r,c,d,b, terminated by NUL byte. It is a string but we test individual bytes instead of using string compares. Do not free any of the returned values.

- int `dwarf_get_frame_instruction_a` (`Dwarf_Frame_Instr_Head` dw_, `Dwarf_Unsigned` dw_instr_index, `Dwarf_Unsigned` *dw_instr_offset_in_instrs, `Dwarf_Small` *dw_cfa_operation, const char **dw_fields_↵ description, `Dwarf_Unsigned` *dw_u0, `Dwarf_Unsigned` *dw_u1, `Dwarf_Unsigned` *dw_u2, `Dwarf_Signed` *dw_s0, `Dwarf_Signed` *dw_s1, `Dwarf_Unsigned` *dw_code_alignment_factor, `Dwarf_Signed` *dw_data_↵ alignment_factor, `Dwarf_Block` *dw_expression_block, `Dwarf_Error` *dw_error)

Expands CIE or FDE instructions for detailed examination. Called for CIE initial instructions and FDE instructions. This is the same as `dwarf_get_frame_instruction()` except that it adds a dw_u2 field which contains an address-space identifier if the letter a appears in dw_fields_description. The dw_u2 field is non-standard and only applies to Heterogeneous Debugging frame instructions defined by LLVM (DW_CFA_LLVM_def_aspace_cfa and DW_CFA_↵ LLVM_def_aspace_cfa_sf)

- void `dwarf_dealloc_frame_instr_head` (`Dwarf_Frame_Instr_Head` dw_head)

Deallocates the frame instruction data in dw_head.

- int `dwarf_fde_section_offset` (`Dwarf_Debug` dw_dbg, `Dwarf_Fde` dw_in_fde, `Dwarf_Off` *dw_fde_off, `Dwarf_Off` *dw_cie_off, `Dwarf_Error` *dw_error)

Return FDE and CIE offsets from debugging info.

- int `dwarf_cie_section_offset` (`Dwarf_Debug` dw_dbg, `Dwarf_Cie` dw_in_cie, `Dwarf_Off` *dw_cie_off, `Dwarf_Error` *dw_error)

Use to print CIE offsets from debugging info.

- `Dwarf_Half` `dwarf_set_frame_rule_table_size` (`Dwarf_Debug` dw_dbg, `Dwarf_Half` dw_value)

Frame Rule Table Size Invariants for setting frame registers .

- `Dwarf_Half` `dwarf_set_frame_rule_initial_value` (`Dwarf_Debug` dw_dbg, `Dwarf_Half` dw_value)

Frame Rule Initial Value.

- `Dwarf_Half` `dwarf_set_frame_cfa_value` (`Dwarf_Debug` dw_dbg, `Dwarf_Half` dw_value)

Frame CFA Column Invariants for setting frame registers .

- `Dwarf_Half` `dwarf_set_frame_same_value` (`Dwarf_Debug` dw_dbg, `Dwarf_Half` dw_value)

Frame Same Value Default Invariants for setting frame registers .

- `Dwarf_Half` `dwarf_set_frame_undefined_value` (`Dwarf_Debug` dw_dbg, `Dwarf_Half` dw_value)

Frame Undefined Value Default Invariants for setting frame registers .

9.18.1 Detailed Description

Use to access DWARF2-5 .debug_frame and GNU .eh_frame sections. Does not evaluate frame instructions, but provides detailed data so it is possible do that yourself.

9.18.2 Function Documentation

9.18.2.1 dwarf_get_fde_list()

```
int dwarf_get_fde_list (
    Dwarf_Debug dw_dbg,
    Dwarf_Cie ** dw_cie_data,
    Dwarf_Signed * dw_cie_element_count,
    Dwarf_Fde ** dw_fde_data,
    Dwarf_Signed * dw_fde_element_count,
    Dwarf_Error * dw_error )
```

See DWARF5 Section 6.4 Call Frame Information, page 171.

See also

[Extracting fde, cie lists.](#)

The FDE array returned through `dw_fde_data` is sorted low-to-high by the lowest-pc in each FDE.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_cie_data</i>	On success returns a pointer to an array of pointers to CIE data.
<i>dw_cie_element_count</i>	On success returns a count of the number of elements in the <code>dw_cie_data</code> array.
<i>dw_fde_data</i>	On success returns a pointer to an array of pointers to FDE data.
<i>dw_fde_element_count</i>	On success returns a count of the number of elements in the <code>dw_fde_data</code> array. On success
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.18.2.2 dwarf_get_fde_list_eh()

```
int dwarf_get_fde_list_eh (
    Dwarf_Debug dw_dbg,
    Dwarf_Cie ** dw_cie_data,
    Dwarf_Signed * dw_cie_element_count,
    Dwarf_Fde ** dw_fde_data,
    Dwarf_Signed * dw_fde_element_count,
    Dwarf_Error * dw_error )
```

The arguments are identical to the previous function, the difference is the section read. The GNU-defined `.eh_frame` section is very similar to `.debug_frame` but has unique features that matter when following a stack trace.

See also

[dwarf_get_fde_list](#)

9.18.2.3 dwarf_dealloc_fde_cie_list()

```
void dwarf_dealloc_fde_cie_list (
    Dwarf_Debug dw_dbg,
    Dwarf_Cie * dw_cie_data,
    Dwarf_Signed dw_cie_element_count,
    Dwarf_Fde * dw_fde_data,
    Dwarf_Signed dw_fde_element_count )
```

Applies to .eh_frame and .debug_frame lists.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug used in the list setup.
<i>dw_cie_data</i>	As returned from the list setup call.
<i>dw_cie_element_count</i>	
<i>dw_fde_data</i>	As returned from the list setup call.
<i>dw_fde_element_count</i>	As returned from the list setup call.

On return the pointers passed in *dw_cie_data* and *dw_fde_data* should be zeroed by the caller as they are then stale pointers.

9.18.2.4 dwarf_get_fde_range()

```
int dwarf_get_fde_range (
    Dwarf_Fde dw_fde,
    Dwarf_Addr * dw_low_pc,
    Dwarf_Unsigned * dw_func_length,
    Dwarf_Small ** dw_fde_bytes,
    Dwarf_Unsigned * dw_fde_byte_length,
    Dwarf_Off * dw_cie_offset,
    Dwarf_Signed * dw_cie_index,
    Dwarf_Off * dw_fde_offset,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_fde</i>	The FDE of interest.
<i>dw_low_pc</i>	On success returns the low pc value for the function involved.
<i>dw_func_length</i>	On success returns the length of the function code in bytes.
<i>dw_fde_bytes</i>	On success returns a pointer to the bytes of the FDE.
<i>dw_fde_byte_length</i>	On success returns the length of the <i>dw_fde_bytes</i> area.
<i>dw_cie_offset</i>	On success returns the section offset of the associated CIE.
<i>dw_cie_index</i>	On success returns the CIE index of the associated CIE.
<i>dw_fde_offset</i>	On success returns the section offset of this FDE.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.18.2.5 dwarf_get_fde_exception_info()

```
int dwarf_get_fde_exception_info (
    Dwarf_Fde dw_fde,
    Dwarf_Signed * dw_offset_into_exception_tables,
    Dwarf_Error * dw_error )
```

This applies only to IRIX C++ destructor information which was never documented and is unlikely to be of interest.

9.18.2.6 dwarf_get_cie_of_fde()

```
int dwarf_get_cie_of_fde (
    Dwarf_Fde dw_fde,
    Dwarf_Cie * dw_cie_returned,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_fde</i>	The FDE of interest.
<i>dw_cie_returned</i>	On success returns a pointer to the applicable CIE.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.18.2.7 dwarf_get_cie_info_b()

```
int dwarf_get_cie_info_b (
    Dwarf_Cie dw_cie,
    Dwarf_Unsigned * dw_bytes_in_cie,
    Dwarf_Small * dw_version,
    char ** dw_augmenter,
    Dwarf_Unsigned * dw_code_alignment_factor,
    Dwarf_Signed * dw_data_alignment_factor,
    Dwarf_Half * dw_return_address_register_rule,
    Dwarf_Small ** dw_initial_instructions,
    Dwarf_Unsigned * dw_initial_instructions_length,
    Dwarf_Half * dw_offset_size,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_cie</i>	Pass in the CIE of interest.
<i>dw_bytes_in_cie</i>	On success, returns the length of the CIE in bytes.
<i>dw_version</i>	On success, returns the CIE version number.
<i>dw_augmenter</i>	On success, returns a pointer to the augmentation string (which could be the empty string).
<i>dw_code_alignment_factor</i>	On success, returns a the code_alignment_factor used to interpret CIE/FDE operations.

Parameters

<i>dw_data_alignment_factor</i>	On success, returns a the <i>data_alignment_factor</i> used to interpret CIE/FDE operations.
<i>dw_return_address_register_rule</i>	On success, returns a register number of the return address register.
<i>dw_initial_instructions</i>	On success, returns a pointer to the bytes of <i>initial_instructions</i> in the CIE.
<i>dw_initial_instructions_length</i>	On success, returns the length in bytes of the <i>initial_instructions</i> .
<i>dw_offset_size</i>	On success, returns the <i>offset_size</i> within this CIE.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.18.2.8 dwarf_get_cie_index()

```
int dwarf_get_cie_index (
    Dwarf_Cie dw_cie,
    Dwarf_Signed * dw_index,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_cie</i>	Pass in the CIE of interest.
<i>dw_index</i>	On success, returns the index (the position of the CIE in the CIE pointer array).
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.18.2.9 dwarf_get_fde_instr_bytes()

```
int dwarf_get_fde_instr_bytes (
    Dwarf_Fde dw_fde,
    Dwarf_Small ** dw_outinstrs,
    Dwarf_Unsigned * dw_outlen,
    Dwarf_Error * dw_error )
```

See also

[dwarf_expand_frame_instructions](#)

Using [dwarf_expand_frame_instructions](#)

Parameters

<i>dw_fde</i>	Pass in the FDE of interest.
<i>dw_outinstrs</i>	On success returns a pointer to the FDE instruction byte stream.
<i>dw_outlen</i>	On success returns the length of the <i>dw_outinstrs</i> byte stream.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc.

9.18.2.10 dwarf_get_fde_info_for_all_regs3_b()

```
int dwarf_get_fde_info_for_all_regs3_b (
    Dwarf_Fde dw_fde,
    Dwarf_Addr dw_pc_requested,
    Dwarf_Regtable3 * dw_reg_table,
    Dwarf_Addr * dw_row_pc,
    Dwarf_Bool * dw_has_more_rows,
    Dwarf_Addr * dw_subsequent_pc,
    Dwarf_Error * dw_error )
```

An FDE at a given pc (code address) This function is new in October 2023 version 0.9.0.

Parameters

<i>dw_fde</i>	Pass in the FDE of interest.
<i>dw_pc_requested</i>	Pass in a pc (code) address inside that FDE.
<i>dw_reg_table</i>	On success, returns a pointer to a struct given the frame state.
<i>dw_row_pc</i>	On success returns the address of the row of frame data which may be a few counts off of the pc requested.
<i>dw_has_more_rows</i>	On success returns FALSE if there are no more rows, otherwise returns TRUE.
<i>dw_subsequent_pc</i>	On success this returns the address of the next pc for which there is a register row, making access to all the rows in sequence much more efficient than just adding 1 to a pc value.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK if the dw_pc_requested is in the FDE passed in and there is some applicable row in the table.

9.18.2.11 dwarf_get_fde_info_for_all_regs3()

```
int dwarf_get_fde_info_for_all_regs3 (
    Dwarf_Fde dw_fde,
    Dwarf_Addr dw_pc_requested,
    Dwarf_Regtable3 * dw_reg_table,
    Dwarf_Addr * dw_row_pc,
    Dwarf_Error * dw_error )
```

Identical to [dwarf_get_fde_info_for_all_regs3_b\(\)](#) except that this doesn't output dw_has_more_rows and dw_subsequent_pc.

If you need to iterate through all rows of the FDE, consider switching to [dwarf_get_fde_info_for_all_regs3_b\(\)](#) as it is more efficient.

9.18.2.12 dwarf_get_fde_info_for_reg3_c()

```
int dwarf_get_fde_info_for_reg3_c (
    Dwarf_Fde dw_fde,
    Dwarf_Half dw_table_column,
    Dwarf_Addr dw_pc_requested,
    Dwarf_Small * dw_value_type,
    Dwarf_Unsigned * dw_offset_relevant,
    Dwarf_Unsigned * dw_register,
    Dwarf_Signed * dw_offset,
    Dwarf_Block * dw_block_content,
    Dwarf_Addr * dw_row_pc_out,
    Dwarf_Bool * dw_has_more_rows,
    Dwarf_Addr * dw_subsequent_pc,
    Dwarf_Error * dw_error )
```

It is efficient to iterate across all table_columns (registers) using this function ([dwarf_get_fde_info_for_reg3_c\(\)](#)). Or one could instead call [dwarf_get_fde_info_for_all_regs3\(\)](#) and index into the table it fills in.

If `dw_value_type == DW_EXPR_EXPRESSION` or `DW_EXPR_VALUE_EXPRESSION` `dw_offset` is not set and the caller must evaluate the expression, which usually depends on runtime frame data which cannot be calculated without a stack frame including registers (etc).

[dwarf_get_fde_info_for_reg3_c\(\)](#) is new in libdwarf 0.8.0. It corrects the incorrect type of the `dw_offset` argument in [dwarf_get_fde_info_for_reg3_b\(\)](#). Both versions operate correctly.

Parameters

<i>dw_fde</i>	Pass in the FDE of interest.
<i>dw_table_column</i>	Pass in the table_column, column numbers in the table are 0 through the number_of_registers-1.
<i>dw_pc_requested</i>	Pass in the pc of interest within dw_fde.
<i>dw_value_type</i>	On success returns the value type, a DW_EXPR value. For example DW_EXPR_EXPRESSION
<i>dw_offset_relevant</i>	On success returns FALSE if the offset value is irrelevant, otherwise TRUE.
<i>dw_register</i>	On success returns a register number.
<i>dw_offset</i>	On success returns a signed register offset value when dw_value_type is DW_EXPR_OFFSET or DW_EXPR_VAL_OFFSET.
<i>dw_block_content</i>	On success returns a pointer to a block. For example, for DW_EXPR_EXPRESSION the block gives access to the expression bytes.
<i>dw_row_pc_out</i>	On success returns the address of the actual pc for this register at this pc.
<i>dw_has_more_rows</i>	On success returns FALSE if there are no more rows, otherwise returns TRUE.
<i>dw_subsequent_pc</i>	On success this returns the address of the next pc for which there is a register row, making access to all the rows in sequence much more efficient than just adding 1 to a pc value.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK if the `dw_pc_requested` is in the FDE passed in and there is a row for the pc in the table.

9.18.2.13 dwarf_get_fde_info_for_reg3_b()

```
int dwarf_get_fde_info_for_reg3_b (
    Dwarf_Fde dw_fde,
    Dwarf_Half dw_table_column,
    Dwarf_Addr dw_pc_requested,
    Dwarf_Small * dw_value_type,
    Dwarf_Unsigned * dw_offset_relevant,
    Dwarf_Unsigned * dw_register,
    Dwarf_Unsigned * dw_offset,
    Dwarf_Block * dw_block_content,
    Dwarf_Addr * dw_row_pc_out,
    Dwarf_Bool * dw_has_more_rows,
    Dwarf_Addr * dw_subsequent_pc,
    Dwarf_Error * dw_error )
```

Identical to [dwarf_get_fde_info_for_reg3_c\(\)](#) except that this returns `dw_offset` as a `Dwarf_Unsigned`, which was never appropriate, and required you to cast that value to `Dwarf_Signed` to use it properly..

Please switch to using [dwarf_get_fde_info_for_reg3_c\(\)](#)

9.18.2.14 dwarf_get_fde_info_for_cfa_reg3_c()

```
int dwarf_get_fde_info_for_cfa_reg3_c (
    Dwarf_Fde dw_fde,
    Dwarf_Addr dw_pc_requested,
    Dwarf_Small * dw_value_type,
    Dwarf_Unsigned * dw_offset_relevant,
    Dwarf_Unsigned * dw_register,
    Dwarf_Signed * dw_offset,
    Dwarf_Block * dw_block,
    Dwarf_Addr * dw_row_pc_out,
    Dwarf_Bool * dw_has_more_rows,
    Dwarf_Addr * dw_subsequent_pc,
    Dwarf_Error * dw_error )
```

See also

[dwarf_get_fde_info_for_reg3_c\(\)](#) has essentially the same return values as [dwarf_get_fde_info_for_reg3_c](#) but it refers to the CFA (which is not part of the register table) so this function has no table column argument.

New in September 2023, release 0.8.0. [dwarf_get_fde_info_for_cfa_reg3_c\(\)](#) returns `dw_offset` as a signed type. [dwarf_get_fde_info_for_cfa_reg3_b\(\)](#) returns `dw_offset` as an unsigned type, requiring the caller to cast to `Dwarf_Signed` before using the value. Both versions exist and operate properly.

If `dw_value_type == DW_EXPR_EXPRESSION` or `DW_EXPR_VALUE_EXPRESSION` `dw_offset` is not set and the caller must evaluate the expression, which usually depends on runtime frame data which cannot be calculated without a stack frame including register values (etc).

9.18.2.15 dwarf_get_fde_info_for_cfa_reg3_b()

```
int dwarf_get_fde_info_for_cfa_reg3_b (
    Dwarf_Fde dw_fde,
    Dwarf_Addr dw_pc_requested,
    Dwarf_Small * dw_value_type,
    Dwarf_Unsigned * dw_offset_relevant,
    Dwarf_Unsigned * dw_register,
    Dwarf_Unsigned * dw_offset,
    Dwarf_Block * dw_block,
    Dwarf_Addr * dw_row_pc_out,
    Dwarf_Bool * dw_has_more_rows,
    Dwarf_Addr * dw_subsequent_pc,
    Dwarf_Error * dw_error )
```

See also

[dwarf_get_fde_info_for_cfa_reg3_c](#)

This is the earlier version that returns a `dw_offset` of type `Dwarf_Unsigned`, requiring you to cast to `Dwarf_Signed` to work with the value.

9.18.2.16 dwarf_get_fde_for_die()

```
int dwarf_get_fde_for_die (
    Dwarf_Debug dw_dbg,
    Dwarf_Die dw_subr_die,
    Dwarf_Fde * dw_returned_fde,
    Dwarf_Error * dw_error )
```

This is essentially useless as only SGI/MIPS compilers from the 1990's had `DW_AT_MIPS_fde` in `DW_TAG_↔` subprogram DIEs and this relies on that attribute to work.

9.18.2.17 dwarf_get_fde_n()

```
int dwarf_get_fde_n (
    Dwarf_Fde * dw_fde_data,
    Dwarf_Unsigned dw_fde_index,
    Dwarf_Fde * dw_returned_fde,
    Dwarf_Error * dw_error )
```

This is just like indexing into the FDE array but with extra checking of the pointer and index.

See also

[dwarf_get_fde_list](#)

9.18.2.18 dwarf_get_fde_at_pc()

```
int dwarf_get_fde_at_pc (
    Dwarf_Fde * dw_fde_data,
    Dwarf_Addr dw_pc_of_interest,
    Dwarf_Fde * dw_returned_fde,
    Dwarf_Addr * dw_lopc,
    Dwarf_Addr * dw_hipc,
    Dwarf_Error * dw_error )
```

Using binary search this finds the FDE that contains this `dw_pc_of_interest`. That works because libdwarf ensures the array of FDEs is sorted by the low-pc.

See also

[dwarf_get_fde_list](#)

Parameters

<i>dw_fde_data</i>	Pass in a pointer an array of fde pointers.
<i>dw_pc_of_interest</i>	The pc value of interest.
<i>dw_returned_fde</i>	On success a pointer to the applicable FDE is set through the pointer.
<i>dw_lopc</i>	On success a pointer to the low pc in <code>dw_returned_fde</code> is set through the pointer.
<i>dw_hipc</i>	On success a pointer to the high pc (one past the actual last byte address) in <code>dw_returned_fde</code> is set through the pointer.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns `DW_DLV_OK` if the `dw_pc_of_interest` found in some FDE in the array. If no FDE is found containing `dw_pc_of_interest` `DW_DLV_NO_ENTRY` is returned.

9.18.2.19 dwarf_get_cie_augmentation_data()

```
int dwarf_get_cie_augmentation_data(
    Dwarf_Cie dw_cie,
    Dwarf_Small ** dw_augdata,
    Dwarf_Unsigned * dw_augdata_len,
    Dwarf_Error * dw_error )
```

GNU `.eh_frame` CIE augmentation information. See Linux Standard Base Core Specification version 3.0 .

See also

<https://gcc.gnu.org/legacy-ml/gcc/2003-12/msg01168.html>

Parameters

<i>dw_cie</i>	The CIE of interest.
<i>dw_augdata</i>	On success returns a pointer to the augmentation data.
<i>dw_augdata_len</i>	On success returns the length in bytes of the augmentation data.
<i>dw_error</i>	The usual error-detail return pointer.

Returns

Returns DW_DLV_OK etc. If the augmentation data length is zero it returns DW_DLV_NO_ENTRY.

9.18.2.20 dwarf_get_fde_augmentation_data()

```
int dwarf_get_fde_augmentation_data (
    Dwarf_Fde dw_fde,
    Dwarf_Small ** dw_augdata,
    Dwarf_Unsigned * dw_augdata_len,
    Dwarf_Error * dw_error )
```

GNU .eh_frame FDE augmentation information. See Linux Standard Base Core Specification version 3.0 .

See also

<https://gcc.gnu.org/legacy-ml/gcc/2003-12/msg01168.html>

Parameters

<i>dw_fde</i>	The FDE of interest.
<i>dw_augdata</i>	On success returns a pointer to the augmentation data.
<i>dw_augdata_len</i>	On success returns the length in bytes of the augmentation data.
<i>dw_error</i>	The usual error detail return pointer.

Returns

Returns DW_DLV_OK etc. If the augmentation data length is zero it returns DW_DLV_NO_ENTRY.

9.18.2.21 dwarf_expand_frame_instructions()

```
int dwarf_expand_frame_instructions (
    Dwarf_Cie dw_cie,
    Dwarf_Small * dw_instructionspointer,
    Dwarf_Unsigned dw_length_in_bytes,
    Dwarf_Frame_Instr_Head * dw_head,
    Dwarf_Unsigned * dw_instr_count,
    Dwarf_Error * dw_error )
```

Combined with [dwarf_get_frame_instruction\(\)](#) or [dwarf_get_frame_instruction_a\(\)](#) (the second is like the first but adds an argument for LLVM address space numbers) it enables detailed access to frame instruction fields for evaluation or printing.

Free allocated memory with [dwarf_dealloc_frame_instr_head\(\)](#).

See also

[Using dwarf_expand_frame_instructions](#)

Parameters

<i>dw_cie</i>	The cie relevant to the instructions.
<i>dw_instructionspointer</i>	points to the instructions
<i>dw_length_in_bytes</i>	byte length of the instruction sequence.
<i>dw_head</i>	The address of an allocated <i>dw_head</i>
<i>dw_instr_count</i>	Returns the number of instructions in the byte stream
<i>dw_error</i>	Error return details

Returns

On success returns DW_DLV_OK

9.18.2.22 dwarf_get_frame_instruction()

```
int dwarf_get_frame_instruction (
    Dwarf_Frame_Instr_Head dw_head,
    Dwarf_Unsigned dw_instr_index,
    Dwarf_Unsigned * dw_instr_offset_in_instrs,
    Dwarf_Small * dw_cfa_operation,
    const char ** dw_fields_description,
    Dwarf_Unsigned * dw_u0,
    Dwarf_Unsigned * dw_u1,
    Dwarf_Signed * dw_s0,
    Dwarf_Signed * dw_s1,
    Dwarf_Unsigned * dw_code_alignment_factor,
    Dwarf_Signed * dw_data_alignment_factor,
    Dwarf_Block * dw_expression_block,
    Dwarf_Error * dw_error )
```

See also

[Using dwarf_expand_frame_instructions](#)

Parameters

<i>dw_head</i>	A head record
<i>dw_instr_index</i>	index $0 < i < \text{instr_count}$
<i>dw_instr_offset_in_instrs</i>	Returns the byte offset of this instruction within instructions.
<i>dw_cfa_operation</i>	Returns a DW_CFA opcode.
<i>dw_fields_description</i>	Returns a string. Do not free.
<i>dw_u0</i>	May be set to an unsigned value
<i>dw_u1</i>	May be set to an unsigned value
<i>dw_s0</i>	May be set to a signed value
<i>dw_s1</i>	May be set to a signed value
<i>dw_code_alignment_factor</i>	May be set by the call
<i>dw_data_alignment_factor</i>	May be set by the call
<i>dw_expression_block</i>	Pass in a pointer to a block
<i>dw_error</i>	If DW_DLV_ERROR and the argument is non-NULL, returns details about the error.

Returns

On success returns DW_DLV_OK. If there is no such instruction with that index it returns DW_DLV_NO_ENTRY. On error it returns DW_DLV_ERROR and if dw_error is NULL it pushes back a pointer to a Dwarf_Error to the caller.

Frame expressions have a variety of formats and content. The dw_fields parameter is set to a pointer to a short string with some set of the letters s,u,r,d,c,b,a which enables determining exactly which values the call sets. Some examples: A *s* in fields[0] means s0 is a signed number.

A *b* somewhere in fields means the expression block passed in has been filled in.

A *r* in fields[1] means u1 is set to a register number.

A *d* in fields means data_alignment_factor is set

A *c* in fields means code_alignment_factor is set

An *a* in fields means an LLVM address space value and only exists if calling [dwarf_get_frame_instruction_a\(\)](#).

The possible frame instruction formats are:

```
" " "b" "r" "rb" "rr" "rsd" "rsda" "ru" "rua" "rud"
"sd" "u" "uc"
```

are the possible frame instruction formats.

9.18.2.23 dwarf_get_frame_instruction_a()

```
int dwarf_get_frame_instruction_a (
    Dwarf_Frame_Instr_Head dw_,
    Dwarf_Unsigned dw_instr_index,
    Dwarf_Unsigned * dw_instr_offset_in_instrs,
    Dwarf_Small * dw_cfa_operation,
    const char ** dw_fields_description,
    Dwarf_Unsigned * dw_u0,
    Dwarf_Unsigned * dw_u1,
    Dwarf_Unsigned * dw_u2,
    Dwarf_Signed * dw_s0,
    Dwarf_Signed * dw_s1,
    Dwarf_Unsigned * dw_code_alignment_factor,
    Dwarf_Signed * dw_data_alignment_factor,
    Dwarf_Block * dw_expression_block,
    Dwarf_Error * dw_error )
```

Where multiplication is called for (via dw_code_alignment_factor or dw_data_alignment_factor) to produce an offset there is no need to check for overflow as libdwarf has already verified there is no overflow.

The return values are the same except here we have: an *a* in fields[2] or fields[3] means dw_u2 is an address-space identifier for the LLVM CFA instruction.

9.18.2.24 dwarf_dealloc_frame_instr_head()

```
void dwarf_dealloc_frame_instr_head (
    Dwarf_Frame_Instr_Head dw_head )
```

Parameters

<i>dw_head</i>	A head pointer. Frees all data created by dwarf_expand_frame_instructions() and makes the head pointer stale. The caller should set to NULL.
----------------	--

9.18.2.25 dwarf_fde_section_offset()

```
int dwarf_fde_section_offset (
    Dwarf_Debug dw_dbg,
    Dwarf_Fde dw_in_fde,
    Dwarf_Off * dw_fde_off,
    Dwarf_Off * dw_cie_off,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest
<i>dw_in_fde</i>	Pass in the FDE of interest.
<i>dw_fde_off</i>	On success returns the section offset of the FDE.
<i>dw_cie_off</i>	On success returns the section offset of the CIE.
<i>dw_error</i>	Error return details

Returns

Returns DW_DLV_OK etc.

9.18.2.26 dwarf_cie_section_offset()

```
int dwarf_cie_section_offset (
    Dwarf_Debug dw_dbg,
    Dwarf_Cie dw_in_cie,
    Dwarf_Off * dw_cie_off,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest
<i>dw_in_cie</i>	Pass in the CIE of interest.
<i>dw_cie_off</i>	On success returns the section offset of the CIE.
<i>dw_error</i>	Error return details

Returns

Returns DW_DLV_OK etc.

9.18.2.27 dwarf_set_frame_rule_table_size()

```
Dwarf_Half dwarf_set_frame_rule_table_size (
```

```
Dwarf_Debug dw_dbg,
Dwarf_Half dw_value )
```

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_value</i>	Pass in the value to record for the library to use.

Returns

Returns the previous value.

9.18.2.28 dwarf_set_frame_rule_initial_value()

```
Dwarf_Half dwarf_set_frame_rule_initial_value (
    Dwarf_Debug dw_dbg,
    Dwarf_Half dw_value )
```

Invariants for setting frame registers**Parameters**

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_value</i>	Pass in the value to record for the library to use.

Returns

Returns the previous value.

9.18.2.29 dwarf_set_frame_cfa_value()

```
Dwarf_Half dwarf_set_frame_cfa_value (
    Dwarf_Debug dw_dbg,
    Dwarf_Half dw_value )
```

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_value</i>	Pass in the value to record for the library to use.

Returns

Returns the previous value.

9.18.2.30 dwarf_set_frame_same_value()

```
Dwarf_Half dwarf_set_frame_same_value (
```

```
Dwarf_Debug dw_dbg,
Dwarf_Half dw_value )
```

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_value</i>	Pass in the value to record for the library to use.

Returns

Returns the previous value.

9.18.2.31 dwarf_set_frame_undefined_value()

```
Dwarf_Half dwarf_set_frame_undefined_value (
    Dwarf_Debug dw_dbg,
    Dwarf_Half dw_value )
```

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_value</i>	Pass in the value to record for the library to use.

Returns

Returns the previous value.

9.19 Abbreviations Section Details

Functions

- int [dwarf_get_abbrev](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Unsigned](#) dw_offset, [Dwarf_Abbrev](#) *dw_returned_↔
abbrev, [Dwarf_Unsigned](#) *dw_length, [Dwarf_Unsigned](#) *dw_attr_count, [Dwarf_Error](#) *dw_error)
Reading Abbreviation Data.
- int [dwarf_get_abbrev_tag](#) ([Dwarf_Abbrev](#) dw_abbrev, [Dwarf_Half](#) *dw_return_tag_number, [Dwarf_Error](#)
*dw_error)
Get abbreviation tag.
- int [dwarf_get_abbrev_code](#) ([Dwarf_Abbrev](#) dw_abbrev, [Dwarf_Unsigned](#) *dw_return_code_number,
[Dwarf_Error](#) *dw_error)
Get Abbreviation Code.
- int [dwarf_get_abbrev_children_flag](#) ([Dwarf_Abbrev](#) dw_abbrev, [Dwarf_Signed](#) *dw_return_flag, [Dwarf_Error](#)
*dw_error)
Get Abbrev Children Flag.
- int [dwarf_get_abbrev_entry_b](#) ([Dwarf_Abbrev](#) dw_abbrev, [Dwarf_Unsigned](#) dw_idx, [Dwarf_Bool](#) dw_filter↔
_outliers, [Dwarf_Unsigned](#) *dw_returned_attr_num, [Dwarf_Unsigned](#) *dw_returned_form, [Dwarf_Signed](#)
*dw_returned_implicit_const, [Dwarf_Off](#) *dw_offset, [Dwarf_Error](#) *dw_error)
Get Abbrev Entry Details.

9.19.1 Detailed Description

Allows reading section `.debug_abbrev` independently of CUs or DIEs. Normally not done (libdwf uses it as necessary to access DWARF DIEs and DWARF attributes) unless one is interested in the content of the section.

[About Reading Independently.](#)

9.19.2 Function Documentation

9.19.2.1 `dwarf_get_abbrev()`

```
int dwarf_get_abbrev (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_offset,
    Dwarf_Abbrev * dw_returned_abbrev,
    Dwarf_Unsigned * dw_length,
    Dwarf_Unsigned * dw_attr_count,
    Dwarf_Error * dw_error )
```

Normally you never need to call these functions. Calls that involve DIEs do all this for you behind the scenes in the library.

This reads the data for a single abbrev code starting at `dw_offset`. Essentially, opening access to an abbreviation entry.

When libdwf itself reads abbreviations to access DIEs the offset comes from the Compilation Unit Header `debug_abbrev_offset` field.

See also

[dwarf_next_cu_header_d](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_offset</i>	Pass in the offset where a Debug_Abbrev starts.
<i>dw_returned_abbrev</i>	On success, sets a pointer to a Dwarf_Abbrev through the pointer to allow further access.
<i>dw_length</i>	On success, returns the length of the entire abbreviation block (bytes), useful to calculate the next offset if reading the section independently of any compilation unit.
<i>dw_attr_count</i>	On success, returns the number of attributes in this abbreviation entry.
<i>dw_error</i>	On error <code>dw_error</code> is set to point to the error details.

Returns

The usual value: `DW_DLV_OK` etc. If the abbreviation is a single zero byte it is a null abbreviation. `DW_DLV_OK` is returned.

Close the abbrev by calling `dwarf_dealloc(dbg,*dw_returned_abbrev, DW_DLA_ABBREV)`

9.19.2.2 dwarf_get_abbrev_tag()

```
int dwarf_get_abbrev_tag (
    Dwarf_Abbrev dw_abbrev,
    Dwarf_Half * dw_return_tag_number,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_abbrev</i>	The Dwarf_Abbrev of interest.
<i>dw_return_tag_number</i>	Returns the tag value, for example DW_TAG_compile_unit.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.19.2.3 dwarf_get_abbrev_code()

```
int dwarf_get_abbrev_code (
    Dwarf_Abbrev dw_abbrev,
    Dwarf_Unsigned * dw_return_code_number,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_abbrev</i>	The Dwarf_Abbrev of interest.
<i>dw_return_code_number</i>	Returns the code for this abbreviation, a number assigned to the abbreviation and unique within the applicable CU.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.19.2.4 dwarf_get_abbrev_children_flag()

```
int dwarf_get_abbrev_children_flag (
    Dwarf_Abbrev dw_abbrev,
    Dwarf_Signed * dw_return_flag,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_abbrev</i>	The Dwarf_Abbrev of interest.
<i>dw_return_flag</i>	On success returns the flag TRUE (greater than zero) if the DIE referencing the abbreviation has children, else returns FALSE (zero).
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.19.2.5 dwarf_get_abbrev_entry_b()

```
int dwarf_get_abbrev_entry_b (
    Dwarf_Abbrev dw_abbrev,
    Dwarf_Unsigned dw_indx,
    Dwarf_Bool dw_filter_outliers,
    Dwarf_Unsigned * dw_returned_attr_num,
    Dwarf_Unsigned * dw_returned_form,
    Dwarf_Signed * dw_returned_implicit_const,
    Dwarf_Off * dw_offset,
    Dwarf_Error * dw_error )
```

Most will call with filter_outliers non-zero.

Parameters

<i>dw_abbrev</i>	The Dwarf_Abbrev of interest.
<i>dw_indx</i>	Valid dw_index values are 0 through dw_attr_count-1
<i>dw_filter_outliers</i>	Pass non-zero (TRUE) so the function will check for unreasonable abbreviation content and return DW_DLV_ERROR if such found. If zero (FALSE) passed in even a nonsensical attribute number and/or unknown DW_FORM are allowed (used by dwarfdump to report the issue(s)).
<i>dw_returned_attr_num</i>	On success returns the attribute number, such as DW_AT_name
<i>dw_returned_form</i>	On success returns the attribute FORM, such as DW_FORM_uda
<i>dw_returned_implicit_const</i>	On success, if the dw_returned_form is DW_FORM_implicit_const then dw_returned_implicit_const is the implicit const value, but if not implicit const the return value is zero..
<i>dw_offset</i>	On success returns the offset of the start of this attr/form pair in the abbreviation section.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. If the abbreviation code for this Dwarf_Abbrev is 0 it is a null abbreviation, the dw_indx is ignored, and the function returns DW_DLV_NO_ENTRY.

9.20 String Section .debug_str Details**Functions**

- int `dwarf_get_str` (Dwarf_Debug dw_dbg, Dwarf_Off dw_offset, char **dw_string, Dwarf_Signed *dw_strlen_of_string, Dwarf_Error *dw_error)

Reading From a String Section.

9.20.1 Detailed Description

Shows just the section content in detail

9.20.2 Function Documentation

9.20.2.1 dwarf_get_str()

```
int dwarf_get_str (
    Dwarf_Debug dw_dbg,
    Dwarf_Off dw_offset,
    char ** dw_string,
    Dwarf_Signed * dw_strlen_of_string,
    Dwarf_Error * dw_error )
```

Reading The String Section

Parameters

<i>dw_dbg</i>	The Dwarf_Debug whose .debug_str section we want to access.
<i>dw_offset</i>	Pass in a string offset. Start at 0, and for the next call pass in dw_offset plus dw_strlen_of_string plus 1.
<i>dw_string</i>	The caller must pass in a valid pointer to a char *. On success returns a pointer to a string from offset dw_offset. Never dealloc or free this string.
<i>dw_strlen_of_string</i>	The caller must pass in a valid pointer to a Dwarf_Signed.

On success returns the strlen() of the string.

Parameters

<i>dw_error</i>	On error dw_error is set to point to the error details.
-----------------	---

Returns

The usual value: DW_DLV_OK etc. If there is no such section it returns DW_DLV_NO_ENTRY. If the dw_offset is greater than the section size, or dw_string passed in is NULL or dw_strlen_of_string is NULL the function returns DW_DLV_ERROR.

9.21 Str_Offsets section details

Functions

- int [dwarf_open_str_offsets_table_access](#) (Dwarf_Debug dw_dbg, Dwarf_Str_Offsets_Table *dw_table_data, Dwarf_Error *dw_error)
Creates access to a .debug_str_offsets table.
- int [dwarf_close_str_offsets_table_access](#) (Dwarf_Str_Offsets_Table dw_table_data, Dwarf_Error *dw_error)
Close str_offsets access, free table_data.
- int [dwarf_next_str_offsets_table](#) (Dwarf_Str_Offsets_Table dw_table_data, Dwarf_Unsigned *dw_unit_length, Dwarf_Unsigned *dw_unit_length_offset, Dwarf_Unsigned *dw_table_start_offset, Dwarf_Half *dw_entry_size, Dwarf_Half *dw_version, Dwarf_Half *dw_padding, Dwarf_Unsigned *dw_table_value_count, Dwarf_Error *dw_error)
Iterate through the offsets tables.
- int [dwarf_str_offsets_value_by_index](#) (Dwarf_Str_Offsets_Table dw_table_data, Dwarf_Unsigned dw_index_to_entry, Dwarf_Unsigned *dw_entry_value, Dwarf_Error *dw_error)

Access to an individual str offsets table entry.

- int [dwarf_str_offsets_statistics](#) ([Dwarf_Str_Offsets_Table](#) dw_table_data, [Dwarf_Unsigned](#) *dw_wasted_byte_count, [Dwarf_Unsigned](#) *dw_table_count, [Dwarf_Error](#) *dw_error)

Reports final wasted-bytes count.

9.21.1 Detailed Description

Shows just the section content in detail. Most library users will never call these, as references to this is handled by the code accessing some Dwarf_Attribute. [Reading The Str_Offsets](#)

9.21.2 Function Documentation

9.21.2.1 dwarf_open_str_offsets_table_access()

```
int dwarf_open_str_offsets_table_access (
    Dwarf_Debug dw_dbg,
    Dwarf_Str_Offsets_Table * dw_table_data,
    Dwarf_Error * dw_error )
```

See also

[Reading string offsets section data](#)

Parameters

<i>dw_dbg</i>	Pass in the Dwarf_Debug of interest.
<i>dw_table_data</i>	On success returns a pointer to an opaque structure for use in further calls.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

DW_DLV_OK etc. If there is no .debug_str_offsets section it returns DW_DLV_NO_ENTRY

9.21.2.2 dwarf_close_str_offsets_table_access()

```
int dwarf_close_str_offsets_table_access (
    Dwarf_Str_Offsets_Table dw_table_data,
    Dwarf_Error * dw_error )
```

See also

[Reading string offsets section data](#)

Parameters

<i>dw_table_data</i>	
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

DW_DLV_OK etc. If there is no .debug_str_offsets section it returns DW_DLV_NO_ENTRY If it returns DW_DLV_ERROR there is nothing you can do except report the error and, optionally, call dwarf_dealloc_error to dealloc the error content (and then set the dw_error to NULL as after the dealloc the pointer is stale)..

9.21.2.3 dwarf_next_str_offsets_table()

```
int dwarf_next_str_offsets_table (
    Dwarf_Str_Offsets_Table dw_table_data,
    Dwarf_Unsigned * dw_unit_length,
    Dwarf_Unsigned * dw_unit_length_offset,
    Dwarf_Unsigned * dw_table_start_offset,
    Dwarf_Half * dw_entry_size,
    Dwarf_Half * dw_version,
    Dwarf_Half * dw_padding,
    Dwarf_Unsigned * dw_table_value_count,
    Dwarf_Error * dw_error )
```

See also

[Reading string offsets section data](#)

Access to the tables starts at offset zero. The library progresses through the next table automatically, keeping track internally to know where it is.

Parameters

<i>dw_table_data</i>	Pass in an open Dwarf_Str_Offsets_Table.
<i>dw_unit_length</i>	On success returns a table unit_length field
<i>dw_unit_length_offset</i>	On success returns the section offset of the unit_length field.
<i>dw_table_start_offset</i>	On success returns the section offset of the array of table entries.
<i>dw_entry_size</i>	On success returns the entry size (4 or 8)
<i>dw_version</i>	On success returns the value in the version field 5.
<i>dw_padding</i>	On success returns the zero value in the padding field.
<i>dw_table_value_count</i>	On success returns the number of table entries, each of size dw_entry_size, in the table.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

DW_DLV_OK Returns DW_DLV_NO_ENTRY if there are no more entries.

9.21.2.4 dwarf_str_offsets_value_by_index()

```
int dwarf_str_offsets_value_by_index (
    Dwarf_Str_Offsets_Table dw_table_data,
    Dwarf_Unsigned dw_index_to_entry,
    Dwarf_Unsigned * dw_entry_value,
    Dwarf_Error * dw_error )
```

See also

[Reading string offsets section data](#)

Parameters

<i>dw_table_data</i>	Pass in the open table pointer.
<i>dw_index_to_entry</i>	Pass in the entry number, 0 through <i>dw_table_value_count</i> -1 for the active table
<i>dw_entry_value</i>	On success returns the value in that table entry, an offset into a string table.
<i>dw_error</i>	On error <i>dw_error</i> is set to point to the error details.

Returns

DW_DLV_OK Returns DW_DLV_ERROR if *dw_index_to_entry* is out of the correct range.

9.21.2.5 dwarf_str_offsets_statistics()

```
int dwarf_str_offsets_statistics (
    Dwarf_Str_Offsets_Table dw_table_data,
    Dwarf_Unsigned * dw_wasted_byte_count,
    Dwarf_Unsigned * dw_table_count,
    Dwarf_Error * dw_error )
```

Reports the number of tables seen so far. Not very interesting.

Parameters

<i>dw_table_data</i>	Pass in the open table pointer.
<i>dw_wasted_byte_count</i>	Always returns 0 at present.
<i>dw_table_count</i>	On success returns the total number of tables seen so far in the section.
<i>dw_error</i>	On error <i>dw_error</i> is set to point to the error details.

Returns

DW_DLV_OK etc.

9.22 Dwarf_Error Functions

Functions

- `Dwarf_Unsigned dwarf_errno (Dwarf_Error dw_error)`
What DW_DLE code does the error have?
- `char * dwarf_errmsg (Dwarf_Error dw_error)`
What message string is in the error?
- `char * dwarf_errmsg_by_number (Dwarf_Unsigned dw_erronum)`
What message string is associated with the error number.
- `void dwarf_error_creation (Dwarf_Debug dw_dbg, Dwarf_Error *dw_error, char *dw_errmsg)`

Creating an error. This is very rarely helpful. It lets the library user create a `Dwarf_Error` and associate any string with that error. Your code could then return `DW_DLV_ERROR` to your caller when your intent is to let your caller clean up whatever seems wrong.

- void `dwarf_dealloc_error` (`Dwarf_Debug` dw_dbg, `Dwarf_Error` dw_error)

Free (dealloc) an `Dwarf_Error` something created.

9.22.1 Detailed Description

These functions aid in understanding handling.

9.22.2 Function Documentation

9.22.2.1 dwarf_errno()

```
Dwarf_Unsigned dwarf_errno (
    Dwarf_Error dw_error )
```

Parameters

<code>dw_error</code>	The dw_error should be non-null and a valid <code>Dwarf_Error</code> .
-----------------------	--

Returns

A `DW_DLE` value of some kind. For example: `DW_DLE_DIE_NULL`.

9.22.2.2 dwarf_errmsg()

```
char * dwarf_errmsg (
    Dwarf_Error dw_error )
```

Parameters

<code>dw_error</code>	The dw_error should be non-null and a valid <code>Dwarf_Error</code> .
-----------------------	--

Returns

A string with a message related to the error.

9.22.2.3 dwarf_errmsg_by_number()

```
char * dwarf_errmsg_by_number (
    Dwarf_Unsigned dw_errornum )
```

Parameters

<code>dw_errornum</code>	The dw_error should be an integer from the <code>DW_DLE</code> set. For example, <code>DW_DLE_DIE_NULL</code> .
--------------------------	---

Returns

The generic string describing that error number.

9.22.2.4 dwarf_error_creation()

```
void dwarf_error_creation (
    Dwarf_Debug dw_dbg,
    Dwarf_Error * dw_error,
    char * dw_errmsg )
```

Parameters

<i>dw_dbg</i>	The relevant Dwarf_Debug.
<i>dw_error</i>	a Dwarf_Error is returned through this pointer.
<i>dw_errmsg</i>	The message string you provide.

9.22.2.5 dwarf_dealloc_error()

```
void dwarf_dealloc_error (
    Dwarf_Debug dw_dbg,
    Dwarf_Error dw_error )
```

Parameters

<i>dw_dbg</i>	The relevant Dwarf_Debug pointer.
<i>dw_error</i>	A pointer to a Dwarf_Error. The pointer is then stale so you should immediately zero that pointer passed in.

9.23 Generic dwarf_dealloc Function**Functions**

- void **dwarf_dealloc** (Dwarf_Debug dw_dbg, void *dw_space, Dwarf_Unsigned dw_type)

The generic dealloc (free) function. It requires you know the correct DW_DLA value to pass in, and in a few cases such is not provided. The functions doing allocations tell you which dealloc to use.

9.23.1 Detailed Description

Works for most dealloc needed.

For easier to use versions see the following

See also

[dwarf_dealloc_attribute](#)
[dwarf_dealloc_die](#)
[dwarf_dealloc_dnames](#)
[dwarf_dealloc_error](#)
[dwarf_dealloc_fde_cie_list](#)
[dwarf_dealloc_frame_instr_head](#)
[dwarf_dealloc_macro_context](#)
[dwarf_dealloc_ranges](#)
[dwarf_dealloc_rnglists_head](#)
[dwarf_dealloc_uncompressed_block](#)
[dwarf_globals_dealloc](#)
[dwarf_gnu_index_dealloc](#)
[dwarf_loc_head_c_dealloc](#)
[dwarf_srclines_dealloc_b](#)

9.23.2 Function Documentation

9.23.2.1 dwarf_dealloc()

```
void dwarf_dealloc (
    Dwarf_Debug dw_dbg,
    void * dw_space,
    Dwarf_Unsigned dw_type )
```

Parameters

<i>dw_dbg</i>	Must be a valid open Dwarf_Debug. and must be the dw_dbg that the error was created on. If it is not the dealloc will do nothing.
<i>dw_space</i>	Must be an address returned directly by a libdwarf call that the call specifies as requiring dealloc/free. If it is not a segfault or address fault is possible.
<i>dw_type</i>	Must be a correct naming of the DW_DLA type. If it is not the dealloc will do nothing.

9.24 Access to Section .debug_sup

Functions

- int [dwarf_get_debug_sup](#) (Dwarf_Debug dw_dbg, Dwarf_Half *dw_version, Dwarf_Small *dw_is_↵ supplementary, char **dw_filename, Dwarf_Unsigned *dw_checksum_len, Dwarf_Small **dw_checksum, Dwarf_Error *dw_error)

Return basic .debug_sup section header data.

9.24.1 Detailed Description

9.24.2 Function Documentation

9.24.2.1 dwarf_get_debug_sup()

```
int dwarf_get_debug_sup (
    Dwarf_Debug dw_dbg,
    Dwarf_Half * dw_version,
    Dwarf_Small * dw_is_supplementary,
    char ** dw_filename,
    Dwarf_Unsigned * dw_checksum_len,
    Dwarf_Small ** dw_checksum,
    Dwarf_Error * dw_error )
```

This returns basic data from the header of a .debug_sup section. See DWARF5 Section 7.3.6, "DWARF Supplementary Object Files"

Other sections present should be normal DWARF5, so normal libdwarf calls should work. We have no existing examples on hand, so it is hard to know what really works.

If there is no such section it returns DW_DLV_NO_ENTRY.

9.25 Fast Access to .debug_names DWARF5

Functions

- int `dwarf_dnames_header` (`Dwarf_Debug` dw_dbg, `Dwarf_Off` dw_starting_offset, `Dwarf_Dnames_Head` *dw_dn, `Dwarf_Off` *dw_offset_of_next_table, `Dwarf_Error` *dw_error)
Open access to a .debug_names table.
- void `dwarf_dealloc_dnames` (`Dwarf_Dnames_Head` dw_dn)
Frees all the malloc data associated with dw_dn.
- int `dwarf_dnames_abbrevtable` (`Dwarf_Dnames_Head` dw_dn, `Dwarf_Unsigned` dw_index, `Dwarf_Unsigned` *dw_abbrev_offset, `Dwarf_Unsigned` *dw_abbrev_code, `Dwarf_Unsigned` *dw_abbrev_tag, `Dwarf_Unsigned` dw_array_size, `Dwarf_Half` *dw_idxattr_array, `Dwarf_Half` *dw_form_array, `Dwarf_Unsigned` *dw_idxattr_↵ count)
Access to the abbrevs table content.
- int `dwarf_dnames_sizes` (`Dwarf_Dnames_Head` dw_dn, `Dwarf_Unsigned` *dw_comp_unit_count, `Dwarf_Unsigned` *dw_local_type_unit_count, `Dwarf_Unsigned` *dw_foreign_type_unit_count, `Dwarf_Unsigned` *dw_bucket_count, `Dwarf_Unsigned` *dw_name_count, `Dwarf_Unsigned` *dw_abbrev_table_size, `Dwarf_Unsigned` *dw_entry_pool_size, `Dwarf_Unsigned` *dw_augmentation_string_size, char **dw_↵ augmentation_string, `Dwarf_Unsigned` *dw_section_size, `Dwarf_Half` *dw_table_version, `Dwarf_Half` *dw_↵ _offset_size, `Dwarf_Error` *dw_error)
Sizes and counts from the debug names table.
- int `dwarf_dnames_offsets` (`Dwarf_Dnames_Head` dw_dn, `Dwarf_Unsigned` *dw_header_offset, `Dwarf_Unsigned` *dw_cu_table_offset, `Dwarf_Unsigned` *dw_tu_local_offset, `Dwarf_Unsigned` *dw_foreign_tu_offset, `Dwarf_Unsigned` *dw_bucket_offset, `Dwarf_Unsigned` *dw_hashes_offset, `Dwarf_Unsigned` *dw_↵ stringoffsets_offset, `Dwarf_Unsigned` *dw_entryoffsets_offset, `Dwarf_Unsigned` *dw_abbrev_table_offset, `Dwarf_Unsigned` *dw_entry_pool_offset, `Dwarf_Error` *dw_error)
Offsets from the debug names table.
- int `dwarf_dnames_cu_table` (`Dwarf_Dnames_Head` dw_dn, const char *dw_type, `Dwarf_Unsigned` dw_↵ index_number, `Dwarf_Unsigned` *dw_offset, `Dwarf_Sig8` *dw_sig, `Dwarf_Error` *dw_error)

Each debug names cu list entry one at a time.

- int `dwarf_dnames_bucket` (`Dwarf_Dnames_Head` dw_dn, `Dwarf_Unsigned` dw_bucket_number, `Dwarf_Unsigned` *dw_index, `Dwarf_Unsigned` *dw_indexcount, `Dwarf_Error` *dw_error)

Access to bucket contents.

- int `dwarf_dnames_name` (`Dwarf_Dnames_Head` dw_dn, `Dwarf_Unsigned` dw_name_index, `Dwarf_Unsigned` *dw_bucket_number, `Dwarf_Unsigned` *dw_hash_value, `Dwarf_Unsigned` *dw_offset_to_debug_str, char **dw_ptrtostr, `Dwarf_Unsigned` *dw_offset_in_entrpool, `Dwarf_Unsigned` *dw_abbrev_number, `Dwarf_Half` *dw_abbrev_tag, `Dwarf_Unsigned` dw_array_size, `Dwarf_Half` *dw_idxattr_array, `Dwarf_Half` *dw_form_array, `Dwarf_Unsigned` *dw_idxattr_count, `Dwarf_Error` *dw_error)

Retrieve a name table entry.

- int `dwarf_dnames_entrpool` (`Dwarf_Dnames_Head` dw_dn, `Dwarf_Unsigned` dw_offset_in_entrpool, `Dwarf_Unsigned` *dw_abbrev_code, `Dwarf_Half` *dw_tag, `Dwarf_Unsigned` *dw_value_count, `Dwarf_Unsigned` *dw_index_of_abbrev, `Dwarf_Unsigned` *dw_offset_of_initial_value, `Dwarf_Error` *dw_error)

Return a the set of values from an entrpool entry.

- int `dwarf_dnames_entrpool_values` (`Dwarf_Dnames_Head` dw_dn, `Dwarf_Unsigned` dw_index_of_abbrev, `Dwarf_Unsigned` dw_offset_in_entrpool_of_values, `Dwarf_Unsigned` dw_arrays_length, `Dwarf_Half` *dw↵_array_idx_number, `Dwarf_Half` *dw_array_form, `Dwarf_Unsigned` *dw_array_of_offsets, `Dwarf_Sig8` *dw↵_array_of_signatures, `Dwarf_Bool` *dw_single_cu, `Dwarf_Unsigned` *dw_cu_offset, `Dwarf_Unsigned` *dw↵_offset_of_next_entrpool, `Dwarf_Error` *dw_error)

Return the value set defined by this entry.

9.25.1 Detailed Description

The section is new in DWARF5 and supersedes `.debug_pubnames` and `.debug_pubtypes` in DWARF2, DWARF3, and DWARF4.

The functions provide a detailed reporting of the content and structure of the table (so one can build one's own search table) but they are not particularly helpful for searching.

A new function (more than one?) would be needed for convenient searching.

9.25.2 Function Documentation

9.25.2.1 dwarf_dnames_header()

```
int dwarf_dnames_header (
    Dwarf_Debug dw_dbg,
    Dwarf_Off dw_starting_offset,
    Dwarf_Dnames_Head * dw_dn,
    Dwarf_Off * dw_offset_of_next_table,
    Dwarf_Error * dw_error )
```

Parameters

<code>dw_dbg</code>	The Dwarf_Debug of interest.
<code>dw_starting_offset</code>	Read this section starting at offset zero.
<code>dw_dn</code>	On success returns a pointer to a set of data allowing access to the table.
<code>dw_offset_of_next_table</code>	On success returns Offset just past the end of the the opened table.
<code>dw_error</code>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. If there is no such table or if dw_starting_offset is past the end of the section it returns DW_DLV_NO_ENTRY.

9.25.2.2 dwarf_dealloc_dnames()

```
void dwarf_dealloc_dnames (
    Dwarf_Dnames_Head dw_dn )
```

Parameters

<i>dw_dn</i>	A Dwarf_Dnames_Head pointer. Callers should zero the pointer passed in as soon as possible after this returns as the pointer is then stale.
--------------	---

9.25.2.3 dwarf_dnames_abbrevtable()

```
int dwarf_dnames_abbrevtable (
    Dwarf_Dnames_Head dw_dn,
    Dwarf_Unsigned dw_index,
    Dwarf_Unsigned * dw_abbrev_offset,
    Dwarf_Unsigned * dw_abbrev_code,
    Dwarf_Unsigned * dw_abbrev_tag,
    Dwarf_Unsigned dw_array_size,
    Dwarf_Half * dw_idxattr_array,
    Dwarf_Half * dw_form_array,
    Dwarf_Unsigned * dw_idxattr_count )
```

Of interest mainly to debugging issues with compilers or debuggers.

Parameters

<i>dw_dn</i>	A Dwarf_Dnames_Head pointer.
<i>dw_index</i>	An index (starting at zero) into a table constructed of abbrev data. These indexes are derived from abbrev data and are not in the abbrev data itself.
<i>dw_abbrev_offset</i>	Returns the offset of the abbrev table entry for this names table entry.
<i>dw_abbrev_code</i>	Returns the abbrev code for the abbrev at offset dw_abbrev_offset.
<i>dw_abbrev_tag</i>	Returns the tag for the abbrev at offset dw_abbrev_offset.
<i>dw_array_size</i>	The size you allocated in each of the following two arrays.
<i>dw_idxattr_array</i>	Pass in an array you allocated where the function returns and array of index attributes (DW_IDX) for this dw_abbrev_code. The last attribute code in the array is zero.
<i>dw_form_array</i>	Pass in an array you allocated where the function returns and array of forms for this dw_abbrev_code (paralleled to dw_idxattr_array). The last form code in the array is zero.
<i>dw_idxattr_count</i>	Returns the actual idxattribute/form count (including the terminating 0,0 pair. If the array_size passed in is less than this value the array returned is incomplete. Array entries needed. Might be larger than dw_array_size, meaning not all entries could be returned in your arrays.

Returns

Returns DW_DLV_OK on success. If the offset does not refer to a known part of the abbrev table it returns DW_DLV_NO_ENTRY. Never returns DW_DLV_ERROR.

9.25.2.4 dwarf_dnames_sizes()

```
int dwarf_dnames_sizes (
    Dwarf_Dnames_Head dw_dn,
    Dwarf_Unsigned * dw_comp_unit_count,
    Dwarf_Unsigned * dw_local_type_unit_count,
    Dwarf_Unsigned * dw_foreign_type_unit_count,
    Dwarf_Unsigned * dw_bucket_count,
    Dwarf_Unsigned * dw_name_count,
    Dwarf_Unsigned * dw_abbrev_table_size,
    Dwarf_Unsigned * dw_entry_pool_size,
    Dwarf_Unsigned * dw_augmentation_string_size,
    char ** dw_augmentation_string,
    Dwarf_Unsigned * dw_section_size,
    Dwarf_Half * dw_table_version,
    Dwarf_Half * dw_offset_size,
    Dwarf_Error * dw_error )
```

We do not describe these returned values. Other than for dw_dn and dw_error passing pointers you do not care about as NULL is fine. Of course no value can be returned through those passed as NULL.

Any program referencing a names table will need at least a few of these values.

See DWARF5 section 6.1.1 "Lookup By Name" particularly the graph page 139. dw_comp_unit_count is K(k), dw_local_type_unit_count is T(t), and dw_foreign_type_unit_count is F(f).

9.25.2.5 dwarf_dnames_offsets()

```
int dwarf_dnames_offsets (
    Dwarf_Dnames_Head dw_dn,
    Dwarf_Unsigned * dw_header_offset,
    Dwarf_Unsigned * dw_cu_table_offset,
    Dwarf_Unsigned * dw_tu_local_offset,
    Dwarf_Unsigned * dw_foreign_tu_offset,
    Dwarf_Unsigned * dw_bucket_offset,
    Dwarf_Unsigned * dw_hashes_offset,
    Dwarf_Unsigned * dw_stringoffsets_offset,
    Dwarf_Unsigned * dw_entryoffsets_offset,
    Dwarf_Unsigned * dw_abbrev_table_offset,
    Dwarf_Unsigned * dw_entry_pool_offset,
    Dwarf_Error * dw_error )
```

We do not describe these returned values, which refer to the .debug_names section.

The header offset is a section offset. The rest are offsets from the header.

See DWARF5 section 6.1.1 "Lookup By Name"

9.25.2.6 dwarf_dnames_cu_table()

```
int dwarf_dnames_cu_table (
    Dwarf_Dnames_Head dw_dn,
    const char * dw_type,
    Dwarf_Unsigned dw_index_number,
    Dwarf_Unsigned * dw_offset,
    Dwarf_Sig8 * dw_sig,
    Dwarf_Error * dw_error )
```

Indexes to the cu/tu/ tables start at 0.

Some values in dw_offset are actually offsets, such as for DW_IDX_die_offset. DW_IDX_compile_unit and DW_IDX_type_unit are indexes into the table specified by dw_type and are returned through dw_offset field;

Parameters

<i>dw_dn</i>	The table of interest.
<i>dw_type</i>	Pass in the type, "cu" or "tu"
<i>dw_index_number</i>	For "cu" index range is 0 through K-1 For "tu" index range is 0 through T+F-1
<i>dw_offset</i>	Zero if it cannot be determined. (check the return value!).
<i>dw_sig</i>	the Dwarf_Sig8 is filled in with a signature if the TU index is T through T+F-1
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.25.2.7 dwarf_dnames_bucket()

```
int dwarf_dnames_bucket (
    Dwarf_Dnames_Head dw_dn,
    Dwarf_Unsigned dw_bucket_number,
    Dwarf_Unsigned * dw_index,
    Dwarf_Unsigned * dw_indexcount,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_dn</i>	The Dwarf_Dnames_Head of interest.
<i>dw_bucket_number</i>	Pass in a bucket number Bucket numbers start at 0.
<i>dw_index</i>	On success returns the index of the appropriate name entry. Name entry indexes start at one, a zero index means the bucket is unused.
<i>dw_indexcount</i>	On success returns the number of name entries in the bucket.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. An out of range dw_index_number gets a return if DW_DLV_NO_ENTRY

9.25.2.8 dwarf_dnames_name()

```
int dwarf_dnames_name (
    Dwarf_Dnames_Head dw_dn,
    Dwarf_Unsigned dw_name_index,
    Dwarf_Unsigned * dw_bucket_number,
    Dwarf_Unsigned * dw_hash_value,
    Dwarf_Unsigned * dw_offset_to_debug_str,
    char ** dw_ptrtostr,
    Dwarf_Unsigned * dw_offset_in_entrypool,
    Dwarf_Unsigned * dw_abbrev_number,
    Dwarf_Half * dw_abbrev_tag,
    Dwarf_Unsigned dw_array_size,
    Dwarf_Half * dw_idxattr_array,
    Dwarf_Half * dw_form_array,
    Dwarf_Unsigned * dw_idxattr_count,
    Dwarf_Error * dw_error )
```

Retrieve the name and other data from a single name table entry.

Parameters

<i>dw_dn</i>	The table of interest.
<i>dw_name_index</i>	Pass in the desired index, start at one.
<i>dw_bucket_number</i>	On success returns a bucket number, zero if no buckets present.
<i>dw_hash_value</i>	The hash value, all zeros if no hashes present
<i>dw_offset_to_debug_str</i>	The offset to the .debug_str section string.
<i>dw_ptrtostr</i>	if dw_ptrtostr non-null returns a pointer to the applicable string here.
<i>dw_offset_in_entrypool</i>	Returns the offset in the entrypool
<i>dw_abbrev_number</i>	Returned from entrypool.
<i>dw_abbrev_tag</i>	Returned from entrypool abbrev data.
<i>dw_array_size</i>	Size of array you provide to hold DW_IDX index attribute and form numbers. Possibly 10 suffices for practical purposes.
<i>dw_idxattr_array</i>	Array space you provide, for idx attribute numbers (function will initialize it). The final entry in the array will be 0.
<i>dw_form_array</i>	Array you provide, for form numbers (function will initialize it). The final entry in the array will be 0.
<i>dw_idxattr_count</i>	Array entries needed. Might be larger than dw_array_size, meaning not all entries could be returned in your array.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. If the index passed in is outside the valid range returns DW_DLV_NO_ENTRY.

9.25.2.9 dwarf_dnames_entrypool()

```
int dwarf_dnames_entrypool (
    Dwarf_Dnames_Head dw_dn,
    Dwarf_Unsigned dw_offset_in_entrypool,
```



```

Dwarf_Unsigned * dw_abbrev_code,
Dwarf_Half * dw_tag,
Dwarf_Unsigned * dw_value_count,
Dwarf_Unsigned * dw_index_of_abbrev,
Dwarf_Unsigned * dw_offset_of_initial_value,
Dwarf_Error * dw_error )

```

Returns the basic data about an entrypool record and enables correct calling of `dwarf_dnames_entrypool_values` (see below). The two-stage approach makes it simple for callers to prepare for the number of values that will be returned by `dwarf_dnames_entrypool_values()`

Parameters

<i>dw_dn</i>	Pass in the debug names table of interest.
<i>dw_offset_in_entrypool</i>	The record offset (in the entry pool table) of the first record of IDX attributes. Starts at zero.
<i>dw_abbrev_code</i>	On success returns the abbrev code of the idx attributes for the pool entry.
<i>dw_tag</i>	On success returns the TAG of the DIE referred to by this entrypool entry.
<i>dw_value_count</i>	On success returns the number of distinct values imply by this entry.
<i>dw_index_of_abbrev</i>	On success returns the index of the abbrev index/form pairs in the abbreviation table.
<i>dw_offset_of_initial_value</i>	On success returns the entry pool offset of the sequence of bytes containing values, such as a CU index or a DIE offset.
<i>dw_error</i>	The usual error detail record

Returns

DW_DLV_OK is returned if the specified name entry exists. DW_DLV_NO_ENTRY is returned if the specified offset is outside the size of the table. DW_DLV_ERROR is returned in case of an internal error or corrupt section content.

9.25.2.10 dwarf_dnames_entrypool_values()

```

int dwarf_dnames_entrypool_values (
    Dwarf_Dnames_Head dw_dn,
    Dwarf_Unsigned dw_index_of_abbrev,
    Dwarf_Unsigned dw_offset_in_entrypool_of_values,
    Dwarf_Unsigned dw_arrays_length,
    Dwarf_Half * dw_array_idx_number,
    Dwarf_Half * dw_array_form,
    Dwarf_Unsigned * dw_array_of_offsets,
    Dwarf_Sig8 * dw_array_of_signatures,
    Dwarf_Bool * dw_single_cu,
    Dwarf_Unsigned * dw_cu_offset,
    Dwarf_Unsigned * dw_offset_of_next_entrypool,
    Dwarf_Error * dw_error )

```

Call here after calling `dwarf_dnames_entrypool` to provide data to call this function correctly.

This retrieves the index attribute values that identify a names table name.

The caller allocates a set of arrays and the function fills them in. If `dw_array_idx_number[n]` is DW_IDX_type_hash then `dw_array_of_signatures[n]` contains the hash. For other IDX values `dw_array_of_offsets[n]` contains the value being returned.

Parameters

<i>dw_dn</i>	Pass in the debug names table of interest.
<i>dw_index_of_abbrev</i>	Pass in the abbreviation index.
<i>dw_offset_in_entrypool_of_values</i>	Pass in the offset of the values returned by <i>dw_offset_of_initial_value</i> above.
<i>dw_arrays_length</i>	Pass in the array length of each of the following four fields. The <i>dw_value_count</i> returned above is what you need to use.
<i>dw_array_idx_number</i>	Create an array of Dwarf_Half values, <i>dw_arrays_length</i> long, and pass a pointer to the first entry here.
<i>dw_array_form</i>	Create an array of Dwarf_Half values, <i>dw_arrays_length</i> long, and pass a pointer to the first entry here.
<i>dw_array_of_offsets</i>	Create an array of Dwarf_Unsigned values, <i>dw_arrays_length</i> long, and pass a pointer to the first entry here.
<i>dw_array_of_signatures</i>	Create an array of Dwarf_Sig8 structs, <i>dw_arrays_length</i> long, and pass a pointer to the first entry here.
<i>dw_offset_of_next_entrypool</i>	On success returns the offset of the next entrypool. A value here is usable in the next call to <i>dwarf_dnames_entrypool</i> .
<i>dw_single_cu</i>	On success, if it is a single-cu name table there is likely no DW_IDX_compile_unit. So we return TRUE via this flag in such a case.
<i>dw_cu_offset</i>	On success, for a single-cu name table with no DW_IDX_compile_unit this is set to the CU offset from that single CU-table entry.
<i>dw_error</i>	The usual error detail record

Returns

DW_DLV_OK is returned if the specified name entry exists. DW_DLV_NO_ENTRY is returned if the specified offset is outside the size of the table. DW_DLV_ERROR is returned in case of an internal error or corrupt section content.

9.26 Fast Access to a CU given a code address

Functions

- int [dwarf_get_aranges](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Arange](#) **dw_aranges, [Dwarf_Signed](#) *dw_arange_count, [Dwarf_Error](#) *dw_error)
Get access to CUs given code addresses.
- int [dwarf_get_arange](#) ([Dwarf_Arange](#) *dw_aranges, [Dwarf_Unsigned](#) dw_arange_count, [Dwarf_Addr](#) dw_address, [Dwarf_Arange](#) *dw_returned_arange, [Dwarf_Error](#) *dw_error)
Find a range given a code address.
- int [dwarf_get_cu_die_offset](#) ([Dwarf_Arange](#) dw_arange, [Dwarf_Off](#) *dw_return_offset, [Dwarf_Error](#) *dw_error)
Given an arange return its CU DIE offset.
- int [dwarf_get_arange_cu_header_offset](#) ([Dwarf_Arange](#) dw_arange, [Dwarf_Off](#) *dw_return_cu_header_offset, [Dwarf_Error](#) *dw_error)
Given an arange return its CU header offset.
- int [dwarf_get_arange_info_b](#) ([Dwarf_Arange](#) dw_arange, [Dwarf_Unsigned](#) *dw_segment, [Dwarf_Unsigned](#) *dw_segment_entry_size, [Dwarf_Addr](#) *dw_start, [Dwarf_Unsigned](#) *dw_length, [Dwarf_Off](#) *dw_cu_die_offset, [Dwarf_Error](#) *dw_error)
Get the data in an arange entry.

9.26.1 Detailed Description

9.26.2 Function Documentation

9.26.2.1 dwarf_get_aranges()

```
int dwarf_get_aranges (
    Dwarf_Debug dw_dbg,
    Dwarf_Arange ** dw_aranges,
    Dwarf_Signed * dw_arange_count,
    Dwarf_Error * dw_error )
```

This intended as a fast-access to tie code addresses to CU dies. The data is in the .debug_aranges section. which may appear in DWARF2,3,4, or DWARF5.

See also

[Reading an aranges section](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_aranges</i>	On success returns a pointer to an array of Dwarf_Arange pointers.
<i>dw_arange_count</i>	On success returns a count of the length of the array.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. Returns DW_DLV_NO_ENTRY if there is no such section.

9.26.2.2 dwarf_get_arange()

```
int dwarf_get_arange (
    Dwarf_Arange * dw_aranges,
    Dwarf_Unsigned dw_arange_count,
    Dwarf_Addr dw_address,
    Dwarf_Arange * dw_returned_arange,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_aranges</i>	Pass in a pointer to the first entry in the aranges array of pointers.
<i>dw_arange_count</i>	Pass in the dw_arange_count, the count for the array.
<i>dw_address</i>	Pass in the code address of interest.
<i>dw_returned_arange</i>	On success, returns the particular arange that holds that address.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. Returns DW_DLV_NO_ENTRY if there is no such code address present in the section.

9.26.2.3 dwarf_get_cu_die_offset()

```
int dwarf_get_cu_die_offset (
    Dwarf_Arange dw_arange,
    Dwarf_Off * dw_return_offset,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_arange</i>	The specific arange of interest.
<i>dw_return_offset</i>	The CU DIE offset (in .debug_info) applicable to this arange..
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.26.2.4 dwarf_get_arange_cu_header_offset()

```
int dwarf_get_arange_cu_header_offset (
    Dwarf_Arange dw_arange,
    Dwarf_Off * dw_return_cu_header_offset,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_arange</i>	The specific arange of interest.
<i>dw_return_cu_header_offset</i>	The CU header offset (in .debug_info) applicable to this arange.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.26.2.5 dwarf_get_arange_info_b()

```
int dwarf_get_arange_info_b (
    Dwarf_Arange dw_arange,
    Dwarf_Unsigned * dw_segment,
    Dwarf_Unsigned * dw_segment_entry_size,
    Dwarf_Addr * dw_start,
    Dwarf_Unsigned * dw_length,
    Dwarf_Off * dw_cu_die_offset,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_arange</i>	The specific arange of interest.
<i>dw_segment</i>	On success and if <i>segment_entry_size</i> is non-zero this returns the segment number from the arange.
<i>dw_segment_entry_size</i>	On success returns the segment entry size from the arange.
<i>dw_start</i>	On success returns the low address this arange refers to.
<i>dw_length</i>	On success returns the length, in bytes of the code area this arange refers to.
<i>dw_cu_die_offset</i>	On success returns the .debug_info section offset the arange refers to.
<i>dw_error</i>	On error <i>dw_error</i> is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.27 Fast Access to .debug_pubnames and more.

Macros

- `#define DW_GL_GLOBALS 0 /* .debug_pubnames and .debug_names */`
- `#define DW_GL_PUBTYPES 1 /* .debug_pubtypes */`
- `#define DW_GL_FUNCS 2 /* .debug_funcnames */`
- `#define DW_GL_TYPES 3 /* .debug_typednames */`
- `#define DW_GL_VARS 4 /* .debug_varnames */`
- `#define DW_GL_WEAKS 5 /* .debug_weaknames */`

Functions

- `int dwarf_get_globals (Dwarf_Debug dw_dbg, Dwarf_Global **dw_globals, Dwarf_Signed *dw_number_of_globals, Dwarf_Error *dw_error)`
Global name space operations, .debug_pubnames access.
- `int dwarf_get_pubtypes (Dwarf_Debug dw_dbg, Dwarf_Global **dw_pubtypes, Dwarf_Signed *dw_number_of_pubtypes, Dwarf_Error *dw_error)`
Global debug_types access.
- `int dwarf_globals_by_type (Dwarf_Debug dw_dbg, int dw_requested_section, Dwarf_Global **dw_contents, Dwarf_Signed *dw_count, Dwarf_Error *dw_error)`
Allocate Any Fast Access DWARF2-DWARF4.
- `void dwarf_globals_dealloc (Dwarf_Debug dw_dbg, Dwarf_Global *dw_global_like, Dwarf_Signed dw_count)`
Dealloc the Dwarf_Global data.
- `int dwarf_globname (Dwarf_Global dw_global, char **dw_returned_name, Dwarf_Error *dw_error)`
Return the name of a global-like data item.
- `int dwarf_global_die_offset (Dwarf_Global dw_global, Dwarf_Off *dw_die_offset, Dwarf_Error *dw_error)`
Return the DIE offset of a global data item.
- `int dwarf_global_cu_offset (Dwarf_Global dw_global, Dwarf_Off *dw_cu_header_offset, Dwarf_Error *dw_error)`
Return the CU header data of a global data item.
- `int dwarf_global_name_offsets (Dwarf_Global dw_global, char **dw_returned_name, Dwarf_Off *dw_die_offset, Dwarf_Off *dw_cu_die_offset, Dwarf_Error *dw_error)`
Return the name and offsets of a global entry.

- [Dwarf_Half dwarf_global_tag_number](#) ([Dwarf_Global](#) dw_global)
Return the DW_TAG number of a global entry.
- [int dwarf_get_globals_header](#) ([Dwarf_Global](#) dw_global, [int](#) *dw_category, [Dwarf_Off](#) *dw_offset_publication, [Dwarf_Unsigned](#) *dw_length_size, [Dwarf_Unsigned](#) *dw_length_publication, [Dwarf_Unsigned](#) *dw_version, [Dwarf_Unsigned](#) *dw_header_info_offset, [Dwarf_Unsigned](#) *dw_info_length, [Dwarf_Error](#) *dw_error)
For more complete globals printing.
- [int dwarf_return_empty_pubnames](#) ([Dwarf_Debug](#) dw_dbg, [int](#) dw_flag)
A flag for dwarfdump on pubnames, pubtypes etc.

9.27.1 Detailed Description

Pubnames and Pubtypes overview

These functions each read one of a set of sections designed for fast access by name, but they are not always emitted as they each have somewhat limited and inflexible capabilities. So you may not see many of these.

All have the same set of functions with a name reflecting the specific object section involved. Only the first, of type [Dwarf_Global](#), is documented here in full detail as the others do the same jobs just each for their applicable object section..

9.27.2 Function Documentation

9.27.2.1 dwarf_get_globals()

```
int dwarf_get_globals (
    Dwarf\_Debug dw_dbg,
    Dwarf\_Global ** dw_globals,
    Dwarf\_Signed * dw_number_of_globals,
    Dwarf\_Error * dw_error )
```

This accesses .debug_pubnames and .debug_names sections. Section .debug_pubnames is defined in DWARF2, DWARF3, and DWARF4. Section .debug_names is defined in DWARF5 and contains lots of information, but only the part of the wealth of information that this interface allows can be retrieved here. See [dwarf_dnames_header\(\)](#) for access to all. debug_names data.

The code here, as of 0.4.3, September 3 2022, returns data from either section.

See also

[Using dwarf_get_globals\(\)](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_globals</i>	On success returns an array of pointers to opaque structs..
<i>dw_number_of_globals</i>	On success returns the number of entries in the array.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. Returns DW_DLV_NO_ENTRY if the section is not present.

9.27.2.2 dwarf_get_pubtypes()

```
int dwarf_get_pubtypes (
    Dwarf_Debug dw_dbg,
    Dwarf_Global ** dw_pubtypes,
    Dwarf_Signed * dw_number_of_pubtypes,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_pubtypes</i>	On success returns an array of pointers to opaque structs..
<i>dw_number_of_pubtypes</i>	On success returns the number of entries in the array.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. Returns DW_DLV_NO_ENTRY if the section is not present.

Same function name as 0.5.0 and earlier, but the data type changes to Dwarf_Global

[dwarf_get_pubtypes\(\)](#) is an alternate name for [dwarf_globals_by_type\(...,DW_GL_PUBTYPES,...\)](#).

9.27.2.3 dwarf_globals_by_type()

```
int dwarf_globals_by_type (
    Dwarf_Debug dw_dbg,
    int dw_requested_section,
    Dwarf_Global ** dw_contents,
    Dwarf_Signed * dw_count,
    Dwarf_Error * dw_error )
```

This interface new in 0.6.0. Simplifies access by replace dwarf_get_pubtypes, dwarf_get_funcs, dwarf_get_types, dwarfget_vars, and dwarf_get_weakes with a single set of types.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_requested_section</i>	Pass in one of the values DW_GL_GLOBALS through DW_GL_WEAKS to select the section to extract data from.
<i>dw_contents</i>	On success returns an array of pointers to opaque structs.
<i>dw_count</i>	On success returns the number of entries in the array.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc. Returns DW_DLV_NO_ENTRY if the section is not present.

9.27.2.4 dwarf_globals_dealloc()

```
void dwarf_globals_dealloc (
    Dwarf_Debug dw_dbg,
    Dwarf_Global * dw_global_like,
    Dwarf_Signed dw_count )
```

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_global_like</i>	The array of globals/types/etc data to dealloc (free).
<i>dw_count</i>	The number of entries in the array.

9.27.2.5 dwarf_globname()

```
int dwarf_globname (
    Dwarf_Global dw_global,
    char ** dw_returned_name,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_global</i>	The Dwarf_Global of interest.
<i>dw_returned_name</i>	On success a pointer to the name (a null-terminated string) is returned.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.27.2.6 dwarf_global_die_offset()

```
int dwarf_global_die_offset (
    Dwarf_Global dw_global,
    Dwarf_Off * dw_die_offset,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_global</i>	The Dwarf_Global of interest.
<i>dw_die_offset</i>	On success a the section-global DIE offset of a data item is returned.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.27.2.7 dwarf_global_cu_offset()

```
int dwarf_global_cu_offset (
    Dwarf_Global dw_global,
    Dwarf_Off * dw_cu_header_offset,
    Dwarf_Error * dw_error )
```

A CU header offset is rarely useful.

Parameters

<i>dw_global</i>	The Dwarf_Global of interest.
<i>dw_cu_header_offset</i>	On success a the section-global offset of a CU header is returned.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.27.2.8 dwarf_global_name_offsets()

```
int dwarf_global_name_offsets (
    Dwarf_Global dw_global,
    char ** dw_returned_name,
    Dwarf_Off * dw_die_offset,
    Dwarf_Off * dw_cu_die_offset,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_global</i>	The Dwarf_Global of interest.
<i>dw_returned_name</i>	On success a pointer to the name (a null-terminated string) is returned.
<i>dw_die_offset</i>	On success a the section-global DIE offset of the global with the name.
<i>dw_cu_die_offset</i>	On success a the section-global offset of the relevant CU DIE is returned.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

The usual value: DW_DLV_OK etc.

9.27.2.9 dwarf_global_tag_number()

```
Dwarf_Half dwarf_global_tag_number (
    Dwarf_Global dw_global )
```

Parameters

<i>dw_global</i>	The Dwarf_Global of interest.
------------------	-------------------------------

Returns

If the Dwarf_Global refers to a global from the .debug_names section the return value is the DW_TAG for the DIE in the global entry, for example DW_TAG_subprogram. In case of error or if the section for this global was not .debug_names zero is returned.

9.27.2.10 dwarf_get_globals_header()

```
int dwarf_get_globals_header (
    Dwarf_Global dw_global,
    int * dw_category,
    Dwarf_Off * dw_offset_pub_header,
    Dwarf_Unsigned * dw_length_size,
    Dwarf_Unsigned * dw_length_pub,
    Dwarf_Unsigned * dw_version,
    Dwarf_Unsigned * dw_header_info_offset,
    Dwarf_Unsigned * dw_info_length,
    Dwarf_Error * dw_error )
```

For each CU represented in .debug_pubnames, etc, there is a .debug_pubnames header. For any given Dwarf_Global this returns the content of the applicable header. This does not include header information from any .debug_names headers.

The function declaration changed at version 0.6.0.

9.27.2.11 dwarf_return_empty_pubnames()

```
int dwarf_return_empty_pubnames (
    Dwarf_Debug dw_dbg,
    int dw_flag )
```

Sets a flag in the dbg. Always returns DW_DLV_OK. Applies to all the sections of this kind: pubnames, pubtypes, funcs, typenames, vars, weaks. Ensures empty content (meaning no offset/name tuples, but with a header) for a CU shows up rather than being suppressed.

Primarily useful if one wants to note any pointless header data in the section.

[Pubnames and Pubtypes overview](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_flag</i>	Must be the value one.

Returns

Returns DW_DLV_OK. Always.

9.28 Fast Access to GNU .debug_gnu_pubnames

Functions

- int `dwarf_get_gnu_index_head` (`Dwarf_Debug` dw_dbg, `Dwarf_Bool` dw_which_section, `Dwarf_Gnu_Index_Head` *dw_head, `Dwarf_Unsigned` *dw_index_block_count_out, `Dwarf_Error` *dw_error)
Access to .debug_gnu_pubnames or .debug_gnu_pubtypes.
- void `dwarf_gnu_index_dealloc` (`Dwarf_Gnu_Index_Head` dw_head)
Free resources of .debug_gnu_pubnames .debug_gnu_pubtypes.
- int `dwarf_get_gnu_index_block` (`Dwarf_Gnu_Index_Head` dw_head, `Dwarf_Unsigned` dw_number, `Dwarf_Unsigned` *dw_block_length, `Dwarf_Half` *dw_version, `Dwarf_Unsigned` *dw_offset_into_debug_info, `Dwarf_Unsigned` *dw_size_of_debug_info_area, `Dwarf_Unsigned` *dw_count_of_index_entries, `Dwarf_Error` *dw_error)
Access a particular block.
- int `dwarf_get_gnu_index_block_entry` (`Dwarf_Gnu_Index_Head` dw_head, `Dwarf_Unsigned` dw_blocknumber, `Dwarf_Unsigned` dw_entrynumber, `Dwarf_Unsigned` *dw_offset_in_debug_info, const char **dw_name_string, unsigned char *dw_flagbyte, unsigned char *dw_staticorglobal, unsigned char *dw_typeofentry, `Dwarf_Error` *dw_error)
Access a particular entry of a block.

9.28.1 Detailed Description

Section .debug_gnu_pubnames or .debug_gnu_pubtypes.

This is a section created for and used by the GNU gdb debugger to access DWARF information.

Not part of standard DWARF.

9.28.2 Function Documentation

9.28.2.1 dwarf_get_gnu_index_head()

```
int dwarf_get_gnu_index_head (
    Dwarf_Debug dw_dbg,
    Dwarf_Bool dw_which_section,
    Dwarf_Gnu_Index_Head * dw_head,
    Dwarf_Unsigned * dw_index_block_count_out,
    Dwarf_Error * dw_error )
```

Call this to get access.

Parameters

<i>dw_dbg</i>	Pass in the Dwarf_Debug of interest.
<i>dw_which_section</i>	Pass in TRUE to access .debug_gnu_pubnames. Pass in FALSE to access .debug_gnu_typenames.
<i>dw_head</i>	On success, set to a pointer to a head record allowing access to all the content of the section.
Generated by Doxygen	
<i>dw_index_block_count_out</i>	On success, set to a count of the number of blocks of data available.
<i>dw_error</i>	

Returns

Returns DW_DLV_OK, DW_DLV_NO_ENTRY (if the section does not exist or is empty), or, in case of an error reading the section, DW_DLV_ERROR.

9.28.2.2 dwarf_gnu_index_dealloc()

```
void dwarf_gnu_index_dealloc (
    Dwarf_Gnu_Index_Head dw_head )
```

Call this to deallocate all memory used by dw_head.

Parameters

<i>dw_head</i>	Pass in the Dwarf_Gnu_Index_head whose data is to be deallocated.
----------------	---

9.28.2.3 dwarf_get_gnu_index_block()

```
int dwarf_get_gnu_index_block (
    Dwarf_Gnu_Index_Head dw_head,
    Dwarf_Unsigned dw_number,
    Dwarf_Unsigned * dw_block_length,
    Dwarf_Half * dw_version,
    Dwarf_Unsigned * dw_offset_into_debug_info,
    Dwarf_Unsigned * dw_size_of_debug_info_area,
    Dwarf_Unsigned * dw_count_of_index_entries,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_head</i>	Pass in the Dwarf_Gnu_Index_head interest.
<i>dw_number</i>	Pass in the block number of the block of interest. 0 through dw_index_block_count_out-1.
<i>dw_block_length</i>	On success set to the length of the data in this block, in bytes.
<i>dw_version</i>	On success set to the version number of the block.
<i>dw_offset_into_debug_info</i>	On success set to the offset, in .debug_info, of the data for this block. The returned offset may be outside the bounds of the actual .debug_info section, such a possibility does not cause the function to return DW_DLV_ERROR.
<i>dw_size_of_debug_info_area</i>	On success set to the size in bytes, in .debug_info, of the area this block refers to. The returned dw_dw_size_of_debug_info_area plus dw_offset_into_debug_info may be outside the bounds of the actual .debug_info section, such a possibility does not cause the function to return DW_DLV_ERROR. Use dwarf_get_section_max_offsets_d() to learn the size of .debug_info and optionally other sections as well.
<i>dw_count_of_index_entries</i>	On success set to the count of index entries in this particular block number.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

Returns DW_DLV_OK, DW_DLV_NO_ENTRY (if the section does not exist or is empty), or, in case of an error reading the section, DW_DLV_ERROR.

9.28.2.4 dwarf_get_gnu_index_block_entry()

```
int dwarf_get_gnu_index_block_entry (
    Dwarf_Gnu_Index_Head dw_head,
    Dwarf_Unsigned dw_blocknumber,
    Dwarf_Unsigned dw_entrynumber,
    Dwarf_Unsigned * dw_offset_in_debug_info,
    const char ** dw_name_string,
    unsigned char * dw_flagbyte,
    unsigned char * dw_staticorglobal,
    unsigned char * dw_typeofentry,
    Dwarf_Error * dw_error )
```

Access to a single entry in a block.

Parameters

<i>dw_head</i>	Pass in the Dwarf_Gnu_Index_head interest.
<i>dw_blocknumber</i>	Pass in the block number of the block of interest. 0 through dw_index_block_count_out-1.
<i>dw_entrynumber</i>	Pass in the entry number of the entry of interest. 0 through dw_count_of_index_entries-1.
<i>dw_offset_in_debug_info</i>	On success set to the offset in .debug_info relevant to this entry.
<i>dw_name_string</i>	On success set to the size in bytes, in .debug_info, of the area this block refersto.
<i>dw_flagbyte</i>	On success set to the entry flag byte content.
<i>dw_staticorglobal</i>	On success set to the entry static/global letter.
<i>dw_typeofentry</i>	On success set to the type of entry.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

Returns DW_DLV_OK, DW_DLV_NO_ENTRY (if the section does not exist or is empty), or, in case of an error reading the section, DW_DLV_ERROR.

9.29 Fast Access to Gdb Index

Functions

- int `dwarf_gdbindex_header` (`Dwarf_Debug` dw_dbg, `Dwarf_Gdbindex` *dw_gdbindexptr, `Dwarf_Unsigned` *dw_version, `Dwarf_Unsigned` *dw_cu_list_offset, `Dwarf_Unsigned` *dw_types_cu_list_offset, `Dwarf_Unsigned` *dw_address_area_offset, `Dwarf_Unsigned` *dw_symbol_table_offset, `Dwarf_Unsigned` *dw_constant_↵ pool_offset, `Dwarf_Unsigned` *dw_section_size, const char **dw_section_name, `Dwarf_Error` *dw_error)
Open access to the .gdb_index section.
- void `dwarf_dealloc_gdbindex` (`Dwarf_Gdbindex` dw_gdbindexptr)
Free (dealloc) all allocated Dwarf_Gdbindex memory It should named dwarf_dealloc_gdbindex.
- int `dwarf_gdbindex_culist_array` (`Dwarf_Gdbindex` dw_gdbindexptr, `Dwarf_Unsigned` *dw_list_length, `Dwarf_Error` *dw_error)
Return the culist array length.
- int `dwarf_gdbindex_culist_entry` (`Dwarf_Gdbindex` dw_gdbindexptr, `Dwarf_Unsigned` dw_entryindex, `Dwarf_Unsigned` *dw_cu_offset, `Dwarf_Unsigned` *dw_cu_length, `Dwarf_Error` *dw_error)
For a CU entry in the list return the offset and length.

- int `dwarf_gdbindex_types_culist_array` (Dwarf_Gdbindex dw_gdbindexptr, Dwarf_Unsigned *dw_types_list↵_length, Dwarf_Error *dw_error)
Return the types culist array length.
- int `dwarf_gdbindex_types_culist_entry` (Dwarf_Gdbindex dw_gdbindexptr, Dwarf_Unsigned dw_types_↵entryindex, Dwarf_Unsigned *dw_cu_offset, Dwarf_Unsigned *dw_tu_offset, Dwarf_Unsigned *dw_type↵_signature, Dwarf_Error *dw_error)
For a types CU entry in the list returns the offset and length.
- int `dwarf_gdbindex_addressarea` (Dwarf_Gdbindex dw_gdbindexptr, Dwarf_Unsigned *dw_addressarea_↵list_length, Dwarf_Error *dw_error)
Get access to gdbindex address area.
- int `dwarf_gdbindex_addressarea_entry` (Dwarf_Gdbindex dw_gdbindexptr, Dwarf_Unsigned dw_entryindex, Dwarf_Unsigned *dw_low_address, Dwarf_Unsigned *dw_high_address, Dwarf_Unsigned *dw_cu_index, Dwarf_Error *dw_error)
Get an address area value.
- int `dwarf_gdbindex_symboltable_array` (Dwarf_Gdbindex dw_gdbindexptr, Dwarf_Unsigned *dw_symtab_↵list_length, Dwarf_Error *dw_error)
Get access to the symboltable array.
- int `dwarf_gdbindex_symboltable_entry` (Dwarf_Gdbindex dw_gdbindexptr, Dwarf_Unsigned dw_entryindex, Dwarf_Unsigned *dw_string_offset, Dwarf_Unsigned *dw_cu_vector_offset, Dwarf_Error *dw_error)
Access individual symtab entry.
- int `dwarf_gdbindex_cuvector_length` (Dwarf_Gdbindex dw_gdbindexptr, Dwarf_Unsigned dw_cuvector_↵offset, Dwarf_Unsigned *dw_innercount, Dwarf_Error *dw_error)
Get access to a cuvector.
- int `dwarf_gdbindex_cuvector_inner_attributes` (Dwarf_Gdbindex dw_gdbindexptr, Dwarf_Unsigned dw_↵cuvector_offset_in, Dwarf_Unsigned dw_innerindex, Dwarf_Unsigned *dw_field_value, Dwarf_Error *dw↵_error)
Get access to a cuvector.
- int `dwarf_gdbindex_cuvector_instance_expand_value` (Dwarf_Gdbindex dw_gdbindexptr, Dwarf_Unsigned dw_field_value, Dwarf_Unsigned *dw_cu_index, Dwarf_Unsigned *dw_symbol_kind, Dwarf_Unsigned *dw_is_static, Dwarf_Error *dw_error)
Expand the bit fields in a cuvector entry.
- int `dwarf_gdbindex_string_by_offset` (Dwarf_Gdbindex dw_gdbindexptr, Dwarf_Unsigned dw_stringoffset, const char **dw_string_ptr, Dwarf_Error *dw_error)
Retrieve a symbol name from the index data.

9.29.1 Detailed Description

Section .gdb_index

This is a section created for and used by the GNU gdb debugger to access DWARF information.

Not part of standard DWARF.

See also

[https://sourceware.org/gdb/onlinedocs/gdb/Index-Section-Format.html#↵Index-Section-Format](https://sourceware.org/gdb/onlinedocs/gdb/Index-Section-Format.html#Index-Section-Format)

Version 8 built by gdb, so type entries are ok as is. Version 7 built by the 'gold' linker and type index entries for a CU must be derived otherwise, the type index is not correct... Earlier versions cannot be read correctly by the functions here.

The functions here make it possible to print the section content in detail, there is no search function here.

9.29.2 Function Documentation

9.29.2.1 dwarf_gdbindex_header()

```
int dwarf_gdbindex_header (
    Dwarf_Debug dw_dbg,
    Dwarf_Gdbindex * dw_gdbindexptr,
    Dwarf_Unsigned * dw_version,
    Dwarf_Unsigned * dw_cu_list_offset,
    Dwarf_Unsigned * dw_types_cu_list_offset,
    Dwarf_Unsigned * dw_address_area_offset,
    Dwarf_Unsigned * dw_symbol_table_offset,
    Dwarf_Unsigned * dw_constant_pool_offset,
    Dwarf_Unsigned * dw_section_size,
    const char ** dw_section_name,
    Dwarf_Error * dw_error )
```

The section is a single table one thinks.

See also

[Reading gdbindex data](#)

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_gdbindexptr</i>	On success returns a pointer to make access to table details possible.
<i>dw_version</i>	On success returns the table version.
<i>dw_cu_list_offset</i>	On success returns the offset of the cu_list in the section.
<i>dw_types_cu_list_offset</i>	On success returns the offset of the types cu_list in the section.
<i>dw_address_area_offset</i>	On success returns the area pool offset.
<i>dw_symbol_table_offset</i>	On success returns the symbol table offset.
<i>dw_constant_pool_offset</i>	On success returns the constant pool offset.
<i>dw_section_size</i>	On success returns section size.
<i>dw_section_name</i>	On success returns section name.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc. Returns DW_DLV_NO_ENTRY if the section is absent.

9.29.2.2 dwarf_dealloc_gdbindex()

```
void dwarf_dealloc_gdbindex (
    Dwarf_Gdbindex dw_gdbindexptr )
```

Parameters

<i>dw_gdbindexptr</i>	Pass in a valid dw_gdbindexptr and on return assign zero to dw_gdbindexptr as it is stale.
-----------------------	--

9.29.2.3 dwarf_gdbindex_culist_array()

```
int dwarf_gdbindex_culist_array (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned * dw_list_length,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_list_length</i>	On success returns the array length of the cu list.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.4 dwarf_gdbindex_culist_entry()

```
int dwarf_gdbindex_culist_entry (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned dw_entryindex,
    Dwarf_Unsigned * dw_cu_offset,
    Dwarf_Unsigned * dw_cu_length,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_entryindex</i>	Pass in a number from 0 through <i>dw_list_length</i> -1. If <i>dw_entryindex</i> is too large for the array the function returns DW_DLV_NO_ENTRY.
<i>dw_cu_offset</i>	On success returns the CU offset for this list entry.
<i>dw_cu_length</i>	On success returns the CU length(in bytes) for this list entry.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.5 dwarf_gdbindex_types_culist_array()

```
int dwarf_gdbindex_types_culist_array (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned * dw_types_list_length,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_types_list_length</i>	On success returns the array length of the types cu list.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.6 dwarf_gdbindex_types_culist_entry()

```
int dwarf_gdbindex_types_culist_entry (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned dw_types_entryindex,
    Dwarf_Unsigned * dw_cu_offset,
    Dwarf_Unsigned * dw_tu_offset,
    Dwarf_Unsigned * dw_type_signature,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_types_entryindex</i>	Pass in a number from 0 through dw_list_length-1. If the value is greater than dw_list_length-1 the function returns DW_DLV_NO_ENTRY.
<i>dw_cu_offset</i>	On success returns the types CU offset for this list entry.
<i>dw_tu_offset</i>	On success returns the tu offset for this list entry.
<i>dw_type_signature</i>	On success returns the type unit offset for this entry if the type has a signature.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.7 dwarf_gdbindex_addressarea()

```
int dwarf_gdbindex_addressarea (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned * dw_addressarea_list_length,
    Dwarf_Error * dw_error )
```

See also

[Reading gdbindex addressarea](#)

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_addressarea_list_length</i>	On success returns the number of entries in the addressarea.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.8 dwarf_gdbindex_addressarea_entry()

```
int dwarf_gdbindex_addressarea_entry (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned dw_entryindex,
    Dwarf_Unsigned * dw_low_address,
    Dwarf_Unsigned * dw_high_address,
    Dwarf_Unsigned * dw_cu_index,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_entryindex</i>	Pass in an index, 0 through dw_addressarea_list_length-1. addressarea.
<i>dw_low_address</i>	On success returns the low address for the entry.
<i>dw_high_address</i>	On success returns the high address for the entry.
<i>dw_cu_index</i>	On success returns the index to the cu for the entry.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.9 dwarf_gdbindex_symboltable_array()

```
int dwarf_gdbindex_symboltable_array (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned * dw_syntab_list_length,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_syntab_list_length</i>	On success returns the number of entries in the symbol table
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.10 dwarf_gdbindex_symboltable_entry()

```
int dwarf_gdbindex_symboltable_entry (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned dw_entryindex,
    Dwarf_Unsigned * dw_string_offset,
    Dwarf_Unsigned * dw_cu_vector_offset,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_entryindex</i>	Pass in a valid index in the range 0 through dw_syntab_list_length-1. If the value is greater than dw_syntab_list_length-1 the function returns DW_DLV_NO_ENTRY;
<i>dw_string_offset</i>	On success returns the string offset in the appropriate string section.
<i>dw_cu_vector_offset</i>	On success returns the CU vector offset.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.11 dwarf_gdbindex_cuvector_length()

```
int dwarf_gdbindex_cuvector_length (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned dw_cuvector_offset,
    Dwarf_Unsigned * dw_innercount,
    Dwarf_Error * dw_error )
```

See also

[Reading the gdbindex symbol table](#)

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_cuvector_offset</i>	Pass in the offset, dw_cu_vector_offset.
<i>dw_innercount</i>	On success returns the number of CUs in the cuvector instance array.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.12 dwarf_gdbindex_cuvector_inner_attributes()

```
int dwarf_gdbindex_cuvector_inner_attributes (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned dw_cuvector_offset_in,
    Dwarf_Unsigned dw_innerindex,
    Dwarf_Unsigned * dw_field_value,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
-----------------------	---

Parameters

<i>dw_cuvector_offset_in</i>	Pass in the value of <i>dw_cuvector_offset</i>
<i>dw_innerindex</i>	Pass in the index of the CU vector in, from 0 through <i>dw_innercount</i> -1.
<i>dw_field_value</i>	On success returns a field of bits. To expand the bits call <i>dwarf_gdbindex_cuvector_instance_expand_value</i> .
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.13 dwarf_gdbindex_cuvector_instance_expand_value()

```
int dwarf_gdbindex_cuvector_instance_expand_value (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned dw_field_value,
    Dwarf_Unsigned * dw_cu_index,
    Dwarf_Unsigned * dw_symbol_kind,
    Dwarf_Unsigned * dw_is_static,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_field_value</i>	Pass in the <i>dw_field_value</i> returned by <i>dwarf_gdbindex_cuvector_inner_attributes</i> .
<i>dw_cu_index</i>	On success returns the CU index from the <i>dw_field_value</i>
<i>dw_symbol_kind</i>	On success returns the symbol kind (see the sourceware page. Kinds are TYPE, VARIABLE, or FUNCTION.
<i>dw_is_static</i>	On success returns non-zero if the entry is a static symbol (file-local, as in C or C++), otherwise it returns non-zero and the symbol is global.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.29.2.14 dwarf_gdbindex_string_by_offset()

```
int dwarf_gdbindex_string_by_offset (
    Dwarf_Gdbindex dw_gdbindexptr,
    Dwarf_Unsigned dw_stringoffset,
    const char ** dw_string_ptr,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
-----------------------	---

Parameters

<code>dw_stringoffset</code>	Pass in the string offset returned by <code>dwarf_gdbindex_symboltable_entry</code>
<code>dw_string_ptr</code>	On success returns a pointer to the null-terminated string.
<code>dw_error</code>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.30 Fast Access to Split Dwarf (Debug Fission)

Functions

- `int dwarf_get_xu_index_header (Dwarf_Debug dw_dbg, const char *dw_section_type, Dwarf_Xu_Index_Header *dw_xuhdr, Dwarf_Unsigned *dw_version_number, Dwarf_Unsigned *dw_section_count, Dwarf_Unsigned *dw_units_count, Dwarf_Unsigned *dw_hash_slots_count, const char **dw_sect_name, Dwarf_Error *dw_error)`
Access a .debug_cu_index or dw_tu_index section.
- `void dwarf_dealloc_xu_header (Dwarf_Xu_Index_Header dw_xuhdr)`
Dealloc (free) memory associated with dw_xuhdr.
- `int dwarf_get_xu_index_section_type (Dwarf_Xu_Index_Header dw_xuhdr, const char **dw_typename, const char **dw_sectionname, Dwarf_Error *dw_error)`
Return basic information about a Dwarf_Xu_Index_Header.
- `int dwarf_get_xu_hash_entry (Dwarf_Xu_Index_Header dw_xuhdr, Dwarf_Unsigned dw_index, Dwarf_Sig8 *dw_hash_value, Dwarf_Unsigned *dw_index_to_sections, Dwarf_Error *dw_error)`
Get a Hash Entry.
- `int dwarf_get_xu_section_names (Dwarf_Xu_Index_Header dw_xuhdr, Dwarf_Unsigned dw_column_index, Dwarf_Unsigned *dw_SECT_number, const char **dw_SECT_name, Dwarf_Error *dw_error)`
get DW_SECT value for a column.
- `int dwarf_get_xu_section_offset (Dwarf_Xu_Index_Header dw_xuhdr, Dwarf_Unsigned dw_row_index, Dwarf_Unsigned dw_column_index, Dwarf_Unsigned *dw_sec_offset, Dwarf_Unsigned *dw_sec_size, Dwarf_Error *dw_error)`
Get row data (section data) for a row and column.
- `int dwarf_get_debugfission_for_die (Dwarf_Die dw_die, Dwarf_Debug_Fission_Per_CU *dw_percu_out, Dwarf_Error *dw_error)`
Get debugfission data for a Dwarf_Die.
- `int dwarf_get_debugfission_for_key (Dwarf_Debug dw_dbg, Dwarf_Sig8 *dw_hash_sig, const char *dw_cu_type, Dwarf_Debug_Fission_Per_CU *dw_percu_out, Dwarf_Error *dw_error)`
Given a hash signature find per-cu Fission data.

9.30.1 Detailed Description

9.30.2 Function Documentation

9.30.2.1 dwarf_get_xu_index_header()

```
int dwarf_get_xu_index_header (
    Dwarf_Debug dw_dbg,
```

```

const char * dw_section_type,
Dwarf_Xu_Index_Header * dw_xuhdr,
Dwarf_Unsigned * dw_version_number,
Dwarf_Unsigned * dw_section_count,
Dwarf_Unsigned * dw_units_count,
Dwarf_Unsigned * dw_hash_slots_count,
const char ** dw_sect_name,
Dwarf_Error * dw_error )

```

These sections are in a DWARF5 package file, a file normally named with the .dwo or .dwp extension.. See DWARF5 section 7.3.5.3 Format of the CU and TU Index Sections.

Parameters

<i>dw_dbg</i>	Pass in the Dwarf_Debug of interest
<i>dw_section_type</i>	Pass in a pointer to either "cu" or "tu".
<i>dw_xuhdr</i>	On success, returns a pointer usable in further calls.
<i>dw_version_number</i>	On success returns five.
<i>dw_section_count</i>	On success returns the number of entries in the table of section counts. Referred to as N .
<i>dw_units_count</i>	On success returns the number of compilation units or type units in the index. Referred to as U .
<i>dw_hash_slots_count</i>	On success returns the number of slots in the hash table. Referred to as S .
<i>dw_sect_name</i>	On success returns a pointer to the name of the section. Do not free/dealloc the returned pointer.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc. Returns DW_DLV_NO_ENTRY if the section requested is not present.

9.30.2.2 dwarf_dealloc_xu_header()

```

void dwarf_dealloc_xu_header (
    Dwarf_Xu_Index_Header dw_xuhdr )

```

Should be named dwarf_dealloc_xuhdr instead.

Parameters

<i>dw_xuhdr</i>	Dealloc (free) all associated memory. The caller should zero the passed in value on return as it is then a stale value.
-----------------	---

9.30.2.3 dwarf_get_xu_index_section_type()

```

int dwarf_get_xu_index_section_type (
    Dwarf_Xu_Index_Header dw_xuhdr,
    const char ** dw_typename,
    const char ** dw_sectionname,
    Dwarf_Error * dw_error )

```

Parameters

<i>dw_xuhdr</i>	Pass in an open header pointer.
<i>dw_typename</i>	On success returns a pointer to the immutable string "tu" or "cu". Do not free.
<i>dw_sectionname</i>	On success returns a pointer to the section name in the object file. Do not free.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.30.2.4 dwarf_get_xu_hash_entry()

```
int dwarf_get_xu_hash_entry (
    Dwarf_Xu_Index_Header dw_xuhdr,
    Dwarf_Unsigned dw_index,
    Dwarf_Sig8 * dw_hash_value,
    Dwarf_Unsigned * dw_index_to_sections,
    Dwarf_Error * dw_error )
```

See also

examplez/x

Parameters

<i>dw_xuhdr</i>	Pass in an open header pointer.
<i>dw_index</i>	Pass in the index of the entry you wish. Valid index values are 0 through S-1 . If the <i>dw_index</i> passed in is outside the valid range the functionj
<i>dw_hash_value</i>	Pass in a pointer to a Dwarf_Sig8. On success the hash struct is filled in with the 8 byte hash value.
<i>dw_index_to_sections</i>	On success returns the offset/size table index for this hash entry.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK on success. If the *dw_index* passed in is outside the valid range the function it returns DW_DLV_NO_ENTRY (before version 0.7.0 it returned DW_DLV_ERROR, though nothing mentioned that). In case of error it returns DW_DLV_ERROR. If *dw_error* is non-null returns error details through *dw_error* (the usual error behavior).

9.30.2.5 dwarf_get_xu_section_names()

```
int dwarf_get_xu_section_names (
    Dwarf_Xu_Index_Header dw_xuhdr,
    Dwarf_Unsigned dw_column_index,
    Dwarf_Unsigned * dw_SECT_number,
    const char ** dw_SECT_name,
    Dwarf_Error * dw_error )
```

See also

[Reading Split Dwarf \(Debug Fission\) data](#)

Parameters

<i>dw_xuhdr</i>	Pass in an open header pointer.
<i>dw_column_index</i>	The section names are in row zero of the table so we do not mention the row number at all. Pass in the column of the entry you wish. Valid <i>dw_column_index</i> values are 0 through N-1 .
<i>dw_SECT_number</i>	On success returns DW_SECT_INFO or other section id as appears in <i>dw_column_index</i> .
<i>dw_SECT_name</i>	On success returns a pointer to the string with the section name.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.30.2.6 dwarf_get_xu_section_offset()

```
int dwarf_get_xu_section_offset (
    Dwarf_Xu_Index_Header dw_xuhdr,
    Dwarf_Unsigned dw_row_index,
    Dwarf_Unsigned dw_column_index,
    Dwarf_Unsigned * dw_sec_offset,
    Dwarf_Unsigned * dw_sec_size,
    Dwarf_Error * dw_error )
```

The section offset represents a base offset for the section the row data refers to. DWARF6 Section 7.3.5.3 page 193.

Parameters

<i>dw_xuhdr</i>	Pass in an open header pointer.
<i>dw_row_index</i>	Pass in a row number , 1 through U
<i>dw_column_index</i>	Pass in a column number , 0 through N-1
<i>dw_sec_offset</i>	On success returns the section offset of the section whose name <i>dwarf_get_xu_section_names</i> returns.
<i>dw_sec_size</i>	On success returns the section size of the section whose name <i>dwarf_get_xu_section_names</i> returns. If the returned section size is zero then this column makes no contribution to the dwp object file and the <i>dw_sec_size</i> and <i>dw_sec_offset</i> should be ignored.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.30.2.7 dwarf_get_debugfission_for_die()

```
int dwarf_get_debugfission_for_die (
    Dwarf_Die dw_die,
    Dwarf_Debug_Fission_Per_CU * dw_percu_out,
    Dwarf_Error * dw_error )
```

For any Dwarf_Die in a compilation unit, return the debug fission table data through dw_percu_out. Usually applications will pass in the CU die. Calling code should zero all of the struct Dwarf_Debug_Fission_Per_CU_s before calling this. If there is no debugfission data this returns DW_DLV_NO_ENTRY (only .dwp objects have debugfission data)

Parameters

<i>dw_die</i>	Pass in a Dwarf_Die pointer, Usually pass in a CU DIE pointer.
<i>dw_percu_out</i>	Pass in a pointer to a zeroed structure. On success the function fills in the structure.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.30.2.8 dwarf_get_debugfission_for_key()

```
int dwarf_get_debugfission_for_key (
    Dwarf_Debug dw_dbg,
    Dwarf_Sig8 * dw_hash_sig,
    const char * dw_cu_type,
    Dwarf_Debug_Fission_Per_CU * dw_percu_out,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_dbg</i>	Pass in the Dwarf_Debug of interest.
<i>dw_hash_sig</i>	Pass in a pointer to a Dwarf_Sig8 containing a hash value of interest.
<i>dw_cu_type</i>	Pass in the type, a string. Either "cu" or "tu".
<i>dw_percu_out</i>	Pass in a pointer to a zeroed structure. On success the function fills in the structure.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.31 Access GNU .gnu_debuglink, build-id.

Functions

- int dwarf_gnu_debuglink (Dwarf_Debug dw_dbg, char **dw_debuglink_path_returned, unsigned char **dw_crc_returned, char **dw_debuglink_fullpath_returned, unsigned int *dw_debuglink_path_length_returned, unsigned int *dw_buildid_type_returned, char **dw_buildid_owner_name_returned, unsigned

```
char **dw_buildid_returned, unsigned int *dw_buildid_length_returned, char ***dw_paths_returned, unsigned int *dw_paths_length_returned, Dwarf_Error *dw_error)
```

Find a separated DWARF object file.

- int dwarf_suppress_debuglink_crc (int dw_suppress)

Suppressing crc calculations.

- int dwarf_add_debuglink_global_path (Dwarf_Debug dw_dbg, const char *dw_pathname, Dwarf_Error *dw_error)

Adding debuglink global paths.

- int dwarf_crc32 (Dwarf_Debug dw_dbg, unsigned char *dw_crcbuf, Dwarf_Error *dw_error)

Crc32 used for debuglink crc calculation.

- unsigned int dwarf_basic_crc32 (const unsigned char *dw_buf, unsigned long dw_len, unsigned int dw_init)

Public interface to the real crc calculation.

9.31.1 Detailed Description

When DWARF sections are in a different object than the executable or a normal shared object. The special GNU section provides a way to name the object file with DWARF.

libdwf will attempt to use this data to find the object file with DWARF.

Has nothing to do with split-dwarf/debug-fission.

9.31.2 Function Documentation

9.31.2.1 dwarf_gnu_debuglink()

```
int dwarf_gnu_debuglink (
    Dwarf_Debug dw_dbg,
    char ** dw_debuglink_path_returned,
    unsigned char ** dw_crc_returned,
    char ** dw_debuglink_fullpath_returned,
    unsigned int * dw_debuglink_path_length_returned,
    unsigned int * dw_buildid_type_returned,
    char ** dw_buildid_owner_name_returned,
    unsigned char ** dw_buildid_returned,
    unsigned int * dw_buildid_length_returned,
    char *** dw_paths_returned,
    unsigned int * dw_paths_length_returned,
    Dwarf_Error * dw_error )
```

.gnu_debuglink and/or the section .note.gnu.build-id.

Unless something is odd and you want to know details of the two sections you will not need this function.

See also

<https://sourceware.org/gdb/onlinedocs/gdb/Separate-Debug-Files.html>

[Using GNU debuglink data](#)

If no debuglink then name_returned, crc_returned and debuglink_path_returned will get set 0 through the pointers.

If no .note.gnu.build-id then buildid_length_returned, and buildid_returned will be set 0 through the pointers.

In most cases output arguments can be passed as zero and the function will simply not return data through such arguments. Useful if you only care about some of the data potentially returned.

If dw_debuglink_fullpath_returned is set by the call the space allocated must be freed by the caller with free(dw_↔ debuglink_fullpath_returned).

if dw_debuglink_paths_returned is set by the call the space allocated must be free by the caller with free(dw_↔ debuglink_paths_returned).

[dwarf_finish\(\)](#) will not free strings dw_debuglink_fullpath_returned or dw_debuglink_paths_returned.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_debuglink_path_returned</i>	On success returns a pointer to a path in the debuglink section. Do not free!
<i>dw_crc_returned</i>	On success returns a pointer to a 4 byte area through the pointer.
<i>dw_debuglink_fullpath_returned</i>	On success returns a pointer to a full path computed from debuglink data of a correct path to a file with DWARF sections. Free this string when no longer of interest.
<i>dw_debuglink_path_length_returned</i>	On success returns the strlen() of <i>dw_debuglink_fullpath_returned</i> .
<i>dw_buildid_type_returned</i>	On success returns a pointer to integer with a type code. See the buildid definition.
<i>dw_buildid_owner_name_returned</i>	On success returns a pointer to the owner name from the buildid section. Do not free this.
<i>dw_buildid_returned</i>	On success returns a pointer to a sequence of bytes containing the buildid.
<i>dw_buildid_length_returned</i>	On success this is set to the length of the set of bytes pointed to by <i>dw_buildid_returned</i> .
<i>dw_paths_returned</i>	On success sets a pointer to an array of pointers to strings, each with a global path. These strings must be freed by the caller, dwarf_finish() will not free these strings. Call <code>free(dw_paths_returned)</code> .
<i>dw_paths_length_returned</i>	On success returns the length of the array of string pointers <i>dw_paths_returned</i> points at.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.31.2.2 dwarf_suppress_debuglink_crc()

```
int dwarf_suppress_debuglink_crc (
    int dw_suppress )
```

The .gnu_debuglink section contains a compilation-system created crc (4 byte) value. If `dwarf_init_path[_dl]()` is called such a section can result in the reader/consumer calculating the crc value of a different object file. Which on a large object file could seem slow. See https://en.wikipedia.org/wiki/Cyclic_redundancy_check

When one is confident that any debug_link file found is the appropriate one one can call `dwarf_suppress_debuglink_crc` with a non-zero argument and any `dwarf_init_path[_dl]` call will skip debuglink crc calculations and just assume the crc would match whenever it applies. This is a global flag, applies to all Dwarf_Debug opened after the call in the program execution.

Does not apply to the .note.gnu.buildid section as that section never implies the reader/consumer needs to do a crc calculation.

Parameters

<i>dw_suppress</i>	Pass in 1 to suppress future calculation of crc values to verify a debuglink target is correct. So use only when you know this is safe. Pass in 0 to ensure future <code>dwarf_init_path[_dl]</code> calls compute debuglink CRC values as required.
--------------------	--

Returns

Returns the previous value of the global flag.

[Details on separate DWARF object access](#)

9.31.2.3 dwarf_add_debuglink_global_path()

```
int dwarf_add_debuglink_global_path (
    Dwarf_Debug dw_dbg,
    const char * dw_pathname,
    Dwarf_Error * dw_error )
```

Used inside src/bin/dwarfexample/dwdebuglink.c so we can show all that is going on. The following has the explanation for how debuglink and global paths interact:

See also

<https://sourceware.org/gdb/onlinedocs/gdb/Separate-Debug-Files.html>

Parameters

<i>dw_dbg</i>	Pass in the Dwarf_Debug of interest.
<i>dw_pathname</i>	Pass in a pathname to add to the list of global paths used by debuglink.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.31.2.4 dwarf_crc32()

```
int dwarf_crc32 (
    Dwarf_Debug dw_dbg,
    unsigned char * dw_crcbuf,
    Dwarf_Error * dw_error )
```

Caller passes pointer to array of 4 unsigned char provided by the caller and if this returns DW_DLV_OK that array is filled in.

Callers must guarantee dw_crcbuf points to at least 4 bytes of writable memory. Passing in a null dw_crcbuf results in an immediate return of DW_DLV_NO_ENTRY and the pointer is not used.

Parameters

<i>dw_dbg</i>	Pass in an open dw_dbg. When you attempted to open it, and it succeeded then pass the it via the Dwarf_Debug The function reads the file into memory and performs a crc calculation.
<i>dw_crcbuf</i>	Pass in a pointer to a 4 byte area to hold the returned crc, on success the function puts the 4 bytes there.
<i>dw_error</i>	The usual pointer to return error details.

Returns

Returns DW_DLV_OK etc.

9.31.2.5 dwarf_basic_crc32()

```
unsigned int dwarf_basic_crc32 (
    const unsigned char * dw_buf,
    unsigned long dw_len,
    unsigned int dw_init )
```

It is unlikely this is useful. The calculation will not produce a return matching that of Linux/Macos if the compiler implements unsigned int or signed int as 16 bits long.

The caller must guarantee that dw_buf is non-null and pointing to dw_len bytes of readable memory. If dw_buf is NULL then 0 is immediately returned and there is no indication of error.

Parameters

<i>dw_buf</i>	Pass in a pointer to some bytes on which the crc calculation as done in debuglink is to be done.
<i>dw_len</i>	Pass in the length in bytes of dw_buf.
<i>dw_init</i>	Pass in the initial 32 bit value, zero is the right choice.

Returns

Returns an int (assumed 32 bits int!) with the calculated crc.

9.32 Harmless Error recording**Macros**

- `#define DW_HARMLESS_ERROR_CIRCULAR_LIST_DEFAULT_SIZE 4`
Default size of the libdwarf-internal circular list.

Functions

- `int dwarf_get_harmless_error_list (Dwarf_Debug dw_dbg, unsigned int dw_count, const char **dw_errmsg↔
_ptrs_array, unsigned int *dw_newerr_count)`
Get the harmless error count and content.
- `unsigned int dwarf_set_harmless_error_list_size (Dwarf_Debug dw_dbg, unsigned int dw_maxcount)`
The size of the circular list of strings libdwarf holds internally may be set and reset as needed. If it is shortened excess messages are simply dropped. It returns the previous size. If zero passed in the size is unchanged and it simply returns the current size.
- `void dwarf_insert_harmless_error (Dwarf_Debug dw_dbg, char *dw_newerror)`
Harmless Error Insertion is only for testing.

9.32.1 Detailed Description

The harmless error list is a fixed size circular buffer of errors we note but which do not stop us from processing the object. Created so dwarfdump or other tools can report such inconsequential errors without causing anything to stop early.

You can change the list size from the default of DW_HARMLESS_ERROR_CIRCULAR_LIST_DEFAULT_SIZE at any time for a Dwarf_Debug dbg.

Harmless error data is dealloc'd by `dwarf_finish()`.

9.32.2 Function Documentation

9.32.2.1 dwarf_get_harmless_error_list()

```
int dwarf_get_harmless_error_list (
    Dwarf_Debug dw_dbg,
    unsigned int dw_count,
    const char ** dw_errmsg_ptrs_array,
    unsigned int * dw_newerr_count )
```

User code supplies size of array of pointers `dw_errmsg_ptrs_array` in `count` and the array of pointers (the pointers themselves need not be initialized). The pointers returned in the array of pointers are invalidated by ANY call to `libdwarf`. Use them before making another `libdwarf` call! The array of string pointers passed in always has a final null pointer, so if there are `N` pointers and `M` actual strings, then `MIN(M,N-1)` pointers are set to point to error strings. The array of pointers to strings always terminates with a NULL pointer. Do not free the strings. Every string is null-terminated.

Each call empties the error list (discarding all current entries). and fills in your array

Parameters

<i>dw_dbg</i>	The applicable Dwarf_Debug.
<i>dw_count</i>	The number of string buffers. If count is passed as zero no elements of the array are touched.
<i>dw_errmsg_ptrs_array</i>	A pointer to a user-created array of pointer to const char.
<i>dw_newerr_count</i>	If non-NULL the count of harmless errors pointers since the last call is returned through the pointer. If <code>dw_count</code> is greater than zero the first <code>dw_count</code> of the pointers in the user-created array point to null-terminated strings. Do not free the strings. print or copy the strings before any other <code>libdwarf</code> call.

Returns

Returns DW_DLV_NO_ENTRY if no harmless errors were noted so far. Returns DW_DLV_OK if there are harmless errors. Never returns DW_DLV_ERROR.

If DW_DLV_NO_ENTRY is returned none of the arguments other than `dw_dbg` are touched or used.

9.32.2.2 dwarf_set_harmless_error_list_size()

```
unsigned int dwarf_set_harmless_error_list_size (
    Dwarf_Debug dw_dbg,
    unsigned int dw_maxcount )
```

Parameters

<i>dw_dbg</i>	The applicable Dwarf_Debug.
<i>dw_maxcount</i>	Set the new internal buffer count to a number greater than zero.

Returns

returns the current size of the internal circular buffer if dw_maxcount is zero. If dw_maxcount is greater than zero the internal array is adjusted to hold that many and the previous number of harmless errors possible in the circular buffer is returned.

9.32.2.3 dwarf_insert_harmless_error()

```
void dwarf_insert_harmless_error (
    Dwarf_Debug dw_dbg,
    char * dw_newerror )
```

Useful for testing the harmless error mechanism.

Parameters

<i>dw_dbg</i>	Pass in an open Dwarf_Debug
<i>dw_newerror</i>	Pass in a string whose content the function inserts as a harmless error (which dwarf_get_harmless_error_list will retrieve).

9.33 Names DW_TAG_member etc as strings

Functions

- int **dwarf_get_ACCESS_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_ACCESS_name
- int **dwarf_get_ADDR_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_ADDR_name
- int **dwarf_get_AT_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_AT_name
- int **dwarf_get_ATCF_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_AT_name
- int **dwarf_get_ATE_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_ATE_name
- int **dwarf_get_CC_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_CC_name
- int **dwarf_get_CFA_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_CFA_name
- int **dwarf_get_children_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_children_name - *historic misspelling.*
- int **dwarf_get_CHILDREN_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_CHILDREN_name

- int **dwarf_get_DEFAULTED_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_DEFAULTED_name
- int **dwarf_get_DS_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_DS_name
- int **dwarf_get_DSC_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_DSC_name
- int **dwarf_get_GNUKIND_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_GNUKIND_name - libdwarf invention
- int **dwarf_get_EH_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_EH_name
- int **dwarf_get_END_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_END_name
- int **dwarf_get_FORM_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_FORM_name
- int **dwarf_get_FRAME_name** (unsigned int dw_val_in, const char **dw_s_out)
This is a set of register names.
- int **dwarf_get_GNUVIS_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_GNUVIS_name - a libdwarf invention
- int **dwarf_get_ID_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_ID_name
- int **dwarf_get_IDX_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_IDX_name
- int **dwarf_get_INL_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_INL_name
- int **dwarf_get_ISA_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_ISA_name
- int **dwarf_get_LANG_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_LANG_name
- int **dwarf_get_LLE_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_LLE_name
- int **dwarf_get_LLEX_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_LLEX_name - a GNU extension.
- int **dwarf_get_LNAME_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_LNAME
- int **dwarf_get_LNCT_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_LNCT_name
- int **dwarf_get_LNE_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_LNE_name
- int **dwarf_get_LNS_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_LNS_name
- int **dwarf_get_MACINFO_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_MACINFO_name
- int **dwarf_get_MACRO_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_MACRO_name
- int **dwarf_get_OP_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_OP_name
- int **dwarf_get_ORD_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_ORD_name
- int **dwarf_get_RLE_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_RLE_name
- int **dwarf_get_SECT_name** (unsigned int dw_val_in, const char **dw_s_out)

- dwarf_get_SECT_name*
- int **dwarf_get_TAG_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_TAG_name
- int **dwarf_get_UT_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_UT_name
- int **dwarf_get_VIRTUALITY_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_VIRTUALITY_name
- int **dwarf_get_VIS_name** (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_VIS_name
- int **dwarf_get_FORM_CLASS_name** (enum Dwarf_Form_Class dw_fc, const char **dw_s_out)
dwarf_get_FORM_CLASS_name is for a libdwarf extension. Not defined by the DWARF standard though the concept is defined in the standard. It seemed essential to invent it for libdwarf to report correctly.

9.33.1 Detailed Description

Given a value you know is one of a particular name category in DWARF2 or later, call the appropriate function and on finding the name it returns DW_DLV_OK and sets the identifier for the value through a pointer. On success these functions return the string corresponding to **dw_val_in** passed in through the pointer **dw_s_out** and the value returned is DW_DLV_OK.

The strings returned on success are in static storage and must not be freed.

These functions are generated from information in [dwarf.h](#), not hand coded functions.

If DW_DLV_NO_ENTRY is returned the **dw_val_in** is not known and ***s_out** is not set. This is unusual.

DW_DLV_ERROR is never returned.

The example referred to offers the suggested way to use functions like these.

See also

[Retrieving tag,attribute,etc names](#)

9.33.2 Function Documentation

9.33.2.1 dwarf_get_GNUKIND_name()

```
int dwarf_get_GNUKIND_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

So we can report things GNU extensions sensibly.

9.33.2.2 dwarf_get_EH_name()

```
int dwarf_get_EH_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

So we can report this GNU extension sensibly.

9.33.2.3 dwarf_get_FRAME_name()

```
int dwarf_get_FRAME_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

The set of register names is unlikely to match your register set, but perhaps this is better than no name.

9.33.2.4 dwarf_get_GNUIVIS_name()

```
int dwarf_get_GNUIVIS_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

So we report a GNU extension sensibly.

9.33.2.5 dwarf_get_LLEX_name()

```
int dwarf_get_LLEX_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

The name is a libdwarf invention for the GNU extension. So we report a GNU extension sensibly.

9.33.2.6 dwarf_get_MACINFO_name()

```
int dwarf_get_MACINFO_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

Used in DWARF2-DWARF4

9.33.2.7 dwarf_get_MACRO_name()

```
int dwarf_get_MACRO_name (
    unsigned int dw_val_in,
    const char ** dw_s_out )
```

Used in DWARF5

9.33.2.8 dwarf_get_FORM_CLASS_name()

```
int dwarf_get_FORM_CLASS_name (
    enum Dwarf_Form_Class dw_fc,
    const char ** dw_s_out )
```

See DWARF5 Table 2.3, Classes of Attribute Value page 23. Earlier DWARF versions have a similar table.

9.34 Object Sections Data

Functions

- int [dwarf_get_die_section_name](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Bool](#) dw_is_info, const char **dw_sec_name, [Dwarf_Error](#) *dw_error)
Get the real name a DIE section.
- int [dwarf_get_die_section_name_b](#) ([Dwarf_Die](#) dw_die, const char **dw_sec_name, [Dwarf_Error](#) *dw_error)
Get the real name of a DIE section.
- int [dwarf_get_macro_section_name](#) ([Dwarf_Debug](#) dw_dbg, const char **dw_sec_name_out, [Dwarf_Error](#) *dw_err)
Get the real name of a .debug_macro section.
- int [dwarf_get_real_section_name](#) ([Dwarf_Debug](#) dw_dbg, const char *dw_std_section_name, const char **dw_actual_sec_name_out, [Dwarf_Small](#) *dw_marked_zcompressed, [Dwarf_Small](#) *dw_marked_zlib_compressed, [Dwarf_Small](#) *dw_marked_shf_compressed, [Dwarf_Unsigned](#) *dw_compressed_length, [Dwarf_Unsigned](#) *dw_uncompressed_length, [Dwarf_Error](#) *dw_error)
Get the real name of a section.
- int [dwarf_get_frame_section_name](#) ([Dwarf_Debug](#) dw_dbg, const char **dw_section_name_out, [Dwarf_Error](#) *dw_error)
Get .debug_frame section name.
- int [dwarf_get_frame_section_name_eh_gnu](#) ([Dwarf_Debug](#) dw_dbg, const char **dw_section_name_out, [Dwarf_Error](#) *dw_error)
Get GNU .eh_frame section name.
- int [dwarf_get_aranges_section_name](#) ([Dwarf_Debug](#) dw_dbg, const char **dw_section_name_out, [Dwarf_Error](#) *dw_error)
Get .debug_aranges section name The usual arguments.
- int [dwarf_get_ranges_section_name](#) ([Dwarf_Debug](#) dw_dbg, const char **dw_section_name_out, [Dwarf_Error](#) *dw_error)
Get .debug_ranges section name The usual arguments and return values.
- int [dwarf_get_offset_size](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Half](#) *dw_offset_size, [Dwarf_Error](#) *dw_error)
Get offset size as defined by the object.
- int [dwarf_get_address_size](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Half](#) *dw_addr_size, [Dwarf_Error](#) *dw_error)
Get the address size as defined by the object.
- int [dwarf_get_string_section_name](#) ([Dwarf_Debug](#) dw_dbg, const char **dw_section_name_out, [Dwarf_Error](#) *dw_error)
Get the string table section name The usual arguments and return values.
- int [dwarf_get_line_section_name](#) ([Dwarf_Debug](#) dw_dbg, const char **dw_section_name_out, [Dwarf_Error](#) *dw_error)
Get the line table section name The usual arguments and return values.
- int [dwarf_get_line_section_name_from_die](#) ([Dwarf_Die](#) dw_die, const char **dw_section_name_out, [Dwarf_Error](#) *dw_error)
Get the line table section name.
- int [dwarf_get_section_info_by_name_a](#) ([Dwarf_Debug](#) dw_dbg, const char *dw_section_name, [Dwarf_Addr](#) *dw_section_addr, [Dwarf_Unsigned](#) *dw_section_size, [Dwarf_Unsigned](#) *dw_section_flags, [Dwarf_Unsigned](#) *dw_section_offset, [Dwarf_Error](#) *dw_error)
Given a section name, get its size, address, etc.
- int [dwarf_get_section_info_by_name](#) ([Dwarf_Debug](#) dw_dbg, const char *dw_section_name, [Dwarf_Addr](#) *dw_section_addr, [Dwarf_Unsigned](#) *dw_section_size, [Dwarf_Error](#) *dw_error)
Given a section name, get its size and address.
- int [dwarf_get_section_info_by_index_a](#) ([Dwarf_Debug](#) dw_dbg, int dw_section_index, const char **dw_section_name, [Dwarf_Addr](#) *dw_section_addr, [Dwarf_Unsigned](#) *dw_section_size, [Dwarf_Unsigned](#) *dw_section_flags, [Dwarf_Unsigned](#) *dw_section_offset, [Dwarf_Error](#) *dw_error)
Given a section index, get its size and address, etc.

- int `dwarf_get_section_info_by_index` (`Dwarf_Debug` dw_dbg, int dw_section_index, const char **dw_section_name, `Dwarf_Addr` *dw_section_addr, `Dwarf_Unsigned` *dw_section_size, `Dwarf_Error` *dw_error)
Given a section index, get its size and address.
- int `dwarf_machine_architecture_a` (`Dwarf_Debug` dw_dbg, `Dwarf_Small` *dw_ftype, `Dwarf_Small` *dw_obj_pointersize, `Dwarf_Bool` *dw_obj_is_big_endian, `Dwarf_Unsigned` *dw_obj_machine, `Dwarf_Unsigned` *dw_obj_type, `Dwarf_Unsigned` *dw_obj_flags, `Dwarf_Small` *dw_path_source, `Dwarf_Unsigned` *dw_ub_offset, `Dwarf_Unsigned` *dw_ub_count, `Dwarf_Unsigned` *dw_ub_index, `Dwarf_Unsigned` *dw_comdat_groupnumber)
Get basic object information from Dwarf_Debug.
- int `dwarf_machine_architecture` (`Dwarf_Debug` dw_dbg, `Dwarf_Small` *dw_ftype, `Dwarf_Small` *dw_obj_pointersize, `Dwarf_Bool` *dw_obj_is_big_endian, `Dwarf_Unsigned` *dw_obj_machine, `Dwarf_Unsigned` *dw_obj_flags, `Dwarf_Small` *dw_path_source, `Dwarf_Unsigned` *dw_ub_offset, `Dwarf_Unsigned` *dw_ub_count, `Dwarf_Unsigned` *dw_ub_index, `Dwarf_Unsigned` *dw_comdat_groupnumber)
Get basic object information original version.
- `Dwarf_Unsigned` `dwarf_get_section_count` (`Dwarf_Debug` dw_dbg)
Get section count (of object file sections).
- int `dwarf_get_section_max_offsets_d` (`Dwarf_Debug` dw_dbg, `Dwarf_Unsigned` *dw_debug_info_size, `Dwarf_Unsigned` *dw_debug_abbrev_size, `Dwarf_Unsigned` *dw_debug_line_size, `Dwarf_Unsigned` *dw_debug_loc_size, `Dwarf_Unsigned` *dw_debug_aranges_size, `Dwarf_Unsigned` *dw_debug_macinfo_size, `Dwarf_Unsigned` *dw_debug_pubnames_size, `Dwarf_Unsigned` *dw_debug_str_size, `Dwarf_Unsigned` *dw_debug_frame_size, `Dwarf_Unsigned` *dw_debug_ranges_size, `Dwarf_Unsigned` *dw_debug_pubtypes_size, `Dwarf_Unsigned` *dw_debug_types_size, `Dwarf_Unsigned` *dw_debug_macro_size, `Dwarf_Unsigned` *dw_debug_str_offsets_size, `Dwarf_Unsigned` *dw_debug_sup_size, `Dwarf_Unsigned` *dw_debug_cu_index_size, `Dwarf_Unsigned` *dw_debug_tu_index_size, `Dwarf_Unsigned` *dw_debug_names_size, `Dwarf_Unsigned` *dw_debug_loclists_size, `Dwarf_Unsigned` *dw_debug_rnglists_size)
Get section sizes for many sections.

9.34.1 Detailed Description

These functions are not often used. They give access to section- and objectfile-related information, and that sort of information is not generally needed to understand DWARF content..

Section name access. Because names sections such as .debug_info might end with .dwo or be .zdebug or might not.

String pointers returned via these functions must not be freed, the strings are statically declared.

For non-Elf the name reported will be as if it were Elf sections. For example, not the names MacOS puts in its object sections (which the MacOS reader translates).

These calls returning selected object header {machine architecture,flags} and section {offset, flags} data are not of interest to most library callers: `dwarf_machine_architecture()`, `dwarf_get_section_info_by_index_a()`, and `dwarf_get_section_info_by_name_a()`.

The simple calls will not be documented in full detail here.

9.34.2 Function Documentation

9.34.2.1 dwarf_get_die_section_name()

```
int dwarf_get_die_section_name (
    Dwarf_Debug dw_dbg,
    Dwarf_Bool dw_is_info,
    const char ** dw_sec_name,
    Dwarf_Error * dw_error )
```

dw_is_info

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest
<i>dw_is_info</i>	We do not pass in a DIE, so we have to pass in TRUE for for .debug_info, or if DWARF4 .debug_types pass in FALSE.
<i>dw_sec_name</i>	On success returns a pointer to the actual section name in the object file. Do not free the string.
<i>dw_error</i>	The usual error argument to report error details.

Returns

DW_DLV_OK etc.

9.34.2.2 dwarf_get_die_section_name_b()

```
int dwarf_get_die_section_name_b (
    Dwarf_Die dw_die,
    const char ** dw_sec_name,
    Dwarf_Error * dw_error )
```

The same as **dwarf_get_die_section_name** except we have a DIE so do not need **dw_is_info** as a argument.

9.34.2.3 dwarf_get_real_section_name()

```
int dwarf_get_real_section_name (
    Dwarf_Debug dw_dbg,
    const char * dw_std_section_name,
    const char ** dw_actual_sec_name_out,
    Dwarf_Small * dw_marked_zcompressed,
    Dwarf_Small * dw_marked_zlib_compressed,
    Dwarf_Small * dw_marked_shf_compressed,
    Dwarf_Unsigned * dw_compressed_length,
    Dwarf_Unsigned * dw_uncompressed_length,
    Dwarf_Error * dw_error )
```

If the object has section groups only the sections in the group in dw_dbg will be found.

Whether .zdebug or ZLIB or SHF_COMPRESSED is the marker there is just one uncompress algorithm (zlib) for all three cases.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_std_section_name</i>	Pass in a standard section name, such as .debug_info or .debug_info.dwo .
<i>dw_actual_sec_name_out</i>	On success returns the actual section name from the object file.
<i>dw_marked_zcompressed</i>	On success returns TRUE if the original section name ends in .zdebug
<i>dw_marked_zlib_compressed</i>	On success returns TRUE if the section has the ZLIB string at the front of the section.
<i>dw_marked_shf_compressed</i>	On success returns TRUE if the section flag (Elf SHF_COMPRESSED) is marked as compressed.
<i>dw_compressed_length</i>	On success if the section was compressed it returns the original section length in the object file.
<i>dw_uncompressed_length</i>	On success if the section was compressed this returns the uncompressed length of the object section.
<i>dw_error</i>	On error returns the error usual details.

Returns

The usual DW_DLV_OK etc. If the section is not relevant to this Dwarf_Debug or is not in the object file at all, returns DW_DLV_NO_ENTRY

9.34.2.4 dwarf_get_frame_section_name()

```
int dwarf_get_frame_section_name (
    Dwarf_Debug dw_dbg,
    const char ** dw_section_name_out,
    Dwarf_Error * dw_error )
```

Returns

returns DW_DLV_OK if the .debug_frame exists

9.34.2.5 dwarf_get_frame_section_name_eh_gnu()

```
int dwarf_get_frame_section_name_eh_gnu (
    Dwarf_Debug dw_dbg,
    const char ** dw_section_name_out,
    Dwarf_Error * dw_error )
```

Returns

Returns DW_DLV_OK if the .debug_frame is present Returns DW_DLV_NO_ENTRY if it is not present.

9.34.2.6 dwarf_get_offset_size()

```
int dwarf_get_offset_size (
    Dwarf_Debug dw_dbg,
    Dwarf_Half * dw_offset_size,
    Dwarf_Error * dw_error )
```

This is not from DWARF information, it is from object file headers.

9.34.2.7 dwarf_get_address_size()

```
int dwarf_get_address_size (
    Dwarf_Debug dw_dbg,
    Dwarf_Half * dw_addr_size,
    Dwarf_Error * dw_error )
```

This is not from DWARF information, it is from object file headers.

9.34.2.8 dwarf_get_line_section_name_from_die()

```
int dwarf_get_line_section_name_from_die (
    Dwarf_Die dw_die,
    const char ** dw_section_name_out,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_die</i>	Pass in a Dwarf_Die pointer.
<i>dw_section_name_out</i>	On success returns the section name, usually some .debug_info* name but in DWARF4 could be a .debug_types* name.
<i>dw_error</i>	On error returns the usual error pointer.

Returns

Returns DW_DLV_OK etc.

9.34.2.9 dwarf_get_section_info_by_name_a()

```
int dwarf_get_section_info_by_name_a (
    Dwarf_Debug dw_dbg,
    const char * dw_section_name,
    Dwarf_Addr * dw_section_addr,
    Dwarf_Unsigned * dw_section_size,
    Dwarf_Unsigned * dw_section_flags,
    Dwarf_Unsigned * dw_section_offset,
    Dwarf_Error * dw_error )
```

New in v0.9.0 November 2023.

This is not often used and is completely unnecessary for most to call.

See [dwarf_get_section_info_by_name\(\)](#) for the older and still current version.

Any of the pointers dw_section_addr, dw_section_size, dw_section_flags, and dw_section_offset may be passed in as zero and those will be ignored by the function.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_section_name</i>	Pass in a pointer to a section name. It must be an exact match to the real section name.
<i>dw_section_addr</i>	On success returns the section address as defined by an object header.
<i>dw_section_size</i>	On success returns the section size as defined by an object header.
<i>dw_section_flags</i>	On success returns the section flags as defined by an object header. The flag meaning depends on which object format is being read and the meaning is defined by the object format. We hope it is of some use. In PE object files this field is called Characteristics .
<i>dw_section_offset</i>	On success returns the section offset as defined by an object header. The offset meaning is supposedly an object file offset but the meaning depends on the object file type(!). We hope it is of some use.
<i>dw_error</i>	On error returns the usual error pointer.

Returns

Returns DW_DLV_OK etc.

9.34.2.10 dwarf_get_section_info_by_name()

```
int dwarf_get_section_info_by_name (
    Dwarf_Debug dw_dbg,
    const char * dw_section_name,
    Dwarf_Addr * dw_section_addr,
    Dwarf_Unsigned * dw_section_size,
    Dwarf_Error * dw_error )
```

See [dwarf_get_section_info_by_name_a\(\)](#) for the newest version which returns additional values.

Fields and meanings in [dwarf_get_section_info_by_name\(\)](#) are the same as in [dwarf_get_section_info_by_name_a\(\)](#) except that the arguments `dw_section_flags` and `dw_section_offset` are missing here.

9.34.2.11 dwarf_get_section_info_by_index_a()

```
int dwarf_get_section_info_by_index_a (
    Dwarf_Debug dw_dbg,
    int dw_section_index,
    const char ** dw_section_name,
    Dwarf_Addr * dw_section_addr,
    Dwarf_Unsigned * dw_section_size,
    Dwarf_Unsigned * dw_section_flags,
    Dwarf_Unsigned * dw_section_offset,
    Dwarf_Error * dw_error )
```

See [dwarf_get_section_info_by_index\(\)](#) for the older and still current version.

Any of the pointers `dw_section_addr`, `dw_section_size`, `dw_section_flags`, and `dw_section_offset` may be passed in as zero and those will be ignored by the function.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_section_index</i>	Pass in an index, 0 through N-1 where N is the count returned from <code>dwarf_get_section_count</code> . As an index type -int- works in practice, but should really be Dwarf_Unsigned.
<i>dw_section_name</i>	On success returns a pointer to the section name as it appears in the object file.
<i>dw_section_addr</i>	On success returns the section address as defined by an object header.
<i>dw_section_size</i>	On success returns the section size as defined by an object header.
<i>dw_section_flags</i>	On success returns the section flags as defined by an object header. The flag meaning depends on which object format is being read and the meaning is defined by the object format. In PE object files this field is called Characteristics . We hope it is of some use.
<i>dw_section_offset</i>	On success returns the section offset as defined by an object header. The offset meaning is supposedly an object file offset but the meaning depends on the object file type(!). We hope it is of some use.
<i>dw_error</i>	On error returns the usual error pointer.

Returns

Returns DW_DLV_OK etc.

9.34.2.12 dwarf_get_section_info_by_index()

```
int dwarf_get_section_info_by_index (
    Dwarf_Debug dw_dbg,
    int dw_section_index,
    const char ** dw_section_name,
    Dwarf_Addr * dw_section_addr,
    Dwarf_Unsigned * dw_section_size,
    Dwarf_Error * dw_error )
```

See [dwarf_get_section_info_by_index_a\(\)](#) for the newest version which returns additional values.

Fields and meanings in [dwarf_get_section_info_by_index\(\)](#) are the same as in [dwarf_get_section_info_by_index_a\(\)](#) except that the arguments `dw_section_flags` and `dw_section_offset` are missing here.

9.34.2.13 dwarf_machine_architecture_a()

```
int dwarf_machine_architecture_a (
    Dwarf_Debug dw_dbg,
    Dwarf_Small * dw_ftype,
    Dwarf_Small * dw_obj_pointersize,
    Dwarf_Bool * dw_obj_is_big_endian,
    Dwarf_Unsigned * dw_obj_machine,
    Dwarf_Unsigned * dw_obj_type,
    Dwarf_Unsigned * dw_obj_flags,
    Dwarf_Small * dw_path_source,
    Dwarf_Unsigned * dw_ub_offset,
    Dwarf_Unsigned * dw_ub_count,
    Dwarf_Unsigned * dw_ub_index,
    Dwarf_Unsigned * dw_comdat_groupnumber )
```

Not all the fields here are relevant for all object types, and the `dw_obj_machine` and `dw_obj_flags` have ABI-defined values which have nothing to do with DWARF.

This version added December 2024 with an additional argument: `dw_obj_type`.

`dw_ub_offset`, `dw_ub_count`, `dw_ub_index` only apply to `DW_FTYPE_APPLEUNIVERSAL`.

`dw_comdat_groupnumber` only applies to `DW_FTYPE_ELF`.

Other than `dw_dbg` one can pass in `NULL` for any pointer parameter whose value is not of interest.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_ftype</i>	Pass in a pointer. On success the value pointed to will be set to the applicable DW_FTYPE value (see libdwarf.h).
<i>dw_obj_pointersize</i>	Pass in a pointer. On success the value pointed to will be set to the applicable pointer size, which is almost always either 4 or 8.
<i>dw_obj_is_big_endian</i>	Pass in a pointer. On success the value pointed to will be set to either 1 (the object being read is big-endian) or 0 (the object being read is little-endian).
<i>dw_obj_machine</i>	Pass in a pointer. On success the value pointed to will be set to a value that the specific ABI uses for the machine-architecture the object file says it is for.
<i>dw_obj_type</i>	Pass in a pointer. On success the value pointed to will be set to a value that the specific ABI uses for the machine-architecture the object file says it is for (for ELF is elf header <code>e_type</code>).

Parameters

<i>dw_obj_flags</i>	Pass in a pointer. On success the value pointed to will be set to a value that the specific ABI uses for a header record flags word (in a PE object the flags word is called Characteristics).
<i>dw_path_source</i>	Pass in a pointer. On success the value pointed to will be set to a value that libdwarf sets to a DW_PATHSOURCE value indicating what caused the file path.
<i>dw_ub_offset</i>	Pass in a pointer. On success if the value of dw_ftype is DW_FTYPE_APPLEUNIVERSAL the returned value will be set to the count (in all other cases, the value is set to 0)
<i>dw_ub_count</i>	Pass in a pointer. On success if the value of dw_ftype is DW_FTYPE_APPLEUNIVERSAL the returned value will be set to the number of object files in the binary (in all other cases, the value is set to 0)
<i>dw_ub_index</i>	Pass in a pointer. On success if the value of dw_ftype is DW_FTYPE_APPLEUNIVERSAL the returned value will be set to the number of the specific object from the universal-binary, usable values are 0 through dw_ub_count-1. (in all other cases, the value is set to 0)
<i>dw_comdat_groupnumber</i>	Pass in a pointer. On success if the value of dw_ftype is DW_FTYPE_ELF the returned value will be the comdat group being referenced. (in all other cases, the value is set to 0)

Returns

Returns DW_DLV_NO_ENTRY if the Dwarf_Debug passed in is null or stale. Otherwise returns DW_DLV_OK and non-null return-value pointers will have meaningful data.

9.34.2.14 dwarf_machine_architecture()

```
int dwarf_machine_architecture (
    Dwarf_Debug dw_dbg,
    Dwarf_Small * dw_ftype,
    Dwarf_Small * dw_obj_pointersize,
    Dwarf_Bool * dw_obj_is_big_endian,
    Dwarf_Unsigned * dw_obj_machine,
    Dwarf_Unsigned * dw_obj_flags,
    Dwarf_Small * dw_path_source,
    Dwarf_Unsigned * dw_ub_offset,
    Dwarf_Unsigned * dw_ub_count,
    Dwarf_Unsigned * dw_ub_index,
    Dwarf_Unsigned * dw_comdat_groupnumber )
```

Identical to [dwarf_machine_architecture_a\(\)](#) except that this older version does not have the the dw_obj_type argument so it cannot return the Elf e_type value..

9.34.2.15 dwarf_get_section_count()

```
Dwarf_Unsigned dwarf_get_section_count (
    Dwarf_Debug dw_dbg )
```

Return the section count. Returns 0 if the dw_dbg argument is improper in any way.

Parameters

<i>dw_dbg</i>	Pass in a valid Dwarf_Debug of interest.
---------------	--

Returns

Returns the count of sections in the object file or zero.

9.34.2.16 dwarf_get_section_max_offsets_d()

```
int dwarf_get_section_max_offsets_d (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned * dw_debug_info_size,
    Dwarf_Unsigned * dw_debug_abbrev_size,
    Dwarf_Unsigned * dw_debug_line_size,
    Dwarf_Unsigned * dw_debug_loc_size,
    Dwarf_Unsigned * dw_debug_aranges_size,
    Dwarf_Unsigned * dw_debug_macinfo_size,
    Dwarf_Unsigned * dw_debug_pubnames_size,
    Dwarf_Unsigned * dw_debug_str_size,
    Dwarf_Unsigned * dw_debug_frame_size,
    Dwarf_Unsigned * dw_debug_ranges_size,
    Dwarf_Unsigned * dw_debug_pubtypes_size,
    Dwarf_Unsigned * dw_debug_types_size,
    Dwarf_Unsigned * dw_debug_macro_size,
    Dwarf_Unsigned * dw_debug_str_offsets_size,
    Dwarf_Unsigned * dw_debug_sup_size,
    Dwarf_Unsigned * dw_debug_cu_index_size,
    Dwarf_Unsigned * dw_debug_tu_index_size,
    Dwarf_Unsigned * dw_debug_names_size,
    Dwarf_Unsigned * dw_debug_loclists_size,
    Dwarf_Unsigned * dw_debug_rnglists_size )
```

The list of sections is incomplete and the argument list is ... too long ... making this an unusual function

Originally a hack so clients could verify offsets. Added so that one can detect broken offsets (which happened in an IRIX executable larger than 2GB with MIPSpro 7.3.1.3 toolchain.).

Parameters

<i>dw_dbg</i>	Pass in a valid Dwarf_Debug of interest.
---------------	--

Returns

If the *dw_dbg* is non-null it returns DW_DLV_OK. If *dw_dbg* is NULL it returns DW_DLV_NO_ENTRY.

9.35 Section Groups Objectfile Data

Functions

- int **dwarf_sec_group_sizes** (Dwarf_Debug dw_dbg, Dwarf_Unsigned *dw_section_count_out, Dwarf_Unsigned *dw_group_count_out, Dwarf_Unsigned *dw_selected_group_out, Dwarf_Unsigned *dw_map_entry_count_out, Dwarf_Error *dw_error)

Get Section Groups data counts.

- int [dwarf_sec_group_map](#) ([Dwarf_Debug](#) dw_dbg, [Dwarf_Unsigned](#) dw_map_entry_count, [Dwarf_Unsigned](#) *dw_group_numbers_array, [Dwarf_Unsigned](#) *dw_sec_numbers_array, const char **dw_sec_names_array, [Dwarf_Error](#) *dw_error)

Return a map between group numbers and section numbers.

9.35.1 Detailed Description

Section Groups are defined in the extended Elf ABI and are seen in relocatable Elf object files, not executables or shared objects.

[Section Groups Overview](#)

9.35.2 Function Documentation

9.35.2.1 dwarf_sec_group_sizes()

```
int dwarf_sec_group_sizes (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned * dw_section_count_out,
    Dwarf_Unsigned * dw_group_count_out,
    Dwarf_Unsigned * dw_selected_group_out,
    Dwarf_Unsigned * dw_map_entry_count_out,
    Dwarf_Error * dw_error )
```

Allows callers to find out what groups (dwo or COMDAT) are in the object and how much to allocate so one can get the group-section map data.

This is relevant for Debug Fission. If an object file has both .dwo sections and non-dwo sections or it has Elf COMDAT GROUP sections this becomes important.

[Section Groups Overview](#)

Parameters

dw_dbg	Pass in the Dwarf_Debug of interest.
dw_section_count_out	On success returns the number of DWARF sections in the object file. Can sometimes be many more than are of interest.
dw_group_count_out	On success returns the number of groups. Though usually one, it can be much larger.
dw_selected_group_out	On success returns the groupnumber that applies to this specific open Dwarf_Debug.
dw_map_entry_count_out	On success returns the count of record allocations needed to call dwarf_sec_group_map successfully. dw_map_entry_count_out will be less than or equal to dw_section_count_out .
dw_error	The usual error details pointer.

Returns

On success returns DW_DLV_OK

9.35.2.2 dwarf_sec_group_map()

```
int dwarf_sec_group_map (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned dw_map_entry_count,
    Dwarf_Unsigned * dw_group_numbers_array,
    Dwarf_Unsigned * dw_sec_numbers_array,
    const char ** dw_sec_names_array,
    Dwarf_Error * dw_error )
```

This map shows all the groups in the object file and shows which object sections go with which group.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_map_entry_count</i>	Pass in the dw_map_entry_count_out from dwarf_sec_group_sizes
<i>dw_group_numbers_array</i>	Pass in an array of Dwarf_Unsigned with dw_map_entry_count entries. Zero the data before the call here. On success returns a list of group numbers.
<i>dw_sec_numbers_array</i>	Pass in an array of Dwarf_Unsigned with dw_map_entry_count entries. Zero the data before the call here. On success returns a list of section numbers.
<i>dw_sec_names_array</i>	Pass in an array of const char * with dw_map_entry_count entries. Zero the data before the call here. On success returns a list of section names.
<i>dw_error</i>	The usual error details pointer.

Returns

On success returns DW_DLV_OK

9.36 LEB Encode and Decode

Functions

- int **dwarf_encode_leb128** (Dwarf_Unsigned dw_val, int *dw_nbytes, char *dw_space, int dw_splen)
- int **dwarf_encode_signed_leb128** (Dwarf_Signed dw_val, int *dw_nbytes, char *dw_space, int dw_splen)
- int **dwarf_decode_leb128** (char *dw_leb, Dwarf_Unsigned *dw_leblen, Dwarf_Unsigned *dw_outval, char *dw_endptr)
- int **dwarf_decode_signed_leb128** (char *dw_leb, Dwarf_Unsigned *dw_leblen, Dwarf_Signed *dw_outval, char *dw_endptr)

9.36.1 Detailed Description

These are LEB/ULEB reading and writing functions heavily used inside libdwarf.

While the DWARF Standard does not mention allowing extra insignificant trailing bytes in a ULEB these functions allow a few such for compilers using extras for alignment in DWARF.

9.37 Miscellaneous Functions

Functions

- `const char * dwarf_package_version (void)`
Return the version string in the library.
- `int dwarf_set_stringcheck (int dw_stringcheck)`
Turn off libdwarf checks of strings.
- `int dwarf_set_reloc_application (int dw_apply)`
*Set libdwarf response to *.rela relocations.*
- `void dwarf_record_cmdline_options (Dwarf_Cmdline_Options dw_dd_options)`
Tell libdwarf to add verbosity to Line Header errors By default the flag in the struct argument is zero. dwarfdump uses this when -v used on dwarfdump.
- `int dwarf_set_de_alloc_flag (int dw_v)`
Eliminate libdwarf tracking of allocations Independent of any Dwarf_Debug and applicable to all whenever the setting is changed. Defaults to non-zero.
- `int dwarf_library_allow_dup_attr (int dw_v)`
Eliminate libdwarf checking attribute duplication.
- `Dwarf_Small dwarf_set_default_address_size (Dwarf_Debug dw_dbg, Dwarf_Small dw_value)`
Set the address size on a Dwarf_Debug.
- `int dwarf_get_universalbinary_count (Dwarf_Debug dw_dbg, Dwarf_Unsigned *dw_current_index, Dwarf_Unsigned *dw_available_count)`
Retrieve universal binary index.

Variables

- `void(*) (void *, const void *, unsigned long) dwarf_get_endian_copy_function (Dwarf_Debug dw_dbg)`
Get a pointer to the applicable swap/noswap function.
- `Dwarf_Cmdline_Options dwarf_cmdline_options`

9.37.1 Detailed Description

9.37.2 Function Documentation

9.37.2.1 dwarf_package_version()

```
const char * dwarf_package_version (
    void )
```

An example: "0.3.0" which is a Semantic Version identifier. Before September 2021 the version string was a date, for example "20210528", which is in ISO date format. See DW_LIBDWARF_VERSION DW_LIBDWARF_VERSION_MAJOR DW_LIBDWARF_VERSION_MINOR DW_LIBDWARF_VERSION_MICRO

Returns

The Package Version built into libdwarf.so or libdwarf.a

9.37.2.2 dwarf_set_stringcheck()

```
int dwarf_set_stringcheck (
    int dw_stringcheck )
```

Zero is the default and means do all string length validity checks. It applies to all Dwarf_Debug open and all opened later in this library instance.

Parameters

<i>dw_stringcheck</i>	Pass in a small non-zero value to turn off all libdwarf string validity checks. It speeds up libdwarf, but...is dangerous and voids all promises the library will not segfault.
-----------------------	---

Returns

Returns the previous value of this flag.

9.37.2.3 dwarf_set_reloc_application()

```
int dwarf_set_reloc_application (
    int dw_apply )
```

dw_apply defaults to 1 and means apply all '.rela' relocations on reading in a dwarf object section of such relocations. Best to just ignore this function It applies to all Dwarf_Debug open and all opened later in this library instance.

Parameters

<i>dw_apply</i>	Pass in a zero to turn off reading and applying of .rela relocations, which will likely break reading of .o object files but probably will not break reading executables or shared objects. Pass in non zero (it is really just an 8 bit value, so use a small value) to turn off inspecting .rela sections.
-----------------	--

Returns

Returns the previous value of the apply flag.

9.37.2.4 dwarf_record_cmdline_options()

```
void dwarf_record_cmdline_options (
    Dwarf_Cmdline_Options dw_dd_options )
```

See also

[dwarf_register_printf_callback](#)

Parameters

<i>dw_dd_options</i>	The structure has one flag, and if the flag is nonzero and there is an error in reading a line table header the function passes back detail error messages via dwarf_register_printf_callback .
----------------------	---

9.37.2.5 dwarf_set_de_alloc_flag()

```
int dwarf_set_de_alloc_flag (
    int dw_v )
```


Parameters

<i>dw</i> ↔ _v	If zero passed in libdwarf will run somewhat faster and library memory allocations will not all be tracked and <code>dwarf_finish()</code> will be unable to free/dealloc some things. User code can do the necessary deallocs (as documented), but the normal guarantee that libdwarf will clean up is revoked. If non-zero passed in libdwarf will resume or continue tracking allocations
-------------------	--

Returns

Returns the previous version of the flag.

9.37.2.6 dwarf_library_allow_dup_attr()

```
int dwarf_library_allow_dup_attr (
    int dw_v )
```

Independent of any Dwarf_Debug, this is sets a global flag in libdwarf and is applicable to all whenever the setting is changed. Defaults to zero so by default libdwarf does check every set of abbreviations for duplicate attributes.

DWARF5 Sec 2.2 Attribute Types Each attribute value is characterized by an attribute name. No more than one attribute with a given name may appear in any debugging information entry. Essentially the same wording is in Sec 2.2 of DWARF2, DWARF3 and DWARF4.

Do not call this with non-zero dw_v unless you really want the library to avoid this basic DWARF-correctness check.

Since

{0.12.0}

Parameters

<i>dw</i> ↔ _v	If non-zero passed in libdwarf will avoid the checks and will not return errors for an abbreviation list with duplicate attributes.
-------------------	---

Returns

Returns the previous version of the flag.

9.37.2.7 dwarf_set_default_address_size()

```
Dwarf_Small dwarf_set_default_address_size (
    Dwarf_Debug dw_dbg,
    Dwarf_Small dw_value )
```

DWARF information CUs and other section DWARF headers define a CU-specific address size, but this Dwarf_↔ Debug value is used when other address size information does not exist, for example in a DWARF2 CIE or FDE.

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_value</i>	Sets the address size for the Dwarf_Debug to a non-zero value. The default address size is derived from headers in the object file. Values larger than the size of Dwarf_Addr are not set. If zero passed the default is not changed.

Returns

Returns the last set address size.

9.37.2.8 dwarf_get_universalbinary_count()

```
int dwarf_get_universalbinary_count (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned * dw_current_index,
    Dwarf_Unsigned * dw_available_count )
```

For Mach-O universal binaries this returns relevant information.

For non-universal binaries (Mach-O, Elf, or PE) the values are not meaningful, so the function returns DW_DLV_↔ NO_ENTRY..

Parameters

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_current_index</i>	If dw_current_index is passed in non-null the function returns the universal-binary index of the current object (which came from a universal binary).
<i>dw_available_count</i>	If dw_current_index is passed in non-null the function returns the count of binaries in the universal binary.

Returns

Returns DW_DLV_NO_ENTRY if the object file is not from a Mach-O universal binary. Returns DW_DLV_↔ NO_ENTRY if dw_dbg is passed in NULL. Never returns DW_DLV_ERROR.

9.37.3 Variable Documentation

9.37.3.1 dwarf_get_endian_copy_function

```
void(*) (void *, const void *, unsigned long) dwarf_get_endian_copy_function(Dwarf_Debug dw_dbg)
(
    Dwarf_Debug dw_dbg )
```

the function pointer returned enables libdwarf users to use the same 64bit/32bit/16bit word copy as libdwarf does internally for the Dwarf_Debug passed in. The function makes it possible for libdwarf to read either endianness.

Parameters

<i>dw_dbg</i>	Pass in a pointer to the applicable Dwarf_Debug.
---------------	--

Returns

a pointer to a copy function. If the object file referred to and the libdwarf reading that file are the same endianness the function returned will, when called, do a simple memcpy, effectively, while otherwise it would do a byte-swapping copy. It seems unlikely this will be useful to most library users. To call the copy function returned the first argument must be a pointer to the target word and the second must be a pointer to the input word. The third argument is the length to be copied and it must be 2,4,or 8.

9.38 Determine Object Type of a File

Functions

- int **dwarf_object_detector_path_b** (const char *dw_path, char *dw_outpath_buffer, unsigned long dw_outpathlen, char **dw_gl_pathnames, unsigned int dw_gl_pathcount, unsigned int *dw_ftype, unsigned int *dw_endian, unsigned int *dw_offsetsize, Dwarf_Unsigned *dw_filesize, unsigned char *dw_pathsource, int *dw_errcode)
- int **dwarf_object_detector_path_dSYM** (const char *dw_path, char *dw_outpath, unsigned long dw_outpath_len, char **dw_gl_pathnames, unsigned int dw_gl_pathcount, unsigned int *dw_ftype, unsigned int *dw_endian, unsigned int *dw_offsetsize, Dwarf_Unsigned *dw_filesize, unsigned char *dw_pathsource, int *dw_errcode)
- int **dwarf_object_detector_fd** (int dw_fd, unsigned int *dw_ftype, unsigned int *dw_endian, unsigned int *dw_offsetsize, Dwarf_Unsigned *dw_filesize, int *dw_errcode)

9.38.1 Detailed Description

This group of functions are unlikely to be called by your code unless your code needs to know the basic data about an object file without actually opening a Dwarf_Debug.

These are crucial for libdwarf itself. The dw_ftype returned is one of DW_FTYPE_ELF, DW_FTYPE_PE, DW_FTYPE_MACH_O, or DW_FTYPE_APPLEUNIVERSAL.

9.39 Section allocation: malloc or mmap

Functions

- enum Dwarf_Sec_Alloc_Pref dwarf_set_load_preference (enum Dwarf_Sec_Alloc_Pref dw_load_preference)
Set/Retrieve section allocation preference.
- int dwarf_get_mmap_count (Dwarf_Debug dw_dbg, Dwarf_Unsigned *dw_mmap_count, Dwarf_Unsigned *dw_mmap_size, Dwarf_Unsigned *dw_malloc_count, Dwarf_Unsigned *dw_malloc_size)
Retrieve count of mmap/malloc sections.

9.39.1 Detailed Description

Functions related to the choice of malloc/read or mmap for object section memory allocation.

The default allocation preference is malloc().

The shell environment variable DWARF_WHICH_ALLOC is also involved at runtime but it only applies to reading Elf object files.. If the value is 'malloc' then use of read/malloc is preferred. If the value is 'mmap' then use of mmap is preferred (Example: 'export DWARF_WHICH_ALLOC=mmap'). Otherwise, the environment value is checked and ignored.

If present and valid this environment variable takes precedence over dwarf_set_load_preference().

9.39.2 Function Documentation

9.39.2.1 dwarf_set_load_preference()

```
enum Dwarf_Sec_Alloc_Pref dwarf_set_load_preference (
    enum Dwarf_Sec_Alloc_Pref dw_load_preference )
```

Since

{0.12.0}

By default object file sections are loaded using malloc and read (Dwarf_Alloc_Malloc). This works everywhere and works well on all but gigantic object files.

The preference of Dwarf_Alloc_Mmap does not guarantee mmap will be used for object section data, but does cause mmap() to be used when possible.

In 0.12.0 mmap() is only usable on Elf object files.

dw_load_preference is one of Dwarf_Alloc_Malloc (1) Dwarf_Alloc_Mmap (2)

Must be called before calling a dwarf_init*() to be effective in a dwarf_init*(). The value is remembered for subsequent dwarf_init*() in the library runtime being executed.

Parameters

<i>dw_load_preference</i>	If passed in Dwarf_Alloc_Mmap then future calls to any dwarf_init*() function will use mmap to load object sections if possible. If passed in Dwarf_Alloc_Malloc then future calls to any dwarf_init*() function will use mmap to load sections. Any other value passed in dw_load_preference is ignored.
---------------------------	---

Returns

Always returns the value before dw_load_preference applied, of this runtime global preference.

9.39.2.2 dwarf_get_mmap_count()

```
int dwarf_get_mmap_count (
    Dwarf_Debug dw_dbg,
    Dwarf_Unsigned * dw_mmap_count,
    Dwarf_Unsigned * dw_mmap_size,
    Dwarf_Unsigned * dw_malloc_count,
    Dwarf_Unsigned * dw_malloc_size )
```

Since

{0.12.0}

Note that compressed section contents will be expanded into a malloc/read section in all cases.

Parameters

<i>dw_dbg</i>	A valid open Dwarf_Debug.
<i>dw_mmap_count</i>	On success the number of sections allocated with mmap is returned. If null passed in the argument is ignored.
<i>dw_mmap_size</i>	On success the size total in bytes of sections allocated with mmap is returned. If null passed in the argument is ignored.
<i>dw_malloc_count</i>	On success the number of sections read/allocated with read/malloc is returned. If null passed in the argument is ignored. On success the number of sections allocated with malloc/read is returned.
<i>dw_malloc_size</i>	On success the total size in bytes of sections with malloc/read is returned. If null passed in the argument is ignored. On success the number of sections read/allocated with read/malloc is returned.

Returns

On success returns DW_DLV_OK and sets the counts and total size through the respective non-null pointer arguments. If dw_dbg is invalid or NULL the function returns DW_DLV_ERROR. Never returns DW_DLV_NO_ENTRY.

9.40 Using dwarf_init_path()

Example of a libdwarf initialization call.

An example calling [dwarf_init_path\(\)](#) and [dwarf_finish\(\)](#)

Parameters

<i>path</i>	Path to an object we wish to open.
<i>groupnumber</i>	Desired groupnumber. Use DW_DW_GROUPNUMBER_ANY unless you have reason to do otherwise.

Returns

Returns the applicable result. DW_DLV_OK etc.

```

*/
int exampleinit(const char *path, unsigned groupnumber)
{
    static char true_pathbuf[FILENAME_MAX];
    unsigned tpathlen = FILENAME_MAX;
    Dwarf_Handler errhand = 0;
    Dwarf_Ptr errarg = 0;
    Dwarf_Error error = 0;
    Dwarf_Debug dbg = 0;
    int res = 0;

    res = dwarf_init_path(path, true_pathbuf,
        tpathlen, groupnumber, errhand,
        errarg, &dbg, &error);
    if (res == DW_DLV_ERROR) {
        /* Necessary call even though dbg is null!
           This avoids a memory leak. */
        dwarf_dealloc_error(dbg, error);
        return res;
    }
    if (res == DW_DLV_NO_ENTRY) {
        /* Nothing we can do */
        return res;
    }
    printf("The file we actually opened is %s\n",

```

```

        true_pathbuf);
/* Call libdwarf functions here */
dwarf_finish(dbg);
return DW_DLV_OK;
}

```

9.41 Using dwarf_init_path_dl()

Example focused on GNU debuglink data.

In case GNU debuglink data is followed the `true_pathbuf` content will not match `path`. The path actually used is copied to `true_path_out`.

In the case of MacOS dSYM the `true_path_out` may not match `path`.

If debuglink data is missing from the Elf executable or shared-object (ie, it is a normal object!) or unusable by libdwarf or `true_path_buffer` len is zero or `true_path_out_buffer` is zero libdwarf accepts the path given as the object to report on, no debuglink or dSYM processing will be used.

See also

<https://sourceware.org/gdb/onlinedocs/gdb/Separate-Debug-Files.html>

An example calling `dwarf_init_path_dl()` and `dwarf_finish()`

Parameters

<i>path</i>	Path to an object we wish to open.
<i>groupnumber</i>	Desired groupnumber. Use <code>DW_DW_GROUPNUMBER_ANY</code> unless you have reason to do otherwise.
<i>error</i>	A pointer we can use to record error details.

Returns

Returns the applicable result. `DW_DLV_OK` etc.

```

*/
int exampleinit_dl(const char *path, unsigned groupnumber,
Dwarf_Error *error)
{
    static char true_pathbuf[FILENAME_MAX];
    static const char *glpath[3] = {
        "/usr/local/debug",
        "/usr/local/private/debug",
        "/usr/local/libdwarf/debug"
    };
    unsigned tpathlen = FILENAME_MAX;
    Dwarf_Handler errhand = 0;
    Dwarf_Ptr errarg = 0;
    Dwarf_Debug dbg = 0;
    int res = 0;
    unsigned char path_source = 0;

    res = dwarf_init_path_dl(path, true_pathbuf,
        tpathlen, groupnumber, errhand,
        errarg, &dbg,
        (char **)glpath,
        3,
        &path_source,
        error);
    if (res == DW_DLV_ERROR) {
        /* We are not returning dbg, so we must do:
        dwarf_dealloc_error(dbg, error);
        here to free the error details. */
    }
}

```

```

    dwarf_dealloc_error(dbg, *error);
    *error = 0;
    return res;
}
if (res == DW_DLV_NO_ENTRY) {
    return res;
}
printf("The file we actually opened is %s\n",
    true_pathbuf);
/* Call libdwarf functions here */
dwarf_finish(dbg);
return res;
}

```

9.42 Using dwarf_attrlist()

Example showing `dwarf_attrlist()`

Parameters

<i>somedie</i>	Pass in any valid relevant DIE pointer.
<i>error</i>	An error pointer we can use.

Returns

Return DW_DLV_OK (etc).

```

*/
int example1(Dwarf_Die somedie, Dwarf_Error *error)
{
    Dwarf_Debug dbg = 0;
    Dwarf_Signed atcount;
    Dwarf_Attribute *atlist;
    Dwarf_Signed i = 0;
    int errv;

    errv = dwarf_attrlist(somedie, &atlist, &atcount, error);
    if (errv != DW_DLV_OK) {
        return errv;
    }
    for (i = 0; i < atcount; ++i) {
        Dwarf_Half attrnum = 0;
        const char *attrname = 0;

        /* use atlist[i], likely calling
        libdwarf functions and likely
        returning DW_DLV_ERROR if
        what you call gets DW_DLV_ERROR */
        errv = dwarf_whatattr(atlist[i], &attrnum, error);
        if (errv != DW_DLV_OK) {
            /* Something really bad happened. */
            return errv;
        }
        dwarf_get_AT_name(attrnum, &attrname);
        printf("Attribute[%ld], value %u name %s\n",
            (long int)i, attrnum, attrname);
        dwarf_dealloc_attribute(atlist[i]);
        atlist[i] = 0;
    }
    dwarf_dealloc(dbg, atlist, DW_DLA_LIST);
    return DW_DLV_OK;
}

```

9.43 Attaching a tied dbg

Example attaching base dbg to a split-DWARF object.

See DWARF5 Appendix F on Split-DWARF.

By libdwarf convention, open the split Dwarf_Debug using a dwarf_init call. Then open the executable as the tied object. Then call [dwarf_set_tied_dbg\(\)](#) so the library can look for relevant data in the tied-dbg (the executable).

With split dwarf your libdwarf calls after the the initial open are done against the split Dwarf_Dbg and libdwarf automatically looks in the tied dbg when and as appropriate. the tied_dbg can be detached too, see example3 link, though you must call [dwarf_finish\(\)](#) on the detached dw_tied_dbg, the library will not do that for you.

Parameters

<i>split_dbg</i>	
<i>tied_dbg</i>	
<i>error</i>	

Returns

Returns DW_DLV_OK or DW_DLV_ERROR or DW_DLV_NO_ENTRY to the caller.

```

*/
int example2(Dwarf_Debug split_dbg, Dwarf_Debug tied_dbg,
Dwarf_Error *error)
{
    int res = 0;

    /* The caller should have opened dbg
    on the split-dwarf object/dwp,
    an object with DWARF, but no executable
    code.
    And it should have opened tieddbg on the
    runnable shared object or executable. */
    res = dwarf_set_tied_dbg(split_dbg, tied_dbg, error);
    /* Let the caller (who initialized the dbg
    values) deal with doing dwarf_finish()
    /
    return res;
}

```

9.44 Detaching a tied dbg

Example detaching a tied (executable) dbg.

See DWARF5 Appendix F on Split-DWARF.

With split dwarf your libdwarf calls after than the initial open are done against the split Dwarf_Dbg and libdwarf automatically looks in the open tied dbg when and as appropriate. the tied-dbg can be detached too, see example3 link, though you must call [dwarf_finish\(\)](#) on the detached dw_tied_dbg, the library will not do that for you..

```

*/
int example3(Dwarf_Debug split_dbg, Dwarf_Error *error)
{
    int res = 0;
    res = dwarf_set_tied_dbg(split_dbg, NULL, error);
    if (res != DW_DLV_OK) {
        /* Something went wrong*/
        return res;
    }
    return res;
}

```

9.45 Examining Section Group data

Example accessing Section Group data.

With split dwarf your libdwarf calls after than the initial open are done against the base Dwarf_Dbg and libdwarf automatically looks in the open tied dbg when and as appropriate. the tied-dbg can be detached too, see example3 link, though you must call [dwarf_finish\(\)](#) on the detached dw_tied_dbg, the library will not do that for you..

Section groups apply to Elf COMDAT groups too.

```

*/
void examplesecgroup(Dwarf_Debug dbg)
{
    int res = 0;
    Dwarf_Unsigned section_count = 0;
    Dwarf_Unsigned group_count;
    Dwarf_Unsigned selected_group = 0;
    Dwarf_Unsigned group_map_entry_count = 0;
    Dwarf_Unsigned *sec_nums = 0;
    Dwarf_Unsigned *group_nums = 0;
    const char ** sec_names = 0;
    Dwarf_Error error = 0;
    Dwarf_Unsigned i = 0;

    res = dwarf_sec_group_sizes(dbg, &section_count,
                               &group_count, &selected_group, &group_map_entry_count,
                               &error);
    if (res != DW_DLV_OK) {
        /* Something is badly wrong*/
        return;
    }
    /* In an object without split-dwarf sections
       or COMDAT sections we now have
       selected_group == 1. */
    sec_nums = calloc(group_map_entry_count, sizeof(Dwarf_Unsigned));
    if (!sec_nums) {
        /* FAIL. out of memory */
        return;
    }
    group_nums = calloc(group_map_entry_count, sizeof(Dwarf_Unsigned));
    if (!group_nums) {
        free(group_nums);
        /* FAIL. out of memory */
        return;
    }
    sec_names = calloc(group_map_entry_count, sizeof(char*));
    if (!sec_names) {
        free(group_nums);
        free(sec_nums);
        /* FAIL. out of memory */
        return;
    }

    res = dwarf_sec_group_map(dbg, group_map_entry_count,
                              group_nums, sec_nums, sec_names, &error);
    if (res != DW_DLV_OK) {
        /* FAIL. Something badly wrong. */
        free(sec_names);
        free(group_nums);
        free(sec_nums);
    }
    for (i = 0; i < group_map_entry_count; ++i) {
        /* Now do something with
           group_nums[i], sec_nums[i], sec_names[i] */
    }
    /* The strings are in Elf data.
       Do not free() the strings themselves.*/
    free(sec_names);
    free(group_nums);
    free(sec_nums);
}

```

9.46 Using dwarf_siblingof_c()

Example accessing a DIE sibling.

Access to each DIE on a sibling list. This is the preferred form as it is slightly more efficient than [dwarf_siblingof_b\(\)](#).

```

*/
int example4c(Dwarf_Die in_die,
              Dwarf_Error *error)
{
    Dwarf_Die return_sib = 0;

```

```

int res = 0;

/* in_die must be a valid Dwarf_Die */
res = dwarf_siblingof_c(in_die,&return_sib, error);
if (res == DW_DLV_OK) {
    /* Use return_sib here. */
    dwarf_dealloc_die(return_sib);
    /* return_sib is no longer usable for anything, we
       ensure we do not use it accidentally with: */
    return_sib = 0;
    return res;
}
return res;
}

```

9.47 Using dwarf_siblingof_b()

Example accessing a DIE sibling.

Access to each DIE on a sibling list This is the older form, required after [dwarf_next_cu_header_d\(\)](#).

Better to use [dwarf_next_cu_header_e\(\)](#) and [dwarf_siblingof_c\(\)](#).

```

/*
int example4b(Dwarf_Debug dbg,Dwarf_Die in_die,
Dwarf_Bool is_info,
Dwarf_Error *error)
{
    Dwarf_Die return_sib = 0;
    int res = 0;

    /* in_die might be NULL following a call
       to dwarf_next_cu_header_d()
       or a valid Dwarf_Die */
    res = dwarf_siblingof_b(dbg,in_die,is_info,&return_sib, error);
    if (res == DW_DLV_OK) {
        /* Use return_sib here. */
        dwarf_dealloc_die(return_sib);
        /* return_sib is no longer usable for anything, we
           ensure we do not use it accidentally with: */
        return_sib = 0;
        return res;
    }
    return res;
}

```

9.48 Using dwarf_child()

Example accessing a DIE child.

If the DIE has children (for example inner scopes in a function or members of a struct) this retrieves the DIE which appears first. The child itself may have its own sibling chain.

```

/*
void example5(Dwarf_Die in_die)
{
    Dwarf_Die return_kid = 0;
    Dwarf_Error error = 0;
    int res = 0;

    res = dwarf_child(in_die,&return_kid, &error);
    if (res == DW_DLV_OK) {
        /* Use return_kid here. */
        dwarf_dealloc_die(return_kid);
        /* The original form of dealloc still works
           dwarf_dealloc(dbg, return_kid, DW_DLA_DIE);
           /
        /* return_kid is no longer usable for anything, we
           ensure we do not use it accidentally with: */
        return_kid = 0;
    }
}

```

9.49 using dwarf_validate_die_sibling

Example of a DIE tree validation.

Here we show how one uses `dwarf_validate_die_sibling()`. Dwarfdump uses this function as a part of its validation of DIE trees.

It is not something you need to use. But one must use it in a specific pattern for it to work properly.

`dwarf_validate_die_sibling()` depends on data set by `dwarf_child()` preceeding `dwarf_siblingof_b()` . `dwarf_child()` records a little bit of information invisibly in the Dwarf_Debug data.

```

*/
int example_sibvalid(Dwarf_Debug dbg,
    Dwarf_Die in_die,
    Dwarf_Error*error)
{
    int cres = DW_DLV_OK;
    int sibres = DW_DLV_OK;
    Dwarf_Die die = 0;
    Dwarf_Die sibdie = 0;
    Dwarf_Die child = 0;
    Dwarf_Bool is_info = dwarf_get_die_infotypes_flag(die);

    die = in_die;
    for ( ; die ; die = sibdie) {
        int vres = 0;
        Dwarf_Unsigned offset = 0;

        /* Maybe print something you extract from the DIE */
        cres = dwarf_child(die,&child,error);
        if (cres == DW_DLV_ERROR) {
            if (die != in_die) {
                dwarf_dealloc_die(die);
            }
            printf("dwarf_child ERROR\n");
            return DW_DLV_ERROR;
        }
        if (cres == DW_DLV_OK) {
            int lres = 0;

            child = 0;
            lres = example_sibvalid(dbg,child,error);
            if (lres == DW_DLV_ERROR) {
                if (die != in_die) {
                    dwarf_dealloc_die(die);
                }
                dwarf_dealloc_die(child);
                printf("example_sibvalid ERROR\n");
                return lres;
            }
        }
        sibdie = 0;
        sibres = dwarf_siblingof_b(dbg,die,is_info,
            &sibdie,error);
        if (sibres == DW_DLV_ERROR) {
            if (die != in_die) {
                dwarf_dealloc_die(die);
            }
            if (child) {
                dwarf_dealloc_die(child);
            }
            printf("dwarf_siblingof_b ERROR\n");
            return DW_DLV_ERROR;
        }
        if (sibres == DW_DLV_NO_ENTRY) {
            if (die != in_die) {
                dwarf_dealloc_die(die);
            }
            if (child) {
                dwarf_dealloc_die(child);
            }
            return DW_DLV_OK;
        }
        vres = dwarf_validate_die_sibling(sibdie,&offset);
        if (vres == DW_DLV_ERROR) {
            if (die != in_die) {
                dwarf_dealloc_die(die);
            }
            if (child) {
                dwarf_dealloc_die(child);
            }
        }
    }
}

```

```

    }
    dwarf_dealloc_die(sibdie);
    printf("Invalid sibling DIE\n");
    return DW_DLV_ERROR;
}
/* loop again */
if (die != in_die) {
    dwarf_dealloc_die(die);
}
die = 0;
}
return DW_DLV_OK;
}

```

9.50 Example walking CUs(e)

Example examining CUs looking for specific items(e).

Loops through as many CUs as needed, stops and returns once a CU provides the desired data.

Assumes certain functions you write to remember the aspect of CUs that matter to you so once found in a cu my_needed_data_exists() or some other function of yours can identify the correct record.

Depending on your goals in examining the DIE tree it may be helpful to maintain a DIE stack of active DIEs, pushing and popping as you make your way through the DIE levels.

We assume that on a serious error we will give up (for simplicity here).

We assume the caller to examplecuhdre() will know what to retrieve (when we return DW_DLV_OK from examplecuhdree() and that myrecords points to a record with all the data needed by my_needed_data_exists() and recorded by myrecord_data_for_die().

```

*/

struct myrecords_struct *myrecords;
void myrecord_data_for_die(struct myrecords_struct *myrecords_data,
    Dwarf_Die d)
{
    /* do something */
    /* avoid compiler warnings */
    (void)myrecords_data;
    (void)d;
}
int my_needed_data_exists(struct myrecords_struct *myrecords_data)
{
    /* do something */
    /* avoid compiler warnings */
    (void)myrecords_data;
    return DW_DLV_OK;
}

/* Loop on DIE tree. */
static void
record_die_and_siblings_e(Dwarf_Debug dbg, Dwarf_Die in_die,
    int is_info, int in_level,
    struct myrecords_struct *myrec,
    Dwarf_Error *error)
{
    int res = DW_DLV_OK;
    Dwarf_Die cur_die=in_die;
    Dwarf_Die child = 0;

    myrecord_data_for_die(myrec,in_die);

    /* Loop on a list of siblings */
    for (;;) {
        Dwarf_Die sib_die = 0;

        /* Depending on your goals, the in_level,
        and the DW_TAG of cur_die, you may want
        to skip the dwarf_child call. We descend
        the DWARF-standard way of depth-first. */
        res = dwarf_child(cur_die,&child,error);
        if (res == DW_DLV_ERROR) {
            printf("Error in dwarf_child , level %d \n",in_level);

```

```

        exit(EXIT_FAILURE);
    }
    if (res == DW_DLV_OK) {
        record_die_and_siblings_e(dbg, child, is_info,
                                in_level+1, myrec, error);
        /* No longer need 'child' die. */
        dwarf_dealloc(dbg, child, DW_DLA_DIE);
        child = 0;
    }
    /* res == DW_DLV_NO_ENTRY or DW_DLV_OK */
    res = dwarf_siblingof_c(cur_die, &sib_die, error);
    if (res == DW_DLV_ERROR) {
        exit(EXIT_FAILURE);
    }
    if (res == DW_DLV_NO_ENTRY) {
        /* Done at this level. */
        break;
    }
    /* res == DW_DLV_OK */
    if (cur_die != in_die) {
        dwarf_dealloc(dbg, cur_die, DW_DLA_DIE);
        cur_die = 0;
    }
    cur_die = sib_die;
    myrecord_data_for_die(myrec, sib_die);
}
return;
}

/* Assuming records properly initialized for your use. */
int examplecuhdre(Dwarf_Debug dbg,
                 struct myrecords_struct *myrec,
                 Dwarf_Error *error)
{
    Dwarf_Unsigned abbrev_offset = 0;
    Dwarf_Half address_size = 0;
    Dwarf_Half version_stamp = 0;
    Dwarf_Half offset_size = 0;
    Dwarf_Half extension_size = 0;
    Dwarf_Sig8 signature;
    Dwarf_Unsigned typeoffset = 0;
    Dwarf_Unsigned next_cu_header = 0;
    Dwarf_Half header_cu_type = 0;
    Dwarf_Bool is_info = TRUE;
    int res = 0;

    while(!my_needed_data_exists(myrec)) {
        Dwarf_Die cu_die = 0;
        Dwarf_Unsigned cu_header_length = 0;

        memset(&signature, 0, sizeof(signature));
        res = dwarf_next_cu_header_e(dbg, is_info,
                                    &cu_die,
                                    &cu_header_length,
                                    &version_stamp, &abbrev_offset,
                                    &address_size, &offset_size,
                                    &extension_size, &signature,
                                    &typeoffset, &next_cu_header,
                                    &header_cu_type, error);
        if (res == DW_DLV_ERROR) {
            return res;
        }
        if (res == DW_DLV_NO_ENTRY) {
            if (is_info == TRUE) {
                /* Done with .debug_info, now check for
                 * .debug_types. */
                is_info = FALSE;
                continue;
            }
            /* No more CUs to read! Never found
             * what we were looking for in either
             * .debug_info or .debug_types. */
            return res;
        }
        /* We have the cu_die .
         * New in v0.9.0 because the connection of
         * the CU_DIE to the CU header is clear
         * in the argument list.
         */
        record_die_and_siblings_e(dbg, cu_die, is_info,
                                0, myrec, error);
        dwarf_dealloc_die(cu_die);
    }
    /* Found what we looked for */
    return DW_DLV_OK;
}

```

9.51 Example walking CUs(d)

Example accessing all CUs looking for specific items(d).

Loops through as many CUs as needed, stops and returns once a CU provides the desired data.

Assumes certain functions you write to remember the aspect of CUs that matter to you so once found in a cu my_needed_data_exists() or some other function of yours can identify the correct record. (Possibly a DIE global offset. Remember to note if each DIE has is_info TRUE or FALSE so libdwarf can find the DIE properly.)

Depending on your goals in examining the DIE tree it may be helpful to maintain a DIE stack of active DIEs, pushing and popping as you make your way through the DIE levels.

We assume that on a serious error we will give up (for simplicity here).

We assume the caller to examplecuhdrd() will know what to retrieve (when we return DW_DLV_OK from examplecuhdrd() and that myrecords points to a record with all the data needed by my_needed_data_exists() and recorded by myrecord_data_for_die().

```

*/
struct myrecords_struct *myrecords;
void myrecord_data_for_die(struct myrecords_struct *myrecords,
    Dwarf_Die d);
int my_needed_data_exists(struct myrecords_struct *myrecords);

/* Loop on DIE tree. */
static void
record_die_and_siblingsd(Dwarf_Debug dbg, Dwarf_Die in_die,
    int is_info, int in_level,
    struct myrecords_struct *myrec,
    Dwarf_Error *error)
{
    int res = DW_DLV_OK;
    Dwarf_Die cur_die=in_die;
    Dwarf_Die child = 0;

    myrecord_data_for_die(myrec,in_die);

    /* Loop on a list of siblings */
    for (;;) {
        Dwarf_Die sib_die = 0;

        /* Depending on your goals, the in_level,
         and the DW_TAG of cur_die, you may want
         to skip the dwarf_child call. */
        res = dwarf_child(cur_die,&child,error);
        if (res == DW_DLV_ERROR) {
            printf("Error in dwarf_child , level %d \n",in_level);
            exit(EXIT_FAILURE);
        }
        if (res == DW_DLV_OK) {
            record_die_and_siblingsd(dbg,child,is_info,
                in_level+1,myrec,error);
            /* No longer need 'child' die. */
            dwarf_dealloc(dbg,child,DW_DLA_DIE);
            child = 0;
        }
        /* res == DW_DLV_NO_ENTRY or DW_DLV_OK */
        res = dwarf_siblingof_b(dbg,cur_die,is_info,&sib_die,error);
        if (res == DW_DLV_ERROR) {
            exit(EXIT_FAILURE);
        }
        if (res == DW_DLV_NO_ENTRY) {
            /* Done at this level. */
            break;
        }
        /* res == DW_DLV_OK */
        if (cur_die != in_die) {
            dwarf_dealloc(dbg,cur_die,DW_DLA_DIE);
            cur_die = 0;
        }
        cur_die = sib_die;
        myrecord_data_for_die(myrec,sib_die);
    }
    return;
}

/* Assuming records properly initialized for your use. */
int examplecuhdrd(Dwarf_Debug dbg,
```

```

struct myrecords_struct *myrec,
Dwarf_Error *error)
{
    Dwarf_Unsigned abbrev_offset = 0;
    Dwarf_Half address_size = 0;
    Dwarf_Half version_stamp = 0;
    Dwarf_Half offset_size = 0;
    Dwarf_Half extension_size = 0;
    Dwarf_Sig8 signature;
    Dwarf_Unsigned typeoffset = 0;
    Dwarf_Unsigned next_cu_header = 0;
    Dwarf_Half header_cu_type = 0;
    Dwarf_Bool is_info = TRUE;
    int res = 0;

    while (!my_needed_data_exists(myrec)) {
        Dwarf_Die no_die = 0;
        Dwarf_Die cu_die = 0;
        Dwarf_Unsigned cu_header_length = 0;

        memset(&signature, 0, sizeof(signature));
        res = dwarf_next_cu_header_d(dbg, is_info, &cu_header_length,
            &version_stamp, &abbrev_offset,
            &address_size, &offset_size,
            &extension_size, &signature,
            &typeoffset, &next_cu_header,
            &header_cu_type, error);
        if (res == DW_DLV_ERROR) {
            return res;
        }
        if (res == DW_DLV_NO_ENTRY) {
            if (is_info == TRUE) {
                /* Done with .debug_info, now check for
                 * .debug_types. */
                is_info = FALSE;
                continue;
            }
            /* No more CUs to read! Never found
             * what we were looking for in either
             * .debug_info or .debug_types. */
            return res;
        }
        /* The CU will have a single sibling, a cu_die.
         * It is essential to call this right after
         * a call to dwarf_next_cu_header_d() because
         * there is no explicit connection provided to
         * dwarf_siblingof_b(), which returns a DIE
         * from whatever CU was last accessed by
         * dwarf_next_cu_header_d()!
         * The lack of explicit connection was a
         * design mistake in the API (made in 1992). */

        res = dwarf_siblingof_b(dbg, no_die, is_info,
            &cu_die, error);
        if (res == DW_DLV_ERROR) {
            return res;
        }
        if (res == DW_DLV_NO_ENTRY) {
            /* Impossible */
            exit(EXIT_FAILURE);
        }
        record_die_and_siblingsd(dbg, cu_die, is_info,
            0, myrec, error);
        dwarf_dealloc_die(cu_die);
    }
    /* Found what we looked for */
    return DW_DLV_OK;
}

```

9.52 Using dwarf_offdie_b()

Example accessing a DIE by its offset.

```

/*
int example6(Dwarf_Debug dbg, Dwarf_Off die_offset,
    Dwarf_Bool is_info,
    Dwarf_Error *error)
{
    Dwarf_Die return_die = 0;
    int res = 0;

    res = dwarf_offdie_b(dbg, die_offset, is_info, &return_die, error);
}

```

```

    if (res != DW_DLV_OK) {
        /* res could be NO ENTRY or ERROR, so no
           dealloc necessary. */
        return res;
    }
    /* Use return_die here. */
    dwarf_dealloc_die(return_die);
    /* return_die is no longer usable for anything, we
       ensure we do not use it accidentally
       though a bit silly here given the return_die
       goes out of scope... */
    return_die = 0;
    return res;
}

```

9.53 Using dwarf_offset_given_die()

Example finding the section offset of a DIE.

Here finding the offset of a CU-DIE.

```

/*
int example7(Dwarf_Debug dbg, Dwarf_Die in_die,
             Dwarf_Bool is_info,
             Dwarf_Error * error)
{
    int res = 0;
    Dwarf_Off cudieoff = 0;
    Dwarf_Die cudie = 0;

    res = dwarf_CU_dieoffset_given_die(in_die, &cudieoff, error);
    if (res != DW_DLV_OK) {
        /* FAIL */
        return res;
    }
    res = dwarf_offdie_b(dbg, cudieoff, is_info, &cudie, error);
    if (res != DW_DLV_OK) {
        /* FAIL */
        return res;
    }
    /* do something with cu_die */
    dwarf_dealloc_die(cudie);
    return res;
}

```

9.54 Using dwarf_attrlist()

Example Calling dwarf_attrlist()

```

/*
int example8(Dwarf_Debug dbg, Dwarf_Die somedie, Dwarf_Error *error)
{
    Dwarf_Signed atcount = 0;
    Dwarf_Attribute *atlist = 0;
    int errv = 0;
    Dwarf_Signed i = 0;

    errv = dwarf_attrlist(somedie, &atlist, &atcount, error);
    if (errv != DW_DLV_OK) {
        return errv;
    }
    for (i = 0; i < atcount; ++i) {
        /* use atlist[i] */
        dwarf_dealloc_attribute(atlist[i]);
        atlist[i] = 0;
    }
    dwarf_dealloc(dbg, atlist, DW_DLA_LIST);
    return DW_DLV_OK;
}

```

9.55 Using dwarf_offset_list()

Example using dwarf_offset_list.

An example calling dwarf_offset_list

Parameters

<i>dbg</i>	the Dwarf_Debug of interest
<i>dieoffset</i>	The section offset of a Dwarf_Die
<i>is_info</i>	Pass in TRUE if the dieoffset is for the .debug_info section, else pass in FALSE meaning the dieoffset is for the DWARF4 .debug_types section.
<i>error</i>	The usual error detail return.

Returns

Returns DW_DLV_OK etc

```

/*
int exampleoffset_list(Dwarf_Debug dbg, Dwarf_Off dieoffset,
    Dwarf_Bool is_info,Dwarf_Error * error)
{
    Dwarf_Unsigned offcnt = 0;
    Dwarf_Off *offbuf = 0;
    int errv = 0;
    Dwarf_Unsigned i = 0;

    errv = dwarf_offset_list(dbg,dieoffset, is_info,
        &offbuf,&offcnt, error);
    if (errv != DW_DLV_OK) {
        return errv;
    }
    for (i = 0; i < offcnt; ++i) {
        /* use offbuf[i] */
        /* No need to free the offbuf entry, it
           is just an offset value. */
    }
    dwarf_dealloc(dbg, offbuf, DW_DLA_LIST);
    return DW_DLV_OK;
}

```

9.56 Documenting Form_Block

Example documents Form_Block content.

Used with certain location information functions, a frame expression function, expanded frame instructions, and DW_FORM_block<> functions and more.

See also

[dwarf_formblock](#)

[Dwarf_Block_s](#)

```

struct Dwarf_Block_s fields {
    Dwarf_Unsigned bl_len;
        Length of block bl_data points at

    Dwarf_Ptr      bl_data;
        Uninterpreted data bytes

    Dwarf_Small    bl_from_loclist;
        See libdwarf.h DW_LKIND, defaults to
        DW_LKIND_expression and except in certain
        location expressions the field is ignored.

    Dwarf_Unsigned bl_section_offset;
        Section offset of what bl_data points to

```

9.57 Using dwarf_discr_list()

Example using dwarf_discr_list, dwarf_formblock.

An example calling dwarf_get_form_class, dwarf_discr_list, and dwarf_formblock. and the dwarf_deallocs applicable.

See also

[dwarf_discr_list](#)

[dwarf_get_form_class](#)

[dwarf_formblock](#)

Parameters

<i>dw_dbg</i>	The applicable Dwarf_Debug
<i>dw_die</i>	The applicable Dwarf_Die
<i>dw_attr</i>	The applicable Dwarf_Attribute
<i>dw_attrnum, The</i>	attribute number passed in to shorten this example a bit.
<i>dw_isunsigned, The</i>	attribute number passed in to shorten this example a bit.
<i>dw_theform, The</i>	form number passed in to shorten this example a bit.
<i>dw_error</i>	The usual error pointer.

Returns

Returns DW_DLV_OK etc

```

/*
int example_discr_list(Dwarf_Debug dbg,
    Dwarf_Die die,
    Dwarf_Attribute attr,
    Dwarf_Half attrnum,
    Dwarf_Bool isunsigned,
    Dwarf_Half theform,
    Dwarf_Error *error)
{
    /* The example here assumes that
       attribute attr is a DW_AT_discr_list.
       isunsigned should be set from the signedness
       of the parent of 'die' per DWARF rules for
       DW_AT_discr_list. */
    enum Dwarf_Form_Class fc = DW_FORM_CLASS_UNKNOWN;
    Dwarf_Half version = 0;
    Dwarf_Half offset_size = 0;
    int wres = 0;

    wres = dwarf_get_version_of_die(die, &version, &offset_size);
    if (wres != DW_DLV_OK) {
        /* FAIL */
        return wres;
    }
    fc = dwarf_get_form_class(version, attrnum, offset_size, theform);
    if (fc == DW_FORM_CLASS_BLOCK) {
        int fres = 0;
        Dwarf_Block *tempb = 0;
        fres = dwarf_formblock(attr, &tempb, error);
        if (fres == DW_DLV_OK) {
            Dwarf_Disc_Head h = 0;
            Dwarf_Unsigned u = 0;
            Dwarf_Unsigned arraycount = 0;
            int sres = 0;

            sres = dwarf_discr_list(dbg,
                (Dwarf_Small *)tempb->bl_data,
                tempb->bl_len,
                &h, &arraycount, error);
            if (sres == DW_DLV_NO_ENTRY) {
                /* Nothing here. */
            }
        }
    }
}

```

```

        dwarf_dealloc(dbg, tempb, DW_DLA_BLOCK);
        return sres;
    }
    if (sres == DW_DLV_ERROR) {
        /* FAIL . */
        dwarf_dealloc(dbg, tempb, DW_DLA_BLOCK);
        return sres ;
    }
    for (u = 0; u < arraycount; u++) {
        int u2res = 0;
        Dwarf_Half dtype = 0;
        Dwarf_Signed dlow = 0;
        Dwarf_Signed dhigh = 0;
        Dwarf_Unsigned ulow = 0;
        Dwarf_Unsigned uhigh = 0;

        if (isunsigned) {
            u2res = dwarf_discr_entry_u(h,u,
                &dtype,&ulow,&uhigh,error);
        } else {
            u2res = dwarf_discr_entry_s(h,u,
                &dtype,&dlow,&dhigh,error);
        }
        if (u2res == DW_DLV_ERROR) {
            /* Something wrong */
            dwarf_dealloc(dbg,h,DW_DLA_DSC_HEAD);
            dwarf_dealloc(dbg, tempb, DW_DLA_BLOCK);
            return u2res ;
        }
        if (u2res == DW_DLV_NO_ENTRY) {
            /* Impossible. u < arraycount. */
            dwarf_dealloc(dbg,h,DW_DLA_DSC_HEAD);
            dwarf_dealloc(dbg, tempb, DW_DLA_BLOCK);
            return u2res;
        }
        /* Do something with dtype, and whichever
           of ulow, uhigh,dlow,dhigh got set.
           Probably save the values somewhere.
           Simple casting of dlow to ulow (or vice versa)
           will not get the right value due to the nature
           of LEB values. Similarly for uhigh, dhigh.
           One must use the right call.  */
    }
    dwarf_dealloc(dbg,h,DW_DLA_DSC_HEAD);
    dwarf_dealloc(dbg, tempb, DW_DLA_BLOCK);
}
}
return DW_DLV_OK;
}

```

9.58 Location/expression access

Example using DWARF2-5 loclists and loc-expressions.

Valid for DWARF2 and later DWARF.

This example simply *assumes* the attribute has a form which relates to location lists or location expressions. Use [dwarf_get_form_class\(\)](#) to determine if this attribute fits. Use [dwarf_get_version_of_die\(\)](#) to help get the data you need.

See also

[dwarf_get_form_class](#)

[dwarf_get_version_of_die](#)

[Reading a location expression](#)

```

/*
int example_loclistcv5(Dwarf_Attribute someattr,
    Dwarf_Error *error)
{
    Dwarf_Unsigned lcount = 0;
    Dwarf_Loc_Head_c loclist_head = 0;
    int lres = 0;

    lres = dwarf_get_loclist_c(someattr,&loclist_head,

```

```

    &lcount,error);
if (lres == DW_DLV_OK) {
    Dwarf_Unsigned i = 0;

    /* Before any return remember to call
       dwarf_loc_head_c_dealloc(loclist_head); */
    for (i = 0; i < lcount; ++i) {
        Dwarf_Small loclist_lkind = 0;
        Dwarf_Small lle_value = 0;
        Dwarf_Unsigned rawval1 = 0;
        Dwarf_Unsigned rawval2 = 0;
        Dwarf_Bool debug_addr_unavailable = FALSE;
        Dwarf_Addr lopc = 0;
        Dwarf_Addr hipc = 0;
        Dwarf_Unsigned loclist_expr_op_count = 0;
        Dwarf_Locdesc_c locdesc_entry = 0;
        Dwarf_Unsigned expression_offset = 0;
        Dwarf_Unsigned locdesc_offset = 0;

        lres = dwarf_get_locdesc_entry_d(loclist_head,
            i,
            &lle_value,
            &rawval1,&rawval2,
            &debug_addr_unavailable,
            &lopc,&hipc,
            &loclist_expr_op_count,
            &locdesc_entry,
            &loclist_lkind,
            &expression_offset,
            &locdesc_offset,
            error);
        if (lres == DW_DLV_OK) {
            Dwarf_Unsigned j = 0;
            int opres = 0;
            Dwarf_Small op = 0;

            for (j = 0; j < loclist_expr_op_count; ++j) {
                Dwarf_Unsigned opd1 = 0;
                Dwarf_Unsigned opd2 = 0;
                Dwarf_Unsigned opd3 = 0;
                Dwarf_Unsigned offsetforbranch = 0;

                opres = dwarf_get_location_op_value_c(
                    locdesc_entry, j,&op,
                    &opd1,&opd2,&opd3,
                    &offsetforbranch,
                    error);
                if (opres == DW_DLV_OK) {
                    /* Do something with the operators.
                       Usually you want to use opd1,2,3
                       as appropriate. Calculations
                       involving base addresses etc
                       have already been incorporated
                       in opd1,2,3. */
                } else {
                    dwarf_dealloc_loc_head_c(loclist_head);
                    /*Something is wrong. */
                    return opres;
                }
            }
        } else {
            /* Something is wrong. Do something. */
            dwarf_dealloc_loc_head_c(loclist_head);
            return lres;
        }
    }
}
/* Always call dwarf_loc_head_c_dealloc()
   to free all the memory associated with loclist_head. */
dwarf_dealloc_loc_head_c(loclist_head);
loclist_head = 0;
return lres;
}

```

9.59 Reading a location expression

Example getting details of a location expression.

See also

Location/expression access

```

*/
int example_locexpr(Dwarf_Debug dbg, Dwarf_Ptr expr_bytes,
    Dwarf_Unsigned expr_len,
    Dwarf_Half addr_size,
    Dwarf_Half offset_size,
    Dwarf_Half version,
    Dwarf_Error*error)
{
    Dwarf_Loc_Head_c head = 0;
    Dwarf_Locdesc_c locentry = 0;
    int res2 = 0;
    Dwarf_Unsigned rawlopc = 0;
    Dwarf_Unsigned rawhipc = 0;
    Dwarf_Bool debug_addr_unavail = FALSE;
    Dwarf_Unsigned lopc = 0;
    Dwarf_Unsigned hipc = 0;
    Dwarf_Unsigned ulistlen = 0;
    Dwarf_Unsigned ulocentry_count = 0;
    Dwarf_Unsigned section_offset = 0;
    Dwarf_Unsigned locdesc_offset = 0;
    Dwarf_Small lle_value = 0;
    Dwarf_Small loclist_source = 0;
    Dwarf_Unsigned i = 0;

    res2 = dwarf_loclist_from_expr_c(dbg,
        expr_bytes, expr_len,
        addr_size,
        offset_size,
        version,
        &head,
        &ulistlen,
        error);
    if (res2 != DW_DLV_OK) {
        return res2;
    }
    /* These are a location expression, not loclist.
       So we just need the 0th entry. */
    res2 = dwarf_get_locdesc_entry_d(head,
        0, /* Data from 0th because it is a loc expr,
           there is no list */
        &lle_value,
        &rawlopc, &rawhipc, &debug_addr_unavail, &lopc, &hipc,
        &ulocentry_count, &locentry,
        &loclist_source, &section_offset, &locdesc_offset,
        error);
    if (res2 == DW_DLV_ERROR) {
        dwarf_dealloc_loc_head_c(head);
        return res2;
    } else if (res2 == DW_DLV_NO_ENTRY) {
        dwarf_dealloc_loc_head_c(head);
        return res2;
    }
    /* ASSERT: ulistlen == 1 */
    for (i = 0; i < ulocentry_count; ++i) {
        Dwarf_Small op = 0;
        Dwarf_Unsigned opd1 = 0;
        Dwarf_Unsigned opd2 = 0;
        Dwarf_Unsigned opd3 = 0;
        Dwarf_Unsigned offsetforbranch = 0;

        res2 = dwarf_get_location_op_value_c(locentry,
            i, &op, &opd1, &opd2, &opd3,
            &offsetforbranch,
            error);
        /* Do something with the expression operator and operands */
        if (res2 != DW_DLV_OK) {
            dwarf_dealloc_loc_head_c(head);
            return res2;
        }
    }
    dwarf_dealloc_loc_head_c(head);
    return DW_DLV_OK;
}

```

9.60 Using dwarf_srclines_b()

Example using [dwarf_srclines_b\(\)](#)

An example calling `dwarf_srclines_b`

`dwarf_srclines_dealloc_b` `dwarf_srclines_from_linecontext` `dwarf_srclines_files_indexes` `dwarf_srclines_files_data_b` `dwarf_srclines_two_level_from_linecontext`

Parameters

<i>path</i>	Path to an object we wish to open.
<i>error</i>	Allows passing back error details to the caller.

Returns

Return `DW_DLV_OK` etc.

```

*/
int examplec(Dwarf_Die cu_die, Dwarf_Error *error)
{
    /* EXAMPLE: DWARF2-DWARF5 access. */
    Dwarf_Line *linebuf = 0;
    Dwarf_Signed linecount = 0;
    Dwarf_Line *linebuf_actuals = 0;
    Dwarf_Signed linecount_actuals = 0;
    Dwarf_Line_Context line_context = 0;
    Dwarf_Small table_count = 0;
    Dwarf_Unsigned lineversion = 0;
    int sres = 0;
    /* ... */
    /* we use 'return' here to signify we can do nothing more
       at this point in the code. */
    sres = dwarf_srclines_b(cu_die, &lineversion,
        &table_count, &line_context, error);
    if (sres != DW_DLV_OK) {
        /* Handle the DW_DLV_NO_ENTRY or DW_DLV_ERROR
           No memory was allocated so there nothing
           to dealloc here. */
        return sres;
    }
    if (table_count == 0) {
        /* A line table with no actual lines. */
        /*...do something, see dwarf_srclines_files_count()
           etc below. */

        dwarf_srclines_dealloc_b(line_context);
        /* All the memory is released, the line_context
           and linebuf zeroed now
           as a reminder they are stale. */
        linebuf = 0;
        line_context = 0;
    } else if (table_count == 1) {
        Dwarf_Signed i = 0;
        Dwarf_Signed baseindex = 0;
        Dwarf_Signed file_count = 0;
        Dwarf_Signed endindex = 0;
        /* Standard dwarf 2,3,4, or 5 line table */
        /* Do something. */

        /* First let us index through all the files listed
           in the line table header. */
        sres = dwarf_srclines_files_indexes(line_context,
            &baseindex, &file_count, &endindex, error);
        if (sres != DW_DLV_OK) {
            /* Something badly wrong! */
            return sres;
        }
        /* Works for DWARF2,3,4 (one-based index)
           and DWARF5 (zero-based index) */
        for (i = baseindex; i < endindex; i++) {
            Dwarf_Unsigned dirindex = 0;
            Dwarf_Unsigned modtime = 0;
            Dwarf_Unsigned flength = 0;
            Dwarf_Form_Data16 *md5data = 0;
            int vres = 0;
            const char *name = 0;

            vres = dwarf_srclines_files_data_b(line_context, i,
                &name, &dirindex, &modtime, &flength,
                &md5data, error);
            if (vres != DW_DLV_OK) {
                /* something very wrong. */
            }
        }
    }
}

```

```

        return vres;
    }
    /* do something */
}

/* For this case where we have a line table we will likely
   wish to get the line details: */
sres = dwarf_srclines_from_linecontext(line_context,
&linebuf, &linecount,
error);
if (sres != DW_DLV_OK) {
    /* Error. Clean up the context information. */
    dwarf_srclines_dealloc_b(line_context);
    return sres;
}
/* The lines are normal line table lines. */
for (i = 0; i < linecount; ++i) {
    /* use linebuf[i] */
}
dwarf_srclines_dealloc_b(line_context);
/* All the memory is released, the line_context
   and linebuf zeroed now as a reminder they are stale */
linebuf = 0;
line_context = 0;
linecount = 0;
} else {
    Dwarf_Signed i = 0;
    /* ASSERT: table_count == 2,
       Experimental two-level line table. Version 0xf006
       We do not define the meaning of this non-standard
       set of tables here. */

    /* For 'something C' (two-level line tables)
       one codes something like this
       Note that we do not define the meaning or
       use of two-level line
       tables as these are experimental, not standard DWARF. */
    sres = dwarf_srclines_two_level_from_linecontext(line_context,
&linebuf, &linecount,
&linebuf_actuais, &linecount_actuais,
error);
    if (sres == DW_DLV_OK) {
        for (i = 0; i < linecount; ++i) {
            /* use linebuf[i], these are the 'logicals'
               entries. */
        }
        for (i = 0; i < linecount_actuais; ++i) {
            /* use linebuf_actuais[i], these are the
               actuals entries */
        }
        dwarf_srclines_dealloc_b(line_context);
        line_context = 0;
        linebuf = 0;
        linecount = 0;
        linebuf_actuais = 0;
        linecount_actuais = 0;
    } else if (sres == DW_DLV_NO_ENTRY) {
        /* This should be impossible, but do something. */
        /* Then Free the line_context */
        dwarf_srclines_dealloc_b(line_context);
        line_context = 0;
        linebuf = 0;
        linecount = 0;
        linebuf_actuais = 0;
        linecount_actuais = 0;
    } else {
        /* ERROR, show the error or something.
           Free the line_context. */
        dwarf_srclines_dealloc_b(line_context);
        line_context = 0;
        linebuf = 0;
        linecount = 0;
        linebuf_actuais = 0;
        linecount_actuais = 0;
    }
}
return DW_DLV_OK;
}

```

9.61 Using dwarf_srclines_b() and linecontext

Example two using `dwarf_srclines_b()`, `dwarf_linesrc()`.

See also

[dwarf_srclines_b](#)[dwarf_srclines_from_linecontext](#)[dwarf_srclines_dealloc_b](#)

```

*/
int exampled(Dwarf_Debug dbg, Dwarf_Die somedie, Dwarf_Error *error)
{
    Dwarf_Signed count = 0;
    Dwarf_Line_Context context = 0;
    Dwarf_Line *linebuf = 0;
    Dwarf_Signed i = 0;
    Dwarf_Line *line;
    Dwarf_Small table_count = 0;
    Dwarf_Unsigned version = 0;
    int sres = 0;

    sres = dwarf_srclines_b(somedie,
        &version, &table_count, &context, error);
    if (sres != DW_DLV_OK) {
        return sres;
    }
    sres = dwarf_srclines_from_linecontext(context,
        &linebuf, &count, error);
    if (sres != DW_DLV_OK) {
        dwarf_srclines_dealloc_b(context);
        return sres;
    }
    line = linebuf;
    for (i = 0; i < count; ++line, ++i) {
        char * filename = 0;
        int lres = 0;
        Dwarf_Line dline = linebuf[i];

        lres = dwarf_linesrc(dline, &filename, error);
        if (lres != DW_DLV_OK) {
            dwarf_srclines_dealloc_b(context);
            return lres;
        }
        /* use filename */
        dwarf_dealloc(dbg, filename, DW_DLA_STRING);
    }
    dwarf_srclines_dealloc_b(context);
    return DW_DLV_OK;
}

```

9.62 Using dwarf_srcfiles()

Example getting source file names given a DIE.

```

*/
int examplee(Dwarf_Debug dbg, Dwarf_Die somedie, Dwarf_Error *error)
{
    /* It is an annoying historical mistake in libdwarf
       that the count is a signed value. */
    Dwarf_Signed count = 0;
    char **srcfiles = 0;
    Dwarf_Signed i = 0;
    int res = 0;
    Dwarf_Line_Context line_context = 0;
    Dwarf_Small table_count = 0;
    Dwarf_Unsigned lineversion = 0;

    res = dwarf_srclines_b(somedie, &lineversion,
        &table_count, &line_context, error);
    if (res != DW_DLV_OK) {
        /* dwarf_finish() will dealloc srcfiles, not doing
           that here. */
        return res;
    }
    res = dwarf_srcfiles(somedie, &srcfiles, &count, error);
    if (res != DW_DLV_OK) {
        dwarf_srclines_dealloc_b(line_context);
        return res;
    }

    for (i = 0; i < count; ++i) {
        Dwarf_Signed propernumber = 0;

        /* Use srcfiles[i] If you wish to print 'i'

```



```

        mostusefully
        you should reflect the numbering that
        a DW_AT_decl_file attribute would report in
        this CU. */
    if (lineversion == 5) {
        propernumber = i;
    } else {
        propernumber = i+1;
    }
    printf("File %4ld %s\n", (unsigned long)propernumber,
           srcfiles[i]);
    dwarf_dealloc(dbg, srcfiles[i], DW_DLA_STRING);
    srcfiles[i] = 0;
}
/* We could leave all dealloc to dwarf_finish() to
   handle, but this tidies up sooner. */
dwarf_dealloc(dbg, srcfiles, DW_DLA_LIST);
dwarf_srclines_dealloc_b(line_context);
return DW_DLV_OK;
}

```

9.63 Using dwarf_get_globals()

Example using global symbol names.

For 0.4.2 and earlier this returned `.debug_pubnames` content. As of version 0.5.0 (October 2022) this returns `.debug_pubnames` (if it exists) and the relevant portion of `.debug_names` (if `.debug_names` exists) data.

```

*/
int examplef(Dwarf_Debug dbg, Dwarf_Error *error)
{
    Dwarf_Signed count = 0;
    Dwarf_Global *globs = 0;
    Dwarf_Signed i = 0;
    int res = 0;

    res = dwarf_get_globals(dbg, &globs, &count, error);
    if (res != DW_DLV_OK) {
        return res;
    }
    for (i = 0; i < count; ++i) {
        /* use globs[i] */
        char *name = 0;
        res = dwarf_globname(globs[i], &name, error);
        if (res != DW_DLV_OK) {
            dwarf_globals_dealloc(dbg, globs, count);
            return res;
        }
    }
    dwarf_globals_dealloc(dbg, globs, count);
    return DW_DLV_OK;
}

```

9.64 Using dwarf_globals_by_type()

Example reading `.debug_pubtypes`.

The `.debug_pubtypes` section was in DWARF4, it could appear as an extension in other DWARF versions.. In libdwarf 0.5.0 and earlier the function `dwarf_get_pubtypes()` was used instead.

```

*/
int exampleg(Dwarf_Debug dbg, Dwarf_Error *error)
{
    Dwarf_Signed count = 0;
    Dwarf_Global *types = 0;
    Dwarf_Signed i = 0;
    int res = 0;

    res = dwarf_globals_by_type(dbg, DW_GL_PUBTYPES,
                               &types, &count, error);
    /* Alternatively the 0.5.0 and earlier call:
       res=dwarf_get_pubtypes(dbg, &types, &count, error); */
    if (res != DW_DLV_OK) {
        return res;
    }
}

```

```

    }
    for (i = 0; i < count; ++i) {
        /* use types[i] */
    }
    dwarf_globals_dealloc(dbg, types, count);
    return DW_DLV_OK;
}

```

9.65 Reading .debug_weaknames (nonstandard)

Example. weaknames was IRIX/MIPS only.

This section is an SGI/MIPS extension, not created by modern compilers.

```

/*
int exampleh(Dwarf_Debug dbg, Dwarf_Error *error)
{
    Dwarf_Signed count = 0;
    Dwarf_Global *weakns = 0;
    Dwarf_Signed i = 0;
    int res = 0;

    res = dwarf_globals_by_type(dbg, DW_GL_WEAKNS,
        &weakns, &count, error);
    if (res != DW_DLV_OK) {
        return res;
    }
    for (i = 0; i < count; ++i) {
        /* use weakns[i] */
    }
    dwarf_globals_dealloc(dbg, weakns, count);
    return DW_DLV_OK;
}

```

9.66 Reading .debug_funcnames (nonstandard)

Example. funcnames was IRIX/MIPS only.

This section is an SGI/MIPS extension, not created by modern compilers.

```

/*
int examplej(Dwarf_Debug dbg, Dwarf_Error *error)
{
    Dwarf_Signed count = 0;
    Dwarf_Global *funcs = 0;
    Dwarf_Signed i = 0;
    int fres = 0;

    fres = dwarf_globals_by_type(dbg, DW_GL_FUNCS,
        &funcs, &count, error);
    if (fres != DW_DLV_OK) {
        return fres;
    }
    for (i = 0; i < count; ++i) {
        /* use funcs[i] */
    }
    dwarf_globals_dealloc(dbg, funcs, count);
    return DW_DLV_OK;
}

```

9.67 Reading .debug_types (nonstandard)

Example .debug_types was IRIX/MIPS only.

This section is an SGI/MIPS extension, not created by modern compilers.

```

/*
int examplel(Dwarf_Debug dbg, Dwarf_Error *error)
{

```

```

Dwarf_Signed count = 0;
Dwarf_Global *types = 0;
Dwarf_Signed i = 0;
int res = 0;

res = dwarf_globals_by_type(dbg, DW_GL_TYPES,
    &types, &count, error);
if (res != DW_DLV_OK) {
    return res;
}
for (i = 0; i < count; ++i) {
    /* use types[i] */
}
dwarf_globals_dealloc(dbg, types, count);
return DW_DLV_OK;
}

```

9.68 Reading .debug_varnames data (nonstandard)

Example .debug_varnames was IRIX/MIPS only.

This section is an SGI/MIPS extension, not created by modern compilers.

```

/*
int examplen(Dwarf_Debug dbg, Dwarf_Error *error)
{
    Dwarf_Signed count = 0;
    Dwarf_Global *vars = 0;
    Dwarf_Signed i = 0;
    int res = 0;

    res = dwarf_globals_by_type(dbg, DW_GL_VARS,
        &vars, &count, error);
    if (res != DW_DLV_OK) {
        return res;
    }
    for (i = 0; i < count; ++i) {
        /* use vars[i] */
    }
    dwarf_globals_dealloc(dbg, vars, count);
    return DW_DLV_OK;
}

```

9.69 Reading .debug_names data

Example access to .debug_names.

This is accessing DWARF5 .debug_names, a section intended to provide fast access to DIEs.

It bears a strong resemblance to what libdwarf does in dwarf_global.c.

Making this a single (long) function here, though that is not how libdwarf or dwarfdump are written.

That is just one possible sort of access. There are many, and we would love to hear suggestions for specific new API functions in the library.

There is a wealth of information in .debug_names and the following is all taken care of for you by [dwarf_get_globals\(\)](#).

```

/*
#define MAXPAIRS 8 /* The standard defines 5.*/
int exampledebugnames(Dwarf_Debug dbg,
    Dwarf_Unsigned *dnentrycount,
    Dwarf_Error *error)
{
    int res = DW_DLV_OK;
    Dwarf_Unsigned offset = 0;
    Dwarf_Dnames_Head dn = 0;
    Dwarf_Unsigned new_offset = 0;

    for ( ; res == DW_DLV_OK; offset = new_offset) {

```

```

Dwarf_Unsigned comp_unit_count = 0;
Dwarf_Unsigned local_type_unit_count = 0;
Dwarf_Unsigned foreign_type_unit_count = 0;
Dwarf_Unsigned bucket_count = 0;
Dwarf_Unsigned name_count = 0;
Dwarf_Unsigned abbrev_table_size = 0;
Dwarf_Unsigned entry_pool_size = 0;
Dwarf_Unsigned augmentation_string_size = 0;
char          *aug_string = 0;
Dwarf_Unsigned section_size = 0;
Dwarf_Half    table_version = 0;
Dwarf_Half    offset_size = 0;
Dwarf_Unsigned i = 0;

res = dwarf_dnames_header(dbg, offset, &dn,
    &new_offset, error);
if (res == DW_DLV_ERROR) {
    /* Something wrong. */
    return res;
}
if (res == DW_DLV_NO_ENTRY) {
    /* Done. Normal end of the .debug_names section. */
    break;
}
*dnentrycount += 1;

res = dwarf_dnames_sizes(dn, &comp_unit_count,
    &local_type_unit_count,
    &foreign_type_unit_count,
    &bucket_count,
    &name_count, &abbrev_table_size,
    &entry_pool_size, &augmentation_string_size,
    &aug_string,
    &section_size, &table_version,
    &offset_size,
    error);
if (res != DW_DLV_OK) {
    /* Something wrong. */
    return res;
}
/* name indexes start with one */
for (i = 1 ; i <= name_count; ++i) {
    Dwarf_Unsigned j = 0;
    /* dnames_name data */
    Dwarf_Unsigned bucketnum = 0;
    Dwarf_Unsigned hashvalunsign = 0;
    Dwarf_Unsigned offset_to_debug_str = 0;
    char          *ptrtostr = 0;
    Dwarf_Unsigned offset_in_entrypool = 0;
    Dwarf_Unsigned abbrev_code = 0;
    Dwarf_Half    abbrev_tag = 0;
    Dwarf_Half    nt_idxattr_array[MAXPAIRS];
    Dwarf_Half    nt_form_array[MAXPAIRS];
    Dwarf_Unsigned attr_count = 0;

    /* dnames_entrypool data */
    Dwarf_Half    tag = 0;
    Dwarf_Bool    single_cu_case = 0;
    Dwarf_Unsigned single_cu_offset = 0;
    Dwarf_Unsigned value_count = 0;
    Dwarf_Unsigned index_of_abbrev = 0;
    Dwarf_Unsigned offset_of_initial_value = 0;
    Dwarf_Unsigned offset_next_entry_pool = 0;
    Dwarf_Half    idx_array[MAXPAIRS];
    Dwarf_Half    form_array[MAXPAIRS];
    Dwarf_Unsigned offsets_array[MAXPAIRS];
    Dwarf_Sig8    signatures_array[MAXPAIRS];

    Dwarf_Unsigned cu_table_index = 0;
    Dwarf_Unsigned tu_table_index = 0;
    Dwarf_Unsigned local_die_offset = 0;
    Dwarf_Unsigned parent_index = 0;
    Dwarf_Sig8    parenthash;

    (void)parent_index; /* avoids warning */
    (void)local_die_offset; /* avoids warning */
    (void)tu_table_index; /* avoids warning */
    (void)cu_table_index; /* avoids warning */

    memset(&parenthash, 0, sizeof(parenthash));
    /* This gets us the entry pool offset we need.
       we provide idxattr and nt_form arrays (need
       not be initialized) and on return
       attr_count of those arrays are filled in.
       if attr_count < array_size then array_size
       is too small and things will not go well!
       See the count of DW_IDX entries in dwarf.h
    */

```

```

    and make the arrays (say) 2 or more larger
    ensuring against future new DW_IDX index
    attributes..

    ptrtostring is the name in the Names Table. */
res = dwarf_dnames_name(dn,i,
    &bucketnum, &hashvalunsign,
    &offset_to_debug_str,&ptrtostr,
    &offset_in_entrypool, &abbrev_code,
    &abbrev_tag,
    MAXPAIRS,
    nt_idxattr_array, nt_form_array,
    &attr_count,error);
if (res == DW_DLV_NO_ENTRY) {
    /* past end. Normal. */
    break;
}
if (res == DW_DLV_ERROR) {
    dwarf_dealloc_dnames(dn);
    return res;
}

/* Check attr_count < MAXPAIRS ! */
/* Now check the value of TAG to ensure it
   is something of interest as data or function.
   Plausible choices: */
switch (abbrev_tag) {
case DW_TAG_subprogram:
case DW_TAG_variable:
case DW_TAG_label:
case DW_TAG_member:
case DW_TAG_common_block:
case DW_TAG_enumerator:
case DW_TAG_namelist:
case DW_TAG_module:
    break;
default:
    /* Not data or variable DIE involved.
       Loop on the next i */
    continue;
}

/* We need the number of values for this name
   from this call. tag will match abbrev_tag. */
res = dwarf_dnames_entrypool(dn,
    offset_in_entrypool,
    &abbrev_code,&tag,&value_count,&index_of_abbrev,
    &offset_of_initial_value,
    error);
if (res != DW_DLV_OK) {
    dwarf_dealloc_dnames(dn);
    return res;
}

/* This gets us an actual array of values
   as the library combines abbreviations,
   IDX attributes and values. We use
   the idx_array and form_array data
   created above. */

res = dwarf_dnames_entrypool_values(dn,
    index_of_abbrev,
    offset_of_initial_value,
    value_count,
    idx_array,
    form_array,
    offsets_array,
    signatures_array,
    &single_cu_case,&single_cu_offset,
    &offset_next_entry_pool,
    error);
if (res != DW_DLV_OK) {
    dwarf_dealloc_dnames(dn);
    return res;
}
for (j = 0; j < value_count; ++j) {
    Dwarf_Half idx = idx_array[j];

    switch(idx) {
case DW_IDX_compile_unit:
        cu_table_index = offsets_array[j];
        break;
case DW_IDX_die_offset:
        local_die_offset = offsets_array[j];
        break;
/* The following are not meaningful when
   reading globals. */

```

```

        case DW_IDX_type_unit:
            tu_table_index = offsets_array[j];
            break;
        case DW_IDX_parent:
            parent_index = offsets_array[j];
            break;
        case DW_IDX_type_hash:
            parenthash = signatures_array[j];
            break;
        default:
            /* Not handled DW_IDX_GNU... */
            break;
    }
}
/* Now do something with the data aggregated */

}
dwarf_dealloc_dnames(dn);
}
return DW_DLX_OK;
}

```

9.70 Reading .debug_macro data (DWARF5)

Example reading DWARF5 macro data.

This builds an list or some other data structure (not defined) to give an import somewhere to list the import offset and then later to enquire if the list has unexamined offsets. The code compiles but is not yet tested.

This example does not actually do the import at the correct time as this is just checking import offsets, not creating a proper full list (in the proper order) of the macros with the imports inserted. Here we find the macro context for a DIE, report those macro entries, noting any macro_import in a list loop extracting unchecked macro offsets from the list note any import in a list Of course some functions are not implemented here...

```

/*
int has_unchecked_import_in_list(void)
{
    /* Do something */
    return DW_DLX_OK;
}

Dwarf_Unsigned get_next_import_from_list(void)
{
    /* Do something */
    return 22;
}

void mark_this_offset_as_examined(
    Dwarf_Unsigned macro_unit_offset)
{
    /* do something */
    /* avoid compiler warnings. */
    (void)macro_unit_offset;
}

void add_offset_to_list(Dwarf_Unsigned offset)
{
    /* do something */
    /* avoid compiler warnings. */
    (void)offset;
}

int examplep5(Dwarf_Die cu_die, Dwarf_Error *error)
{
    int lres = 0;
    Dwarf_Unsigned k = 0;
    Dwarf_Unsigned version = 0;
    Dwarf_Macro_Context macro_context = 0;
    Dwarf_Unsigned macro_unit_offset = 0;
    Dwarf_Unsigned number_of_ops = 0;
    Dwarf_Unsigned ops_total_byte_len = 0;
    Dwarf_Bool is_primary = TRUE;

    /* Just call once each way to test both.
       Really the second is just for imported units.*/
    for ( ; ; ) {
        if (is_primary) {
            lres = dwarf_get_macro_context(cu_die,
                &version, &macro_context,
                &macro_unit_offset,
                &number_of_ops,
                &ops_total_byte_len,

```

```

        error);
        is_primary = FALSE;
    } else {
        if (has_unchecked_import_in_list()) {
            macro_unit_offset = get_next_import_from_list();
        } else {
            /* We are done */
            break;
        }
    }
    lres = dwarf_get_macro_context_by_offset(cu_die,
        macro_unit_offset,
        &version,
        &macro_context,
        &number_of_ops,
        &ops_total_byte_len,
        error);
    mark_this_offset_as_examined(macro_unit_offset);
}

if (lres == DW_DLV_ERROR) {
    /* Something is wrong. */
    return lres;
}
if (lres == DW_DLV_NO_ENTRY) {
    /* We are done. */
    break;
}
/* lres == DW_DLV_OK */
for (k = 0; k < number_of_ops; ++k) {
    Dwarf_Unsigned section_offset = 0;
    Dwarf_Half macro_operator = 0;
    Dwarf_Half forms_count = 0;
    const Dwarf_Small *formcode_array = 0;
    Dwarf_Unsigned line_number = 0;
    Dwarf_Unsigned index = 0;
    Dwarf_Unsigned offset = 0;
    const char * macro_string = 0;
    int lres2 = 0;

    lres2 = dwarf_get_macro_op(macro_context,
        k, &section_offset, &macro_operator,
        &forms_count, &formcode_array, error);
    if (lres2 != DW_DLV_OK) {
        /* Some error. Deal with it */
        dwarf_dealloc_macro_context(macro_context);
        return lres2;
    }
    switch(macro_operator) {
    case 0:
        /* Nothing to do. */
        break;
    case DW_MACRO_end_file:
        /* Do something */
        break;
    case DW_MACRO_define:
    case DW_MACRO_undef:
    case DW_MACRO_define_strp:
    case DW_MACRO_undef_strp:
    case DW_MACRO_define_strx:
    case DW_MACRO_undef_strx:
    case DW_MACRO_define_sup:
    case DW_MACRO_undef_sup: {
        lres2 = dwarf_get_macro_defundef(macro_context,
            k,
            &line_number,
            &index,
            &offset,
            &forms_count,
            &macro_string,
            error);
        if (lres2 != DW_DLV_OK) {
            /* Some error. Deal with it */
            dwarf_dealloc_macro_context(macro_context);
            return lres2;
        }
        /* do something */
    }
    break;
    case DW_MACRO_start_file: {
        lres2 = dwarf_get_macro_startend_file(macro_context,
            k, &line_number,
            &index,
            &macro_string, error);
        if (lres2 != DW_DLV_OK) {
            /* Some error. Deal with it */
            dwarf_dealloc_macro_context(macro_context);
            return lres2;
        }
    }
}

```

```

    }
    /* do something */
}
break;
case DW_MACRO_import: {
    lres2 = dwarf_get_macro_import (macro_context,
        k,&offset,error);
    if (lres2 != DW_DLV_OK) {
        /* Some error. Deal with it */
        dwarf_dealloc_macro_context (macro_context);
        return lres2;
    }
    add_offset_to_list (offset);
}
break;
case DW_MACRO_import_sup: {
    lres2 = dwarf_get_macro_import (macro_context,
        k,&offset,error);
    if (lres2 != DW_DLV_OK) {
        /* Some error. Deal with it */
        dwarf_dealloc_macro_context (macro_context);
        return lres2;
    }
    /* do something */
}
break;
default:
    /* This is an error or an omission
       in the code here. We do not
       know what to do.
       Do something appropriate, print something?. */
    break;
}
}
dwarf_dealloc_macro_context (macro_context);
macro_context = 0;
}
return DW_DLV_OK;
}
/*

```

9.71 Reading .debug_macinfo (DWARF2-4)

Example reading .debug_macinfo, DWARF2-4.

```

/*
void functionusingsigned(Dwarf_Signed s) {
    /* Do something */
    /* Avoid compiler warnings. */
    (void)s;
}

int examplep2(Dwarf_Debug dbg, Dwarf_Off cur_off,
    Dwarf_Error*error)
{
    Dwarf_Signed count = 0;
    Dwarf_Macro_Details *maclist = 0;
    Dwarf_Signed i = 0;
    Dwarf_Unsigned max = 500000; /* sanity limit */
    int errv = 0;

    /* This is for DWARF2, DWARF3, and DWARF4
       .debug_macinfo section only.*/
    /* Given an offset from a compilation unit,
       start at that offset (from DW_AT_macroinfo)
       and get its macro details. */
    errv = dwarf_get_macro_details (dbg, cur_off, max,
        &count, &maclist, error);
    if (errv == DW_DLV_OK) {
        for (i = 0; i < count; ++i) {
            Dwarf_Macro_Details * mentry = maclist + i;
            /* example of use */
            Dwarf_Signed lineno = mentry->dmd_lineno;
            functionusingsigned (lineno);
        }
        dwarf_dealloc (dbg, maclist, DW_DLA_STRING);
    }
    /* Loop through all the compilation units macro info from zero.
       This is not guaranteed to work because DWARF does not
       guarantee every byte in the section is meaningful:
       there can be garbage between the macro info

```



```

        for CUs. But this loop will sometimes work.
    /
    cur_off = 0;
    while((errv = dwarf_get_macro_details(dbg, cur_off,max,
        &count,&maclist,error))== DW_DLV_OK) {
        for (i = 0; i < count; ++i) {
            Dwarf_Macro_Details * mentry = maclist +i;
            /* example of use */
            Dwarf_Signed lineno = mentry->dmd_lineno;
            functionusingsigned(lineno);
        }
        cur_off = maclist[count-1].dmd_offset + 1;
        dwarf_dealloc(dbg, maclist, DW_DLA_STRING);
    }
    return DW_DLV_OK;
}

```

9.72 Extracting fde, cie lists.

Example Opening FDE and CIE lists.

```

*/
int exampleq(Dwarf_Debug dbg,Dwarf_Error *error)
{
    Dwarf_Cie *cie_data = 0;
    Dwarf_Signed cie_count = 0;
    Dwarf_Fde *fde_data = 0;
    Dwarf_Signed fde_count = 0;
    int fres = 0;

    fres = dwarf_get_fde_list(dbg,&cie_data,&cie_count,
        &fde_data,&fde_count,error);
    if (fres != DW_DLV_OK) {
        return fres;
    }
    /* Do something with the lists*/
    dwarf_dealloc_fde_cie_list(dbg, cie_data, cie_count,
        fde_data,fde_count);
    return fres;
}

```

9.73 Reading the .eh_frame section

Example access to .eh_frame.

```

*/
int exemplar(Dwarf_Debug dbg,Dwarf_Addr mypcval,Dwarf_Error *error)
{
    /* Given a pc value
    for a function find the FDE and CIE data for
    the function.
    Example shows basic access to FDE/CIE plus
    one way to access details given a PC value.
    dwarf_get_fde_n() allows accessing all FDE/CIE
    data so one could build up an application-specific
    table of information if that is more useful. */
    Dwarf_Cie *cie_data = 0;
    Dwarf_Signed cie_count = 0;
    Dwarf_Fde *fde_data = 0;
    Dwarf_Signed fde_count = 0;
    int fres = 0;

    fres = dwarf_get_fde_list_eh(dbg,&cie_data,&cie_count,
        &fde_data,&fde_count,error);
    if (fres == DW_DLV_OK) {
        Dwarf_Fde myfde = 0;
        Dwarf_Addr low_pc = 0;
        Dwarf_Addr high_pc = 0;

        fres = dwarf_get_fde_at_pc(fde_data,mypcval,
            &myfde,&low_pc,&high_pc,
            error);
        if (fres == DW_DLV_OK) {
            Dwarf_Cie mycie = 0;
            fres = dwarf_get_cie_of_fde(myfde,&mycie,error);
            if (fres == DW_DLV_ERROR) {
                return fres;
            }
        }
    }
}

```

```

    }
    if (fres == DW_DLV_OK) {
        /* Now we can access a range of information
           about the fde and cie applicable. */
    }
}
dwarf_dealloc_fde_cie_list(dbg, cie_data, cie_count,
                           fde_data, fde_count);
return fres;
}
return fres;
}

```

9.74 Using dwarf_expand_frame_instructions

Example using dwarf_expand_frame_instructions.

```

*/
int examples(Dwarf_Cie cie,
             Dwarf_Ptr instruction, Dwarf_Unsigned len,
             Dwarf_Error *error)
{
    Dwarf_Frame_Instr_Head head = 0;
    Dwarf_Unsigned count = 0;
    int res = 0;
    Dwarf_Unsigned i = 0;

    res = dwarf_expand_frame_instructions(cie, instruction, len,
                                         &head, &count, error);
    if (res != DW_DLV_OK) {
        return res;
    }

    for (i = 0; i < count; ++i) {
        Dwarf_Unsigned instr_offset_in_instrs = 0;
        Dwarf_Small cfa_operation = 0;
        const char *fields_description = 0;
        Dwarf_Unsigned u0 = 0;
        Dwarf_Unsigned u1 = 0;
        Dwarf_Signed s0 = 0;
        Dwarf_Signed s1 = 0;
        Dwarf_Unsigned code_alignment_factor = 0;
        Dwarf_Signed data_alignment_factor = 0;
        Dwarf_Block expression_block;
        const char * op_name = 0;

        memset(&expression_block, 0, sizeof(expression_block));
        res = dwarf_get_frame_instruction(head, i,
                                         &instr_offset_in_instrs, &cfa_operation,
                                         &fields_description, &u0, &u1,
                                         &s0, &s1,
                                         &code_alignment_factor,
                                         &data_alignment_factor,
                                         &expression_block, error);
        if (res == DW_DLV_ERROR) {
            dwarf_dealloc_frame_instr_head(head);
            return res;
        }
        if (res == DW_DLV_OK) {
            res = dwarf_get_CFA_name(cfa_operation,
                                    &op_name);
            if (res != DW_DLV_OK) {
                op_name = "unknown op";
            }
            printf("Instr %2lu %-22s %s\n",
                  (unsigned long)i,
                  op_name,
                  fields_description);
            /* Do something with the various data
               as guided by the fields_description. */
        }
    }
    dwarf_dealloc_frame_instr_head(head);
    return DW_DLV_OK;
}

```

9.75 Reading string offsets section data

Example accessing the string offsets section.

An example accessing the string offsets section

Parameters

<i>dbg</i>	The Dwarf_Debug of interest.
<i>dw_error</i>	On error <i>dw_error</i> is set to point to the error details.

Returns

DW_DLV_OK etc.

```

*/
int examplestrngoffsets(Dwarf_Debug dbg,Dwarf_Error *error)
{
    int                res = 0;
    Dwarf_Str_Offsets_Table sot = 0;
    Dwarf_Unsigned     wasted_byte_count = 0;
    Dwarf_Unsigned     table_count = 0;
    Dwarf_Error        closeerror = 0;

    res = dwarf_open_str_offsets_table_access(dbg, &sot,error);
    if (res == DW_DLV_NO_ENTRY) {
        /* No such table */
        return res;
    }
    if (res == DW_DLV_ERROR) {
        /* Something is very wrong. Print the error? */
        return res;
    }
    for (;;) {
        Dwarf_Unsigned unit_length=0;
        Dwarf_Unsigned unit_length_offset=0;
        Dwarf_Unsigned table_start_offset=0;
        Dwarf_Half     entry_size = 0;
        Dwarf_Half     version=0;
        Dwarf_Half     padding=0;
        Dwarf_Unsigned table_value_count=0;
        Dwarf_Unsigned i = 0;
        Dwarf_Unsigned table_entry_value = 0;

        res = dwarf_next_str_offsets_table(sot,
            &unit_length, &unit_length_offset,
            &table_start_offset,
            &entry_size,&version,&padding,
            &table_value_count,error);
        if (res == DW_DLV_NO_ENTRY) {
            /* We have dealt with all tables */

            break;
        }
        if (res == DW_DLV_ERROR) {
            /* Something badly wrong. Do something. */
            dwarf_close_str_offsets_table_access(sot,&closeerror);
            dwarf_dealloc_error(dbg,closeerror);
            return res;
        }
        /* One could call dwarf_str_offsets_statistics to
           get the wasted bytes so far, but we do not do that
           in this example. */
        /* Possibly print the various table-related values
           returned just above. */
        for (i=0; i < table_value_count; ++i) {
            res = dwarf_str_offsets_value_by_index(sot,i,
                &table_entry_value,error);
            if (res != DW_DLV_OK) {
                /* Something is badly wrong. Do something. */
                dwarf_close_str_offsets_table_access(sot,&closeerror);
                dwarf_dealloc_error(dbg,closeerror);
                return res;
            }
            /* Do something with the table_entry_value
               at this index. Maybe just print it.
               It is an offset in .debug_str. */
        }
    }
    res = dwarf_str_offsets_statistics(sot,&wasted_byte_count,
        &table_count,error);
    if (res != DW_DLV_OK) {
        dwarf_close_str_offsets_table_access(sot,&closeerror);
        dwarf_dealloc_error(dbg,closeerror);
    }
}

```

```

        return res;
    }
    res = dwarf_close_str_offsets_table_access(sot,error);
    /* little can be done about any error. */
    sot = 0;
    return res;
}
/*

```

9.76 Reading an aranges section

Example reading .debug_aranges.

An example accessing the .debug_aranges section. Looking all the aranges entries. This example is not searching for anything.

Parameters

<i>dbg</i>	The Dwarf_Debug of interest.
<i>dw_error</i>	On error dw_error is set to point to the error details.

Returns

DW_DLV_OK etc.

```

/*
static void cleanupbadarange(Dwarf_Debug dbg,
    Dwarf_Arange *arange, Dwarf_Signed i, Dwarf_Signed count)
{
    Dwarf_Signed k = i;

    for ( ; k < count; ++k) {
        dwarf_dealloc(dbg,arange[k] , DW_DLA_ARANGE);
        arange[k] = 0;
    }
}

int exampleu(Dwarf_Debug dbg,Dwarf_Error *error)
{
    /* It is a historical accident that the count is signed.
       No negative count is possible. */
    Dwarf_Signed count = 0;
    Dwarf_Arange *arange = 0;
    int res = 0;

    res = dwarf_get_aranges(dbg, &arange,&count, error);
    if (res == DW_DLV_OK) {
        Dwarf_Signed i = 0;

        for (i = 0; i < count; ++i) {
            Dwarf_Arange ara = arange[i];
            Dwarf_Unsigned segment = 0;
            Dwarf_Unsigned segment_entry_size = 0;
            Dwarf_Addr start = 0;
            Dwarf_Unsigned length = 0;
            Dwarf_Off cu_die_offset = 0;

            res = dwarf_get_arange_info_b(ara,
                &segment,&segment_entry_size,
                &start, &length,
                &cu_die_offset,error);
            if (res != DW_DLV_OK) {
                cleanupbadarange(dbg,arange,i,count);
                dwarf_dealloc(dbg, arange, DW_DLA_LIST);
                return res;
            }
            /* Do something with ara */
            dwarf_dealloc(dbg, ara, DW_DLA_ARANGE);
            arange[i] = 0;
        }
        dwarf_dealloc(dbg, arange, DW_DLA_LIST);
    }
    return res;
}

```

9.77 Example getting .debug_ranges data

Example accessing ranges data.

If have_base_addr is false there is no die (as in reading the raw .debug_ranges section) or there is some serious data corruption somewhere.

```

*/

static
void functionusingrange(Dwarf_Signed i,Dwarf_Ranges *r,
    Dwarf_Bool *have_base_addr,
    Dwarf_Unsigned *baseaddr)
{
    Dwarf_Unsigned base = *baseaddr;

    printf("[%4ld] ", (signed long)i);
    switch(r->dwr_type) {
    case DW_RANGES_ENTRY:
        printf(
            "DW_RANGES_ENTRY: raw      addr1 " PRX
            " addr2 " PRX,
            r->dwr_addr1,r->dwr_addr2);
        if (r->dwr_addr1 == r->dwr_addr2) {
            printf(" (empty range)");
        }
        printf("\n");
        if (*have_base_addr) {
            printf("      "
                "DW_RANGES_ENTRY: cooked addr1 0x%08llx"
                " addr2 " PRX "\n",
                r->dwr_addr1+base,r->dwr_addr2+base);
        }
        break;
    case DW_RANGES_ADDRESS_SELECTION:
        printf(
            "Base Address   : " PRX "\n",
            r->dwr_addr2);
        *have_base_addr = TRUE;
        *baseaddr = r->dwr_addr2;
        break;
    case DW_RANGES_END:
        printf(
            "DW_RANGES_END   : 0,0\n");
        *have_base_addr = FALSE;
        *baseaddr = 0;
        break;
    default:
        printf(
            "ERROR           : incorrect dwr_type is 0x%lx\n",
            (unsigned long)r->dwr_type);
    }
}

/* On call the rangesoffset is a default zero. */
int examplev(Dwarf_Debug dbg,Dwarf_Off rangesoffset_in,
    Dwarf_Die die, Dwarf_Error*error)
{
    Dwarf_Signed count = 0;
    Dwarf_Off realoffset = 0;
    Dwarf_Ranges *rangesbuf = 0;
    Dwarf_Unsigned bytcount = 0;
    int res = 0;
    Dwarf_Unsigned base_address = 0;
    Dwarf_Bool have_base_addr = FALSE;
    Dwarf_Bool have_rangesoffset = FALSE;
    Dwarf_Unsigned rangesoffset = (Dwarf_Unsigned)rangesoffset_in;

    (void)have_rangesoffset;
    if (die) {
        /* Find the ranges for a specific DIE */
        res = dwarf_get_ranges_baseaddress(dbg,die,&have_base_addr,
            &base_address,&have_rangesoffset,&rangesoffset,error);
        if (res == DW_DLV_ERROR) {
            /* Just pretend not an error. */
            dwarf_dealloc_error(dbg,*error);
            *error = 0;
        }
    } else {
        /* To test getting all ranges and no knowledge
        of the base address (so cooked values
        cannot be definitely known unless
        the base is in the .debug_ranges entries

```

```

        themselves */
    }
    res = dwarf_get_ranges_b(dbg, rangesoffset, die,
        &realoffset,
        &rangesbuf, &count, &bytecount, error);
    if (res != DW_DLV_OK) {
        if (res == DW_DLV_ERROR) {
            printf("ERROR dwarf_get_ranges_b %s\n",
                dwarf_errmsg(*error));
        } else {
            printf("NO_ENTRY dwarf_get_ranges_b\n");
        }
        return res;
    }
    {
        Dwarf_Signed i = 0;
        printf("Range group base address: " PRX
            ", offset in .debug_ranges:"
            " 0x%08llx\n",
            base_address, rangesoffset);
        for (i = 0; i < count; ++i) {
            Dwarf_Ranges *cur = rangesbuf+i;
            /* Use cur. */
            functionusingrange(i, cur, &have_base_addr, &base_address);
        }
        dwarf_dealloc_ranges(dbg, rangesbuf, count);
    }
    return DW_DLV_OK;
}

```

9.78 Reading gdbindex data

Example accessing gdbindex section data.

```

*/
int examplew(Dwarf_Debug dbg, Dwarf_Error *error)
{
    Dwarf_Gdbindex gindexptr = 0;
    Dwarf_Unsigned version = 0;
    Dwarf_Unsigned cu_list_offset = 0;
    Dwarf_Unsigned types_cu_list_offset = 0;
    Dwarf_Unsigned address_area_offset = 0;
    Dwarf_Unsigned symbol_table_offset = 0;
    Dwarf_Unsigned constant_pool_offset = 0;
    Dwarf_Unsigned section_size = 0;
    const char * section_name = 0;
    int res = 0;

    res = dwarf_gdbindex_header(dbg, &gindexptr,
        &version, &cu_list_offset, &types_cu_list_offset,
        &address_area_offset, &symbol_table_offset,
        &constant_pool_offset, &section_size,
        &section_name, error);
    if (res != DW_DLV_OK) {
        return res;
    }
    {
        /* do something with the data */
        Dwarf_Unsigned length = 0;
        Dwarf_Unsigned typeslength = 0;
        Dwarf_Unsigned i = 0;
        res = dwarf_gdbindex_culist_array(gindexptr,
            &length, error);
        /* Example actions. */
        if (res != DW_DLV_OK) {
            dwarf_dealloc_gdbindex(gindexptr);
            return res;
        }
        for (i = 0; i < length; ++i) {
            Dwarf_Unsigned cuoffset = 0;
            Dwarf_Unsigned culength = 0;
            res = dwarf_gdbindex_culist_entry(gindexptr,
                i, &cuoffset, &culength, error);
            if (res != DW_DLV_OK) {
                return res;
            }
            /* Do something with cuoffset, culength */
        }
        res = dwarf_gdbindex_types_culist_array(gindexptr,
            &typeslength, error);
        if (res != DW_DLV_OK) {

```

```

        dwarf_dealloc_gdbindex(gindexptr);
        return res;
    }
    for (i = 0; i < typeslength; ++i) {
        Dwarf_Unsigned cuoffset = 0;
        Dwarf_Unsigned tuoffset = 0;
        Dwarf_Unsigned type_signature = 0;
        res = dwarf_gdbindex_types_culist_entry(gindexptr,
            i, &cuoffset, &tuoffset, &type_signature, error);
        if (res != DW_DLV_OK) {
            dwarf_dealloc_gdbindex(gindexptr);
            return res;
        }
        /* Do something with cuoffset etc. */
    }
    dwarf_dealloc_gdbindex(gindexptr);
}
return DW_DLV_OK;
}

```

9.79 Reading gdbindex addressarea

Example accessing gdbindex addressarea data.

```

/*
int examplew gdbindex(Dwarf_Gdbindex gdbindex,
    Dwarf_Error *error)
{
    Dwarf_Unsigned list_len = 0;
    Dwarf_Unsigned i = 0;
    int res = 0;

    res = dwarf_gdbindex_addressarea(gdbindex, &list_len, error);
    if (res != DW_DLV_OK) {
        /* Something wrong, ignore the addressarea */
        return res;
    }
    /* Iterate through the address area. */
    for (i = 0; i < list_len; i++) {
        Dwarf_Unsigned lowpc = 0;
        Dwarf_Unsigned highpc = 0;
        Dwarf_Unsigned cu_index = 0;

        res = dwarf_gdbindex_addressarea_entry(gdbindex, i,
            &lowpc, &highpc,
            &cu_index,
            error);
        if (res != DW_DLV_OK) {
            /* Something wrong, ignore the addressarea */
            return res;
        }
        /* We have a valid address area entry, do something
            with it. */
    }
    return DW_DLV_OK;
}

```

9.80 Reading the gdbindex symbol table

Example accessing gdbindex symbol table data.

```

/*
int examplex(Dwarf_Gdbindex gdbindex, Dwarf_Error *error)
{
    Dwarf_Unsigned symtab_list_length = 0;
    Dwarf_Unsigned i = 0;
    int res = 0;

    res = dwarf_gdbindex_symboltable_array(gdbindex,
        &symtab_list_length, error);
    if (res != DW_DLV_OK) {
        return res;
    }
    for (i = 0; i < symtab_list_length; i++) {
        Dwarf_Unsigned symnameoffset = 0;
        Dwarf_Unsigned cuvecoffset = 0;
        Dwarf_Unsigned cuvec_len = 0;
    }
}

```

```

Dwarf_Unsigned ii = 0;
const char *name = 0;
int res1 = 0;

res1 = dwarf_gdbindex_symboltable_entry(gdbindex, i,
    &symnameoffset, &cuvecoffset,
    error);
if (res1 != DW_DLV_OK) {
    return res1;
}
res1 = dwarf_gdbindex_string_by_offset(gdbindex,
    symnameoffset, &name, error);
if (res1 != DW_DLV_OK) {
    return res1;
}
res1 = dwarf_gdbindex_cuvector_length(gdbindex,
    cuvecoffset, &cuvec_len, error);
if (res1 != DW_DLV_OK) {
    return res1;
}
for (ii = 0; ii < cuvec_len; ++ii) {
    Dwarf_Unsigned attributes = 0;
    Dwarf_Unsigned cu_index = 0;
    Dwarf_Unsigned symbol_kind = 0;
    Dwarf_Unsigned is_static = 0;
    int res2 = 0;

    res2 = dwarf_gdbindex_cuvector_inner_attributes(
        gdbindex, cuvecoffset, ii,
        &attributes, error);
    if (res2 != DW_DLV_OK) {
        return res2;
    }
    /* 'attributes' is a value with various internal
       fields so we expand the fields. */
    res2 = dwarf_gdbindex_cuvector_instance_expand_value(
        gdbindex, attributes, &cu_index,
        &symbol_kind, &is_static,
        error);
    if (res2 != DW_DLV_OK) {
        return res2;
    }
    /* Do something with the attributes. */
}
return DW_DLV_OK;
}

```

9.81 Reading cu and tu Debug Fission data

Example using `dwarf_get_xu_index_header`.

Debug Fission is an older name for Split Dwarf.

```

/*
int example(Dwarf_Debug dbg, const char *type,
    Dwarf_Error *error)
{
    /* type is "tu" or "cu" */
    int res = 0;
    Dwarf_Xu_Index_Header xuhdr = 0;
    Dwarf_Unsigned version_number = 0;
    Dwarf_Unsigned offsets_count = 0; /* L */
    Dwarf_Unsigned units_count = 0; /* M */
    Dwarf_Unsigned hash_slots_count = 0; /* N */
    const char *section_name = 0;

    res = dwarf_get_xu_index_header(dbg,
        type,
        &xuhdr,
        &version_number,
        &offsets_count,
        &units_count,
        &hash_slots_count,
        &section_name,
        error);
    if (res != DW_DLV_OK) {
        return res;
    }
    /* Do something with the xuhdr here . */
    dwarf_dealloc_xu_header(xuhdr);
    return DW_DLV_OK;
}

```


9.82 Reading Split Dwarf (Debug Fission) hash slots

Example using `dwarf_get_xu_hash_entry()`

```

/*
int examplez( Dwarf_Xu_Index_Header xuhdr,
    Dwarf_Unsigned hash_slots_count,
    Dwarf_Error *error)
{
    /* hash_slots_count returned by
       dwarf_get_xu_index_header() */
    static Dwarf_Sig8 zerohashval;
    Dwarf_Unsigned h = 0;

    for (h = 0; h < hash_slots_count; h++) {
        Dwarf_Sig8 hashval;
        Dwarf_Unsigned index = 0;
        int res = 0;

        res = dwarf_get_xu_hash_entry(xuhdr, h,
            &hashval, &index, error);
        if (res != DW_DLV_OK) {
            return res;
        }
        if (!memcmp(&hashval, &zerohashval,
            sizeof(Dwarf_Sig8)) && index == 0 ) {
            /* An unused hash slot */
            continue;
        }
        /* Here, hashval and index (a row index into
           offsets and lengths) are valid. Do
           something with them */
    }
    return DW_DLV_OK;
}

```

9.83 Reading high pc from a DIE.

Example get high-pc from a DIE.

```

/*
int examplehighpc(Dwarf_Die die,
    Dwarf_Addr *highpc,
    Dwarf_Error *error)
{
    int res = 0;
    Dwarf_Addr localhighpc = 0;
    Dwarf_Half form = 0;
    enum Dwarf_Form_Class formclass = DW_FORM_CLASS_UNKNOWN;

    res = dwarf_highpc_b(die, &localhighpc,
        &form, &formclass, error);
    if (res != DW_DLV_OK) {
        return res;
    }
    if (form != DW_FORM_addr &&
        !dwarf_addr_form_is_indexed(form)) {
        Dwarf_Addr low_pc = 0;

        /* The localhighpc is an offset from
           DW_AT_low_pc. */
        res = dwarf_lowpc(die, &low_pc, error);
        if (res != DW_DLV_OK) {
            return res;
        } else {
            localhighpc += low_pc;
        }
    }
    *highpc = localhighpc;
    return DW_DLV_OK;
}

```

9.84 Reading Split Dwarf (Debug Fission) data

Example getting cu/tu name, offset.

```

*/
int exampleza(Dwarf_Xu_Index_Header xuhdr,
Dwarf_Unsigned offsets_count,
Dwarf_Unsigned index,
Dwarf_Error *error)
{
    Dwarf_Unsigned col = 0;

    /* We use 'offsets_count' returned by
       a dwarf_get_xu_index_header() call.
       We use 'index' returned by a
       dwarf_get_xu_hash_entry() call. */
    for (col = 0; col < offsets_count; col++) {
        Dwarf_Unsigned off = 0;
        Dwarf_Unsigned len = 0;
        const char *name = 0;
        Dwarf_Unsigned num = 0;
        int res = 0;

        res = dwarf_get_xu_section_names(xuhdr,
                                         col, &num, &name, error);
        if (res == DW_DLV_ERROR) {
            return res;
        }
        if (res == DW_DLV_NO_ENTRY) {
            break;
        }
        res = dwarf_get_xu_section_offset(xuhdr,
                                         index, col, &off, &len, error);
        if (res == DW_DLV_ERROR) {
            return res;
        }
        if (res == DW_DLV_NO_ENTRY) {
            break;
        }
        /* Here we have the DW_SECT_ name and number
           and the base offset and length of the
           section data applicable to the hash
           that got us here.
           Use the values.*/
    }
    return DW_DLV_OK;
}

```

9.85 Retrieving tag,attribute,etc names

Example getting tag,attribute,etc names as strings.

```

*/
void examplezb(void)
{
    const char * out = "unknown something";
    int res = 0;

    /* The following is wrong, do not do it!
       Confusing TAG with ACCESS! */
    res = dwarf_get_ACCESS_name(DW_TAG_entry_point, &out);
    /* Nothing one does here with 'res' or 'out'
       is meaningful. */

    out = "<unknown TAG>"; /* Not a malloc'd string! */
    /* The following is meaningful.*/
    res = dwarf_get_TAG_name(DW_TAG_entry_point, &out);
    (void)res; /* avoids unused var compiler warning */
    /* If res == DW_DLV_ERROR or DW_DLV_NO_ENTRY
       out will be the locally assigned static string.
       If res == DW_DLV_OK it will be a usable
       TAG name string.
       In no case should a returned string be free(). */
}

```

9.86 Using GNU debuglink data

Example showing dwarf_add_debuglink_global_path.

An example using both dwarf_add_debuglink_global_path and dwarf_gnu_debuglink .

```

*/
int exampledebuglink(Dwarf_Debug dbg, Dwarf_Error* error)
{
    int      res = 0;
    char      *debuglink_path = 0;
    unsigned char *crc = 0;
    char      *debuglink_fullpath = 0;
    unsigned debuglink_fullpath_strlen = 0;
    unsigned buildid_type = 0;
    char *    buildidowner_name = 0;
    unsigned char *buildid_itself = 0;
    unsigned buildid_length = 0;
    char **   paths = 0;
    unsigned paths_count = 0;
    unsigned i = 0;

    /* This is just an example if one knows
       of another place full-DWARF objects
       may be. "/usr/lib/debug" is automatically
       set. */
    res = dwarf_add_debuglink_global_path(dbg,
        "/some/path/debug", error);
    if (res != DW_DLV_OK) {
        /* Something is wrong*/
        return res;
    }
    res = dwarf_gnu_debuglink(dbg,
        &debuglink_path,
        &crc,
        &debuglink_fullpath,
        &debuglink_fullpath_strlen,
        &buildid_type,
        &buildidowner_name,
        &buildid_itself,
        &buildid_length,
        &paths,
        &paths_count,
        error);
    if (res == DW_DLV_ERROR) {
        return res;
    }
    if (res == DW_DLV_NO_ENTRY) {
        /* No such sections as .note.gnu.build-id
           or .gnu_debuglink */
        return res;
    }
    if (debuglink_fullpath_strlen) {
        printf("debuglink      path: %s\n", debuglink_path);
        printf("crc length      : %u  crc: ", 4);
        for (i = 0; i < 4; ++i) {
            printf("%02x", crc[i]);
        }
        printf("\n");
        printf("debuglink fullpath: %s\n", debuglink_fullpath);
    }
    if (buildid_length) {
        printf("buildid type      : %u\n", buildid_type);
        printf("Buildid owner     : %s\n", buildidowner_name);
        printf("buildid byte count: %u\n", buildid_length);
        printf(" ");
        /* buildid_length should be 20. */
        for (i = 0; i < buildid_length; ++i) {
            printf("%02x", buildid_itself[i]);
        }
        printf("\n");
    }
    printf("Possible paths count %u\n", paths_count);
    for ( ; i < paths_count; ++i) {
        printf("%2u: %s\n", i, paths[i]);
    }
    free(debuglink_fullpath);
    free(paths);
    return DW_DLV_OK;
}

```

9.87 Accessing accessing raw rnglist

Example showing access to rnglist.

This is accessing DWARF5 .debug_rnglists.

```

*/
int example_raw_rnglist(Dwarf_Debug dbg,Dwarf_Error *error)
{
    Dwarf_Unsigned count = 0;
    int res = 0;
    Dwarf_Unsigned i = 0;

    res = dwarf_load_rnglists(dbg,&count,error);
    if (res != DW_DLV_OK) {
        return res;
    }
    for (i=0 ; i < count ; ++i) {
        Dwarf_Unsigned header_offset = 0;
        Dwarf_Small offset_size = 0;
        Dwarf_Small extension_size = 0;
        unsigned version = 0; /* 5 */
        Dwarf_Small address_size = 0;
        Dwarf_Small segment_selector_size = 0;
        Dwarf_Unsigned offset_entry_count = 0;
        Dwarf_Unsigned offset_of_offset_array = 0;
        Dwarf_Unsigned offset_of_first_rangeentry = 0;
        Dwarf_Unsigned offset_past_last_rangeentry = 0;

        res = dwarf_get_rnglist_context_basics(dbg,i,
            &header_offset,&offset_size,&extension_size,
            &version,&address_size,&segment_selector_size,
            &offset_entry_count,&offset_of_offset_array,
            &offset_of_first_rangeentry,
            &offset_past_last_rangeentry,error);
        if (res != DW_DLV_OK) {
            return res;
        }
        {
            Dwarf_Unsigned e = 0;
            unsigned colmax = 4;
            unsigned col = 0;
            Dwarf_Unsigned global_offset_of_value = 0;

            for ( ; e < offset_entry_count; ++e) {
                Dwarf_Unsigned value = 0;
                int resc = 0;

                resc = dwarf_get_rnglist_offset_index_value(dbg,
                    i,e,&value,
                    &global_offset_of_value,error);
                if (resc != DW_DLV_OK) {
                    return resc;
                }
                /* Do something */
                col++;
                if (col == colmax) {
                    col = 0;
                }
            }
        }
        {
            Dwarf_Unsigned curoffset = offset_of_first_rangeentry;
            Dwarf_Unsigned endoffset = offset_past_last_rangeentry;
            int rese = 0;
            Dwarf_Unsigned ct = 0;

            for ( ; curoffset < endoffset; ++ct ) {
                unsigned entrylen = 0;
                unsigned code = 0;
                Dwarf_Unsigned v1 = 0;
                Dwarf_Unsigned v2 = 0;
                rese = dwarf_get_rnglist_rle(dbg,i,
                    curoffset,endoffset,
                    &entrylen,
                    &code,&v1,&v2,error);
                if (rese != DW_DLV_OK) {
                    return rese;
                }
                /* Do something with the values */
                curoffset += entrylen;
                if (curoffset > endoffset) {
                    return DW_DLV_ERROR;
                }
            }
        }
    }
    return DW_DLV_OK;
}

```

9.88 Accessing rnglists section

Example showing access to rnglists on an Attribute.

This is accessing DWARF5 .debug_rnglists. The section first appears in DWARF5.

```

/*
int example_rnglist_for_attribute(Dwarf_Attribute attr,
    Dwarf_Unsigned attrvalue, Dwarf_Error *error)
{
    /* attrvalue must be the DW_AT_ranges
       DW_FORM_rnglistx or DW_FORM_sec_offset value
       extracted from attr. */
    int res = 0;
    Dwarf_Half theform = 0;
    Dwarf_Unsigned entries_count;
    Dwarf_Unsigned global_offset_of_rle_set;
    Dwarf_Rnglists_Head rnglhead = 0;
    Dwarf_Unsigned i = 0;

    res = dwarf_rnglists_get_rle_head(attr,
        theform,
        attrvalue,
        &rnglhead,
        &entries_count,
        &global_offset_of_rle_set,
        error);
    if (res != DW_DLV_OK) {
        return res;
    }
    for (i = 0; i < entries_count; ++i) {
        unsigned entrylen = 0;
        unsigned code = 0;
        Dwarf_Unsigned rawlowpc = 0;
        Dwarf_Unsigned rawhighpc = 0;
        Dwarf_Bool debug_addr_unavailable = FALSE;
        Dwarf_Unsigned lowpc = 0;
        Dwarf_Unsigned highpc = 0;

        /* Actual addresses are most likely what one
           wants to know, not the lengths/offsets
           recorded in .debug_rnglists. */
        res = dwarf_get_rnglists_entry_fields_a(rnglhead,
            i, &entrylen, &code,
            &rawlowpc, &rawhighpc,
            &debug_addr_unavailable,
            &lowpc, &highpc, error);
        if (res != DW_DLV_OK) {
            dwarf_dealloc_rnglists_head(rnglhead);
            return res;
        }
        if (code == DW_RLE_end_of_list) {
            /* we are done */
            break;
        }
        if (code == DW_RLE_base_addressx ||
            code == DW_RLE_base_address) {
            /* We do not need to use these, they
               have been accounted for already. */
            continue;
        }
        if (debug_addr_unavailable) {
            /* lowpc and highpc are not real addresses */
            continue;
        }
        /* Here do something with lowpc and highpc, these
           are real addresses */
    }
    dwarf_dealloc_rnglists_head(rnglhead);
    return DW_DLV_OK;
}

```

9.89 Demonstrating reading DWARF without a file.

How to read DWARF2 and later from memory.

```

/*
#include <config.h>

#include <stddef.h> /* NULL */

```

```

#include <stdio.h> /* printf() */
#include <stdlib.h> /* exit() */
#include <string.h> /* strcmp() */

#include "dwarf.h"
#include "libdwarf.h"
#include "libdwarf_private.h"

/*
   This demonstrates processing DWARF
   from in_memory data. For simplicity
   in this example we are using static arrays.
   The C source is src/bin/dwarfexample/jitreader.c

   The motivation is from JIT compiling, where
   at runtime of some application, it generates
   code on the file and DWARF information for it too.

   This gives an example of enabling all of libdwarf's
   functions without actually having the DWARF information
   in a file. (If you have a file in some odd format
   you can use this approach to have libdwarf access
   the format for DWARF data and work normally without
   ever exposing the format to libdwarf.)

   None of the structures defined here in this source
   (or any source using this feature)
   are ever known to libdwarf. They are totally
   private to your code.
   The code you write (like this example) you compile
   separate from libdwarf. You never place your code
   into libdwarf, you just link your code into
   your application and link against libdwarf.
*/

/* Some valid DWARF2 data */
static Dwarf_Small abbrevbytes[] = {
0x01, 0x11, 0x01, 0x25, 0x0e, 0x13, 0x0b, 0x03, 0x08, 0x1b,
0x0e, 0x11, 0x01, 0x12, 0x01, 0x10, 0x06, 0x00, 0x00, 0x02,
0x2e, 0x01, 0x3f, 0x0c, 0x03, 0x08, 0x3a, 0x0b, 0x3b, 0x0b,
0x39, 0x0b, 0x27, 0x0c, 0x11, 0x01, 0x12, 0x01, 0x40, 0x06,
0x97, 0x42, 0x0c, 0x01, 0x13, 0x00, 0x00, 0x03, 0x34, 0x00,
0x03, 0x08, 0x3a, 0x0b, 0x3b, 0x0b, 0x39, 0x0b, 0x49, 0x13,
0x02, 0x0a, 0x00, 0x00, 0x04, 0x24, 0x00, 0x0b, 0x0b, 0x3e,
0x0b, 0x03, 0x08, 0x00, 0x00, 0x00, 0x00, };
static Dwarf_Small infobytes[] = {
0x60, 0x00, 0x00, 0x00, 0x02, 0x00, 0x00, 0x00, 0x00, 0x00,
0x08, 0x01, 0x00, 0x00, 0x00, 0x00, 0x00, 0x0c, 0x74, 0x2e, 0x63,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x02, 0x01, 0x66, 0x00, 0x01,
0x02, 0x06, 0x01, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x01, 0x5c, 0x00, 0x00, 0x00, 0x03, 0x69,
0x00, 0x01, 0x03, 0x08, 0x5c, 0x00, 0x00, 0x00, 0x02, 0x91,
0x6c, 0x00, 0x04, 0x04, 0x05, 0x69, 0x6e, 0x74, 0x00, 0x00, };
static Dwarf_Small strbytes[] = {
0x47, 0x4e, 0x55, 0x20, 0x43, 0x31, 0x37, 0x20, 0x39, 0x2e,
0x33, 0x2e, 0x30, 0x20, 0x2d, 0x6d, 0x74, 0x75, 0x6e, 0x65,
0x3d, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x69, 0x63, 0x20, 0x2d,
0x6d, 0x61, 0x72, 0x63, 0x68, 0x3d, 0x78, 0x38, 0x36, 0x2d,
0x36, 0x34, 0x20, 0x2d, 0x67, 0x64, 0x77, 0x61, 0x72, 0x66,
0x2d, 0x32, 0x20, 0x2d, 0x4f, 0x30, 0x20, 0x2d, 0x66, 0x61,
0x73, 0x79, 0x6e, 0x63, 0x68, 0x72, 0x6f, 0x6e, 0x6f, 0x75,
0x73, 0x2d, 0x75, 0x6e, 0x77, 0x69, 0x6e, 0x64, 0x2d, 0x74,
0x61, 0x62, 0x6c, 0x65, 0x73, 0x20, 0x2d, 0x66, 0x73, 0x74,
0x61, 0x63, 0x6b, 0x2d, 0x70, 0x72, 0x6f, 0x74, 0x65, 0x63,
0x74, 0x6f, 0x72, 0x2d, 0x73, 0x74, 0x72, 0x6f, 0x6e, 0x67,
0x20, 0x2d, 0x66, 0x73, 0x74, 0x61, 0x63, 0x6b, 0x2d, 0x63,
0x6c, 0x61, 0x73, 0x68, 0x2d, 0x70, 0x72, 0x6f, 0x74, 0x65,
0x63, 0x74, 0x69, 0x6f, 0x6e, 0x20, 0x2d, 0x66, 0x63, 0x66,
0x2d, 0x70, 0x72, 0x6f, 0x74, 0x65, 0x63, 0x74, 0x69, 0x6f,
0x6e, 0x00, 0x2f, 0x76, 0x61, 0x72, 0x2f, 0x74, 0x6d, 0x70,
0x2f, 0x74, 0x69, 0x6e, 0x79, 0x64, 0x77, 0x61, 0x72, 0x66,
0x00, };

/* An internals_t , data used elsewhere but
   not directly visible elsewhere. One needs to have one
   of these but maybe the content here too little
   or useless, this is just an example of sorts. */
#define SECCOUNT 4
struct sectiondata_s {
    unsigned int    sd_addr;
    unsigned int    sd_objoffsetlen;
    unsigned int    sd_objpointersize;
    Dwarf_Unsigned  sd_sectionsize;
    const char      * sd_secname;

```

```

    Dwarf_Small * sd_content;
};

/* The secname must not be 0 , pass "" if
   there is no name. */
static struct sectiondata_s sectiondata[SECCOUNT] = {
{0,0,0,0,"",0},
{0,32,32,sizeof(abbrevbytes),".debug_abbrev",abbrevbytes},
{0,32,32,sizeof(infobytes),".debug_info",infobytes},
{0,32,32,sizeof(strbytes),".debug_str",strbytes}
};

typedef struct special_filedata_s {
    int f_is_64bit;
    Dwarf_Small f_object_endian;
    unsigned f_pointersize;
    unsigned f_offsetsize;
    Dwarf_Unsigned f_filesize;
    Dwarf_Unsigned f_sectioncount;
    struct sectiondata_s * f_sectarray;
} special_filedata_internals_t;

/* Use DW_END_little.
   Libdwarf finally sets the file-format-specific
   f_object_endianness field to a DW_END_little or
   DW_END_big (see dwarf.h).
   Here we must do that ourselves. */
static special_filedata_internals_t base_internals =
{ FALSE,DW_END_little,32,32,200,SECCOUNT, sectiondata };

static
int gsinfo(void* obj,
    Dwarf_Unsigned section_index,
    Dwarf_Obj_Access_Section_a* return_section,
    int* error )
{
    special_filedata_internals_t *internals =
        (special_filedata_internals_t *) (obj);
    struct sectiondata_s *finfo = 0;

    *error = 0; /* No error. Avoids unused arg */
    if (section_index >= SECCOUNT) {
        return DW_DLV_NO_ENTRY;
    }
    finfo = internals->f_sectarray + section_index;
    return_section->as_name = finfo->sd_secname;
    return_section->as_type = 0;
    return_section->as_flags = 0;
    return_section->as_addr = finfo->sd_addr;
    return_section->as_offset = 0;
    return_section->as_size = finfo->sd_sectionsize;
    return_section->as_link = 0;
    return_section->as_info = 0;
    return_section->as_addralign = 0;
    return_section->as_entrysize = 1;
    return DW_DLV_OK;
}

static Dwarf_Small
gborder(void * obj)
{
    special_filedata_internals_t *internals =
        (special_filedata_internals_t *) (obj);
    return internals->f_object_endian;
}

static
Dwarf_Small glensize(void * obj)
{
    /* offset size */
    special_filedata_internals_t *internals =
        (special_filedata_internals_t *) (obj);
    return internals->f_offsetsize/8;
}

static
Dwarf_Small gptrsize(void * obj)
{
    special_filedata_internals_t *internals =
        (special_filedata_internals_t *) (obj);
    return internals->f_pointersize/8;
}

static
Dwarf_Unsigned gfilesize(void * obj)
{
    special_filedata_internals_t *internals =
        (special_filedata_internals_t *) (obj);
    return internals->f_filesize;
}

static

```

```

Dwarf_Unsigned gseccount(void* obj)
{
    special_filedata_internals_t *internals =
        (special_filedata_internals_t *) (obj);
    return internals->f_sectioncount;
}

static
int gloadsec(void * obj,
    Dwarf_Unsigned secindex,
    Dwarf_Small**rdata,
    int *error)
{
    special_filedata_internals_t *internals =
        (special_filedata_internals_t *) (obj);
    struct sectiondata_s *secp = 0;

    *error = 0; /* No Error, avoids compiler warning */
    if (secindex >= internals->f_sectioncount) {
        return DW_DLV_NO_ENTRY;
    }
    secp = secindex + internals->f_sectarray;
    *rdata = secp->sd_content;
    return DW_DLV_OK;
}

const Dwarf_Obj_Access_Methods_a methods = {
    gsinf,
    gborder,
    glensize,
    gpysize,
    gfilesize,
    gseccount,
    gloadsec,
    0 /* no relocating anything */,
    0 /* no file with DWARF here, so mmap impossible */,
    0 /* no destructor appropriate */
};

struct Dwarf_Obj_Access_Interface_a_s dw_interface =
{ &base_internals,&methods };

static const Dwarf_Sig8 zerosignature;
static int
isformstring(Dwarf_Half form)
{
    /* Not handling every form string, just the
       ones used in simple cases. */
    switch(form) {
    case DW_FORM_string:      return TRUE;
    case DW_FORM_GNU_strp_alt: return TRUE;
    case DW_FORM_GNU_str_index: return TRUE;
    case DW_FORM_strx:       return TRUE;
    case DW_FORM_strx1:      return TRUE;
    case DW_FORM_strx2:      return TRUE;
    case DW_FORM_strx3:      return TRUE;
    case DW_FORM_strx4:      return TRUE;
    case DW_FORM_strp:       return TRUE;
    default: break;
    };
    return FALSE;
}

static int
print_attr(Dwarf_Attribute atr,
    Dwarf_Signed anumber, Dwarf_Error *error)
{
    int res = 0;
    char *str = 0;
    const char *attrname = 0;
    const char *formname = 0;
    Dwarf_Half form = 0;
    Dwarf_Half attrnum = 0;
    res = dwarf_whatform(atr,&form,error);
    if (res != DW_DLV_OK) {
        printf("dwarf_whatform failed! res %d\n",res);
        return res;
    }
    res = dwarf_whatattr(atr,&attrnum,error);
    if (res != DW_DLV_OK) {
        printf("dwarf_whatattr failed! res %d\n",res);
        return res;
    }
    res = dwarf_get_AT_name(attrnum,&attrname);
    if (res == DW_DLV_NO_ENTRY) {
        printf("Bogus attrnum 0x%x\n",attrnum);
        attrname = "<internal error ?>";
    }
}

```



```

    res = dwarf_get_FORM_name(form,&formname);
    if (res == DW_DLV_NO_ENTRY) {
        printf("Bogus form 0x%x\n",attrnum);
        attrname = "<internal error ?>";
    }
    if (!isformstring(form)) {
        printf(" [%2d] Attr: %-15s Form: %-15s\n",
            (int)anumber,attrname,formname);
        return DW_DLV_OK;
    }
    res = dwarf_formstring(atr,&str,error);
    if (res != DW_DLV_OK) {
        printf("dwarf_formstring failed! res %d\n",res);
        return res;
    }
    printf(" [%2d] Attr: %-15s Form: %-15s %s\n",
        (int)anumber,attrname,formname,str);
    return DW_DLV_OK;
}

static void
dealloc_list(Dwarf_Debug dbg,
    Dwarf_Attribute *attrbuf,
    Dwarf_Signed attrcount,
    Dwarf_Signed i)
{
    for ( ; i < attrcount; ++i) {
        dwarf_dealloc_attribute(attrbuf[i]);
    }
    dwarf_dealloc(dbg,attrbuf,DW_DLA_LIST);
}

static int
print_one_die(Dwarf_Debug dbg,Dwarf_Die in_die,int level,
    Dwarf_Error *error)
{
    Dwarf_Attribute *attrbuf = 0;
    Dwarf_Signed attrcount = 0;
    Dwarf_Half tag = 0;
    const char * tagname = 0;
    int res = 0;
    Dwarf_Signed i = 0;

    res = dwarf_tag(in_die,&tag,error);
    if (res != DW_DLV_OK) {
        printf("dwarf_tag failed! res %d\n",res);
        return res;
    }
    res = dwarf_get_TAG_name(tag,&tagname);
    if (res != DW_DLV_OK) {
        tagname = "<bogus tag>";
    }
    printf("%3d: Die: %s\n",level,tagname);
    res = dwarf_attrlist(in_die,&attrbuf,&attrcount,error);
    if (res != DW_DLV_OK) {
        printf("dwarf_attrlist failed! res %d\n",res);
        return res;
    }
    for (i = 0; i < attrcount; ++i) {
        res = print_attr(attrbuf[i],i,error);
        if (res != DW_DLV_OK) {
            dealloc_list(dbg,attrbuf,attrcount,0);
            printf("dwarf_attr print failed! res %d\n",res);
            return res;
        }
    }
    dealloc_list(dbg,attrbuf,attrcount,0);
    return DW_DLV_OK;
}

static int
print_object_info(Dwarf_Debug dbg,Dwarf_Error *error)
{
    Dwarf_Bool is_info = TRUE; /* our data is not DWARF4
        .debug_types. */
    Dwarf_Unsigned cu_header_length = 0;
    Dwarf_Half version_stamp = 0;
    Dwarf_Off abbrev_offset = 0;
    Dwarf_Half address_size = 0;
    Dwarf_Half length_size = 0;
    Dwarf_Half extension_size = 0;
    Dwarf_Sig8 type_signature;
    Dwarf_Unsigned typeoffset = 0;
    Dwarf_Unsigned next_cu_header_offset = 0;
    Dwarf_Half header_cu_type = 0;
    int res = 0;
    Dwarf_Die cu_die = 0;

```

```

int level = 0;

type_signature = zerosignature;
res = dwarf_next_cu_header_d(dbg,
    is_info,
    &cu_header_length,
    &version_stamp,
    &abbrev_offset,
    &address_size,
    &length_size,
    &extension_size,
    &type_signature,
    &typeoffset,
    &next_cu_header_offset,
    &header_cu_type,
    error);
if (res != DW_DLV_OK) {
    printf("Next cu header result %d. "
        "Something is wrong FAIL, line %d\n", res, __LINE__);
    if (res == DW_DLV_ERROR) {
        printf("Error is: %s\n", dwarf_errmsg(*error));
    }
    exit(EXIT_FAILURE);
}
printf("CU header length.....0x%lx\n",
    (unsigned long)cu_header_length);
printf("Version stamp.....%d\n", version_stamp);
printf("Address size .....%d\n", address_size);
printf("Offset size.....%d\n", length_size);
printf("Next cu header offset.....0x%lx\n",
    (unsigned long)next_cu_header_offset);

res = dwarf_siblingof_b(dbg, NULL, is_info, &cu_die, error);
if (res != DW_DLV_OK) {
    /* There is no CU die, which should be impossible. */
    if (res == DW_DLV_ERROR) {
        printf("ERROR: dwarf_siblingof_b failed, no CU die\n");
        printf("Error is: %s\n", dwarf_errmsg(*error));
        return res;
    } else {
        printf("ERROR: dwarf_siblingof_b got NO_ENTRY, "
            "no CU die\n");
        return res;
    }
}
res = print_one_die(dbg, cu_die, level, error);
if (res != DW_DLV_OK) {
    dwarf_dealloc_die(cu_die);
    printf("print_one_die failed! %d\n", res);
    return res;
}
dwarf_dealloc_die(cu_die);
return DW_DLV_OK;
}

/* testing interfaces useful for embedding
libdwarf inside another program or library. */
int main(int argc, char **argv)
{
    int res = 0;
    Dwarf_Debug dbg = 0;
    Dwarf_Error error = 0;
    int fail = FALSE;
    int i = 1;

    if (i >= argc) {
        /* OK */
    } else {
        if (!strcmp(argv[i], "--suppress-de-alloc-tree")) {
            /* Do nothing, ignore the argument */
            ++i;
        }
    }

    /* Fill in interface before this call.
    We are using a static area, see above. */
    res = dwarf_object_init_b(&dw_interface,
        0, 0, DW_GROUPNUMBER_ANY, &dbg,
        &error);
    if (res == DW_DLV_NO_ENTRY) {
        printf("FAIL Cannot dwarf_object_init_b() NO ENTRY. \n");
        exit(EXIT_FAILURE);
    } else if (res == DW_DLV_ERROR) {
        printf("FAIL Cannot dwarf_object_init_b(). \n");
        printf("msg: %s\n", dwarf_errmsg(error));
        dwarf_dealloc_error(dbg, error);
        exit(EXIT_FAILURE);
    }
}

```

```

    res = print_object_info(dbg,&error);
    if (res != DW_DLV_OK) {
        if (res == DW_DLV_ERROR) {
            dwarf_dealloc_error(dbg,error);
        }
        printf("FAIL printing, res %d line %d\n",res,__LINE__);
        exit(EXIT_FAILURE);
    }
    dwarf_object_finish(dbg);
    if (fail) {
        printf("FAIL objectaccess.c\n");
        exit(EXIT_FAILURE);
    }
    return 0;
}

```

9.90 A simple report on section groups.

Section groups are for Split DWARF.

The C source is src/bin/dwarfexample/showsectiongroups.c

```

*/
#include <config.h>

#include <stdio.h> /* printf() */
#include <stdlib.h> /* calloc() exit() free() */
#include <string.h> /* strcmp() */

#include "dwarf.h"
#include "libdwarf.h"
#define FALSE 0

char trueoutpath[2000];

static int
one_file_show_groups(char *path_in,
    char *shortpath,
    int chosengroup)
{
    int res = 0;
    Dwarf_Debug dbg = 0;
    Dwarf_Error error = 0;
    char *path = 0;
    Dwarf_Unsigned section_count = 0;
    Dwarf_Unsigned group_count = 0;
    Dwarf_Unsigned selected_group = 0;
    Dwarf_Unsigned map_entry_count = 0;
    Dwarf_Unsigned *group_numbers_array = 0;
    Dwarf_Unsigned *sec_numbers_array = 0;
    const char **sec_names_array = 0;
    Dwarf_Unsigned i = 0;
    const char *grpname = 0;

    switch(chosengroup) {
    case DW_GROUPNUMBER_ANY:
        grpname="DW_GROUPNUMBER_ANY";
        break;
    case DW_GROUPNUMBER_BASE:
        grpname="DW_GROUPNUMBER_BASE";
        break;
    case DW_GROUPNUMBER_DWO:
        grpname="DW_GROUPNUMBER_DWO";
        break;
    default:
        grpname = "";
    }
    path = path_in;
    res = dwarf_init_path(path,
        0,0,
        chosengroup,
        0,0, &dbg, &error);
    if (res == DW_DLV_ERROR) {
        printf("Error from libdwarf opening \"%s\": %s\n",
            shortpath, dwarf_errmsg(error));
        dwarf_dealloc_error(dbg,error);
        error = 0;
        return res;
    }
    if (res == DW_DLV_NO_ENTRY) {
        printf("There is no such file as \"%s\" "
            "or the selected group %d (%s) does "

```

```

        "not appear in the file\n",
        shortpath,chosengroup,grpname);
    return DW_DLV_NO_ENTRY;
}

res = dwarf_sec_group_sizes(dbg, &section_count,
    &group_count, &selected_group, &map_entry_count,
    &error);
if (res == DW_DLV_ERROR) {
    printf("Error from libdwarf getting group "
        "sizes \"%s\": %s\n",
        shortpath, dwarf_errmsg(error));
    dwarf_dealloc_error(dbg,error);
    error = 0;
    dwarf_finish(dbg);
    return res;
}
if (res == DW_DLV_NO_ENTRY) {
    printf("Impossible. libdwarf claims no groups from %s\n",
        shortpath);
    dwarf_finish(dbg);
    return res;
}
printf("Group Map data sizes\n");
printf("  requested group : %4lu\n",
    (unsigned long)chosengroup);
printf("  section count   : %4lu\n",
    (unsigned long)section_count);
printf("  group count      : %4lu\n",
    (unsigned long)group_count);
printf("  selected group   : %4lu\n",
    (unsigned long)selected_group);
printf("  map entry count  : %4lu\n",
    (unsigned long)map_entry_count);

group_numbers_array = (Dwarf_Unsigned *)calloc(map_entry_count,
    sizeof(Dwarf_Unsigned));
if (!group_numbers_array) {
    printf("Error calloc fail, group count %lu\n",
        (unsigned long)group_count);
    dwarf_finish(dbg);
    return DW_DLV_ERROR;
}
sec_numbers_array = (Dwarf_Unsigned *)calloc(map_entry_count,
    sizeof(Dwarf_Unsigned));
if (!sec_numbers_array) {
    free(group_numbers_array);
    printf("Error calloc fail sec numbers, section count %lu\n",
        (unsigned long)section_count);
    dwarf_finish(dbg);
    return DW_DLV_ERROR;
}
sec_names_array = (const char **)calloc(map_entry_count,
    sizeof(const char *));
if (!sec_names_array) {
    free(sec_numbers_array);
    free(group_numbers_array);
    printf("Error calloc fail on names, section count %lu\n",
        (unsigned long)section_count);
    dwarf_finish(dbg);
    return DW_DLV_ERROR;
}
res = dwarf_sec_group_map(dbg, map_entry_count,
    group_numbers_array,
    sec_numbers_array, sec_names_array, &error);
if (res == DW_DLV_ERROR) {
    free(sec_names_array);
    free(sec_numbers_array);
    free(group_numbers_array);
    printf("Error from libdwarf getting group details "
        "sizes \"%s\": %s\n",
        shortpath, dwarf_errmsg(error));
    dwarf_dealloc_error(dbg,error);
    error = 0;
    dwarf_finish(dbg);
    return res;
}
if (res == DW_DLV_NO_ENTRY) {
    free(sec_names_array);
    free(sec_numbers_array);
    free(group_numbers_array);
    printf("Impossible. libdwarf claims details from %s\n",
        shortpath);
    dwarf_finish(dbg);
    return res;
}
printf("  [index] group   section \n");

```

```

    for (i = 0; i < map_entry_count; ++i) {
        printf(" [%5lu] %4lu %4lu %s\n",
            (unsigned long)i,
            (unsigned long)group_numbers_array[i],
            (unsigned long)sec_numbers_array[i],
            sec_names_array[i]);
    }
    free(sec_names_array);
    free(sec_numbers_array);
    free(group_numbers_array);
    dwarf_finish(dbg);
    return DW_DLV_OK;
}

/* Does not return */
static void
usage(void)
{
    printf("Usage: showsectiongroups [-group <n>] "
        "<objectfile> ...\n");
    printf("Usage: group defaults to zero (DW_GROUPNUMBER ANY)\n");
    exit(EXIT_FAILURE);
}

/* This trimming of the file path makes libdwarf regression
   testing easier by arranging baseline output
   not show the full path. */
static void
trimpathprefix(char *out, unsigned int outlen, char *in)
{
    char *cpo = out;
    char *cpi = in;
    char *suffix = 0;
    unsigned int lencopied = 0;
    for ( ; *cpi ; ++cpi) {
        if (*cpi == '/') {
            suffix = cpi + 1;
        }
    }
    if (suffix) {
        cpi = suffix;
    }
    lencopied = 0;
    for ( ; lencopied < outlen; ++cpo, ++cpi)
    {
        *cpo = *cpi;
        if (!*cpi) {
            return;
        }
        ++lencopied;
    }
    printf("FAIL copy file name: not terminated\n");
    exit(EXIT_FAILURE);
}

int
main(int argc, char **argv)
{
    int res = 0;
    int i = 1;
    int chosengroup = DW_GROUPNUMBER_ANY;
    static char reportingpath[16000];

    if (argc < 2) {
        usage();
        return 0;
    }
    for ( ; i < argc; ++i) {
        char *arg = argv[i];
        if (!strcmp(arg, "-group")) {
            i++;
            if (i >= argc) {
                usage();
            }
            arg = argv[i];
            chosengroup = atoi(arg);
            /* We are ignoring errors to simplify
               this source. Use strtol, carefully,
               in real code. */
            continue;
        }
        if (!strcmp(argv[i], "--suppress-de-alloc-tree")) {
            /* Do nothing, ignore the argument */
            continue;
        }
        trimpathprefix(reportingpath, sizeof(reportingpath), arg);
        res = one_file_show_groups(arg,

```

```
        reportingpath,chosengroup);
printf("====done with %s, status %s\n",reportingpath,
      (res == DW_DLV_OK)?"DW_DLV_OK":
      (res == DW_DLV_ERROR)?"DW_DLV_ERROR":
      "DW_DLV_NO_ENTRY");
printf("\n");
}
return 0;
}
```

Chapter 10

Data Structure Documentation

10.1 Dwarf_Block_s Struct Reference

Data Fields

- [Dwarf_Unsigned](#) **bl_len**
- [Dwarf_Ptr](#) **bl_data**
- [Dwarf_Small](#) **bl_from_loclist**
- [Dwarf_Unsigned](#) **bl_section_offset**

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.2 Dwarf_Cmdline_Options_s Struct Reference

```
#include <libdwarf.h>
```

Data Fields

- [Dwarf_Bool](#) **check_verbose_mode**

10.2.1 Detailed Description

`check_verbose_mode` defaults to `FALSE`. If a `libdwarf`-calling program sets this `TRUE` it means some errors in Line Table headers get a much more detailed description of the error which is reported the caller via `printf()`↵`_callback()` function (the caller can do something with the message). Or the `libdwarf` calling code can call [`dwarf_record_cmdline_options\(\)`](#) to set the new value.

For convenience the type name for the struct is `Dwarf_Cmdline_Options`.

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.3 Dwarf_Debug_Fission_Per_CU_s Struct Reference

Data Fields

- const char * **pcu_type**
- Dwarf_Unsigned **pcu_index**
- Dwarf_Sig8 **pcu_hash**
- Dwarf_Unsigned **pcu_offset** [12]
- Dwarf_Unsigned **pcu_size** [12]
- Dwarf_Unsigned **unused1**
- Dwarf_Unsigned **unused2**

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.4 Dwarf_Form_Data16_s Struct Reference

Data Fields

- unsigned char **fd_data** [16]

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.5 Dwarf_Macro_Details_s Struct Reference

```
#include <libdwarf.h>
```

Data Fields

- Dwarf_Off **dmd_offset**
- Dwarf_Small **dmd_type**
- Dwarf_Signed **dmd_lineno**
- Dwarf_Signed **dmd_fileindex**
- char * **dmd_macro**

10.5.1 Detailed Description

This applies to DWARF2, DWARF3, and DWARF4 compilation units. DWARF5 .debug_macro has its own function interface which does not use this struct.

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.6 Dwarf_Obj_Access_Interface_a_s Struct Reference

Data Fields

- void * **ai_object**
- const [Dwarf_Obj_Access_Methods_a](#) * **ai_methods**

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.7 Dwarf_Obj_Access_Methods_a_s Struct Reference

```
#include <libdwarf.h>
```

Data Fields

- int(* **om_get_section_info**)(void *obj, [Dwarf_Unsigned](#) section_index, [Dwarf_Obj_Access_Section_a](#) *return_section, int *error)
- [Dwarf_Small](#)(* **om_get_byte_order**)(void *obj)
- [Dwarf_Small](#)(* **om_get_length_size**)(void *obj)
- [Dwarf_Small](#)(* **om_get_pointer_size**)(void *obj)
- [Dwarf_Unsigned](#)(* **om_get_filesize**)(void *obj)
- [Dwarf_Unsigned](#)(* **om_get_section_count**)(void *obj)
- int(* **om_load_section**)(void *obj, [Dwarf_Unsigned](#) dw_section_index, [Dwarf_Small](#) **dw_return_data, int *dw_error)
- int(* **om_relocate_a_section**)(void *obj, [Dwarf_Unsigned](#) section_index, [Dwarf_Debug](#) dbg, int *error)
- int(* **om_load_section_a**)(void *obj, [Dwarf_Unsigned](#) dw_section_index, enum [Dwarf_Sec_Alloc_Pref](#) *dw_alloc_pref, [Dwarf_Small](#) **dw_return_data_ptr, [Dwarf_Unsigned](#) *dw_return_data_len, [Dwarf_Small](#) **dw_return_mmap_base_ptr, [Dwarf_Unsigned](#) *dw_return_mmap_offset, [Dwarf_Unsigned](#) *dw_return_mmap_len, int *dw_error)
- void(* **om_finish**)(void *obj)

10.7.1 Detailed Description

The functions we need to access object data from libdwarf are declared here.

Unless you are reading object sections with your own code (as in [src/bin/dwarfexample/jitreader.c](#)) you will not need to fill in or use the struct.

`om_relocate_a_section` uses malloc/read to get section contents and returns a pointer to the malloc space through `dw_return_data`, which is recorded in the applicable section data.

`om_load_section_a` uses either malloc/read or mmap and consequently returns more data as needed for eventual `free()` or `munmap()`.

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.8 Dwarf_Obj_Access_Section_a_s Struct Reference

Data Fields

- const char * **as_name**
- [Dwarf_Unsigned](#) **as_type**
- [Dwarf_Unsigned](#) **as_flags**
- [Dwarf_Addr](#) **as_addr**
- [Dwarf_Unsigned](#) **as_offset**
- [Dwarf_Unsigned](#) **as_size**
- [Dwarf_Unsigned](#) **as_link**
- [Dwarf_Unsigned](#) **as_info**
- [Dwarf_Unsigned](#) **as_addralign**
- [Dwarf_Unsigned](#) **as_entsize**

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.9 Dwarf_Printf_Callback_Info_s Struct Reference

```
#include <libdwarf.h>
```

Data Fields

- void * **dp_user_pointer**
- [dwarf_printf_callback_function_type](#) **dp_fptr**
- char * **dp_buffer**
- unsigned int **dp_buffer_len**
- int **dp_buffer_user_provided**
- void * **dp_reserved**

10.9.1 Detailed Description

If one wishes to print detailed line table information one creates an instance of this struct and fills in the fields and passes the struct to the relevant init, for example, [dwarf_init_path\(\)](#).

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.10 Dwarf_Ranges_s Struct Reference

Data Fields

- [Dwarf_Addr](#) **dwr_addr1**
- [Dwarf_Addr](#) **dwr_addr2**
- enum [Dwarf_Ranges_Entry_Type](#) **dwr_type**

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.11 Dwarf_Regtable3_s Struct Reference

Data Fields

- struct [Dwarf_Regtable_Entry3_s](#) **rt3_cfa_rule**
- [Dwarf_Half](#) **rt3_reg_table_size**
- struct [Dwarf_Regtable_Entry3_s](#) * **rt3_rules**

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.12 Dwarf_Regtable_Entry3_s Struct Reference

Data Fields

- [Dwarf_Small](#) **dw_offset_relevant**
- [Dwarf_Small](#) **dw_value_type**
- [Dwarf_Half](#) **dw_regnum**
- [Dwarf_Unsigned](#) **dw_offset**
- [Dwarf_Unsigned](#) **dw_args_size**
- [Dwarf_Block](#) **dw_block**

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

10.13 Dwarf_Sig8_s Struct Reference

Data Fields

- char **signature** [8]

The documentation for this struct was generated from the following file:

- [/home/davea/dwarf/code/src/lib/libdwarf/libdwarf.h](#)

Chapter 11

File Documentation

Chapter 12

checkexamples.c

[checkexamples.c](#) contains what user code should be. Hence the code typed in [checkexamples.c](#) is PUBLIC DOMAIN and may be copied, used, and altered without any restrictions.

[checkexamples.c](#) need not be compiled routinely nor should it ever be executed.

To verify syntactic correctness compile in the libdwarf-code/doc directory with:

```
cc -c -Wall -O0 -Wpointer-arith \
-Wdeclaration-after-statement \
-Wextra -Wcomment -Wformat -Wpedantic -Wuninitialized \
-Wno-long-long -Wshadow -Wbad-function-cast \
-Wmissing-parameter-type -Wnested-externs \
-I../src/lib/libdwarf checkexamples.c
```

12.1 /home/davea/dwarf/code/src/bin/dwarfexample/jitreader.c File Reference

12.2 /home/davea/dwarf/code/src/bin/dwarfexample/showsectiongroups.c File Reference

Chapter 13

dwarf.h

[dwarf.h](#) contains all the identifiers such as DW_TAG_compile_unit etc from the various versions of the DWARF Standard beginning with DWARF2 and containing all later Dwarf Standard identifiers.

In addition, it contains all user-defined identifiers that we have been able to find.

All identifiers here are C defines with the prefix "DW_" .

13.1 dwarf.h

[Go to the documentation of this file.](#)

```
00001 /*
00002 Copyright (C) 2000-2006 Silicon Graphics, Inc. All Rights Reserved.
00003 Portions Copyright 2002-2010 Sun Microsystems, Inc. All rights reserved.
00004 Portions Copyright 2007-2023 David Anderson. All rights reserved.
00005
00006 This program is free software; you can redistribute it
00007 and/or modify it under the terms of version 2.1 of the
00008 GNU Lesser General Public License as published by the Free
00009 Software Foundation.
00010
00011 This program is distributed in the hope that it would be
00012 useful, but WITHOUT ANY WARRANTY; without even the implied
00013 warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR
00014 PURPOSE.
00015
00016 Further, this software is distributed without any warranty
00017 that it is free of the rightful claim of any third person
00018 regarding infringement or the like. Any license provided
00019 herein, whether implied or otherwise, applies only to this
00020 software file. Patent licenses, if any, provided herein
00021 do not apply to combinations of this program with other
00022 software, or any other product whatsoever.
00023
00024 You should have received a copy of the GNU Lesser General
00025 Public License along with this program; if not, write the
00026 Free Software Foundation, Inc., 51 Franklin Street - Fifth
00027 Floor, Boston MA 02110-1301, USA.
00028 */
00029
00044 #ifndef __DWARF_H
00045 #define __DWARF_H
00046 #ifdef __cplusplus
00047 extern "C" {
00048 #endif
00049
00050 /*
00051 dwarf.h DWARF debugging information values
00052 $Revision: 1.41 $ $Date: 2006/04/17 00:09:56 $
00053
00054 The comment "DWARF3" appears where there are
00055 new entries from DWARF3 as of 2004, "DWARF3f"
00056 where there are new entries as of the November 2005
```

```

00057     public review document and other comments apply
00058     where extension entries appear.
00059
00060     Extensions part of DWARF4 are marked DWARF4.
00061
00062     A few extension names have omitted the 'vendor id'
00063     (See chapter 7, "Vendor Extensibility"). Please
00064     always use a 'vendor id' string in extension names.
00065
00066     Vendors should use a vendor string in names and
00067     wherever possible avoid duplicating values used by
00068     other vendor extensions
00069
00070     The DWARF1 comments indicate values unused in
00071     DWARF2 and later but used or reserved in DWARF1.
00072 */
00073
00074 #define DW_TAG_array_type                0x01
00075 #define DW_TAG_class_type                0x02
00076 #define DW_TAG_entry_point               0x03
00077 #define DW_TAG_enumeration_type          0x04
00078 #define DW_TAG_formal_parameter          0x05
00079 /* TAG_global_subroutine                0x06 DWARF1 only */
00080 /* TAG_global_variable                  0x07 DWARF1 only */
00081 #define DW_TAG_imported_declaration       0x08
00082 /* reserved by DWARF1                  0x09 DWARF1 only */
00083 #define DW_TAG_label                     0x0a
00084 #define DW_TAG_lexical_block             0x0b
00085 /* TAG_local_variable                  0x0c DWARF1 only. */
00086 #define DW_TAG_member                    0x0d
00087 /* reserved by DWARF1                  0x0e DWARF1 only */
00088 #define DW_TAG_pointer_type               0x0f
00089 #define DW_TAG_reference_type             0x10
00090 #define DW_TAG_compile_unit              0x11
00091 #define DW_TAG_string_type                0x12
00092 #define DW_TAG_structure_type             0x13
00093 /* TAG_subroutine                      0x14 DWARF1 only */
00094 #define DW_TAG_subroutine_type            0x15
00095 #define DW_TAG_typedef                    0x16
00096 #define DW_TAG_union_type                 0x17
00097 #define DW_TAG_unspecified_parameters     0x18
00098 #define DW_TAG_variant                    0x19
00099 #define DW_TAG_common_block               0x1a
00100 #define DW_TAG_common_inclusion             0x1b
00101 #define DW_TAG_inheritance                0x1c
00102 #define DW_TAG_inlined_subroutine         0x1d
00103 #define DW_TAG_module                     0x1e
00104 #define DW_TAG_ptr_to_member_type         0x1f
00105 #define DW_TAG_set_type                   0x20
00106 #define DW_TAG_subrange_type              0x21
00107 #define DW_TAG_with_stmt                  0x22
00108 #define DW_TAG_access_declaration         0x23
00109 #define DW_TAG_base_type                  0x24
00110 #define DW_TAG_catch_block                0x25
00111 #define DW_TAG_const_type                 0x26
00112 #define DW_TAG_constant                   0x27
00113 #define DW_TAG_enumerator                 0x28
00114 #define DW_TAG_file_type                  0x29
00115 #define DW_TAG_friend                     0x2a
00116 #define DW_TAG_namelist                   0x2b
00117 /* Early releases of this header had the following
00118     misspelled with a trailing 's' */
00119 #define DW_TAG_namelist_item              0x2c /* DWARF2 spelling*/
00120 #define DW_TAG_namelist_items             0x2c /* SGI misspelling/typo*/
00121 #define DW_TAG_packed_type                0x2d
00122 #define DW_TAG_subprogram                 0x2e
00123 /* The DWARF2 document had two spellings of the following
00124     two TAGs, DWARF3 specifies the longer spelling. */
00125 #define DW_TAG_template_type_parameter    0x2f /* DWARF3-5 spelling*/
00126 #define DW_TAG_template_type_param        0x2f /* DWARF2 inconsistent*/
00127 #define DW_TAG_template_value_parameter   0x30 /* DWARF all versions*/
00128 #define DW_TAG_template_value_param       0x30 /* SGI misspelling/typo*/
00129 #define DW_TAG_thrown_type                 0x31
00130 #define DW_TAG_try_block                   0x32
00131 #define DW_TAG_variant_part                0x33
00132 #define DW_TAG_variable                   0x34
00133 #define DW_TAG_volatile_type               0x35
00134 #define DW_TAG_dwarf_procedure             0x36 /* DWARF3 */
00135 #define DW_TAG_restrict_type               0x37 /* DWARF3 */
00136 #define DW_TAG_interface_type              0x38 /* DWARF3 */
00137 #define DW_TAG_namespace                   0x39 /* DWARF3 */
00138 #define DW_TAG_imported_module             0x3a /* DWARF3 */
00139 #define DW_TAG_unspecified_type            0x3b /* DWARF3 */
00140 #define DW_TAG_partial_unit                0x3c /* DWARF3 */
00141 #define DW_TAG_imported_unit               0x3d /* DWARF3 */
00142 /* Do not use DW_TAG_mutable_type */
00143 #define DW_TAG_mutable_type 0x3e /*Withdrawn from DWARF3 by DWARF3f*/

```

```
00144 #define DW_TAG_condition 0x3f /* DWARF3f */
00145 #define DW_TAG_shared_type 0x40 /* DWARF3f */
00146 #define DW_TAG_type_unit 0x41 /* DWARF4 */
00147 #define DW_TAG_rvalue_reference_type 0x42 /* DWARF4 */
00148 #define DW_TAG_template_alias 0x43 /* DWARF4 */
00149 #define DW_TAG_coarray_type 0x44 /* DWARF5 */
00150 #define DW_TAG_generic_subrange 0x45 /* DWARF5 */
00151 #define DW_TAG_dynamic_type 0x46 /* DWARF5 */
00152 #define DW_TAG_atomic_type 0x47 /* DWARF5 */
00153 #define DW_TAG_call_site 0x48 /* DWARF5 */
00154 #define DW_TAG_call_site_parameter 0x49 /* DWARF5 */
00155 #define DW_TAG_skeleton_unit 0x4a /* DWARF5 */
00156 #define DW_TAG_immutable_type 0x4b /* DWARF5 */
00157
00158 /* TI = Texas Instruments, for DWARF in COFF */
00159 /* https://www.ti.com/lit/an/spraab5/spraab5.pdf?ts=1705994928599 */
00160
00161 #define DW_TAG_TI_far_type 0x4080 /* TI */
00162 #define DW_TAG_lo_user 0x4080 /* TI */
00163 #define DW_TAG_MIPS_loop 0x4081
00164 #define DW_TAG_TI_near_type 0x4081 /* TI */
00165 #define DW_TAG_TI_assign_register 0x4082 /* TI */
00166 #define DW_TAG_TI_ioport_type 0x4083 /* TI */
00167 #define DW_TAG_TI_restrict_type 0x4084 /* TI */
00168 #define DW_TAG_TI_onchip_type 0x4085 /* TI */
00169
00170 /* HP extensions: ftp://ftp.hp.com/pub/lang/tools/\
00171 WDB/wdb-4.0.tar.gz */
00172 #define DW_TAG_HP_array_descriptor 0x4090 /* HP */
00173
00174 /* GNU extensions. The first 3 missing the GNU. */
00175 #define DW_TAG_format_label 0x4101 /* GNU. Fortran. */
00176 #define DW_TAG_function_template 0x4102 /* GNU. For C++ */
00177 #define DW_TAG_class_template 0x4103 /* GNU. For C++ */
00178 #define DW_TAG_GNU_BINCL 0x4104 /* GNU */
00179 #define DW_TAG_GNU_EINCL 0x4105 /* GNU */
00180
00181 /* GNU extension. http://gcc.gnu.org/wiki/TemplateParmsDwarf */
00182 #define DW_TAG_GNU_template_template_parameter 0x4106 /* GNU */
00183 #define DW_TAG_GNU_template_template_param 0x4106 /* GNU */
00184 #define DW_TAG_GNU_template_parameter_pack 0x4107 /* GNU */
00185 #define DW_TAG_GNU_formal_parameter_pack 0x4108 /* GNU */
00186
00187 #define DW_TAG_GNU_call_site 0x4109 /* GNU */
00188 #define DW_TAG_GNU_call_site_parameter 0x410a /* GNU */
00189
00190 /* The following are SUN extensions */
00191 #define DW_TAG_SUN_function_template 0x4201 /* SUN */
00192 #define DW_TAG_SUN_class_template 0x4202 /* SUN */
00193 #define DW_TAG_SUN_struct_template 0x4203 /* SUN */
00194 #define DW_TAG_SUN_union_template 0x4204 /* SUN */
00195 #define DW_TAG_SUN_indirect_inheritance 0x4205 /* SUN */
00196 #define DW_TAG_SUN_codeflags 0x4206 /* SUN */
00197 #define DW_TAG_SUN_memop_info 0x4207 /* SUN */
00198 #define DW_TAG_SUN_omp_child_func 0x4208 /* SUN */
00199 #define DW_TAG_SUN_rtti_descriptor 0x4209 /* SUN */
00200 #define DW_TAG_SUN_dtor_info 0x420a /* SUN */
00201 #define DW_TAG_SUN_dtor 0x420b /* SUN */
00202 #define DW_TAG_SUN_f90_interface 0x420c /* SUN */
00203 #define DW_TAG_SUN_fortran_vax_structure 0x420d /* SUN */
00204 #define DW_TAG_SUN_hi 0x42ff /* SUN */
00205
00206 /* ALTIUM extensions */
00207 /* DSP-C/Starcore __circ qualifier */
00208 #define DW_TAG_ALTIUM_circ_type 0x5101 /* ALTIUM */
00209 /* Starcore __mwa_circ qualifier */
00210 #define DW_TAG_ALTIUM_mwa_circ_type 0x5102 /* ALTIUM */
00211 /* Starcore __rev_carry qualifier */
00212 #define DW_TAG_ALTIUM_rev_carry_type 0x5103 /* ALTIUM */
00213 /* M16 __rom qualifier */
00214 #define DW_TAG_ALTIUM_rom 0x5111 /* ALTIUM */
00215
00216 #define DW_TAG_LLVM_annotation 0x6000 /* September 2021*/
00217
00218 /* GHS C */
00219 #define DW_TAG_ghs_namespace 0x8004
00220 #define DW_TAG_ghs_using_namespace 0x8005
00221 #define DW_TAG_ghs_using_declaration 0x8006
00222 #define DW_TAG_ghs_template_templ_param 0x8007
00223
00224 /* The following 3 are extensions to support UPC */
00225 #define DW_TAG_upc_shared_type 0x8765 /* UPC */
00226 #define DW_TAG_upc_strict_type 0x8766 /* UPC */
00227 #define DW_TAG_upc_relaxed_type 0x8767 /* UPC */
00228
00229 /* PGI (STMicroelectronics) extensions. */
00230 #define DW_TAG_PGI_kanji_type 0xa000 /* PGI */
```

```

00231 #define DW_TAG_PGI_interface_block      0xa020 /* PGI */
00232
00233 #define DW_TAG_BORLAND_property          0xb000
00234 #define DW_TAG_BORLAND_Delphi_string     0xb001
00235 #define DW_TAG_BORLAND_Delphi_dynamic_array 0xb002
00236 #define DW_TAG_BORLAND_Delphi_set        0xb003
00237 #define DW_TAG_BORLAND_Delphi_variant    0xb004
00238
00239 #define DW_TAG_hi_user                    0xffff
00240
00241 /* The following two are non-standard. Use DW_CHILDREN_yes
00242    and DW_CHILDREN_no instead. These could
00243    probably be deleted, but someone might be using them,
00244    so they remain. */
00245 #define DW_children_no                    0
00246 #define DW_children_yes                   1
00247
00248 #define DW_FORM_addr                     0x01
00249 /* FORM_REF                             0x02 DWARF1 only */
00250 #define DW_FORM_block2                   0x03
00251 #define DW_FORM_block4                   0x04
00252 #define DW_FORM_data2                     0x05
00253 #define DW_FORM_data4                     0x06
00254 #define DW_FORM_data8                     0x07
00255 #define DW_FORM_string                    0x08
00256 #define DW_FORM_block                     0x09
00257 #define DW_FORM_block1                     0x0a
00258 #define DW_FORM_data1                     0x0b
00259 #define DW_FORM_flag                       0x0c
00260 #define DW_FORM_sdata                     0x0d
00261 #define DW_FORM_strp                       0x0e
00262 #define DW_FORM_uda                        0x0f
00263 #define DW_FORM_ref_addr                  0x10
00264 #define DW_FORM_ref1                      0x11
00265 #define DW_FORM_ref2                      0x12
00266 #define DW_FORM_ref4                      0x13
00267 #define DW_FORM_ref8                      0x14
00268 #define DW_FORM_ref_uda                   0x15
00269 #define DW_FORM_indirect                  0x16
00270 #define DW_FORM_sec_offset                 0x17 /* DWARF4 */
00271 #define DW_FORM_exprloc                    0x18 /* DWARF4 */
00272 #define DW_FORM_flag_present               0x19 /* DWARF4 */
00273 #define DW_FORM_strx                       0x1a /* DWARF5 */
00274 #define DW_FORM_addrx                      0x1b /* DWARF5 */
00275 #define DW_FORM_ref_sup4                   0x1c /* DWARF5 */
00276 #define DW_FORM_strp_sup                   0x1d /* DWARF5 */
00277 #define DW_FORM_data16                    0x1e /* DWARF5 */
00278 #define DW_FORM_line_strp                  0x1f /* DWARF5 */
00279 #define DW_FORM_ref_sig8                   0x20 /* DWARF4 */
00280 #define DW_FORM_implicit_const             0x21 /* DWARF5 */
00281 #define DW_FORM_loclistx                   0x22 /* DWARF5 */
00282 #define DW_FORM_rnglistx                   0x23 /* DWARF5 */
00283 #define DW_FORM_ref_sup8                   0x24 /* DWARF5 */
00284 #define DW_FORM_strx1                      0x25 /* DWARF5 */
00285 #define DW_FORM_strx2                      0x26 /* DWARF5 */
00286 #define DW_FORM_strx3                      0x27 /* DWARF5 */
00287 #define DW_FORM_strx4                      0x28 /* DWARF5 */
00288 #define DW_FORM_addrx1                     0x29 /* DWARF5 */
00289 #define DW_FORM_addrx2                     0x2a /* DWARF5 */
00290 #define DW_FORM_addrx3                     0x2b /* DWARF5 */
00291 #define DW_FORM_addrx4                     0x2c /* DWARF5 */
00292
00293 /* Extensions http://gcc.gnu.org/wiki/DebugFission. */
00294 #define DW_FORM_GNU_addr_index 0x1f01 /* GNU, debug_info.dwo.*/
00295
00296 /* GNU, somewhat like DW_FORM_strp */
00297 #define DW_FORM_GNU_str_index 0x1f02
00298
00299 #define DW_FORM_GNU_ref_alt 0x1f20 /* GNU, Offset in .debug_info. */
00300
00301 /* GNU extension. Offset in .debug_str of another object file. */
00302 #define DW_FORM_GNU_strp_alt 0x1f21
00303
00304 #define DW_FORM_LLVM_addrx_offset          0x2001
00305
00306 #define DW_AT_sibling                      0x01
00307 #define DW_AT_location                     0x02
00308 #define DW_AT_name                         0x03
00309 /* reserved DWARF1                        0x04, DWARF1 only */
00310 /* AT_fund_type                           0x05, DWARF1 only */
00311 /* AT_mod_fund_type                       0x06, DWARF1 only */
00312 /* AT_user_def_type                       0x07, DWARF1 only */
00313 /* AT_mod_u_d_type                        0x08, DWARF1 only */
00314 #define DW_AT_ordering                     0x09
00315 #define DW_AT_subscr_data                  0x0a
00316 #define DW_AT_byte_size                    0x0b
00317 #define DW_AT_bit_offset                   0x0c

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00318 #define DW_AT_bit_size                0x0d
00319 /* reserved DWARF1                    0x0d, DWARF1 only */
00320 #define DW_AT_element_list             0x0f
00321 #define DW_AT_stmt_list                0x10
00322 #define DW_AT_low_pc                   0x11
00323 #define DW_AT_high_pc                  0x12
00324 #define DW_AT_language                 0x13
00325 #define DW_AT_member                   0x14
00326 #define DW_AT_discr                    0x15
00327 #define DW_AT_discr_value              0x16
00328 #define DW_AT_visibility               0x17
00329 #define DW_AT_import                   0x18
00330 #define DW_AT_string_length            0x19
00331 #define DW_AT_common_reference         0x1a
00332 #define DW_AT_comp_dir                 0x1b
00333 #define DW_AT_const_value              0x1c
00334 #define DW_AT_containing_type          0x1d
00335 #define DW_AT_default_value            0x1e
00336 /* reserved                            0x1f */
00337 #define DW_AT_inline                    0x20
00338 #define DW_AT_is_optional               0x21
00339 #define DW_AT_lower_bound              0x22
00340 /* reserved                            0x23 */
00341 /* reserved                            0x24 */
00342 #define DW_AT_producer                  0x25
00343 /* reserved                            0x26 */
00344 #define DW_AT_prototyped                0x27
00345 /* reserved                            0x28 */
00346 /* reserved                            0x29 */
00347 #define DW_AT_return_addr               0x2a
00348 /* reserved                            0x2b */
00349 #define DW_AT_start_scope               0x2c
00350 /* reserved                            0x2d */
00351 #define DW_AT_bit_stride                0x2e /* DWARF3 name */
00352 #define DW_AT_stride_size               0x2e /* DWARF2 name */
00353 #define DW_AT_upper_bound               0x2f
00354 /* AT_virtual                          0x30, DWARF1 only */
00355 #define DW_AT_abstract_origin           0x31
00356 #define DW_AT_accessibility             0x32
00357 #define DW_AT_address_class             0x33
00358 #define DW_AT_artificial                0x34
00359 #define DW_AT_base_types                0x35
00360 #define DW_AT_calling_convention        0x36
00361 #define DW_AT_count                     0x37
00362 #define DW_AT_data_member_location      0x38
00363 #define DW_AT_decl_column               0x39
00364 #define DW_AT_decl_file                 0x3a
00365 #define DW_AT_decl_line                 0x3b
00366 #define DW_AT_declaration               0x3c
00367 #define DW_AT_discr_list                0x3d /* DWARF2 */
00368 #define DW_AT_encoding                  0x3e
00369 #define DW_AT_external                  0x3f
00370 #define DW_AT_frame_base                0x40
00371 #define DW_AT_friend                    0x41
00372 #define DW_AT_identifier_case           0x42
00373 #define DW_AT_macro_info                0x43 /* DWARF(234) not DWARF5 */
00374 #define DW_AT_namelist_item             0x44
00375 #define DW_AT_priority                   0x45
00376 #define DW_AT_segment                   0x46
00377 #define DW_AT_specification              0x47
00378 #define DW_AT_static_link               0x48
00379 #define DW_AT_type                       0x49
00380 #define DW_AT_use_location               0x4a
00381 #define DW_AT_variable_parameter        0x4b
00382 #define DW_AT_virtuality                0x4c
00383 #define DW_AT_vtable_elem_location      0x4d
00384 #define DW_AT_allocated                  0x4e /* DWARF3 */
00385 #define DW_AT_associated                 0x4f /* DWARF3 */
00386 #define DW_AT_data_location              0x50 /* DWARF3 */
00387 #define DW_AT_byte_stride                0x51 /* DWARF3f */
00388 #define DW_AT_stride                     0x51 /* DWARF3 (do not use) */
00389 #define DW_AT_entry_pc                   0x52 /* DWARF3 */
00390 #define DW_AT_use_UTF8                   0x53 /* DWARF3 */
00391 #define DW_AT_extension                  0x54 /* DWARF3 */
00392 #define DW_AT_ranges                     0x55 /* DWARF3 */
00393 #define DW_AT_trampoline                 0x56 /* DWARF3 */
00394 #define DW_AT_call_column                0x57 /* DWARF3 */
00395 #define DW_AT_call_file                  0x58 /* DWARF3 */
00396 #define DW_AT_call_line                  0x59 /* DWARF3 */
00397 #define DW_AT_description                 0x5a /* DWARF3 */
00398 #define DW_AT_binary_scale               0x5b /* DWARF3f */
00399 #define DW_AT_decimal_scale             0x5c /* DWARF3f */
00400 #define DW_AT_small                     0x5d /* DWARF3f */
00401 #define DW_AT_decimal_sign               0x5e /* DWARF3f */
00402 #define DW_AT_digit_count                0x5f /* DWARF3f */
00403 #define DW_AT_picture_string             0x60 /* DWARF3f */
00404 #define DW_AT_mutable                    0x61 /* DWARF3f */

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00405 #define DW_AT_threads_scaled 0x62 /* DWARF3f */
00406 #define DW_AT_explicit 0x63 /* DWARF3f */
00407 #define DW_AT_object_pointer 0x64 /* DWARF3f */
00408 #define DW_AT_endianity 0x65 /* DWARF3f */
00409 #define DW_AT_elemental 0x66 /* DWARF3f */
00410 #define DW_AT_pure 0x67 /* DWARF3f */
00411 #define DW_AT_recursive 0x68 /* DWARF3f */
00412 #define DW_AT_signature 0x69 /* DWARF4 */
00413 #define DW_AT_main_subprogram 0x6a /* DWARF4 */
00414 #define DW_AT_data_bit_offset 0x6b /* DWARF4 */
00415 #define DW_AT_const_expr 0x6c /* DWARF4 */
00416 #define DW_AT_enum_class 0x6d /* DWARF4 */
00417 #define DW_AT_linkage_name 0x6e /* DWARF4 */
00418 #define DW_AT_string_length_bit_size 0x6f /* DWARF5 */
00419 #define DW_AT_string_length_byte_size 0x70 /* DWARF5 */
00420 #define DW_AT_rank 0x71 /* DWARF5 */
00421 #define DW_AT_str_offsets_base 0x72 /* DWARF5 */
00422 #define DW_AT_addr_base 0x73 /* DWARF5 */
00423 /* Use DW_AT_rnglists_base, DW_AT_ranges_base is obsolete as */
00424 /* it was only used in some DWARF5 drafts, not the final DWARF5. */
00425 #define DW_AT_rnglists_base 0x74 /* DWARF5 */
00426 /* DW_AT_dwo_id, an experiment in some DWARF4+. Not DWARF5! */
00427 #define DW_AT_dwo_id 0x75 /* DWARF4! */
00428 #define DW_AT_dwo_name 0x76 /* DWARF5 */
00429 #define DW_AT_reference 0x77 /* DWARF5 */
00430 #define DW_AT_rvalue_reference 0x78 /* DWARF5 */
00431 #define DW_AT_macros 0x79 /* DWARF5 */
00432 #define DW_AT_call_all_calls 0x7a /* DWARF5 */
00433 #define DW_AT_call_all_source_calls 0x7b /* DWARF5 */
00434 #define DW_AT_call_all_tail_calls 0x7c /* DWARF5 */
00435 #define DW_AT_call_return_pc 0x7d /* DWARF5 */
00436 #define DW_AT_call_value 0x7e /* DWARF5 */
00437 #define DW_AT_call_origin 0x7f /* DWARF5 */
00438 #define DW_AT_call_parameter 0x80 /* DWARF5 */
00439 #define DW_AT_call_pc 0x81 /* DWARF5 */
00440 #define DW_AT_call_tail_call 0x82 /* DWARF5 */
00441 #define DW_AT_call_target 0x83 /* DWARF5 */
00442 #define DW_AT_call_target_clobbered 0x84 /* DWARF5 */
00443 #define DW_AT_call_data_location 0x85 /* DWARF5 */
00444 #define DW_AT_call_data_value 0x86 /* DWARF5 */
00445 #define DW_AT_noreturn 0x87 /* DWARF5 */
00446 #define DW_AT_alignment 0x88 /* DWARF5 */
00447 #define DW_AT_export_symbols 0x89 /* DWARF5 */
00448 #define DW_AT_deleted 0x8a /* DWARF5 */
00449 #define DW_AT_defaulted 0x8b /* DWARF5 */
00450 #define DW_AT_loclists_base 0x8c /* DWARF5 */
00451 /* As of 6 January 2025 the DWARF committee promises
00452 not to change the name or the assigned number of
00453 the following two attributes. So
00454 compilers are free to use these now with DWARF 5
00455 or earlier. The applicable FORMs of are
00456 of form class constant (See DWARF5 Section 7.5.5 Classes
00457 and Forms). */
00458 #define DW_AT_language_name 0x90 /* DWARF6 */
00459 #define DW_AT_language_version 0x91 /* DWARF6 */
00460
00461 /* GreenHills, ghs.com GHS C */
00462 #define DW_AT_ghs_namespace_alias 0x806
00463 #define DW_AT_ghs_using_namespace 0x807
00464 #define DW_AT_ghs_using_declaration 0x808
00465
00466 /* In extensions, we attempt to include the vendor extension
00467 in the name even when the vendor leaves it out. */
00468 #define DW_AT_HP_block_index 0x2000 /* HP */
00469 /* 0x2000 follows extension so dwarfdump prints the
00470 most-likely-useful name. */
00471 #define DW_AT_lo_user 0x2000
00472
00473 #define DW_AT_TI_veneer 0x2000 /* TI */
00474
00475 #define DW_AT_MIPS_fde 0x2001 /* MIPS/SGI */
00476 #define DW_AT_TI_symbol_name 0x2001 /* TI */
00477 #define DW_AT_MIPS_loop_begin 0x2002 /* MIPS/SGI */
00478 #define DW_AT_MIPS_tail_loop_begin 0x2003 /* MIPS/SGI */
00479 #define DW_AT_MIPS_epilog_begin 0x2004 /* MIPS/SGI */
00480 #define DW_AT_MIPS_loop_unroll_factor 0x2005 /* MIPS/SGI */
00481 #define DW_AT_MIPS_software_pipeline_depth 0x2006 /* MIPS/SGI */
00482 #define DW_AT_MIPS_linkage_name 0x2007 /* MIPS/SGI,GNU, and others.*/
00483 #define DW_AT_MIPS_stride 0x2008 /* MIPS/SGI */
00484 #define DW_AT_MIPS_abstract_name 0x2009 /* MIPS/SGI */
00485 #define DW_AT_MIPS_clone_origin 0x200a /* MIPS/SGI */
00486 #define DW_AT_MIPS_has_inlines 0x200b /* MIPS/SGI */
00487 #define DW_AT_TI_version 0x200b /* TI */
00488 #define DW_AT_MIPS_stride_byte 0x200c /* MIPS/SGI */
00489 #define DW_AT_TI_asm 0x200c /* TI */
00490 #define DW_AT_MIPS_stride_elem 0x200d /* MIPS/SGI */
00491 #define DW_AT_MIPS_ptr_dopetype 0x200e /* MIPS/SGI */

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```
00492 #define DW_AT_TI_skeletal 0x200e /* TI */
00493 #define DW_AT_MIPS_allocatable_dopetype 0x200f /* MIPS/SGI */
00494 #define DW_AT_MIPS_assumed_shape_dopetype 0x2010 /* MIPS/SGI */
00495 #define DW_AT_MIPS_assumed_size 0x2011 /* MIPS/SGI */
00496 #define DW_AT_TT_interrupt 0x2011 /* TI */
00497
00498 /* HP extensions. */
00499 #define DW_AT_HP_unmodifiable 0x2001 /* conflict: MIPS */
00500 #define DW_AT_HP_prologue 0x2005 /* conflict: MIPS */
00501 #define DW_AT_HP_epilogue 0x2008 /* conflict: MIPS */
00502 #define DW_AT_HP_actuals_stmt_list 0x2010 /* conflict: MIPS */
00503 #define DW_AT_HP_proc_per_section 0x2011 /* conflict: MIPS */
00504 #define DW_AT_HP_raw_data_ptr 0x2012 /* HP */
00505 #define DW_AT_HP_pass_by_reference 0x2013 /* HP */
00506 #define DW_AT_HP_opt_level 0x2014 /* HP */
00507 #define DW_AT_HP_prof_version_id 0x2015 /* HP */
00508 #define DW_AT_HP_opt_flags 0x2016 /* HP */
00509 #define DW_AT_HP_cold_region_low_pc 0x2017 /* HP */
00510 #define DW_AT_HP_cold_region_high_pc 0x2018 /* HP */
00511 #define DW_AT_HP_all_variables_modifiable 0x2019 /* HP */
00512 #define DW_AT_HP_linkage_name 0x201a /* HP */
00513 #define DW_AT_HP_prof_flags 0x201b /* HP */
00514 #define DW_AT_HP_unit_name 0x201f /* HP */
00515 #define DW_AT_HP_unit_size 0x2020 /* HP */
00516 #define DW_AT_HP_widened_byte_size 0x2021 /* HP */
00517 #define DW_AT_HP_definition_points 0x2022 /* HP */
00518 #define DW_AT_HP_default_location 0x2023 /* HP */
00519 #define DW_AT_HP_is_result_param 0x2029 /* HP */
00520
00521 #define DW_AT_CPQ_discontig_ranges 0x2001 /* COMPAQ/HP */
00522 #define DW_AT_CPQ_semantic_events 0x2002 /* COMPAQ/HP */
00523 #define DW_AT_CPQ_split_lifetimes_var 0x2003 /* COMPAQ/HP */
00524 #define DW_AT_CPQ_split_lifetimes_rtn 0x2004 /* COMPAQ/HP */
00525 #define DW_AT_CPQ_prologue_length 0x2005 /* COMPAQ/HP */
00526
00527 /* From GHS C GreenHills ghs.com */
00528 #define DW_AT_ghs_mangled 0x2007 /* conflict MIPS */
00529 #define DW_AT_ghs_rsm 0x2083
00530 #define DW_AT_ghs_frsm 0x2085
00531 #define DW_AT_ghs_frames 0x2086
00532 #define DW_AT_ghs_rso 0x2087
00533 #define DW_AT_ghs_subcpu 0x2092
00534 #define DW_AT_ghs_lbrace_line 0x2093
00535
00536 #define DW_AT_INTEL_other_endian 0x2026 /* Intel, 1 if byte swapped.*/
00537
00538 /* GNU extensions. */
00539 #define DW_AT_sf_names 0x2101 /* GNU */
00540 #define DW_AT_src_info 0x2102 /* GNU */
00541 #define DW_AT_mac_info 0x2103 /* GNU */
00542 #define DW_AT_src_coords 0x2104 /* GNU */
00543 #define DW_AT_body_begin 0x2105 /* GNU */
00544 #define DW_AT_body_end 0x2106 /* GNU */
00545 #define DW_AT_GNU_vector 0x2107 /* GNU */
00546
00547 /* Thread safety, see
00548 http://gcc.gnu.org/wiki/ThreadSafetyAnnotation . */
00549 /* The values here are from gcc-4.6.2 include/dwarf2.h. The
00550 values are not given on the web page at all, nor on web pages
00551 it refers to. */
00552 #define DW_AT_GNU_guarded_by 0x2108 /* GNU */
00553 #define DW_AT_GNU_pt_guarded_by 0x2109 /* GNU */
00554 #define DW_AT_GNU_guarded 0x210a /* GNU */
00555 #define DW_AT_GNU_pt_guarded 0x210b /* GNU */
00556 #define DW_AT_GNU_locks_excluded 0x210c /* GNU */
00557 #define DW_AT_GNU_exclusive_locks_required 0x210d /* GNU */
00558 #define DW_AT_GNU_shared_locks_required 0x210e /* GNU */
00559
00560 /* See http://gcc.gnu.org/wiki/DwarfSeparateTypeInfo */
00561 #define DW_AT_GNU_odr_signature 0x210f /* GNU */
00562
00563 /* See http://gcc.gnu.org/wiki/TemplateParmsDwarf */
00564 /* The value here is from gcc-4.6.2 include/dwarf2.h. The value is
00565 not consistent with the web page as of December 2011. */
00566 #define DW_AT_GNU_template_name 0x2110 /* GNU */
00567 /* The GNU call site extension.
00568 See http://www.dwarfstd.org/ShowIssue.php?issue=100909.2&type=open . */
00569 #define DW_AT_GNU_call_site_value 0x2111 /* GNU */
00570 #define DW_AT_GNU_call_site_data_value 0x2112 /* GNU */
00571 #define DW_AT_GNU_call_site_target 0x2113 /* GNU */
00572 #define DW_AT_GNU_call_site_target_clobbered 0x2114 /* GNU */
00573 #define DW_AT_GNU_tail_call 0x2115 /* GNU */
00574 #define DW_AT_GNU_all_tail_call_sites 0x2116 /* GNU */
00575 #define DW_AT_GNU_all_call_sites 0x2117 /* GNU */
00576 #define DW_AT_GNU_all_source_call_sites 0x2118 /* GNU */
00577
00578 /* Section offset to .debug_macro section. */
```



```

00579 #define DW_AT_GNU_macros 0x2119 /* GNU */
00580 #define DW_AT_GNU_deleted 0x211a /* GNU */
00581 /* The GNU DebugFission project:
00582 http://gcc.gnu.org/wiki/DebugFission */
00583 #define DW_AT_GNU_dwo_name 0x2130 /* GNU */
00584 #define DW_AT_GNU_dwo_id 0x2131 /* GNU */
00585
00586 #define DW_AT_GNU_ranges_base 0x2132 /* GNU */
00587 #define DW_AT_GNU_addr_base 0x2133 /* GNU */
00588 #define DW_AT_GNU_pubnames 0x2134 /* GNU */
00589 #define DW_AT_GNU_pubtypes 0x2135 /* GNU */
00590
00591 /* To distinguish distinct basic blocks in a single source line. */
00592 #define DW_AT_GNU_discriminator 0x2136 /* GNU */
00593 #define DW_AT_GNU_locviews 0x2137 /* GNU */
00594 #define DW_AT_GNU_entry_view 0x2138 /* GNU */
00595
00596 /* Sun extensions */
00597 #define DW_AT_SUN_template 0x2201 /* SUN */
00598 #define DW_AT_VMS_rtnbeg_pd_address 0x2201 /* VMS */
00599 #define DW_AT_SUN_alignment 0x2202 /* SUN */
00600 #define DW_AT_SUN_vtable 0x2203 /* SUN */
00601 #define DW_AT_SUN_count_guarantee 0x2204 /* SUN */
00602 #define DW_AT_SUN_command_line 0x2205 /* SUN */
00603 #define DW_AT_SUN_vbase 0x2206 /* SUN */
00604 #define DW_AT_SUN_compile_options 0x2207 /* SUN */
00605 #define DW_AT_SUN_language 0x2208 /* SUN */
00606 #define DW_AT_SUN_browser_file 0x2209 /* SUN */
00607 #define DW_AT_SUN_vtable_abi 0x2210 /* SUN */
00608 #define DW_AT_SUN_func_offsets 0x2211 /* SUN */
00609 #define DW_AT_SUN_cf_kind 0x2212 /* SUN */
00610 #define DW_AT_SUN_vtable_index 0x2213 /* SUN */
00611 #define DW_AT_SUN_omp_tpriv_addr 0x2214 /* SUN */
00612 #define DW_AT_SUN_omp_child_func 0x2215 /* SUN */
00613 #define DW_AT_SUN_func_offset 0x2216 /* SUN */
00614 #define DW_AT_SUN_memop_type_ref 0x2217 /* SUN */
00615 #define DW_AT_SUN_profile_id 0x2218 /* SUN */
00616 #define DW_AT_SUN_memop_signature 0x2219 /* SUN */
00617 #define DW_AT_SUN_obj_dir 0x2220 /* SUN */
00618 #define DW_AT_SUN_obj_file 0x2221 /* SUN */
00619 #define DW_AT_SUN_original_name 0x2222 /* SUN */
00620 #define DW_AT_SUN_hwcprof_signature 0x2223 /* SUN */
00621 #define DW_AT_SUN_amd64_parmdump 0x2224 /* SUN */
00622 #define DW_AT_SUN_part_link_name 0x2225 /* SUN */
00623 #define DW_AT_SUN_link_name 0x2226 /* SUN */
00624 #define DW_AT_SUN_pass_with_const 0x2227 /* SUN */
00625 #define DW_AT_SUN_return_with_const 0x2228 /* SUN */
00626 #define DW_AT_SUN_import_by_name 0x2229 /* SUN */
00627 #define DW_AT_SUN_f90_pointer 0x222a /* SUN */
00628 #define DW_AT_SUN_pass_by_ref 0x222b /* SUN */
00629 #define DW_AT_SUN_f90_allocatable 0x222c /* SUN */
00630 #define DW_AT_SUN_f90_assumed_shape_array 0x222d /* SUN */
00631 #define DW_AT_SUN_c_vla 0x222e /* SUN */
00632 #define DW_AT_SUN_return_value_ptr 0x2230 /* SUN */
00633 #define DW_AT_SUN_dtor_start 0x2231 /* SUN */
00634 #define DW_AT_SUN_dtor_length 0x2232 /* SUN */
00635 #define DW_AT_SUN_dtor_state_initial 0x2233 /* SUN */
00636 #define DW_AT_SUN_dtor_state_final 0x2234 /* SUN */
00637 #define DW_AT_SUN_dtor_state_deltas 0x2235 /* SUN */
00638 #define DW_AT_SUN_import_by_lname 0x2236 /* SUN */
00639 #define DW_AT_SUN_f90_use_only 0x2237 /* SUN */
00640 #define DW_AT_SUN_namelist_spec 0x2238 /* SUN */
00641 #define DW_AT_SUN_is_omp_child_func 0x2239 /* SUN */
00642 #define DW_AT_SUN_fortran_main_alias 0x223a /* SUN */
00643 #define DW_AT_SUN_fortran_based 0x223b /* SUN */
00644
00645 /* ALTIUM extension: ALTIUM Compliant location lists (flag) */
00646 #define DW_AT_ALTIUM_loclist 0x2300 /* ALTIUM */
00647 /* Ada GNAT gcc attributes. constant integer forms. */
00648 /* See http://gcc.gnu.org/wiki/DW_AT_GNAT_descriptive_type . */
00649 #define DW_AT_use_GNAT_descriptive_type 0x2301
00650 #define DW_AT_GNAT_descriptive_type 0x2302
00651 #define DW_AT_GNU_numerator 0x2303 /* GNU */
00652 #define DW_AT_GNU_denominator 0x2304 /* GNU */
00653 /* See https://gcc.gnu.org/wiki/DW_AT_GNU_bias */
00654 #define DW_AT_GNU_bias 0x2305 /* GNU */
00655
00656 /* Go-specific type attributes
00657 Naming as lower-case go instead of GO is a small mistake
00658 by the Go language folks, it seems. This is the
00659 common spelling for these. */
00660 #define DW_AT_go_kind 0x2900
00661 #define DW_AT_go_key 0x2901
00662 #define DW_AT_go_elem 0x2902
00663
00664 /* Attribute for DW_TAG_member of a struct type.
00665 Nonzero value indicates the struct field is an embedded field.*/

```



```

00666 #define DW_AT_go_embedded_field          0x2903
00667
00668 #define DW_AT_go_runtime_type              0x2904
00669
00670 /* UPC extension. */
00671 #define DW_AT_upc_threads_scaled           0x3210 /* UPC */
00672
00673 #define DW_AT_IBM_wsa_addr                 0x393e
00674 #define DW_AT_IBM_home_location           0x393f
00675 #define DW_AT_IBM_alt_srcview             0x3940
00676
00677 /* PGI (STMicroelectronics) extensions. */
00678 /* PGI. Block, constant, reference. This attribute is an ASTPLAB
00679    extension used to describe the array local base. */
00680 #define DW_AT_PGI_lbase                   0x3a00
00681
00682 /* PGI. Block, constant, reference. ASTPLAB adds this attribute
00683    to describe the section offset, or the offset to the
00684    first element in the dimension. */
00685 #define DW_AT_PGI_soffset                  0x3a01
00686
00687 /* PGI. Block, constant, reference. ASTPLAB adds this
00688    attribute to describe the linear stride or the distance
00689    between elements in the dimension. */
00690 #define DW_AT_PGI_lstride                  0x3a02
00691
00692 #define DW_AT_BORLAND_property_read        0x3b11
00693 #define DW_AT_BORLAND_property_write      0x3b12
00694 #define DW_AT_BORLAND_property_implements 0x3b13
00695 #define DW_AT_BORLAND_property_index      0x3b14
00696 #define DW_AT_BORLAND_property_default    0x3b15
00697 #define DW_AT_BORLAND_Delphi_unit         0x3b20
00698 #define DW_AT_BORLAND_Delphi_class        0x3b21
00699 #define DW_AT_BORLAND_Delphi_record       0x3b22
00700 #define DW_AT_BORLAND_Delphi_metaclass    0x3b23
00701 #define DW_AT_BORLAND_Delphi_constructor  0x3b24
00702 #define DW_AT_BORLAND_Delphi_destructor   0x3b25
00703 #define DW_AT_BORLAND_Delphi_anonymous_method 0x3b26
00704 #define DW_AT_BORLAND_Delphi_interface    0x3b27
00705 #define DW_AT_BORLAND_Delphi_ABI          0x3b28
00706 #define DW_AT_BORLAND_Delphi_frameptr     0x3b30
00707 #define DW_AT_BORLAND_closure             0x3b31
00708
00709 #define DW_AT_LLVM_include_path            0x3e00
00710 #define DW_AT_LLVM_config_macros          0x3e01
00711 #define DW_AT_LLVM_sysroot                0x3e02
00712 #define DW_AT_LLVM_tag_offset             0x3e03
00713 /* LLVM intends to use 0x3e04 - 0x3e06 */
00714 #define DW_AT_LLVM_apinotes               0x3e07
00715 /* Next 6 are for Heterogeneous debugging */
00716 #define DW_AT_LLVM_active_lane            0x3e08
00717 #define DW_AT_LLVM_augmentation           0x3e09
00718 #define DW_AT_LLVM_lanes                  0x3e0a
00719 #define DW_AT_LLVM_lane_pc                0x3e0b
00720 #define DW_AT_LLVM_vector_size            0x3e0c
00721
00722 #define DW_AT_APPLE_optimized              0x3fe1
00723 #define DW_AT_APPLE_flags                 0x3fe2
00724 #define DW_AT_APPLE_isa                   0x3fe3
00725 /* 0x3fe4 Also known as DW_AT_APPLE_closure, block preferred. */
00726 #define DW_AT_APPLE_block                 0x3fe4
00727 /* The rest of APPLE here are in support of Objective C */
00728 #define DW_AT_APPLE_major_runtime_vers    0x3fe5
00729 #define DW_AT_APPLE_runtime_class         0x3fe6
00730 #define DW_AT_APPLE_omit_frame_ptr        0x3fe7
00731 #define DW_AT_APPLE_property_name         0x3fe8
00732 #define DW_AT_APPLE_property_getter       0x3fe9
00733 #define DW_AT_APPLE_property_setter       0x3fea
00734 #define DW_AT_APPLE_property_attribute    0x3feb
00735 #define DW_AT_APPLE_objc_complete_type    0x3fec
00736 #define DW_AT_APPLE_property             0x3fed
00737 #define DW_AT_APPLE_objc_direct           0x3fee
00738 #define DW_AT_APPLE_sdk                   0x3fef
00739 #define DW_AT_APPLE_origin                0x3fff0
00740
00741 #define DW_AT_hi_user                     0x3fff
00742
00743 /* OP values 0x01,0x02,0x04,0x05,0x07 are DWARF1 only */
00744 #define DW_OP_addr                        0x03
00745 #define DW_OP_deref                      0x06
00746 #define DW_OP_const1u                    0x08
00747 #define DW_OP_const1s                    0x09
00748 #define DW_OP_const2u                    0x0a
00749 #define DW_OP_const2s                    0x0b
00750 #define DW_OP_const4u                    0x0c
00751 #define DW_OP_const4s                    0x0d
00752 #define DW_OP_const8u                    0x0e

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```
00753 #define DW_OP_const8s      0x0f
00754 #define DW_OP_constu        0x10
00755 #define DW_OP_consts        0x11
00756 #define DW_OP_dup           0x12
00757 #define DW_OP_drop          0x13
00758 #define DW_OP_over          0x14
00759 #define DW_OP_pick          0x15
00760 #define DW_OP_swap          0x16
00761 #define DW_OP_rot           0x17
00762 #define DW_OP_xderef        0x18
00763 #define DW_OP_abs           0x19
00764 #define DW_OP_and           0x1a
00765 #define DW_OP_div           0x1b
00766 #define DW_OP_minus         0x1c
00767 #define DW_OP_mod           0x1d
00768 #define DW_OP_mul           0x1e
00769 #define DW_OP_neg           0x1f
00770 #define DW_OP_not           0x20
00771 #define DW_OP_or            0x21
00772 #define DW_OP_plus          0x22
00773 #define DW_OP_plus_uconst   0x23
00774 #define DW_OP_shl           0x24
00775 #define DW_OP_shr           0x25
00776 #define DW_OP_shra          0x26
00777 #define DW_OP_xor           0x27
00778 #define DW_OP_bra           0x28
00779 #define DW_OP_eq            0x29
00780 #define DW_OP_ge            0x2a
00781 #define DW_OP_gt            0x2b
00782 #define DW_OP_le            0x2c
00783 #define DW_OP_lt            0x2d
00784 #define DW_OP_ne            0x2e
00785 #define DW_OP_skip          0x2f
00786 #define DW_OP_lit0          0x30
00787 #define DW_OP_lit1          0x31
00788 #define DW_OP_lit2          0x32
00789 #define DW_OP_lit3          0x33
00790 #define DW_OP_lit4          0x34
00791 #define DW_OP_lit5          0x35
00792 #define DW_OP_lit6          0x36
00793 #define DW_OP_lit7          0x37
00794 #define DW_OP_lit8          0x38
00795 #define DW_OP_lit9          0x39
00796 #define DW_OP_lit10         0x3a
00797 #define DW_OP_lit11         0x3b
00798 #define DW_OP_lit12         0x3c
00799 #define DW_OP_lit13         0x3d
00800 #define DW_OP_lit14         0x3e
00801 #define DW_OP_lit15         0x3f
00802 #define DW_OP_lit16         0x40
00803 #define DW_OP_lit17         0x41
00804 #define DW_OP_lit18         0x42
00805 #define DW_OP_lit19         0x43
00806 #define DW_OP_lit20         0x44
00807 #define DW_OP_lit21         0x45
00808 #define DW_OP_lit22         0x46
00809 #define DW_OP_lit23         0x47
00810 #define DW_OP_lit24         0x48
00811 #define DW_OP_lit25         0x49
00812 #define DW_OP_lit26         0x4a
00813 #define DW_OP_lit27         0x4b
00814 #define DW_OP_lit28         0x4c
00815 #define DW_OP_lit29         0x4d
00816 #define DW_OP_lit30         0x4e
00817 #define DW_OP_lit31         0x4f
00818 #define DW_OP_reg0          0x50
00819 #define DW_OP_reg1          0x51
00820 #define DW_OP_reg2          0x52
00821 #define DW_OP_reg3          0x53
00822 #define DW_OP_reg4          0x54
00823 #define DW_OP_reg5          0x55
00824 #define DW_OP_reg6          0x56
00825 #define DW_OP_reg7          0x57
00826 #define DW_OP_reg8          0x58
00827 #define DW_OP_reg9          0x59
00828 #define DW_OP_reg10         0x5a
00829 #define DW_OP_reg11         0x5b
00830 #define DW_OP_reg12         0x5c
00831 #define DW_OP_reg13         0x5d
00832 #define DW_OP_reg14         0x5e
00833 #define DW_OP_reg15         0x5f
00834 #define DW_OP_reg16         0x60
00835 #define DW_OP_reg17         0x61
00836 #define DW_OP_reg18         0x62
00837 #define DW_OP_reg19         0x63
00838 #define DW_OP_reg20         0x64
00839 #define DW_OP_reg21         0x65
```

```
00840 #define DW_OP_reg22          0x66
00841 #define DW_OP_reg23          0x67
00842 #define DW_OP_reg24          0x68
00843 #define DW_OP_reg25          0x69
00844 #define DW_OP_reg26          0x6a
00845 #define DW_OP_reg27          0x6b
00846 #define DW_OP_reg28          0x6c
00847 #define DW_OP_reg29          0x6d
00848 #define DW_OP_reg30          0x6e
00849 #define DW_OP_reg31          0x6f
00850 #define DW_OP_breg0          0x70
00851 #define DW_OP_breg1          0x71
00852 #define DW_OP_breg2          0x72
00853 #define DW_OP_breg3          0x73
00854 #define DW_OP_breg4          0x74
00855 #define DW_OP_breg5          0x75
00856 #define DW_OP_breg6          0x76
00857 #define DW_OP_breg7          0x77
00858 #define DW_OP_breg8          0x78
00859 #define DW_OP_breg9          0x79
00860 #define DW_OP_breg10         0x7a
00861 #define DW_OP_breg11         0x7b
00862 #define DW_OP_breg12         0x7c
00863 #define DW_OP_breg13         0x7d
00864 #define DW_OP_breg14         0x7e
00865 #define DW_OP_breg15         0x7f
00866 #define DW_OP_breg16         0x80
00867 #define DW_OP_breg17         0x81
00868 #define DW_OP_breg18         0x82
00869 #define DW_OP_breg19         0x83
00870 #define DW_OP_breg20         0x84
00871 #define DW_OP_breg21         0x85
00872 #define DW_OP_breg22         0x86
00873 #define DW_OP_breg23         0x87
00874 #define DW_OP_breg24         0x88
00875 #define DW_OP_breg25         0x89
00876 #define DW_OP_breg26         0x8a
00877 #define DW_OP_breg27         0x8b
00878 #define DW_OP_breg28         0x8c
00879 #define DW_OP_breg29         0x8d
00880 #define DW_OP_breg30         0x8e
00881 #define DW_OP_breg31         0x8f
00882 #define DW_OP_regx           0x90
00883 #define DW_OP_fbreg           0x91
00884 #define DW_OP_bregx           0x92
00885 #define DW_OP_piece           0x93
00886 #define DW_OP_deref_size     0x94
00887 #define DW_OP_xderef_size    0x95
00888 #define DW_OP_nop             0x96
00889 #define DW_OP_push_object_address 0x97 /* DWARF3 */
00890 #define DW_OP_call12          0x98 /* DWARF3 */
00891 #define DW_OP_call14          0x99 /* DWARF3 */
00892 #define DW_OP_call_ref        0x9a /* DWARF3 */
00893 #define DW_OP_form_tls_address 0x9b /* DWARF3f */
00894 #define DW_OP_call_frame_cfa  0x9c /* DWARF3f */
00895 #define DW_OP_bit_piece       0x9d /* DWARF3f */
00896 #define DW_OP_implicit_value  0x9e /* DWARF4 */
00897 #define DW_OP_stack_value     0x9f /* DWARF4 */
00898 #define DW_OP_implicit_pointer 0xa0 /* DWARF5 */
00899 #define DW_OP_addrx           0xa1 /* DWARF5 */
00900 #define DW_OP_constx          0xa2 /* DWARF5 */
00901 #define DW_OP_entry_value     0xa3 /* DWARF5 */
00902 #define DW_OP_const_type      0xa4 /* DWARF5 */
00903 #define DW_OP_regval_type     0xa5 /* DWARF5 */
00904 #define DW_OP_deref_type      0xa6 /* DWARF5 */
00905 #define DW_OP_xderef_type     0xa7 /* DWARF5 */
00906 #define DW_OP_convert         0xa8 /* DWARF5 */
00907 #define DW_OP_reinterpret     0xa9 /* DWARF5 */
00908
00909 #define DW_OP_GNU_push_tls_address 0xe0 /* GNU */
00910 #define DW_OP_WASM_location      0xed
00911 #define DW_OP_WASM_location_int 0xee
00912
00913 /* Follows extension so dwarfdump prints the
00914 most-likely-useful name. */
00915 #define DW_OP_lo_user           0xe0
00916
00917 /* LLVM extensions. */
00918 #define DW_OP_LLVM_form_aspace_address 0xe1
00919 #define DW_OP_LLVM_push_lane      0xe2
00920 #define DW_OP_LLVM_offset         0xe3
00921 #define DW_OP_LLVM_offset_uconst  0xe4
00922 #define DW_OP_LLVM_bit_offset     0xe5
00923 #define DW_OP_LLVM_call_frame_entry_reg 0xe6
00924 #define DW_OP_LLVM_undefined      0xe7
00925 #define DW_OP_LLVM_aspace_bregx   0xe8
00926 #define DW_OP_LLVM_aspace_implicit_pointer 0xe9
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00927 #define DW_OP_LLVM_piece_end          0xea
00928 #define DW_OP_LLVM_extend              0xeb
00929 #define DW_OP_LLVM_select_bit_piece    0xec
00930 /* HP extensions. */
00931 #define DW_OP_HP_unknown                0xe0 /* HP conflict: GNU */
00932 #define DW_OP_HP_is_value              0xe1 /* HP */
00933 #define DW_OP_HPfltconst4              0xe2 /* HP */
00934 #define DW_OP_HPfltconst8              0xe3 /* HP */
00935 #define DW_OP_HP_mod_range              0xe4 /* HP */
00936 #define DW_OP_HP_unmod_range            0xe5 /* HP */
00937 #define DW_OP_HP_tls                    0xe6 /* HP */
00938
00939 /* Intel: made obsolete by DW_OP_bit_piece above. */
00940 #define DW_OP_INTEL_bit_piece           0xe8
00941
00942 /* Apple extension. */
00943 #define DW_OP_GNU_uninit                0xf0 /* GNU */
00944 #define DW_OP_APPLE_uninit              0xf0 /* Apple */
00945 #define DW_OP_GNU_encoded_addr          0xf1 /* GNU */
00946 #define DW_OP_GNU_implicit_pointer      0xf2 /* GNU */
00947 #define DW_OP_GNU_entry_value           0xf3 /* GNU */
00948 #define DW_OP_GNU_const_type            0xf4 /* GNU */
00949 #define DW_OP_GNU_regval_type            0xf5 /* GNU */
00950 #define DW_OP_GNU_deref_type            0xf6 /* GNU */
00951 #define DW_OP_GNU_convert               0xf7 /* GNU */
00952 #define DW_OP_GNU_reinterpret            0xf9 /* GNU */
00953 #define DW_OP_GNU_parameter_ref         0xfa /* GNU */
00954 #define DW_OP_GNU_addr_index            0xfb /* GNU Fission */
00955 #define DW_OP_GNU_const_index            0xfc /* GNU Fission */
00956 #define DW_OP_GNU_variable_value        0xfd /* GNU 2017 */
00957 #define DW_OP_PGI_omp_thread_num         0xf8 /* PGI (STMicroelectronics) */
00958
00959 #define DW_OP_hi_user                    0xff
00960
00961 #define DW_ATE_address                   0x01
00962 #define DW_ATE_boolean                   0x02
00963 #define DW_ATE_complex_float             0x03
00964 #define DW_ATE_float                     0x04
00965 #define DW_ATE_signed                     0x05
00966 #define DW_ATE_signed_char               0x06
00967 #define DW_ATE_unsigned                   0x07
00968 #define DW_ATE_unsigned_char             0x08
00969 #define DW_ATE_imaginary_float           0x09 /* DWARF3 */
00970 #define DW_ATE_packed_decimal             0x0a /* DWARF3f */
00971 #define DW_ATE_numeric_string             0x0b /* DWARF3f */
00972 #define DW_ATE_edited                     0x0c /* DWARF3f */
00973 #define DW_ATE_signed_fixed               0x0d /* DWARF3f */
00974 #define DW_ATE_unsigned_fixed             0x0e /* DWARF3f */
00975 #define DW_ATE_decimal_float             0x0f /* DWARF3f */
00976 #define DW_ATE_UTF                       0x10 /* DWARF4 */
00977 #define DW_ATE_UCS                       0x11 /* DWARF5 */
00978 #define DW_ATE_ASCII                     0x12 /* DWARF5 */
00979
00980 /* ALTIUM extensions. x80, x81 */
00981 #define DW_ATE_ALTIUM_fract               0x80 /* ALTIUM __fract type */
00982
00983 /* Follows extension so dwarfdump prints
00984    the most-likely-useful name. */
00985 #define DW_ATE_lo_user                    0x80
00986
00987 /* Shown here to help dwarfdump build script. */
00988 #define DW_ATE_ALTIUM_accum               0x81 /* ALTIUM __accum type */
00989
00990 /* HP extensions. */
00991 #define DW_ATE_HP_float80                 0x80 /* (80 bit). HP */
00992 #define DW_ATE_HP_complex_float80         0x81 /* Complex (80 bit). HP */
00993 #define DW_ATE_HP_float128               0x82 /* (128 bit). HP */
00994 #define DW_ATE_HP_complex_float128       0x83 /* Complex (128 bit). HP */
00995 #define DW_ATE_HP_floatpintel             0x84 /* (82 bit IA64). HP */
00996 #define DW_ATE_HP_imaginary_float80      0x85 /* HP */
00997 #define DW_ATE_HP_imaginary_float128     0x86 /* HP */
00998 #define DW_ATE_HP_VAX_float               0x88 /* F or G floating. */
00999 #define DW_ATE_HP_VAX_float_d             0x89 /* D floating. */
01000 #define DW_ATE_HP_packed_decimal          0x8a /* Cobol. */
01001 #define DW_ATE_HP_zoned_decimal           0x8b /* Cobol. */
01002 #define DW_ATE_HP_edited                   0x8c /* Cobol. */
01003 #define DW_ATE_HP_signed_fixed             0x8d /* Cobol. */
01004 #define DW_ATE_HP_unsigned_fixed           0x8e /* Cobol. */
01005 #define DW_ATE_HP_VAX_complex_float       0x8f /* ForG floating complex. */
01006 #define DW_ATE_HP_VAX_complex_float_d     0x90 /* D floating complex. */
01007
01008 /* Sun extensions */
01009 #define DW_ATE_SUN_interval_float         0x91
01010
01011 /* Obsolete: See DW_ATE_imaginary_float */
01012 #define DW_ATE_SUN_imaginary_float        0x92 /* Really SUN 0x86 ? */
01013

```

```

01014 #define DW_ATE_hi_user          0xff
01015
01016 /* DWARF5 Defaulted Member Encodings. */
01017 #define DW_DEFAULTED_no          0x0    /* DWARF5 */
01018 #define DW_DEFAULTED_in_class    0x1    /* DWARF5 */
01019 #define DW_DEFAULTED_out_of_class 0x2    /* DWARF5 */
01020
01021 #define DW_IDX_compile_unit      0x1    /* DWARF5 */
01022 #define DW_IDX_type_unit         0x2    /* DWARF5 */
01023 #define DW_IDX_die_offset        0x3    /* DWARF5 */
01024 #define DW_IDX_parent            0x4    /* DWARF5 */
01025 #define DW_IDX_type_hash         0x5    /* DWARF5 */
01026 #define DW_IDX_GNU_internal      0x2000
01027 #define DW_IDX_lo_user           0x2000 /* DWARF5 */
01028 #define DW_IDX_GNU_external      0x2001
01029 #define DW_IDX_GNU_main          0x2002
01030 #define DW_IDX_GNU_language      0x2003
01031 #define DW_IDX_GNU_linkage_name  0x2004
01032 #define DW_IDX_hi_user           0x3fff /* DWARF5 */
01033
01034 /* These with not-quite-the-same-names were used in DWARF4
01035    We call then DW_LLEX.
01036    Never official and should not be used by anyone.*/
01037 #define DW_LLEX_end_of_list_entry 0x0
01038 #define DW_LLEX_base_address_selection_entry 0x01
01039 #define DW_LLEX_start_end_entry   0x02
01040 #define DW_LLEX_start_length_entry 0x03
01041 #define DW_LLEX_offset_pair_entry 0x04
01042
01043 /* DWARF5 Location List Entries in Split Objects */
01044 #define DW_LLE_end_of_list        0x0    /* DWARF5 */
01045 #define DW_LLE_base_addressxx     0x01    /* DWARF5 */
01046 #define DW_LLE_startx_endx        0x02    /* DWARF5 */
01047 #define DW_LLE_startx_length      0x03    /* DWARF5 */
01048 #define DW_LLE_offset_pair        0x04    /* DWARF5 */
01049 #define DW_LLE_default_location   0x05    /* DWARF5 */
01050 #define DW_LLE_base_address       0x06    /* DWARF5 */
01051 #define DW_LLE_start_end          0x07    /* DWARF5 */
01052 #define DW_LLE_start_length       0x08    /* DWARF5 */
01053
01054 /* DWARF5 Range List Entries */
01055 #define DW_RLE_end_of_list        0x00    /* DWARF5 */
01056 #define DW_RLE_base_addressxx     0x01    /* DWARF5 */
01057 #define DW_RLE_startx_endx        0x02    /* DWARF5 */
01058 #define DW_RLE_startx_length      0x03    /* DWARF5 */
01059 #define DW_RLE_offset_pair        0x04    /* DWARF5 */
01060 #define DW_RLE_base_address       0x05    /* DWARF5 */
01061 #define DW_RLE_start_end          0x06    /* DWARF5 */
01062 #define DW_RLE_start_length       0x07    /* DWARF5 */
01063
01064 /* GNUIndex encodings non-standard. New in 2020,
01065    used in .debug_gnu_pubnames .debug_gnu_pubtypes
01066    but no spellings provided in documentation. */
01067 #define DW_GNUIVIS_global 0
01068 #define DW_GNUIVIS_static 1
01069
01070 /* GNUIndex encodings non-standard. New in 2020,
01071    used in .debug_gnu_pubnames .debug_gnu_pubtypes
01072    but no spellings provided in documentation. */
01073 #define DW_GNUIKIND_none 0
01074 #define DW_GNUIKIND_type 1
01075 #define DW_GNUIKIND_variable 2
01076 #define DW_GNUIKIND_function 3
01077 #define DW_GNUIKIND_other 4
01078
01079 /* DWARF5 Unit header unit type encodings */
01080 #define DW_UT_compile             0x01    /* DWARF5 */
01081 #define DW_UT_type                0x02    /* DWARF5 */
01082 #define DW_UT_partial             0x03    /* DWARF5 */
01083 #define DW_UT_skeleton            0x04    /* DWARF5 */
01084 #define DW_UT_split_compile       0x05    /* DWARF5 */
01085 #define DW_UT_split_type          0x06    /* DWARF5 */
01086 #define DW_UT_lo_user             0x80    /* DWARF5 */
01087 #define DW_UT_hi_user             0xff    /* DWARF5 */
01088
01089 /* DWARF5 DebugFission object section id values
01090    for .dwp object section offsets hash table.
01091    0 is reserved, not used.
01092    2 is actually reserved, not used in DWARF5.
01093    But 2 may be seen in some DWARF4 objects.
01094 */
01095 #define DW_SECT_INFO              1 /* .debug_info.dwo DWARF5 */
01096 #define DW_SECT_TYPES             2 /* .debug_types.dwo pre-DWARF5 */
01097 #define DW_SECT_ABBREV            3 /* .debug_abbrev.dwo DWARF5 */
01098 #define DW_SECT_LINE              4 /* .debug_line.dwo DWARF5 */
01099 #define DW_SECT_LOCLISTS          5 /* .debug_loclists.dwo DWARF5 */
01100 #define DW_SECT_STR_OFFSETS       6 /* .debug_str_offsets.dwo DWARF5 */

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01101 #define DW_SECT_MACRO          7 /* .debug_macro.dwo      DWARF5 */
01102 #define DW_SECT_RNGLISTS       8 /* .debug_rnglists.dwo  DWARF5 */
01103
01104 /* Decimal Sign codes. */
01105 #define DW_DS_unsigned          0x01 /* DWARF3f */
01106 #define DW_DS_leading_overpunch 0x02 /* DWARF3f */
01107 #define DW_DS_trailing_overpunch 0x03 /* DWARF3f */
01108 #define DW_DS_leading_separate  0x04 /* DWARF3f */
01109 #define DW_DS_trailing_separate  0x05 /* DWARF3f */
01110
01111 /* Endian code name. */
01112 #define DW_END_default          0x00 /* DWARF3f */
01113 #define DW_END_big              0x01 /* DWARF3f */
01114 #define DW_END_little           0x02 /* DWARF3f */
01115
01116 #define DW_END_lo_user          0x40 /* DWARF3f */
01117 #define DW_END_hi_user          0xff /* DWARF3f */
01118
01119 /* For use with DW_TAG_SUN_codeflags
01120    If DW_TAG_SUN_codeflags is accepted as a dwarf standard, then
01121    standard dwarf ATCF entries start at 0x01 */
01122 #define DW_ATCF_lo_user          0x40 /* SUN */
01123 #define DW_ATCF_SUN_mop_bitfield 0x41 /* SUN */
01124 #define DW_ATCF_SUN_mop_spill    0x42 /* SUN */
01125 #define DW_ATCF_SUN_mop_scopy    0x43 /* SUN */
01126 #define DW_ATCF_SUN_func_start   0x44 /* SUN */
01127 #define DW_ATCF_SUN_end_ctors    0x45 /* SUN */
01128 #define DW_ATCF_SUN_branch_target 0x46 /* SUN */
01129 #define DW_ATCF_SUN_mop_stack_probe 0x47 /* SUN */
01130 #define DW_ATCF_SUN_func_epilog  0x48 /* SUN */
01131 #define DW_ATCF_hi_user          0xff /* SUN */
01132
01133 /* Accessibility code name. */
01134 #define DW_ACCESS_public          0x01
01135 #define DW_ACCESS_protected       0x02
01136 #define DW_ACCESS_private         0x03
01137
01138 /* Visibility code name. */
01139 #define DW_VIS_local              0x01
01140 #define DW_VIS_exported           0x02
01141 #define DW_VIS_qualified          0x03
01142
01143 /* Virtuality code name. */
01144 #define DW_VIRTUALITY_none        0x00
01145 #define DW_VIRTUALITY_virtual     0x01
01146 #define DW_VIRTUALITY_pure_virtual 0x02
01147
01148 #define DW_LANG_C89                0x0001
01149 #define DW_LANG_C                  0x0002
01150 #define DW_LANG_Ada83              0x0003
01151 #define DW_LANG_C_plus_plus        0x0004
01152 #define DW_LANG_Cobol74            0x0005
01153 #define DW_LANG_Cobol85            0x0006
01154 #define DW_LANG_Fortran77          0x0007
01155 #define DW_LANG_Fortran90          0x0008
01156 #define DW_LANG_Pascal83           0x0009
01157 #define DW_LANG_Modula2            0x000a
01158 #define DW_LANG_Java               0x000b /* DWARF3 */
01159 #define DW_LANG_C99                0x000c /* DWARF3 */
01160 #define DW_LANG_Ada95              0x000d /* DWARF3 */
01161 #define DW_LANG_Fortran95          0x000e /* DWARF3 */
01162 #define DW_LANG_PLI                0x000f /* DWARF3 */
01163 #define DW_LANG_ObjC               0x0010 /* DWARF3f */
01164 #define DW_LANG_ObjC_plus_plus     0x0011 /* DWARF3f */
01165 #define DW_LANG_UPC                0x0012 /* DWARF3f */
01166 #define DW_LANG_D                  0x0013 /* DWARF3f */
01167 #define DW_LANG_Python              0x0014 /* DWARF4 */
01168 #define DW_LANG_OpenCL              0x0015 /* DWARF5 */
01169 #define DW_LANG_Go                  0x0016 /* DWARF5 */
01170 #define DW_LANG_Modula3            0x0017 /* DWARF5 */
01171 #define DW_LANG_Haskel              0x0018 /* DWARF5 */
01172 #define DW_LANG_C_plus_plus_03     0x0019 /* DWARF5 */
01173 #define DW_LANG_C_plus_plus_11     0x001a /* DWARF5 */
01174 #define DW_LANG_OCaml              0x001b /* DWARF5 */
01175 #define DW_LANG_Rust                0x001c /* DWARF5 */
01176 #define DW_LANG_C11                0x001d /* DWARF5 */
01177 #define DW_LANG_Swift               0x001e /* DWARF5 */
01178 #define DW_LANG_Julia              0x001f /* DWARF5 */
01179 #define DW_LANG_Dylan              0x0020 /* DWARF5 */
01180 #define DW_LANG_C_plus_plus_14     0x0021 /* DWARF5 */
01181 #define DW_LANG_Fortran03          0x0022 /* DWARF5 */
01182 #define DW_LANG_Fortran08          0x0023 /* DWARF5 */
01183 #define DW_LANG_RenderScript        0x0024 /* DWARF5 */
01184 #define DW_LANG_BLISS               0x0025 /* DWARF5 */
01185 /* The committee has, in
01186    https://dwarfstd.org/languages-v6.html
01187    specified that these language code, may be

```

```
01188     used by compilers now, and promises these
01189     will not change. */
01190 #define DW_LANG_Kotlin           0x0026 /* DWARF6 */
01191 #define DW_LANG_Zig              0x0027 /* DWARF6 */
01192 #define DW_LANG_Crystal          0x0028 /* DWARF6 */
01193 #define DW_LANG_C_plus_plus_17  0x002a /* DWARF6 */
01194 #define DW_LANG_C_plus_plus_20  0x002b /* DWARF6 */
01195 #define DW_LANG_C17              0x002c /* DWARF6 */
01196 #define DW_LANG_Fortran18       0x002d /* DWARF6 */
01197 #define DW_LANG_Ada2005         0x002e /* DWARF6 */
01198 #define DW_LANG_Ada2012         0x002f /* DWARF6 */
01199 #define DW_LANG_HIP             0x0030 /* DWARF6 */
01200 #define DW_LANG_Assembly        0x0031 /* DWARF6 */
01201 #define DW_LANG_C_sharp         0x0032 /* DWARF6 */
01202 #define DW_LANG_Mojo            0x0033 /* DWARF6 */
01203 #define DW_LANG_GLSL            0x0034 /* DWARF6 */
01204 #define DW_LANG_GLSL_ES         0x0035 /* DWARF6 */
01205 #define DW_LANG_HLSL            0x0036 /* DWARF6 */
01206 #define DW_LANG_OpenCL_CPP      0x0037 /* DWARF6 */
01207 #define DW_LANG_CPP_for_OpenCL  0x0038 /* DWARF6 */
01208 #define DW_LANG_SYCL            0x0039 /* DWARF6 */
01209 #define DW_LANG_Ruby            0x0040 /* DWARF6 */
01210 #define DW_LANG_Move            0x0041 /* DWARF6 */
01211 #define DW_LANG_Hylo            0x0042 /* DWARF6 */
01212 #define DW_LANG_V               0x0043 /* DWARF6 */
01213 #define DW_LANG_Algo168         0x0044 /* DWARF6 */
01214
01215 #define DW_LANG_lo_user         0x8000
01216 #define DW_LANG_Mips_Assembler  0x8001 /* MIPS */
01217 #define DW_LANG_Upc            0x8765 /* UPC, use
01218     DW_LANG_UPC instead. */
01219 #define DW_LANG_GOOGLE_RenderScript 0x8e57
01220 #define DW_LANG_ALTIUM_Assembler  0x9101
01221 #define DW_LANG_BORLAND_Delphi     0xb000
01222
01223 /* Sun extensions */
01224 #define DW_LANG_SUN_Assembler      0x9001 /* SUN */
01225
01226 #define DW_LANG_hi_user            0xffff
01227
01228 /* The committee has, in
01229     https://dwarfstd.org/languages-v6.html
01230     specified that these language code, may be
01231     used by compilers now, and promises these
01232     will not change. */
01233 #define DW_LNAME_Ada             0x0001 /* DWARF6 */
01234 #define DW_LNAME_BLISS           0x0002 /* DWARF6 */
01235 #define DW_LNAME_C               0x0003 /* DWARF6 */
01236 #define DW_LNAME_C_plus_plus    0x0004 /* DWARF6 */
01237 #define DW_LNAME_Cobol           0x0005 /* DWARF6 */
01238 #define DW_LNAME_Crystal         0x0006 /* DWARF6 */
01239 #define DW_LNAME_D               0x0007 /* DWARF6 */
01240 #define DW_LNAME_Dylan           0x0008 /* DWARF6 */
01241 #define DW_LNAME_Fortran         0x0009 /* DWARF6 */
01242 #define DW_LNAME_Go              0x000a /* DWARF6 */
01243 #define DW_LNAME_Haskell         0x000b /* DWARF6 */
01244 #define DW_LNAME_Java            0x000c /* DWARF6 */
01245 #define DW_LNAME_Julia           0x000d /* DWARF6 */
01246 #define DW_LNAME_Kotlin          0x000e /* DWARF6 */
01247 #define DW_LNAME_Modula2         0x000f /* DWARF6 */
01248 #define DW_LNAME_Modula3         0x0010 /* DWARF6 */
01249 #define DW_LNAME_ObjC            0x0011 /* DWARF6 */
01250 #define DW_LNAME_ObjC_plus_plus  0x0012 /* DWARF6 */
01251 #define DW_LNAME_OCaml           0x0013 /* DWARF6 */
01252 #define DW_LNAME_OpenCL_C        0x0014 /* DWARF6 */
01253 #define DW_LNAME_Pascal          0x0015 /* DWARF6 */
01254 #define DW_LNAME_PLI             0x0016 /* DWARF6 */
01255 #define DW_LNAME_Python          0x0017 /* DWARF6 */
01256 #define DW_LNAME_RenderScript    0x0018 /* DWARF6 */
01257 #define DW_LNAME_Rust            0x0019 /* DWARF6 */
01258 #define DW_LNAME_Swift           0x001a /* DWARF6 */
01259 #define DW_LNAME_UPC             0x001b /* DWARF6 */
01260 #define DW_LNAME_Zig             0x001c /* DWARF6 */
01261 #define DW_LNAME_Assembly        0x001d /* DWARF6 */
01262 #define DW_LNAME_C_sharp         0x001e /* DWARF6 */
01263 #define DW_LNAME_Mojo            0x001f /* DWARF6 */
01264 #define DW_LNAME_GLSL            0x0020 /* DWARF6 */
01265 #define DW_LNAME_GLSLES         0x0021 /* DWARF6 */
01266 #define DW_LNAME_HLSL            0x0022 /* DWARF6 */
01267 #define DW_LNAME_OpenCL_CPP      0x0023 /* DWARF6 */
01268 #define DW_LNAME_CPP_for_OpenCL  0x0024 /* DWARF6 */
01269 #define DW_LNAME_SYCL            0x0025 /* DWARF6 */
01270 #define DW_LNAME_Ruby            0x0026 /* DWARF6 */
01271 #define DW_LNAME_Move            0x0027 /* DWARF6 */
01272 #define DW_LNAME_Hylo            0x0028 /* DWARF6 */
01273 #define DW_LNAME_HIP             0x0029 /* DWARF6 */
01274 #define DW_LNAME_Odin            0x002a /* DWARF6 */
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01275 #define DW_LNAME_P4                0x002b /* DWARF6 */
01276 #define DW_LNAME_Metal              0x002c /* DWARF6 */
01277 #define DW_LNAME_V                  0x002d /* DWARF6 */
01278 #define DW_LNAME_Algo168            0x002e /* DWARF6 */
01279 #define DW_LNAME_Nim                 0x002f /* DWARF6 */
01280
01281 /* Identifier case name. */
01282 #define DW_ID_case_sensitive          0x00
01283 #define DW_ID_up_case                 0x01
01284 #define DW_ID_down_case               0x02
01285 #define DW_ID_case_insensitive        0x03
01286
01287 /* Calling Convention Name. */
01288 #define DW_CC_normal                  0x01
01289 #define DW_CC_program                 0x02
01290 #define DW_CC_nocall                  0x03
01291 #define DW_CC_pass_by_reference        0x04 /* DWARF5 */
01292 #define DW_CC_pass_by_value           0x05 /* DWARF5 */
01293
01294 #define DW_CC_GNU_renesas_sh           0x40 /* GNU */
01295 #define DW_CC_lo_user                 0x40
01296 #define DW_CC_GNU_borland_fastcall_i386 0x41 /* GNU */
01297
01298 /* ALTIUM extensions. */
01299 /* Function is an interrupt handler,
01300    return address on system stack. */
01301 #define DW_CC_ALTIUM_interrupt         0x65 /* ALTIUM*/
01302
01303 /* Near function model, return address on system stack. */
01304 #define DW_CC_ALTIUM_near_system_stack 0x66 /*ALTIUM */
01305
01306 /* Near function model, return address on user stack. */
01307 #define DW_CC_ALTIUM_near_user_stack   0x67 /* ALTIUM */
01308
01309 /* Huge function model, return address on user stack. */
01310 #define DW_CC_ALTIUM_huge_user_stack   0x68 /* ALTIUM */
01311
01312 #define DW_CC_GNU_BORLAND_safecall     0xb0
01313 #define DW_CC_GNU_BORLAND_stdcall     0xb1
01314 #define DW_CC_GNU_BORLAND_pascal      0xb2
01315 #define DW_CC_GNU_BORLAND_msfastcall  0xb3
01316 #define DW_CC_GNU_BORLAND_msreturn    0xb4
01317 #define DW_CC_GNU_BORLAND_thiscall    0xb5
01318 #define DW_CC_GNU_BORLAND_fastcall    0xb6
01319
01320 #define DW_CC_LLVM_vectorcall          0xc0
01321 #define DW_CC_LLVM_Win64               0xc1
01322 #define DW_CC_LLVM_X86_64SysV          0xc2
01323 #define DW_CC_LLVM_AAPCS              0xc3
01324 #define DW_CC_LLVM_AAPCS_VFP           0xc4
01325 #define DW_CC_LLVM_IntelOclBicc        0xc5
01326 #define DW_CC_LLVM_SpirFunction         0xc6
01327 #define DW_CC_LLVM_OpenCLKernel        0xc7
01328 #define DW_CC_LLVM_Swift               0xc8
01329 #define DW_CC_LLVM_PreserveMost        0xc9
01330 #define DW_CC_LLVM_PreserveAll         0xca
01331 #define DW_CC_LLVM_X86RegCall          0xcb
01332 #define DW_CC_GDB_IBM_OpenCL           0xff
01333
01334 #define DW_CC_hi_user                   0xff
01335
01336 /* Inline Code Name. */
01337 #define DW_INL_not_inlined              0x00
01338 #define DW_INL_inlined                  0x01
01339 #define DW_INL_declared_not_inlined     0x02
01340 #define DW_INL_declared_inlined         0x03
01341
01342 /* Ordering Name. */
01343 #define DW_ORD_row_major                0x00
01344 #define DW_ORD_col_major                0x01
01345
01346 /* Discriminant Descriptor Name. */
01347 #define DW_DSC_label                    0x00
01348 #define DW_DSC_range                    0x01
01349
01350 /* Line number header entry format encodings. DWARF5 */
01351 #define DW_LNCT_path                    0x1 /* DWARF5 */
01352 #define DW_LNCT_directory_index         0x2 /* DWARF5 */
01353 #define DW_LNCT_timestamp                0x3 /* DWARF5 */
01354 #define DW_LNCT_size                     0x4 /* DWARF5 */
01355 #define DW_LNCT_MD5                     0x5 /* DWARF5 */
01356 /* Experimental two-level line tables. Non standard */
01357 #define DW_LNCT_GNU_subprogram_name      0x6
01358 #define DW_LNCT_GNU_decl_file            0x7
01359 #define DW_LNCT_GNU_decl_line           0x8
01360 #define DW_LNCT_lo_user                  0x2000 /* DWARF5 */
01361 #define DW_LNCT_LLVM_source              0x2001

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01362 #define DW_LNCT_LLVM_is_MD5 0x2002
01363 #define DW_LNCT_hi_user 0x3fff /* DWARF5 */
01364
01365 /* Line number standard opcode name. */
01366 #define DW_LNS_copy 0x01
01367 #define DW_LNS_advance_pc 0x02
01368 #define DW_LNS_advance_line 0x03
01369 #define DW_LNS_set_file 0x04
01370 #define DW_LNS_set_column 0x05
01371 #define DW_LNS_negate_stmt 0x06
01372 #define DW_LNS_set_basic_block 0x07
01373 #define DW_LNS_const_add_pc 0x08
01374 #define DW_LNS_fixed_advance_pc 0x09
01375 #define DW_LNS_set_prologue_end 0x0a /* DWARF3 */
01376 #define DW_LNS_set_epilogue_begin 0x0b /* DWARF3 */
01377 #define DW_LNS_set_isa 0x0c /* DWARF3 */
01378
01379 /* Experimental two-level line tables. NOT STD DWARF5 */
01380 /* Not saying GNU or anything. There are no
01381 DW_LNS_lo_user or DW_LNS_hi_user values though.
01382 DW_LNS_set_address_from_logical and
01383 DW_LNS_set_subprogram being both 0xd
01384 to avoid using up more space in the special opcode table.
01385 EXPERIMENTAL DW_LNS follow.
01386 */
01387 #define DW_LNS_set_address_from_logical 0x0d /* Actuals table only */
01388 #define DW_LNS_set_subprogram 0x0d /* Logicals table only */
01389 #define DW_LNS_inlined_call 0x0e /* Logicals table only */
01390 #define DW_LNS_pop_context 0x0f /* Logicals table only */
01391
01392 /* Line number extended opcode name. */
01393 #define DW_LNE_end_sequence 0x01
01394 #define DW_LNE_set_address 0x02
01395 #define DW_LNE_define_file 0x03 /* DWARF4 and earlier only */
01396 #define DW_LNE_set_discriminator 0x04 /* DWARF4 */
01397
01398 /* HP extensions. */
01399 #define DW_LNE_HP_negate_is_UV_update 0x11 /* 17 HP */
01400 #define DW_LNE_HP_push_context 0x12 /* 18 HP */
01401 #define DW_LNE_HP_pop_context 0x13 /* 19 HP */
01402 #define DW_LNE_HP_set_file_line_column 0x14 /* 20 HP */
01403 #define DW_LNE_HP_set_routine_name 0x15 /* 21 HP */
01404 #define DW_LNE_HP_set_sequence 0x16 /* 22 HP */
01405 #define DW_LNE_HP_negate_post_semantics 0x17 /* 23 HP */
01406 #define DW_LNE_HP_negate_function_exit 0x18 /* 24 HP */
01407 #define DW_LNE_HP_negate_front_end_logical 0x19 /* 25 HP */
01408 #define DW_LNE_HP_define_proc 0x20 /* 32 HP */
01409
01410 #define DW_LNE_HP_source_file_correlation 0x80 /* HP */
01411 #define DW_LNE_lo_user 0x80 /* DWARF3 */
01412 #define DW_LNE_hi_user 0xff /* DWARF3 */
01413
01414 /* These are known values for DW_LNS_set_isa. */
01415 /* These identifiers are not defined by any DWARF standard. */
01416 #define DW_ISA_UNKNOWN 0
01417 /* The following two are ARM specific. */
01418 #define DW_ISA_ARM_thumb 1 /* ARM ISA */
01419 #define DW_ISA_ARM_arm 2 /* ARM ISA */
01420
01421 /* Macro information, DWARF5 */
01422 #define DW_MACRO_define 0x01 /* DWARF5 */
01423 #define DW_MACRO_undef 0x02 /* DWARF5 */
01424 #define DW_MACRO_start_file 0x03 /* DWARF5 */
01425 #define DW_MACRO_end_file 0x04 /* DWARF5 */
01426 #define DW_MACRO_define_strp 0x05 /* DWARF5 */
01427 #define DW_MACRO_undef_strp 0x06 /* DWARF5 */
01428 #define DW_MACRO_import 0x07 /* DWARF5 */
01429 #define DW_MACRO_define_sup 0x08 /* DWARF5 */
01430 #define DW_MACRO_undef_sup 0x09 /* DWARF5 */
01431 #define DW_MACRO_import_sup 0x0a /* DWARF5 */
01432 #define DW_MACRO_define_strx 0x0b /* DWARF5 */
01433 #define DW_MACRO_undef_strx 0x0c /* DWARF5 */
01434 #define DW_MACRO_lo_user 0xe0
01435 #define DW_MACRO_hi_user 0xff
01436
01437 /* Macro information, DWARF2-DWARF4. */
01438 #define DW_MACINFO_define 0x01
01439 #define DW_MACINFO_undef 0x02
01440 #define DW_MACINFO_start_file 0x03
01441 #define DW_MACINFO_end_file 0x04
01442 #define DW_MACINFO_vendor_ext 0xff
01443
01444 /* CFA operator compaction (a space saving measure, see
01445 the DWARF standard) means DW_CFA_extended and DW_CFA_nop
01446 have the same value here. */
01447 #define DW_CFA_advance_loc 0x40
01448 #define DW_CFA_offset 0x80

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01449 #define DW_CFA_restore          0xc0
01450 #define DW_CFA_nop                0x00
01451 #define DW_CFA_extended           0
01452 #define DW_CFA_set_loc            0x01
01453 #define DW_CFA_advance_loc1       0x02
01454 #define DW_CFA_advance_loc2       0x03
01455 #define DW_CFA_advance_loc4       0x04
01456 #define DW_CFA_offset_extended     0x05
01457 #define DW_CFA_restore_extended   0x06
01458 #define DW_CFA_undefined           0x07
01459 #define DW_CFA_same_value          0x08
01460 #define DW_CFA_register           0x09
01461 #define DW_CFA_remember_state      0x0a
01462 #define DW_CFA_restore_state       0x0b
01463 #define DW_CFA_def_cfa             0x0c
01464 #define DW_CFA_def_cfa_register    0x0d
01465 #define DW_CFA_def_cfa_offset      0x0e
01466 #define DW_CFA_def_cfa_expression  0x0f /* DWARF3 */
01467 #define DW_CFA_expression           0x10 /* DWARF3 */
01468 #define DW_CFA_offset_extended_sf   0x11 /* DWARF3 */
01469 #define DW_CFA_def_cfa_sf           0x12 /* DWARF3 */
01470 #define DW_CFA_def_cfa_offset_sf    0x13 /* DWARF3 */
01471 #define DW_CFA_val_offset           0x14 /* DWARF3f */
01472 #define DW_CFA_val_offset_sf        0x15 /* DWARF3f */
01473 #define DW_CFA_val_expression       0x16 /* DWARF3f */
01474 #define DW_CFA_TL_soffset_extended  0x1c /* TI */
01475 #define DW_CFA_lo_user              0x1c
01476 #define DW_CFA_low_user             0x1c /* Incorrect spelling, do not use. */
01477
01478 /* SGI/MIPS extension. */
01479 #define DW_CFA_MIPS_advance_loc8     0x1d /* MIPS */
01480 #define DW_CFA_TL_def_cfa_soffset    0x1d /* TI */
01481
01482 /* GNU extensions. */
01483 #define DW_CFA_GNU_window_save       0x2d /* GNU */
01484 #define DW_CFA_AARCH64_negate_ra_state 0x2d
01485 #define DW_CFA_GNU_args_size         0x2e /* GNU */
01486 #define DW_CFA_GNU_negative_offset_extended 0x2f /* GNU */
01487 #define DW_CFA_LLVM_def_aspace_cfa    0x30
01488 #define DW_CFA_LLVM_def_aspace_cfa_sf 0x31
01489
01490 /* Metaware if HC is augmentation, apparently meaning High C
01491    and the op has a single uleb operand.
01492    See http://sourceforge.net/p/elftoolchain/tickets/397/ */
01493 #define DW_CFA_METAWARE_info          0x34
01494
01495 #define DW_CFA_hi_user                0x3f
01496 #define DW_CFA_high_user              0x3f /* Misspelled. Do not use. */
01497
01498 /* GNU exception header encoding. See the Generic
01499    Elf Specification of the Linux Standard Base (LSB).
01500    http://refspecs.freestdards.org/LSB\_3.0.0/\
01501    LSB-Core-generic/LSB-Core-generic/dwarfext.html
01502    The upper 4 bits indicate how the value is to be applied.
01503    The lower 4 bits indicate the format of the data.
01504    These identifiers are not defined by any DWARF standard.
01505 */
01506 #define DW_EH_PE_absptr              0x00 /* GNU */
01507 #define DW_EH_PE_uleb128             0x01 /* GNU */
01508 #define DW_EH_PE_udata2              0x02 /* GNU */
01509 #define DW_EH_PE_udata4              0x03 /* GNU */
01510 #define DW_EH_PE_udata8              0x04 /* GNU */
01511 #define DW_EH_PE_sleb128             0x09 /* GNU */
01512 #define DW_EH_PE_sdata2              0x0A /* GNU */
01513 #define DW_EH_PE_sdata4              0x0B /* GNU */
01514 #define DW_EH_PE_sdata8              0x0C /* GNU */
01515
01516 #define DW_EH_PE_pcrel                0x10 /* GNU */
01517 #define DW_EH_PE_textrel             0x20 /* GNU */
01518 #define DW_EH_PE_datarel             0x30 /* GNU */
01519 #define DW_EH_PE_funcrel             0x40 /* GNU */
01520 #define DW_EH_PE_aligned             0x50 /* GNU */
01521
01522 #define DW_EH_PE_omit                0xff /* GNU. Means no value present. */
01523
01524 /* Mapping from machine registers and pseudo-regs into the
01525    .debug_frame table. DW_FRAME entries are machine specific.
01526    These describe MIPS/SGI R3000, R4K, R4400 and all later
01527    MIPS/SGI IRIX machines. They describe a mapping from
01528    hardware register number to the number used in the table
01529    to identify that register.
01530
01531    The CFA (Canonical Frame Address) described in DWARF is
01532    called the Virtual Frame Pointer on MIPS/SGI machines.
01533
01534    The DW_FRAME* names here are MIPS/SGI specific.
01535    Libdwarf interfaces defined in 2008 make the

```

```
01536     frame definitions here (and the fixed table sizes
01537     they imply) obsolete.  They are left here for compatibility.
01538 */
01539 /* These identifiers are not defined by any DWARF standard. */
01540
01541 #define DW_FRAME_REG1    1 /* integer reg 1 */
01542 #define DW_FRAME_REG2    2 /* integer reg 2 */
01543 #define DW_FRAME_REG3    3 /* integer reg 3 */
01544 #define DW_FRAME_REG4    4 /* integer reg 4 */
01545 #define DW_FRAME_REG5    5 /* integer reg 5 */
01546 #define DW_FRAME_REG6    6 /* integer reg 6 */
01547 #define DW_FRAME_REG7    7 /* integer reg 7 */
01548 #define DW_FRAME_REG8    8 /* integer reg 8 */
01549 #define DW_FRAME_REG9    9 /* integer reg 9 */
01550 #define DW_FRAME_REG10   10 /* integer reg 10 */
01551 #define DW_FRAME_REG11   11 /* integer reg 11 */
01552 #define DW_FRAME_REG12   12 /* integer reg 12 */
01553 #define DW_FRAME_REG13   13 /* integer reg 13 */
01554 #define DW_FRAME_REG14   14 /* integer reg 14 */
01555 #define DW_FRAME_REG15   15 /* integer reg 15 */
01556 #define DW_FRAME_REG16   16 /* integer reg 16 */
01557 #define DW_FRAME_REG17   17 /* integer reg 17 */
01558 #define DW_FRAME_REG18   18 /* integer reg 18 */
01559 #define DW_FRAME_REG19   19 /* integer reg 19 */
01560 #define DW_FRAME_REG20   20 /* integer reg 20 */
01561 #define DW_FRAME_REG21   21 /* integer reg 21 */
01562 #define DW_FRAME_REG22   22 /* integer reg 22 */
01563 #define DW_FRAME_REG23   23 /* integer reg 23 */
01564 #define DW_FRAME_REG24   24 /* integer reg 24 */
01565 #define DW_FRAME_REG25   25 /* integer reg 25 */
01566 #define DW_FRAME_REG26   26 /* integer reg 26 */
01567 #define DW_FRAME_REG27   27 /* integer reg 27 */
01568 #define DW_FRAME_REG28   28 /* integer reg 28 */
01569 #define DW_FRAME_REG29   29 /* integer reg 29 */
01570 #define DW_FRAME_REG30   30 /* integer reg 30 */
01571 #define DW_FRAME_REG31   31 /* integer reg 31, aka ra */
01572
01573 /* MIPS1,2 have only some of these 64-bit registers.
01574 ** MIPS1 save/restore takes 2 instructions per 64-bit reg, and
01575 ** in that case, the register is considered stored after
01576 ** the second swcl. */
01577 #define DW_FRAME_FREG0    32 /* 64-bit floating point reg 0 */
01578 #define DW_FRAME_FREG1    33 /* 64-bit floating point reg 1 */
01579 #define DW_FRAME_FREG2    34 /* 64-bit floating point reg 2 */
01580 #define DW_FRAME_FREG3    35 /* 64-bit floating point reg 3 */
01581 #define DW_FRAME_FREG4    36 /* 64-bit floating point reg 4 */
01582 #define DW_FRAME_FREG5    37 /* 64-bit floating point reg 5 */
01583 #define DW_FRAME_FREG6    38 /* 64-bit floating point reg 6 */
01584 #define DW_FRAME_FREG7    39 /* 64-bit floating point reg 7 */
01585 #define DW_FRAME_FREG8    40 /* 64-bit floating point reg 8 */
01586 #define DW_FRAME_FREG9    41 /* 64-bit floating point reg 9 */
01587 #define DW_FRAME_FREG10   42 /* 64-bit floating point reg 10 */
01588 #define DW_FRAME_FREG11   43 /* 64-bit floating point reg 11 */
01589 #define DW_FRAME_FREG12   44 /* 64-bit floating point reg 12 */
01590 #define DW_FRAME_FREG13   45 /* 64-bit floating point reg 13 */
01591 #define DW_FRAME_FREG14   46 /* 64-bit floating point reg 14 */
01592 #define DW_FRAME_FREG15   47 /* 64-bit floating point reg 15 */
01593 #define DW_FRAME_FREG16   48 /* 64-bit floating point reg 16 */
01594 #define DW_FRAME_FREG17   49 /* 64-bit floating point reg 17 */
01595 #define DW_FRAME_FREG18   50 /* 64-bit floating point reg 18 */
01596 #define DW_FRAME_FREG19   51 /* 64-bit floating point reg 19 */
01597 #define DW_FRAME_FREG20   52 /* 64-bit floating point reg 20 */
01598 #define DW_FRAME_FREG21   53 /* 64-bit floating point reg 21 */
01599 #define DW_FRAME_FREG22   54 /* 64-bit floating point reg 22 */
01600 #define DW_FRAME_FREG23   55 /* 64-bit floating point reg 23 */
01601 #define DW_FRAME_FREG24   56 /* 64-bit floating point reg 24 */
01602 #define DW_FRAME_FREG25   57 /* 64-bit floating point reg 25 */
01603 #define DW_FRAME_FREG26   58 /* 64-bit floating point reg 26 */
01604 #define DW_FRAME_FREG27   59 /* 64-bit floating point reg 27 */
01605 #define DW_FRAME_FREG28   60 /* 64-bit floating point reg 28 */
01606 #define DW_FRAME_FREG29   61 /* 64-bit floating point reg 29 */
01607 #define DW_FRAME_FREG30   62 /* 64-bit floating point reg 30 */
01608 #define DW_FRAME_FREG31   63 /* 64-bit floating point reg 31 */
01609
01610 #define DW_FRAME_FREG32   64 /* 64-bit floating point reg 32 */
01611 #define DW_FRAME_FREG33   65 /* 64-bit floating point reg 33 */
01612 #define DW_FRAME_FREG34   66 /* 64-bit floating point reg 34 */
01613 #define DW_FRAME_FREG35   67 /* 64-bit floating point reg 35 */
01614 #define DW_FRAME_FREG36   68 /* 64-bit floating point reg 36 */
01615 #define DW_FRAME_FREG37   69 /* 64-bit floating point reg 37 */
01616 #define DW_FRAME_FREG38   70 /* 64-bit floating point reg 38 */
01617 #define DW_FRAME_FREG39   71 /* 64-bit floating point reg 39 */
01618 #define DW_FRAME_FREG40   72 /* 64-bit floating point reg 40 */
01619 #define DW_FRAME_FREG41   73 /* 64-bit floating point reg 41 */
01620 #define DW_FRAME_FREG42   74 /* 64-bit floating point reg 42 */
01621 #define DW_FRAME_FREG43   75 /* 64-bit floating point reg 43 */
01622 #define DW_FRAME_FREG44   76 /* 64-bit floating point reg 44 */
```

```

01623 #define DW_FRAME_FREG45 77 /* 64-bit floating point reg 45 */
01624 #define DW_FRAME_FREG46 78 /* 64-bit floating point reg 46 */
01625 #define DW_FRAME_FREG47 79 /* 64-bit floating point reg 47 */
01626 #define DW_FRAME_FREG48 80 /* 64-bit floating point reg 48 */
01627 #define DW_FRAME_FREG49 81 /* 64-bit floating point reg 49 */
01628 #define DW_FRAME_FREG50 82 /* 64-bit floating point reg 50 */
01629 #define DW_FRAME_FREG51 83 /* 64-bit floating point reg 51 */
01630 #define DW_FRAME_FREG52 84 /* 64-bit floating point reg 52 */
01631 #define DW_FRAME_FREG53 85 /* 64-bit floating point reg 53 */
01632 #define DW_FRAME_FREG54 86 /* 64-bit floating point reg 54 */
01633 #define DW_FRAME_FREG55 87 /* 64-bit floating point reg 55 */
01634 #define DW_FRAME_FREG56 88 /* 64-bit floating point reg 56 */
01635 #define DW_FRAME_FREG57 89 /* 64-bit floating point reg 57 */
01636 #define DW_FRAME_FREG58 90 /* 64-bit floating point reg 58 */
01637 #define DW_FRAME_FREG59 91 /* 64-bit floating point reg 59 */
01638 #define DW_FRAME_FREG60 92 /* 64-bit floating point reg 60 */
01639 #define DW_FRAME_FREG61 93 /* 64-bit floating point reg 61 */
01640 #define DW_FRAME_FREG62 94 /* 64-bit floating point reg 62 */
01641 #define DW_FRAME_FREG63 95 /* 64-bit floating point reg 63 */
01642 #define DW_FRAME_FREG64 96 /* 64-bit floating point reg 64 */
01643 #define DW_FRAME_FREG65 97 /* 64-bit floating point reg 65 */
01644 #define DW_FRAME_FREG66 98 /* 64-bit floating point reg 66 */
01645 #define DW_FRAME_FREG67 99 /* 64-bit floating point reg 67 */
01646 #define DW_FRAME_FREG68 100 /* 64-bit floating point reg 68 */
01647 #define DW_FRAME_FREG69 101 /* 64-bit floating point reg 69 */
01648 #define DW_FRAME_FREG70 102 /* 64-bit floating point reg 70 */
01649 #define DW_FRAME_FREG71 103 /* 64-bit floating point reg 71 */
01650 #define DW_FRAME_FREG72 104 /* 64-bit floating point reg 72 */
01651 #define DW_FRAME_FREG73 105 /* 64-bit floating point reg 73 */
01652 #define DW_FRAME_FREG74 106 /* 64-bit floating point reg 74 */
01653 #define DW_FRAME_FREG75 107 /* 64-bit floating point reg 75 */
01654 #define DW_FRAME_FREG76 108 /* 64-bit floating point reg 76 */
01655
01656 /* Having DW_FRAME_HIGHEST_NORMAL_REGISTER be higher than
01657    is strictly needed ... is safe.
01658    These values can be changed at runtime by libdwarf.
01659 */
01660 #ifndef DW_FRAME_HIGHEST_NORMAL_REGISTER
01661 #define DW_FRAME_HIGHEST_NORMAL_REGISTER 188
01662 #endif
01663 /* This is the number of columns in the Frame Table.
01664 */
01665 #ifndef DW_FRAME_LAST_REG_NUM
01666 #define DW_FRAME_LAST_REG_NUM (DW_FRAME_HIGHEST_NORMAL_REGISTER + 1)
01667 #endif
01668
01669 #define DW_CHILDREN_no 0x00
01670 #define DW_CHILDREN_yes 0x01
01671
01672 #define DW_ADDR_none 0
01673 #define DW_ADDR_TI_PTR8 0x0008 /* TI */
01674 #define DW_ADDR_TI_PTR16 0x0010 /* TI */
01675 #define DW_ADDR_TI_PTR22 0x0016 /* TI */
01676 #define DW_ADDR_TI_PTR23 0x0017 /* TI */
01677 #define DW_ADDR_TI_PTR24 0x0018 /* TI */
01678 #define DW_ADDR_TI_PTR32 0x0020 /* TI */
01679
01680 #ifdef __cplusplus
01681 }
01682 #endif
01683 #endif /* __DWARF_H */

```

Chapter 14

libdwarf.h

[libdwarf.h](#) contains all the type declarations and function declarations needed to use the library. It is essential that coders include [dwarf.h](#) before including [libdwarf.h](#).

All identifiers here in the public namespace begin with DW_ or Dwarf_ or dwarf_ . All function argument names declared here begin with dw_ .

14.1 libdwarf.h

[Go to the documentation of this file.](#)

```
00001 /*
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00003 Portions Copyright 2007-2010 Sun Microsystems, Inc. All rights reserved.
00004 Portions Copyright 2008-2024 David Anderson. All rights reserved.
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00027 Public License along with this program; if not, write the
00028 Free Software Foundation, Inc., 51 Franklin Street - Fifth
00029 Floor, Boston MA 02110-1301, USA.
00030
00031 */
00046 #ifndef _LIBDWARF_H
00047 #define _LIBDWARF_H
00048
00049 #ifdef DW_API
00050 #undef DW_API
00051 #endif /* DW_API */
00052
00053 #ifndef LIBDWARF_STATIC
00054 # if defined(_WIN32) || defined(__CYGWIN__)
00055 #  ifdef LIBDWARF_BUILD
00056 #   define DW_API __declspec(dllexport)
00057 #  else /* !LIBDWARF_BUILD */
00058 #   define DW_API __declspec(dllimport)
```

```

00059 # endif /* LIBDWARF_BUILD */
00060 # elif (defined(__SUNPRO_C) || defined(__SUNPRO_CC))
00061 # if defined(PIC) || defined(__PIC__)
00062 # define DW_API __global
00063 # endif /* __PIC__ */
00064 # elif (defined(__GNUC__) && __GNUC__ >= 4) || \
00065 defined(__INTEL_COMPILER)
00066 # if defined(PIC) || defined(__PIC__)
00067 # define DW_API __attribute__((visibility("default")))
00068 # endif /* PIC */
00069 # endif /* WIN32 SUNPRO GNUC */
00070 #endif /* !LIBDWARF_STATIC */
00071
00072 #ifndef DW_API
00073 #define DW_API
00074 #endif /* DW_API */
00075
00076 #ifdef __cplusplus
00077 extern "C" {
00078 #endif /* __cplusplus */
00079
00080 /*
00081 libdwarf.h
00082 Revision: #9 Date: 2008/01/17
00083
00084 For libdwarf consumers (reading DWARF2 and later)
00085
00086 The interface is defined as having 8-byte signed and unsigned
00087 values so it can handle 64-or-32bit target on 64-or-32bit host.
00088 Dwarf_Ptr is the native size: it represents pointers on
00089 the host machine (not the target!).
00090
00091 This contains declarations for types and all producer
00092 and consumer functions.
00093
00094 Function declarations are written on a single line each here
00095 so one can use grep to each declaration in its entirety.
00096 The declarations are a little harder to read this way, but...
00097 */
00101 /* Semantic Version identity for this libdwarf.h */
00102 #define DW_LIBDWARF_VERSION "0.12.0"
00103 #define DW_LIBDWARF_VERSION_MAJOR 0
00104 #define DW_LIBDWARF_VERSION_MINOR 12
00105 #define DW_LIBDWARF_VERSION_MICRO 0
00106
00107 #define DW_PATHSOURCE_unspecified 0
00108 #define DW_PATHSOURCE_basic 1
00109 #define DW_PATHSOURCE_dsym 2 /* MacOS dSYM */
00110 #define DW_PATHSOURCE_debuglink 3 /* GNU debuglink */
00111
00112 #ifndef DW_FTYPE_UNKNOWN
00113 #define DW_FTYPE_UNKNOWN 0
00114 #define DW_FTYPE_ELF 1 /* Unix/Linux/etc */
00115 #define DW_FTYPE_MACH_O 2 /* MacOS. */
00116 #define DW_FTYPE_PE 3 /* Windows */
00117 #define DW_FTYPE_ARCHIVE 4 /* unix archive */
00118 #define DW_FTYPE_APPLEUNIVERSAL 5
00119 #endif /* DW_FTYPE_UNKNOWN */
00120 /* standard return values for functions */
00121 #define DW_DLV_NO_ENTRY -1
00122 #define DW_DLV_OK 0
00123 #define DW_DLV_ERROR 1
00124 /* These support opening DWARF5 split dwarf objects and
00125 Elf SHT_GROUP blocks of DWARF sections. */
00126 #define DW_GROUPNUMBER_ANY 0
00127 #define DW_GROUPNUMBER_BASE 1
00128 #define DW_GROUPNUMBER_DWO 2
00129
00130 /* FRAME special values */
00131 /* The following 3 are assigned numbers, but
00132 are only present at run time.
00133 Must not conflict with DW_FRAME values in dwarf.h */
00134 /* Taken as meaning 'undefined value', this is not
00135 a column or register number. */
00136 #ifndef DW_FRAME_UNDEFINED_VAL
00137 #define DW_FRAME_UNDEFINED_VAL 12288
00138 #endif
00139 /* Taken as meaning 'same value' as caller had,
00140 not a column or register number */
00141 #ifndef DW_FRAME_SAME_VAL
00142 #define DW_FRAME_SAME_VAL 12289
00143 #endif
00144 /* DW_FRAME_CFA_COL is assigned a virtual table position
00145 but is accessed via CFA specific calls. */
00146 #ifndef DW_FRAME_CFA_COL
00147 #define DW_FRAME_CFA_COL 12290
00148 #endif

```

```

00149 #define DW_FRAME_CFA_COL3 DW_FRAME_CFA_COL /*compatibility name*/
00150 /* END FRAME special values */
00151
00152 /* dwarf_pcline function, slide arguments
00153 */
00154 #define DW_DLS_BACKWARD -1 /* slide backward to find line */
00155 #define DW_DLS_NOSLIDE 0 /* match exactly without sliding */
00156 #define DW_DLS_FORWARD 1 /* slide forward to find line */
00157
00158 /* Defined larger than necessary.
00159 struct Dwarf_Debug_Fission_Per_CU_s,
00160 being visible, will be difficult to change:
00161 binary compatibility. The count is for arrays
00162 inside the struct, the struct itself is
00163 a single struct. */
00164 #define DW_FFISSION_SECT_COUNT 12
00165
00166 typedef unsigned long long Dwarf_Unsigned;
00167 typedef signed long long Dwarf_Signed;
00168 typedef unsigned long long Dwarf_Off;
00169 typedef unsigned long long Dwarf_Addr;
00170 /* Dwarf_Bool as int is wasteful, but for compatibility
00171 it must stay as int, not unsigned char. */
00172 typedef int Dwarf_Bool; /* boolean type */
00173 typedef unsigned short Dwarf_Half; /* 2 byte unsigned value */
00174 typedef unsigned char Dwarf_Small; /* 1 byte unsigned value */
00175 /* If sizeof(Dwarf_Half) is greater than 2
00176 we believe libdwarf still works properly. */
00177
00178 typedef void* Dwarf_Ptr; /* host machine pointer */
00179 enum Dwarf_Ranges_Entry_Type { DW_RANGES_ENTRY,
00180 DW_RANGES_ADDRESS_SELECTION,
00181 DW_RANGES_END
00182 };
00183
00184 enum Dwarf_Form_Class {
00185 DW_FORM_CLASS_UNKNOWN = 0,
00186 DW_FORM_CLASS_ADDRESS = 1,
00187 DW_FORM_CLASS_BLOCK = 2,
00188 DW_FORM_CLASS_CONSTANT = 3,
00189 DW_FORM_CLASS_EXPRLOC = 4,
00190 DW_FORM_CLASS_FLAG = 5,
00191 DW_FORM_CLASS_LINEPTR = 6,
00192 DW_FORM_CLASS_LOCLISTPTR = 7, /* DWARF2,3,4 only */
00193 DW_FORM_CLASS_MACPTR = 8, /* DWARF2,3,4 only */
00194 DW_FORM_CLASS_RANGELISTPTR = 9, /* DWARF2,3,4 only */
00195 DW_FORM_CLASS_REFERENCE = 10,
00196 DW_FORM_CLASS_STRING = 11,
00197 DW_FORM_CLASS_FRAMEPTR = 12, /* MIPS/IRIX DWARF2 only */
00198 DW_FORM_CLASS_MACROPTR = 13, /* DWARF5 */
00199 DW_FORM_CLASS_ADDRPTR = 14, /* DWARF5 */
00200 DW_FORM_CLASS_LOCLIST = 15, /* DWARF5 */
00201 DW_FORM_CLASS_LOCLISTSPTR = 16, /* DWARF5 */
00202 DW_FORM_CLASS_RNGLIST = 17, /* DWARF5 */
00203 DW_FORM_CLASS_RNGLISTSPTR = 18, /* DWARF5 */
00204 DW_FORM_CLASS_STROFFSETSPTR = 19 /* DWARF5 */
00205 };
00206
00207 typedef struct Dwarf_Form_Data16_s {
00208 unsigned char fd_data[16];
00209 } Dwarf_Form_Data16;
00210
00211 typedef struct Dwarf_Sig8_s {
00212 char signature[8];
00213 } Dwarf_Sig8;
00214
00215 typedef struct Dwarf_Block_s {
00216 Dwarf_Unsigned bl_len;
00217 Dwarf_Ptr bl_data;
00218 Dwarf_Small bl_from_loclist;
00219 Dwarf_Unsigned bl_section_offset;
00220 } Dwarf_Block;
00221
00222 typedef struct Dwarf_Locdesc_c_s * Dwarf_Locdesc_c;
00223 typedef struct Dwarf_Loc_Head_c_s * Dwarf_Loc_Head_c;
00224
00225 typedef struct Dwarf_Gnu_Index_Head_s * Dwarf_Gnu_Index_Head;
00226
00227 typedef struct Dwarf_Dsc_Head_s * Dwarf_Dsc_Head;
00228
00229 typedef struct Dwarf_Frame_Instr_Head_s * Dwarf_Frame_Instr_Head;
00230
00231 typedef void (* dwarf_printf_callback_function_type)
00232 (void * dw_user_pointer, const char * dw_linecontent);
00233
00234 struct Dwarf_Printf_Callback_Info_s {
00235 void * dp_user_pointer;
00236 dwarf_printf_callback_function_type dp_fptr;

```



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00416     char *                dp_buffer;
00417     unsigned int          dp_buffer_len;
00418     int                   dp_buffer_user_provided;
00419     void *                dp_reserved;
00420 };
00421
00441 struct Dwarf_Cmdline_Options_s {
00442     Dwarf_Bool check_verbose_mode;
00443 };
00447 typedef struct Dwarf_Cmdline_Options_s Dwarf_Cmdline_Options;
00448
00455 typedef struct Dwarf_Str_Offsets_Table_s * Dwarf_Str_Offsets_Table;
00456
00469 typedef struct Dwarf_Ranges_s {
00470     Dwarf_Addr dwr_addr1;
00471     Dwarf_Addr dwr_addr2;
00472     enum Dwarf_Ranges_Entry_Type dwr_type;
00473 } Dwarf_Ranges;
00474
00553 typedef struct Dwarf_Regtable_Entry3_s {
00554     Dwarf_Small dw_offset_relevant;
00555     Dwarf_Small dw_value_type;
00556     Dwarf_Half dw_regnum;
00557     Dwarf_Unsigned dw_offset; /* Should be Dwarf_Signed */
00558     Dwarf_Unsigned dw_args_size; /* Always zero. */
00559     Dwarf_Block dw_block;
00560 } Dwarf_Regtable_Entry3;
00561
00581 typedef struct Dwarf_Regtable3_s {
00582     struct Dwarf_Regtable_Entry3_s rt3_cfa_rule;
00583     Dwarf_Half rt3_reg_table_size;
00584     struct Dwarf_Regtable_Entry3_s * rt3_rules;
00585 } Dwarf_Regtable3;
00586
00587 /* Opaque types for Consumer Library. */
00597 typedef struct Dwarf_Error_s* Dwarf_Error;
00598
00603 typedef struct Dwarf_Debug_s* Dwarf_Debug;
00608 typedef struct Dwarf_Section_s* Dwarf_Section;
00609
00613 typedef struct Dwarf_Die_s* Dwarf_Die;
00614
00618 typedef struct Dwarf_Debug_Addr_Table_s* Dwarf_Debug_Addr_Table;
00619
00624 typedef struct Dwarf_Line_s* Dwarf_Line;
00625
00630 typedef struct Dwarf_Global_s* Dwarf_Global;
00631
00639 typedef struct Dwarf_Type_s* Dwarf_Type;
00640
00646 typedef struct Dwarf_Func_s* Dwarf_Func;
00652 typedef struct Dwarf_Var_s* Dwarf_Var;
00658 typedef struct Dwarf_Weak_s* Dwarf_Weak;
00659
00663 typedef struct Dwarf_Attribute_s* Dwarf_Attribute;
00664
00670 typedef struct Dwarf_Abbrev_s* Dwarf_Abbrev;
00671
00676 typedef struct Dwarf_Fde_s* Dwarf_Fde;
00681 typedef struct Dwarf_Cie_s* Dwarf_Cie;
00682
00687 typedef struct Dwarf_Arange_s* Dwarf_Arange;
00692 typedef struct Dwarf_Gdbindex_s* Dwarf_Gdbindex;
00698 typedef struct Dwarf_Xu_Index_Header_s *Dwarf_Xu_Index_Header;
00702 typedef struct Dwarf_Line_Context_s *Dwarf_Line_Context;
00703
00707 typedef struct Dwarf_Macro_Context_s *Dwarf_Macro_Context;
00708
00714 typedef struct Dwarf_Dnames_Head_s *Dwarf_Dnames_Head;
00715
00723 typedef void (*Dwarf_Handler)(Dwarf_Error dw_error,
00724     Dwarf_Ptr dw_errarg);
00725
00733 struct Dwarf_Macro_Details_s {
00734     Dwarf_Off dmd_offset; /* offset, in the section,
00735         of this macro info */
00736     Dwarf_Small dmd_type; /* the type, DW_MACINFO_define etc*/
00737     Dwarf_Signed dmd_lineno; /* the source line number where
00738         applicable and vend_def number if
00739         vendor_extension op */
00740     Dwarf_Signed dmd_fileindex; /* the source file index */
00741     char * dmd_macro; /* macro name string */
00742 };
00747 typedef struct Dwarf_Macro_Details_s Dwarf_Macro_Details;
00748
00753 typedef struct Dwarf_Debug_Fission_Per_CU_s
00754     Dwarf_Debug_Fission_Per_CU;

```



```

00755
00756 /* ===== BEGIN Obj_Access data ===== */
00762 typedef struct Dwarf_Obj_Access_Interface_a_s
00763     Dwarf_Obj_Access_Interface_a;
00764
00770 typedef struct Dwarf_Obj_Access_Methods_a_s
00771     Dwarf_Obj_Access_Methods_a;
00772
00781 typedef struct Dwarf_Obj_Access_Section_a_s
00782     Dwarf_Obj_Access_Section_a;
00783 struct Dwarf_Obj_Access_Section_a_s {
00784     const char*    as_name;
00785     Dwarf_Unsigned as_type;
00786     Dwarf_Unsigned as_flags;
00787     Dwarf_Addr     as_addr;
00788     Dwarf_Unsigned as_offset;
00789     Dwarf_Unsigned as_size;
00790     Dwarf_Unsigned as_link;
00791     Dwarf_Unsigned as_info;
00792     Dwarf_Unsigned as_addralign;
00793     Dwarf_Unsigned as_entsize;
00794 };
00795
00808 enum Dwarf_Sec_Alloc_Pref {
00809     /* No dynamic allocation */
00810     Dwarf_Alloc_None=0,
00811     /* alternative allocations */
00812     Dwarf_Alloc_Malloc=1,
00813     Dwarf_Alloc_Mmap=2};
00814
00836 struct Dwarf_Obj_Access_Methods_a_s {
00837     int (*om_get_section_info)(void* obj,
00838         Dwarf_Unsigned section_index,
00839         Dwarf_Obj_Access_Section_a* return_section,
00840         int * error);
00841     Dwarf_Small (*om_get_byte_order)(void* obj);
00842     Dwarf_Small (*om_get_length_size)(void* obj);
00843     Dwarf_Small (*om_get_pointer_size)(void* obj);
00844     Dwarf_Unsigned (*om_get_filesizes)(void* obj);
00845     Dwarf_Unsigned (*om_get_section_count)(void* obj);
00846     /* Always uses malloc/read */
00847     int (*om_load_section)(void* obj,
00848         Dwarf_Unsigned dw_section_index,
00849         Dwarf_Small **dw_return_data,
00850         int *dw_error);
00851     int (*om_relocate_a_section)(void* obj,
00852         Dwarf_Unsigned section_index,
00853         Dwarf_Debug dbg,
00854         int * error);
00855     /* Added in 0.12.0 to allow mmap in section loading.
00856     If you are just using malloc for section loading
00857     and referring to this struct in your code
00858     you should leave this function pointer NULL (zero). */
00859     int (*om_load_section_a)(void* obj,
00860         Dwarf_Unsigned dw_section_index,
00861         /* dw_alloc_pref is input preference and also
00862         output with the actual allocated type */
00863         enum Dwarf_Sec_Alloc_Pref *dw_alloc_pref,
00864         Dwarf_Small **dw_return_data_ptr,
00865         Dwarf_Unsigned *dw_return_data_len,
00866         Dwarf_Small **dw_return_mmap_base_ptr,
00867         Dwarf_Unsigned *dw_return_mmap_offset,
00868         Dwarf_Unsigned *dw_return_mmap_len,
00869         int *dw_error);
00870     void (*om_finish)(void * obj);
00871 };
00872 struct Dwarf_Obj_Access_Interface_a_s {
00873     void* ai_object;
00874     const Dwarf_Obj_Access_Methods_a *ai_methods;
00875 };
00876 /* ===== END Obj_Access data ===== */
00877
00878 /* User code must allocate this struct, zero it,
00879 and pass a pointer to it
00880 into dwarf_get_debugfission_for_cu . */
00881 struct Dwarf_Debug_Fission_Per_CU_s {
00882     /* Do not free the string. It contains "cu" or "tu". */
00883     /* If this is not set (ie, not a CU/TU in DWP Package File)
00884     then pcu_type will be NULL. */
00885     const char * pcu_type;
00886     /* pcu_index is the index (range 1 to N )
00887     into the tu/cu table of offsets and the table
00888     of sizes. 1 to N as the zero index is reserved
00889     for special purposes. Not a value one
00890     actually needs. */
00891     Dwarf_Unsigned pcu_index;
00892     Dwarf_Sig8 pcu_hash; /* 8 byte */

```

```

00893     /* [0] has offset and size 0.
00894     [1]-[8] are DW_SECT_* indexes and the
00895     values are the offset and size
00896     of the respective section contribution
00897     of a single .dwo object. When pcu_size[n] is
00898     zero the corresponding section is not present. */
00899     Dwarf_Unsigned pcu_offset[DW_FISSION_SECT_COUNT];
00900     Dwarf_Unsigned pcu_size[DW_FISSION_SECT_COUNT];
00901     Dwarf_Unsigned unused1;
00902     Dwarf_Unsigned unused2;
00903 };
00904
00909 typedef struct Dwarf_Rnglists_Head_s * Dwarf_Rnglists_Head;
00910
00916 /* Special values for offset_into_exception_table field
00917 of dwarf fde's
00918 The following value indicates that there is no
00919 Exception table offset
00920 associated with a dwarf frame.
00921 */
00922 #define DW_DLX_NO_EH_OFFSET (-1LL)
00923 /* The following value indicates that the producer
00924 was unable to analyze the
00925 source file to generate Exception tables for this function.
00926 */
00927 #define DW_DLX_EH_OFFSET_UNAVAILABLE (-2LL)
00928
00929 /* The augmenter string for CIE */
00930 #define DW_CIE_AUGMENTER_STRING_V0 "z"
00931
00932 /* ***IMPORTANT NOTE, TARGET DEPENDENCY ***
00933 DW_REG_TABLE_SIZE must be at least as large as
00934 the number of registers
00935 DW_FRAME_LAST_REG_NUM as defined in dwarf.h
00936 */
00937 #ifndef DW_REG_TABLE_SIZE
00938 #define DW_REG_TABLE_SIZE DW_FRAME_LAST_REG_NUM
00939 #endif
00940
00941 /* For MIPS, DW_FRAME_SAME_VAL is the correct default value
00942 for a frame register value. For other CPUs another value
00943 may be better, such as DW_FRAME_UNDEFINED_VAL.
00944 See dwarf_set_frame_rule_table_size
00945 */
00946 #ifndef DW_FRAME_REG_INITIAL_VALUE
00947 #define DW_FRAME_REG_INITIAL_VALUE DW_FRAME_SAME_VAL
00948 #endif
00949
00950 /* The following are all needed to evaluate DWARF3 register rules.
00951 These have nothing to do simply printing
00952 frame instructions.
00953 */
00954 #define DW_EXPR_OFFSET 0 /* offset is from CFA reg */
00955 #define DW_EXPR_VAL_OFFSET 1
00956 #define DW_EXPR_EXPRESSION 2
00957 #define DW_EXPR_VAL_EXPRESSION 3
00958 #define DW_DLA_STRING 0x01 /* char* */
00959 #define DW_DLA_LOC 0x02 /* Dwarf_Loc */
00960 #define DW_DLA_LOCDISC 0x03 /* Dwarf_Locdesc */
00961 #define DW_DLA_ELLIST 0x04 /* Dwarf_Ellist (not used) */
00962 #define DW_DLA_BOUNDS 0x05 /* Dwarf_Bounds (not used) */
00963 #define DW_DLA_BLOCK 0x06 /* Dwarf_Block */
00964 #define DW_DLA_DEBUG 0x07 /* Dwarf_Debug */
00965 #define DW_DLA_DIE 0x08 /* Dwarf_Die */
00966 #define DW_DLA_LINE 0x09 /* Dwarf_Line */
00967 #define DW_DLA_ATTR 0x0a /* Dwarf_Attribute */
00968 #define DW_DLA_TYPE 0x0b /* Dwarf_Type (not used) */
00969 #define DW_DLA_SUBSCR 0x0c /* Dwarf_Subscr (not used) */
00970 #define DW_DLA_GLOBAL 0x0d /* Dwarf_Global */
00971 #define DW_DLA_ERROR 0x0e /* Dwarf_Error */
00972 #define DW_DLA_LIST 0x0f /* a list */
00973 #define DW_DLA_LINEBUF 0x10 /* Dwarf_Line* (not used) */
00974 #define DW_DLA_ARANGE 0x11 /* Dwarf_Arange */
00975 #define DW_DLA_ABBREV 0x12 /* Dwarf_Abbrev */
00976 #define DW_DLA_FRAME_INSTR_HEAD 0x13 /* Dwarf_Frame_Instr_Head */
00977 #define DW_DLA_CIE 0x14 /* Dwarf_Cie */
00978 #define DW_DLA_FDE 0x15 /* Dwarf_Fde */
00979 #define DW_DLA_LOC_BLOCK 0x16 /* Dwarf_Loc */
00980
00981 #define DW_DLA_FRAME_OP 0x17 /* Dwarf_Frame_Op (not used) */
00982 #define DW_DLA_FUNC 0x18 /* Dwarf_Func */
00983 #define DW_DLA_UARRAY 0x19 /* Array of Dwarf_Off:Jan2023 */
00984 #define DW_DLA_VAR 0x1a /* Dwarf_Var */
00985 #define DW_DLA_WEAK 0x1b /* Dwarf_Weak */
00986 #define DW_DLA_ADDR 0x1c /* Dwarf_Addr sized entries */
00987 #define DW_DLA_RANGES 0x1d /* Dwarf_Ranges */
00988 /* 0x1e (30) to 0x34 (52) reserved for internal to libdwarf types. */

```

```
00999 /* .debug_gnu_typenames/pubnames, 2020 */
01000 #define DW_DLA_GNU_INDEX_HEAD 0x35
01001
01002 #define DW_DLA_RNGLISTS_HEAD 0x36 /* .debug_rnglists DW5 */
01003 #define DW_DLA_GDBINDEX 0x37 /* Dwarf_Gdbindex */
01004 #define DW_DLA_XU_INDEX 0x38 /* Dwarf_Xu_Index_Header */
01005 #define DW_DLA_LOC_BLOCK_C 0x39 /* Dwarf_Loc_c */
01006 #define DW_DLA_LOCDISC_C 0x3a /* Dwarf_Locdesc_c */
01007 #define DW_DLA_LOC_HEAD_C 0x3b /* Dwarf_Loc_Head_c */
01008 #define DW_DLA_MACRO_CONTEXT 0x3c /* Dwarf_Macro_Context */
01009 /* 0x3d (61) is for libdwarf internal use. */
01010 #define DW_DLA_DSC_HEAD 0x3e /* Dwarf_Dsc_Head */
01011 #define DW_DLA_DNAMES_HEAD 0x3f /* Dwarf_Dnames_Head */
01012
01013 /* struct Dwarf_Str_Offsets_Table_s */
01014 #define DW_DLA_STR_OFFSETS 0x40
01015 /* struct Dwarf_Debug_Addr_Table_s */
01016 #define DW_DLA_DEBUG_ADDR 0x41
01017
01018 /* libdwarf error numbers */
01019 #define DW_DLE_NE 0 /* no error */
01020 #define DW_DLE_VMM 1 /* dwarf format/library version mismatch */
01021 #define DW_DLE_MAP 2 /* memory map failure */
01022 #define DW_DLE_LEE 3 /* libelf error */
01023 #define DW_DLE_NDS 4 /* no debug section */
01024 #define DW_DLE_NLS 5 /* no line section */
01025 #define DW_DLE_ID 6 /* invalid descriptor for query */
01026 #define DW_DLE_IOF 7 /* I/O failure */
01027 #define DW_DLE_MAF 8 /* memory allocation failure */
01028 #define DW_DLE_IA 9 /* invalid argument */
01029 #define DW_DLE_MDE 10 /* mangled debugging entry */
01030 #define DW_DLE_MLE 11 /* mangled line number entry */
01031 #define DW_DLE_FNO 12 /* file not open */
01032 #define DW_DLE_FNR 13 /* file not a regular file */
01033 #define DW_DLE_FWA 14 /* file open with wrong access */
01034 #define DW_DLE_NOB 15 /* not an object file */
01035 #define DW_DLE_MOF 16 /* mangled object file header */
01036 #define DW_DLE_EOLL 17 /* end of location list entries */
01037 #define DW_DLE_NOLL 18 /* no location list section */
01038 #define DW_DLE_BADOFF 19 /* Invalid offset */
01039 #define DW_DLE_EOS 20 /* end of section */
01040 #define DW_DLE_ATRUNC 21 /* abbreviations section appears truncated */
01041 #define DW_DLE_BADBITC 22 /* Address size passed to dwarf bad */
01042 /* It is not an allowed size (64 or 32) */
01043 /* Error codes defined by the current Libdwarf Implementation. */
01044 #define DW_DLE_DBG_ALLOC 23
01045 #define DW_DLE_FSTAT_ERROR 24
01046 #define DW_DLE_FSTAT_MODE_ERROR 25
01047 #define DW_DLE_INIT_ACCESS_WRONG 26
01048 #define DW_DLE_ELF_BEGIN_ERROR 27
01049 #define DW_DLE_ELF_GETEHDR_ERROR 28
01050 #define DW_DLE_ELF_GETSHDR_ERROR 29
01051 #define DW_DLE_ELF_STRPTR_ERROR 30
01052 #define DW_DLE_DEBUG_INFO_DUPLICATE 31
01053 #define DW_DLE_DEBUG_INFO_NULL 32
01054 #define DW_DLE_DEBUG_ABBREV_DUPLICATE 33
01055 #define DW_DLE_DEBUG_ABBREV_NULL 34
01056 #define DW_DLE_DEBUG_ARANGES_DUPLICATE 35
01057 #define DW_DLE_DEBUG_ARANGES_NULL 36
01058 #define DW_DLE_DEBUG_LINE_DUPLICATE 37
01059 #define DW_DLE_DEBUG_LINE_NULL 38
01060 #define DW_DLE_DEBUG_LOC_DUPLICATE 39
01061 #define DW_DLE_DEBUG_LOC_NULL 40
01062 #define DW_DLE_DEBUG_MACINFO_DUPLICATE 41
01063 #define DW_DLE_DEBUG_MACINFO_NULL 42
01064 #define DW_DLE_DEBUG_PUBNAMES_DUPLICATE 43
01065 #define DW_DLE_DEBUG_PUBNAMES_NULL 44
01066 #define DW_DLE_DEBUG_STR_DUPLICATE 45
01067 #define DW_DLE_DEBUG_STR_NULL 46
01068 #define DW_DLE_CU_LENGTH_ERROR 47
01069 #define DW_DLE_VERSION_STAMP_ERROR 48
01070 #define DW_DLE_ABBREV_OFFSET_ERROR 49
01071 #define DW_DLE_ADDRESS_SIZE_ERROR 50
01072 #define DW_DLE_DEBUG_INFO_PTR_NULL 51
01073 #define DW_DLE_DIE_NULL 52
01074 #define DW_DLE_STRING_OFFSET_BAD 53
01075 #define DW_DLE_DEBUG_LINE_LENGTH_BAD 54
01076 #define DW_DLE_LINE_PROLOG_LENGTH_BAD 55
01077 #define DW_DLE_LINE_NUM_OPERANDS_BAD 56
01078 #define DW_DLE_LINE_SET_ADDR_ERROR 57
01079 #define DW_DLE_LINE_EXT_OPCODE_BAD 58
01080 #define DW_DLE_DWARF_LINE_NULL 59
01081 #define DW_DLE_INCL_DIR_NUM_BAD 60
01082 #define DW_DLE_LINE_FILE_NUM_BAD 61
01083 #define DW_DLE_ALLOC_FAIL 62
01084 #define DW_DLE_NO_CALLBACK_FUNC 63
01085 #define DW_DLE_SECT_ALLOC 64
01086 #define DW_DLE_FILE_ENTRY_ALLOC 65
```

```
01097 #define DW_DLE_LINE_ALLOC 66
01098 #define DW_DLE_FPGM_ALLOC 67
01099 #define DW_DLE_INCDIR_ALLOC 68
01100 #define DW_DLE_STRING_ALLOC 69
01101 #define DW_DLE_CHUNK_ALLOC 70
01102 #define DW_DLE_BYTEOFF_ERR 71
01103 #define DW_DLE_CIE_ALLOC 72
01104 #define DW_DLE_FDE_ALLOC 73
01105 #define DW_DLE_REGNO_OVFL 74
01106 #define DW_DLE_CIE_OFFS_ALLOC 75
01107 #define DW_DLE_WRONG_ADDRESS 76
01108 #define DW_DLE_EXTRA_NEIGHBORS 77
01109 #define DW_DLE_WRONG_TAG 78
01110 #define DW_DLE_DIE_ALLOC 79
01111 #define DW_DLE_PARENT_EXISTS 80
01112 #define DW_DLE_DBG_NULL 81
01113 #define DW_DLE_DEBUGLINE_ERROR 82
01114 #define DW_DLE_DEBUGFRAME_ERROR 83
01115 #define DW_DLE_DEBUGINFO_ERROR 84
01116 #define DW_DLE_ATTR_ALLOC 85
01117 #define DW_DLE_ABBREV_ALLOC 86
01118 #define DW_DLE_OFFSET_UFLW 87
01119 #define DW_DLE_ELF_SECT_ERR 88
01120 #define DW_DLE_DEBUG_FRAME_LENGTH_BAD 89
01121 #define DW_DLE_FRAME_VERSION_BAD 90
01122 #define DW_DLE_CIE_RET_ADDR_REG_ERROR 91
01123 #define DW_DLE_FDE_NULL 92
01124 #define DW_DLE_FDE_DBG_NULL 93
01125 #define DW_DLE_CIE_NULL 94
01126 #define DW_DLE_CIE_DBG_NULL 95
01127 #define DW_DLE_FRAME_TABLE_COL_BAD 96
01128 #define DW_DLE_PC_NOT_IN_FDE_RANGE 97
01129 #define DW_DLE_CIE_INSTR_EXEC_ERROR 98
01130 #define DW_DLE_FRAME_INSTR_EXEC_ERROR 99
01131 #define DW_DLE_FDE_PTR_NULL 100
01132 #define DW_DLE_RET_OP_LIST_NULL 101
01133 #define DW_DLE_LINE_CONTEXT_NULL 102
01134 #define DW_DLE_DBG_NO_CU_CONTEXT 103
01135 #define DW_DLE_DIE_NO_CU_CONTEXT 104
01136 #define DW_DLE_FIRST_DIE_NOT_CU 105
01137 #define DW_DLE_NEXT_DIE_PTR_NULL 106
01138 #define DW_DLE_DEBUG_FRAME_DUPLICATE 107
01139 #define DW_DLE_DEBUG_FRAME_NULL 108
01140 #define DW_DLE_ABBREV_DECODE_ERROR 109
01141 #define DW_DLE_DWARF_ABBREV_NULL 110
01142 #define DW_DLE_ATTR_NULL 111
01143 #define DW_DLE_DIE_BAD 112
01144 #define DW_DLE_DIE_ABBREV_BAD 113
01145 #define DW_DLE_ATTR_FORM_BAD 114
01146 #define DW_DLE_ATTR_NO_CU_CONTEXT 115
01147 #define DW_DLE_ATTR_FORM_SIZE_BAD 116
01148 #define DW_DLE_ATTR_DBG_NULL 117
01149 #define DW_DLE_BAD_REF_FORM 118
01150 #define DW_DLE_ATTR_FORM_OFFSET_BAD 119
01151 #define DW_DLE_LINE_OFFSET_BAD 120
01152 #define DW_DLE_DEBUG_STR_OFFSET_BAD 121
01153 #define DW_DLE_STRING_PTR_NULL 122
01154 #define DW_DLE_PUBNAMES_VERSION_ERROR 123
01155 #define DW_DLE_PUBNAMES_LENGTH_BAD 124
01156 #define DW_DLE_GLOBAL_NULL 125
01157 #define DW_DLE_GLOBAL_CONTEXT_NULL 126
01158 #define DW_DLE_DIR_INDEX_BAD 127
01159 #define DW_DLE_LOC_EXPR_BAD 128
01160 #define DW_DLE_DIE_LOC_EXPR_BAD 129
01161 #define DW_DLE_ADDR_ALLOC 130
01162 #define DW_DLE_OFFSET_BAD 131
01163 #define DW_DLE_MAKE_CU_CONTEXT_FAIL 132
01164 #define DW_DLE_REL_ALLOC 133
01165 #define DW_DLE_ARANGE_OFFSET_BAD 134
01166 #define DW_DLE_SEGMENT_SIZE_BAD 135
01167 #define DW_DLE_ARANGE_LENGTH_BAD 136
01168 #define DW_DLE_ARANGE_DECODE_ERROR 137
01169 #define DW_DLE_ARANGES_NULL 138
01170 #define DW_DLE_ARANGE_NULL 139
01171 #define DW_DLE_NO_FILE_NAME 140
01172 #define DW_DLE_NO_COMP_DIR 141
01173 #define DW_DLE_CU_ADDRESS_SIZE_BAD 142
01174 #define DW_DLE_INPUT_ATTR_BAD 143
01175 #define DW_DLE_EXPR_NULL 144
01176 #define DW_DLE_BAD_EXPR_OPCODE 145
01177 #define DW_DLE_EXPR_LENGTH_BAD 146
01178 #define DW_DLE_MULTIPLE_RELOC_IN_EXPR 147
01179 #define DW_DLE_ELF_GETIDENT_ERROR 148
01180 #define DW_DLE_NO_AT_MIPS_FDE 149
01181 #define DW_DLE_NO_CIE_FOR_FDE 150
01182 #define DW_DLE_DIE_ABBREV_LIST_NULL 151
01183 #define DW_DLE_DEBUG_FUNCNAMES_DUPLICATE 152
```

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01184 #define DW_DLE_DEBUG_FUNCNAMES_NULL 153
01185 #define DW_DLE_DEBUG_FUNCNAMES_VERSION_ERROR 154
01186 #define DW_DLE_DEBUG_FUNCNAMES_LENGTH_BAD 155
01187 #define DW_DLE_FUNC_NULL 156
01188 #define DW_DLE_FUNC_CONTEXT_NULL 157
01189 #define DW_DLE_DEBUG_TYPENAMES_DUPLICATE 158
01190 #define DW_DLE_DEBUG_TYPENAMES_NULL 159
01191 #define DW_DLE_DEBUG_TYPENAMES_VERSION_ERROR 160
01192 #define DW_DLE_DEBUG_TYPENAMES_LENGTH_BAD 161
01193 #define DW_DLE_TYPE_NULL 162
01194 #define DW_DLE_TYPE_CONTEXT_NULL 163
01195 #define DW_DLE_DEBUG_VARNAMES_DUPLICATE 164
01196 #define DW_DLE_DEBUG_VARNAMES_NULL 165
01197 #define DW_DLE_DEBUG_VARNAMES_VERSION_ERROR 166
01198 #define DW_DLE_DEBUG_VARNAMES_LENGTH_BAD 167
01199 #define DW_DLE_VAR_NULL 168
01200 #define DW_DLE_VAR_CONTEXT_NULL 169
01201 #define DW_DLE_DEBUG_WEAKNAMES_DUPLICATE 170
01202 #define DW_DLE_DEBUG_WEAKNAMES_NULL 171
01203 #define DW_DLE_DEBUG_WEAKNAMES_VERSION_ERROR 172
01204 #define DW_DLE_DEBUG_WEAKNAMES_LENGTH_BAD 173
01205 #define DW_DLE_WEAK_NULL 174
01206 #define DW_DLE_WEAK_CONTEXT_NULL 175
01207 #define DW_DLE_LOCDISC_COUNT_WRONG 176
01208 #define DW_DLE_MACINFO_STRING_NULL 177
01209 #define DW_DLE_MACINFO_STRING_EMPTY 178
01210 #define DW_DLE_MACINFO_INTERNAL_ERROR_SPACE 179
01211 #define DW_DLE_MACINFO_MALLOC_FAIL 180
01212 #define DW_DLE_DEBUGMACINFO_ERROR 181
01213 #define DW_DLE_DEBUG_MACRO_LENGTH_BAD 182
01214 #define DW_DLE_DEBUG_MACRO_MAX_BAD 183
01215 #define DW_DLE_DEBUG_MACRO_INTERNAL_ERR 184
01216 #define DW_DLE_DEBUG_MACRO_MALLOC_SPACE 185
01217 #define DW_DLE_DEBUG_MACRO_INCONSISTENT 186
01218 #define DW_DLE_DF_NO_CIE_AUGMENTATION 187
01219 #define DW_DLE_DF_REG_NUM_TOO_HIGH 188
01220 #define DW_DLE_DF_MAKE_INSTR_NO_INIT 189
01221 #define DW_DLE_DF_NEW_LOC_LESS_OLD_LOC 190
01222 #define DW_DLE_DF_POP_EMPTY_STACK 191
01223 #define DW_DLE_DF_ALLOC_FAIL 192
01224 #define DW_DLE_DF_FRAME_DECODING_ERROR 193
01225 #define DW_DLE_DEBUG_LOC_SECTION_SHORT 194
01226 #define DW_DLE_FRAME_AUGMENTATION_UNKNOWN 195
01227 #define DW_DLE_PUBTYPE_CONTEXT 196 /* Unused. */
01228 #define DW_DLE_DEBUG_PUBTYPES_LENGTH_BAD 197
01229 #define DW_DLE_DEBUG_PUBTYPES_VERSION_ERROR 198
01230 #define DW_DLE_DEBUG_PUBTYPES_DUPLICATE 199
01231 #define DW_DLE_FRAME_CIE_DECODE_ERROR 200
01232 #define DW_DLE_FRAME_REGISTER_UNREPRESENTABLE 201
01233 #define DW_DLE_FRAME_REGISTER_COUNT_MISMATCH 202
01234 #define DW_DLE_LINK_LOOP 203
01235 #define DW_DLE_STRP_OFFSET_BAD 204
01236 #define DW_DLE_DEBUG_RANGES_DUPLICATE 205
01237 #define DW_DLE_DEBUG_RANGES_OFFSET_BAD 206
01238 #define DW_DLE_DEBUG_RANGES_MISSING_END 207
01239 #define DW_DLE_DEBUG_RANGES_OUT_OF_MEM 208
01240 #define DW_DLE_DEBUG_SYMTAB_ERR 209
01241 #define DW_DLE_DEBUG_STRTAB_ERR 210
01242 #define DW_DLE_RELOC_MISMATCH_INDEX 211
01243 #define DW_DLE_RELOC_MISMATCH_RELOC_INDEX 212
01244 #define DW_DLE_RELOC_MISMATCH_STRTAB_INDEX 213
01245 #define DW_DLE_RELOC_SECTION_MISMATCH 214
01246 #define DW_DLE_RELOC_SECTION_MISSING_INDEX 215
01247 #define DW_DLE_RELOC_SECTION_LENGTH_ODD 216
01248 #define DW_DLE_RELOC_SECTION_PTR_NULL 217
01249 #define DW_DLE_RELOC_SECTION_MALLOC_FAIL 218
01250 #define DW_DLE_NO_ELF64_SUPPORT 219
01251 #define DW_DLE_MISSING_ELF64_SUPPORT 220
01252 #define DW_DLE_ORPHAN_FDE 221
01253 #define DW_DLE_DUPLICATE_INST_BLOCK 222
01254 #define DW_DLE_BAD_REF_SIG8_FORM 223
01255 #define DW_DLE_ATTR_EXPRLOC_FORM_BAD 224
01256 #define DW_DLE_FORM_SEC_OFFSET_LENGTH_BAD 225
01257 #define DW_DLE_NOT_REF_FORM 226
01258 #define DW_DLE_DEBUG_FRAME_LENGTH_NOT_MULTIPLE 227
01259 #define DW_DLE_REF_SIG8_NOT_HANDLED 228
01260 #define DW_DLE_DEBUG_FRAME_POSSIBLE_ADDRESS_BOTCH 229
01261 #define DW_DLE_LOC_BAD_TERMINATION 230
01262 #define DW_DLE_SYMTAB_SECTION_LENGTH_ODD 231
01263 #define DW_DLE_RELOC_SECTION_SYMBOL_INDEX_BAD 232
01264 #define DW_DLE_RELOC_SECTION_RELOC_TARGET_SIZE_UNKNOWN 233
01265 #define DW_DLE_SYMTAB_SECTION_ENTRY_SIZE_ZERO 234
01266 #define DW_DLE_LINE_NUMBER_HEADER_ERROR 235
01267 #define DW_DLE_DEBUG_TYPES_NULL 236
01268 #define DW_DLE_DEBUG_TYPES_DUPLICATE 237
01269 #define DW_DLE_DEBUG_TYPES_ONLY_DWARF4 238
01270 #define DW_DLE_DEBUG_TYPEOFFSET_BAD 239

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01271 #define DW_DLE_GNU_OPCODE_ERROR 240
01272 #define DW_DLE_DEBUGPUPTYPES_ERROR 241
01273 #define DW_DLE_AT_FIXUP_NULL 242
01274 #define DW_DLE_AT_FIXUP_DUP 243
01275 #define DW_DLE_BAD_ABINAME 244
01276 #define DW_DLE_TOO_MANY_DEBUG 245
01277 #define DW_DLE_DEBUG_STR_OFFSETS_DUPLICATE 246
01278 #define DW_DLE_SECTION_DUPLICATION 247
01279 #define DW_DLE_SECTION_ERROR 248
01280 #define DW_DLE_DEBUG_ADDR_DUPLICATE 249
01281 #define DW_DLE_DEBUG_CU_UNAVAILABLE_FOR_FORM 250
01282 #define DW_DLE_DEBUG_FORM_HANDLING_INCOMPLETE 251
01283 #define DW_DLE_NEXT_DIE_PAST_END 252
01284 #define DW_DLE_NEXT_DIE_WRONG_FORM 253
01285 #define DW_DLE_NEXT_DIE_NO_ABBREV_LIST 254
01286 #define DW_DLE_NESTED_FORM_INDIRECT_ERROR 255
01287 #define DW_DLE_CU_DIE_NO_ABBREV_LIST 256
01288 #define DW_DLE_MISSING_NEEDED_DEBUG_ADDR_SECTION 257
01289 #define DW_DLE_ATTR_FORM_NOT_ADDR_INDEX 258
01290 #define DW_DLE_ATTR_FORM_NOT_STR_INDEX 259
01291 #define DW_DLE_DUPLICATE_GDB_INDEX 260
01292 #define DW_DLE_ERRONEOUS_GDB_INDEX_SECTION 261
01293 #define DW_DLE_GDB_INDEX_COUNT_ERROR 262
01294 #define DW_DLE_GDB_INDEX_COUNT_ADDR_ERROR 263
01295 #define DW_DLE_GDB_INDEX_INDEX_ERROR 264
01296 #define DW_DLE_GDB_INDEX_CUVEC_ERROR 265
01297 #define DW_DLE_DUPLICATE_CU_INDEX 266
01298 #define DW_DLE_DUPLICATE_TU_INDEX 267
01299 #define DW_DLE_XU_TYPE_ARG_ERROR 268
01300 #define DW_DLE_XU_IMPOSSIBLE_ERROR 269
01301 #define DW_DLE_XU_NAME_COL_ERROR 270
01302 #define DW_DLE_XU_HASH_ROW_ERROR 271
01303 #define DW_DLE_XU_HASH_INDEX_ERROR 272
01304 /* ..._FAILSAFE_ERRVAL is an aid when out of memory. */
01305 #define DW_DLE_FAILSAFE_ERRVAL 273
01306 #define DW_DLE_ARANGE_ERROR 274
01307 #define DW_DLE_PUBNAMES_ERROR 275
01308 #define DW_DLE_FUNCNAMES_ERROR 276
01309 #define DW_DLE_TYPENAMES_ERROR 277
01310 #define DW_DLE_VARNAMES_ERROR 278
01311 #define DW_DLE_WEAKNAMES_ERROR 279
01312 #define DW_DLE_RELOCS_ERROR 280
01313 #define DW_DLE_ATTR_OUTSIDE_SECTION 281
01314 #define DW_DLE_FFISSION_INDEX_WRONG 282
01315 #define DW_DLE_FFISSION_VERSION_ERROR 283
01316 #define DW_DLE_NEXT_DIE_LOW_ERROR 284
01317 #define DW_DLE_CU_UT_TYPE_ERROR 285
01318 #define DW_DLE_NO_SUCH_SIGNATURE_FOUND 286
01319 #define DW_DLE_SIGNATURE_SECTION_NUMBER_WRONG 287
01320 #define DW_DLE_ATTR_FORM_NOT_DATA8 288
01321 #define DW_DLE_SIG_TYPE_WRONG_STRING 289
01322 #define DW_DLE_MISSING_REQUIRED_TU_OFFSET_HASH 290
01323 #define DW_DLE_MISSING_REQUIRED_CU_OFFSET_HASH 291
01324 #define DW_DLE_DWP_MISSING_DWO_ID 292
01325 #define DW_DLE_DWP_SIBLING_ERROR 293
01326 #define DW_DLE_DEBUG_FFISSION_INCOMPLETE 294
01327 #define DW_DLE_FFISSION_SECNUM_ERR 295
01328 #define DW_DLE_DEBUG_MACRO_DUPLICATE 296
01329 #define DW_DLE_DEBUG_NAMES_DUPLICATE 297
01330 #define DW_DLE_DEBUG_LINE_STR_DUPLICATE 298
01331 #define DW_DLE_DEBUG_SUP_DUPLICATE 299
01332 #define DW_DLE_NO_SIGNATURE_TO_LOOKUP 300
01333 #define DW_DLE_NO_TIED_ADDR_AVAILABLE 301
01334 #define DW_DLE_NO_TIED_SIG_AVAILABLE 302
01335 #define DW_DLE_STRING_NOT_TERMINATED 303
01336 #define DW_DLE_BAD_LINE_TABLE_OPERATION 304
01337 #define DW_DLE_LINE_CONTEXT_BOTCH 305
01338 #define DW_DLE_LINE_CONTEXT_INDEX_WRONG 306
01339 #define DW_DLE_NO_TIED_STRING_AVAILABLE 307
01340 #define DW_DLE_NO_TIED_FILE_AVAILABLE 308
01341 #define DW_DLE_CU_TYPE_MISSING 309
01342 #define DW_DLE_LLE_CODE_UNKNOWN 310
01343 #define DW_DLE_LOCLIST_INTERFACE_ERROR 311
01344 #define DW_DLE_LOCLIST_INDEX_ERROR 312
01345 #define DW_DLE_INTERFACE_NOT_SUPPORTED 313
01346 #define DW_DLE_ZDEBUG_REQUIRES_ZLIB 314
01347 #define DW_DLE_ZDEBUG_INPUT_FORMAT_ODD 315
01348 #define DW_DLE_ZLIB_BUF_ERROR 316
01349 #define DW_DLE_ZLIB_DATA_ERROR 317
01350 #define DW_DLE_MACRO_OFFSET_BAD 318
01351 #define DW_DLE_MACRO_OPCODE_BAD 319
01352 #define DW_DLE_MACRO_OPCODE_FORM_BAD 320
01353 #define DW_DLE_UNKNOWN_FORM 321
01354 #define DW_DLE_BAD_MACRO_HEADER_POINTER 322
01355 #define DW_DLE_BAD_MACRO_INDEX 323
01356 #define DW_DLE_MACRO_OP_UNHANDLED 324
01357 #define DW_DLE_MACRO_PAST_END 325

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01358 #define DW_DLE_LINE_STRP_OFFSET_BAD 326
01359 #define DW_DLE_STRING_FORM_IMPROPER 327
01360 #define DW_DLE_ELF_FLAGS_NOT_AVAILABLE 328
01361 #define DW_DLE_LEB_IMPROPER 329
01362 #define DW_DLE_DEBUG_LINE_RANGE_ZERO 330
01363 #define DW_DLE_READ_LITTLEENDIAN_ERROR 331
01364 #define DW_DLE_READ_BIGENDIAN_ERROR 332
01365 #define DW_DLE_RELOC_INVALID 333
01366 #define DW_DLE_INFO_HEADER_ERROR 334
01367 #define DW_DLE_ARANGES_HEADER_ERROR 335
01368 #define DW_DLE_LINE_OFFSET_WRONG_FORM 336
01369 #define DW_DLE_FORM_BLOCK_LENGTH_ERROR 337
01370 #define DW_DLE_ZLIB_SECTION_SHORT 338
01371 #define DW_DLE_CIE_INSTR_PTR_ERROR 339
01372 #define DW_DLE_FDE_INSTR_PTR_ERROR 340
01373 #define DW_DLE_FISSION_ADDITION_ERROR 341
01374 #define DW_DLE_HEADER_LEN_BIGGER_THAN_SECSIZE 342
01375 #define DW_DLE_LOCEXPRESS_OFF_SECTION_END 343
01376 #define DW_DLE_POINTER_SECTION_UNKNOWN 344
01377 #define DW_DLE_ERRONEOUS_XU_INDEX_SECTION 345
01378 #define DW_DLE_DIRECTORY_FORMAT_COUNT_VS_DIRECTORIES_MISMATCH 346
01379 #define DW_DLE_COMPRESSED_EMPTY_SECTION 347
01380 #define DW_DLE_SIZE_WRAPAROUND 348
01381 #define DW_DLE_ILLOGICAL_TSEARCH 349
01382 #define DW_DLE_BAD_STRING_FORM 350
01383 #define DW_DLE_DEBUGSTR_ERROR 351
01384 #define DW_DLE_DEBUGSTR_UNEXPECTED_REL 352
01385 #define DW_DLE_DISCR_ARRAY_ERROR 353
01386 #define DW_DLE_LEB_OUT_ERROR 354
01387 #define DW_DLE_SIBLING_LIST_IMPROPER 355
01388 #define DW_DLE_LOCLIST_OFFSET_BAD 356
01389 #define DW_DLE_LINE_TABLE_BAD 357
01390 #define DW_DLE_DEBUG_LOCLISTS_DUPLICATE 358
01391 #define DW_DLE_DEBUG_RNGLISTS_DUPLICATE 359
01392 #define DW_DLE_ABBREVE_OFF_END 360
01393 #define DW_DLE_FORM_STRING_BAD_STRING 361
01394 #define DW_DLE_AUGMENTATION_STRING_OFF_END 362
01395 #define DW_DLE_STRING_OFF_END_PUBNAMES_LIKE 363
01396 #define DW_DLE_LINE_STRING_BAD 364
01397 #define DW_DLE_DEFINE_FILE_STRING_BAD 365
01398 #define DW_DLE_MACRO_STRING_BAD 366
01399 #define DW_DLE_MACINFO_STRING_BAD 367
01400 #define DW_DLE_ZLIB_UNCOMPRESS_ERROR 368
01401 #define DW_DLE_IMPROPER_DWO_ID 369
01402 #define DW_DLE_GROUPNUMBER_ERROR 370
01403 #define DW_DLE_ADDRESS_SIZE_ZERO 371
01404 #define DW_DLE_DEBUG_NAMES_HEADER_ERROR 372
01405 #define DW_DLE_DEBUG_NAMES_AUG_STRING_ERROR 373
01406 #define DW_DLE_DEBUG_NAMES_PAD_NON_ZERO 374
01407 #define DW_DLE_DEBUG_NAMES_OFF_END 375
01408 #define DW_DLE_DEBUG_NAMES_ABBREVE_OVERFLOW 376
01409 #define DW_DLE_DEBUG_NAMES_ABBREVE_CORRUPTION 377
01410 #define DW_DLE_DEBUG_NAMES_NULL_POINTER 378
01411 #define DW_DLE_DEBUG_NAMES_BAD_INDEX_ARG 379
01412 #define DW_DLE_DEBUG_NAMES_ENTRYPOOL_OFFSET 380
01413 #define DW_DLE_DEBUG_NAMES_UNHANDLED_FORM 381
01414 #define DW_DLE_LNCT_CODE_UNKNOWN 382
01415 #define DW_DLE_LNCT_FORM_CODE_NOT_HANDLED 383
01416 #define DW_DLE_LINE_HEADER_LENGTH_BOTCH 384
01417 #define DW_DLE_STRING_HASHTAB_IDENTITY_ERROR 385
01418 #define DW_DLE_UNIT_TYPE_NOT_HANDLED 386
01419 #define DW_DLE_GROUP_MAP_ALLOC 387
01420 #define DW_DLE_GROUP_MAP_DUPLICATE 388
01421 #define DW_DLE_GROUP_COUNT_ERROR 389
01422 #define DW_DLE_GROUP_INTERNAL_ERROR 390
01423 #define DW_DLE_GROUP_LOAD_ERROR 391
01424 #define DW_DLE_GROUP_LOAD_READ_ERROR 392
01425 #define DW_DLE_AUG_DATA_LENGTH_BAD 393
01426 #define DW_DLE_ABBREVE_MISSING 394
01427 #define DW_DLE_NO_TAG_FOR_DIE 395
01428 #define DW_DLE_LOWPC_WRONG_CLASS 396
01429 #define DW_DLE_HIGHPC_WRONG_FORM 397
01430 #define DW_DLE_STR_OFFSETS_BASE_WRONG_FORM 398
01431 #define DW_DLE_DATA16_OUTSIDE_SECTION 399
01432 #define DW_DLE_LNCT_MD5_WRONG_FORM 400
01433 #define DW_DLE_LINE_HEADER_CORRUPT 401
01434 #define DW_DLE_STR_OFFSETS_NULLARGUMENT 402
01435 #define DW_DLE_STR_OFFSETS_NULL_DBG 403
01436 #define DW_DLE_STR_OFFSETS_NO_MAGIC 404
01437 #define DW_DLE_STR_OFFSETS_ARRAY_SIZE 405
01438 #define DW_DLE_STR_OFFSETS_VERSION_WRONG 406
01439 #define DW_DLE_STR_OFFSETS_ARRAY_INDEX_WRONG 407
01440 #define DW_DLE_STR_OFFSETS_EXTRA_BYTES 408
01441 #define DW_DLE_DUP_ATTR_ON_DIE 409
01442 #define DW_DLE_SECTION_NAME_BIG 410
01443 #define DW_DLE_FILE_UNAVAILABLE 411
01444 #define DW_DLE_FILE_WRONG_TYPE 412
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01445 #define DW_DLE_SIBLING_OFFSET_WRONG 413
01446 #define DW_DLE_OPEN_FAIL 414
01447 #define DW_DLE_OFFSET_SIZE 415
01448 #define DW_DLE_MACH_O_SEGOFFSET_BAD 416
01449 #define DW_DLE_FILE_OFFSET_BAD 417
01450 #define DW_DLE_SEEK_ERROR 418
01451 #define DW_DLE_READ_ERROR 419
01452 #define DW_DLE_ELF_CLASS_BAD 420
01453 #define DW_DLE_ELF_ENDIAN_BAD 421
01454 #define DW_DLE_ELF_VERSION_BAD 422
01455 #define DW_DLE_FILE_TOO_SMALL 423
01456 #define DW_DLE_PATH_SIZE_TOO_SMALL 424
01457 #define DW_DLE_BAD_TYPE_SIZE 425
01458 #define DW_DLE_PE_SIZE_SMALL 426
01459 #define DW_DLE_PE_OFFSET_BAD 427
01460 #define DW_DLE_PE_STRING_TOO_LONG 428
01461 #define DW_DLE_IMAGE_FILE_UNKNOWN_TYPE 429
01462 #define DW_DLE_LINE_TABLE_LINENO_ERROR 430
01463 #define DW_DLE_PRODUCER_CODE_NOT_AVAILABLE 431
01464 #define DW_DLE_NO_ELF_SUPPORT 432
01465 #define DW_DLE_NO_STREAM_RELOC_SUPPORT 433
01466 #define DW_DLE_RETURN_EMPTY_PUBNAMES_ERROR 434
01467 #define DW_DLE_SECTION_SIZE_ERROR 435
01468 #define DW_DLE_INTERNAL_NULL_POINTER 436
01469 #define DW_DLE_SECTION_STRING_OFFSET_BAD 437
01470 #define DW_DLE_SECTION_INDEX_BAD 438
01471 #define DW_DLE_INTEGER_TOO_SMALL 439
01472 #define DW_DLE_ELF_SECTION_LINK_ERROR 440
01473 #define DW_DLE_ELF_SECTION_GROUP_ERROR 441
01474 #define DW_DLE_ELF_SECTION_COUNT_MISMATCH 442
01475 #define DW_DLE_ELF_STRING_SECTION_MISSING 443
01476 #define DW_DLE_SEEK_OFF_END 444
01477 #define DW_DLE_READ_OFF_END 445
01478 #define DW_DLE_ELF_SECTION_ERROR 446
01479 #define DW_DLE_ELF_STRING_SECTION_ERROR 447
01480 #define DW_DLE_MIXING_SPLIT_DWARF_VERSIONS 448
01481 #define DW_DLE_TAG_CORRUPT 449
01482 #define DW_DLE_FORM_CORRUPT 450
01483 #define DW_DLE_ATTR_CORRUPT 451
01484 #define DW_DLE_ABBREV_ATTR_DUPLICATION 452
01485 #define DW_DLE_DWP_SIGNATURE_MISMATCH 453
01486 #define DW_DLE_CU_UT_TYPE_VALUE 454
01487 #define DW_DLE_DUPLICATE_GNU_DEBUGLINK 455
01488 #define DW_DLE_CORRUPT_GNU_DEBUGLINK 456
01489 #define DW_DLE_CORRUPT_NOTE_GNU_DEBUGID 457
01490 #define DW_DLE_CORRUPT_GNU_DEBUGID_SIZE 458
01491 #define DW_DLE_CORRUPT_GNU_DEBUGID_STRING 459
01492 #define DW_DLE_HEX_STRING_ERROR 460
01493 #define DW_DLE_DECIMAL_STRING_ERROR 461
01494 #define DW_DLE_PRO_INIT_EXTRAS_UNKNOWN 462
01495 #define DW_DLE_PRO_INIT_EXTRAS_ERR 463
01496 #define DW_DLE_NULL_ARGS_DWARF_ADD_PATH 464
01497 #define DW_DLE_DWARF_INIT_DBG_NULL 465
01498 #define DW_DLE_ELF_RELOC_SECTION_ERROR 466
01499 #define DW_DLE_USER_DECLARED_ERROR 467
01500 #define DW_DLE_RNGLISTS_ERROR 468
01501 #define DW_DLE_LOCLISTS_ERROR 469
01502 #define DW_DLE_SECTION_SIZE_OR_OFFSET_LARGE 470
01503 #define DW_DLE_GDBINDEX_STRING_ERROR 471
01504 #define DW_DLE_GNU_PUBNAMES_ERROR 472
01505 #define DW_DLE_GNU_PUBTYPES_ERROR 473
01506 #define DW_DLE_DUPLICATE_GNU_DEBUG_PUBNAMES 474
01507 #define DW_DLE_DUPLICATE_GNU_DEBUG_PUBTYPES 475
01508 #define DW_DLE_DEBUG_SUP_STRING_ERROR 476
01509 #define DW_DLE_DEBUG_SUP_ERROR 477
01510 #define DW_DLE_LOCATION_ERROR 478
01511 #define DW_DLE_DEBUGLINK_PATH_SHORT 479
01512 #define DW_DLE_SIGNATURE_MISMATCH 480
01513 #define DW_DLE_MACRO_VERSION_ERROR 481
01514 #define DW_DLE_NEGATIVE_SIZE 482
01515 #define DW_DLE_UDATA_VALUE_NEGATIVE 483
01516 #define DW_DLE_DEBUG_NAMES_ERROR 484
01517 #define DW_DLE_CFA_INSTRUCTION_ERROR 485
01518 #define DW_DLE_MACHO_CORRUPT_HEADER 486
01519 #define DW_DLE_MACHO_CORRUPT_COMMAND 487
01520 #define DW_DLE_MACHO_CORRUPT_SECTIONDETAILS 488
01521 #define DW_DLE_RELOCATION_SECTION_SIZE_ERROR 489
01522 #define DW_DLE_SYMBOL_SECTION_SIZE_ERROR 490
01523 #define DW_DLE_PE_SECTION_SIZE_ERROR 491
01524 #define DW_DLE_DEBUG_ADDR_ERROR 492
01525 #define DW_DLE_NO_SECT_STRINGS 493
01526 #define DW_DLE_TOO_FEW_SECTIONS 494
01527 #define DW_DLE_BUILD_ID_DESCRIPTION_SIZE 495
01528 #define DW_DLE_BAD_SECTION_FLAGS 496
01529 #define DW_DLE_IMPROPER_SECTION_ZERO 497
01530 #define DW_DLE_INVALID_NULL_ARGUMENT 498
01531 #define DW_DLE_LINE_INDEX_WRONG 499
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01532 #define DW_DLE_LINE_COUNT_WRONG 500
01533 #define DW_DLE_ARITHMETIC_OVERFLOW 501
01534 #define DW_DLE_UNIVERSAL_BINARY_ERROR 502
01535 #define DW_DLE_UNIV_BIN_OFFSET_SIZE_ERROR 503
01536 #define DW_DLE_PE_SECTION_SIZE_HEURISTIC_FAIL 504
01537 #define DW_DLE_LLE_ERROR 505
01538 #define DW_DLE_RLE_ERROR 506
01539 #define DW_DLE_MACHO_SEGMENT_COUNT_HEURISTIC_FAIL 507
01540
01542 #define DW_DLE_LAST 507
01543 #define DW_DLE_LO_USER 0x10000
01608 DW_API int dwarf_init_path(const char * dw_path,
01609     char * dw_true_path_out_buffer,
01610     unsigned int dw_true_path_bufferlen,
01611     unsigned int dw_groupnumber,
01612     Dwarf_Handler dw_errhand,
01613     Dwarf_Ptr dw_errarg,
01614     Dwarf_Debug* dw_dbg,
01615     Dwarf_Error* dw_error);
01616
01629 DW_API int dwarf_init_path_a(const char * dw_path,
01630     char * dw_true_path_out_buffer,
01631     unsigned int dw_true_path_bufferlen,
01632     unsigned int dw_groupnumber,
01633     unsigned int dw_universalnumber,
01634     Dwarf_Handler dw_errhand,
01635     Dwarf_Ptr dw_errarg,
01636     Dwarf_Debug* dw_dbg,
01637     Dwarf_Error* dw_error);
01638
01695 DW_API int dwarf_init_path_dl(const char * dw_path,
01696     char * dw_true_path_out_buffer,
01697     unsigned int dw_true_path_bufferlen,
01698     unsigned int dw_groupnumber,
01699     Dwarf_Handler dw_errhand,
01700     Dwarf_Ptr dw_errarg,
01701     Dwarf_Debug* dw_dbg,
01702     char ** dw_dl_path_array,
01703     unsigned int dw_dl_path_array_size,
01704     unsigned char * dw_dl_path_source,
01705     Dwarf_Error* dw_error);
01706
01723 DW_API int dwarf_init_path_dl_a(const char * dw_path,
01724     char * dw_true_path_out_buffer,
01725     unsigned int dw_true_path_bufferlen,
01726     unsigned int dw_groupnumber,
01727     unsigned int dw_universalnumber,
01728     Dwarf_Handler dw_errhand,
01729     Dwarf_Ptr dw_errarg,
01730     Dwarf_Debug* dw_dbg,
01731     char ** dw_dl_path_array,
01732     unsigned int dw_dl_path_array_size,
01733     unsigned char * dw_dl_path_source,
01734     Dwarf_Error* dw_error);
01735
01769 DW_API int dwarf_init_b(int dw_fd,
01770     unsigned int dw_groupnumber,
01771     Dwarf_Handler dw_errhand,
01772     Dwarf_Ptr dw_errarg,
01773     Dwarf_Debug* dw_dbg,
01774     Dwarf_Error* dw_error);
01775
01791 DW_API int dwarf_finish(Dwarf_Debug dw_dbg);
01792
01826 DW_API int dwarf_object_init_b(Dwarf_Obj_Access_Interface_a* dw_obj,
01827     Dwarf_Handler dw_errhand,
01828     Dwarf_Ptr dw_errarg,
01829     unsigned int dw_groupnumber,
01830     Dwarf_Debug* dw_dbg,
01831     Dwarf_Error* dw_error);
01832
01847 DW_API int dwarf_object_finish(Dwarf_Debug dw_dbg);
01848
01879 DW_API int dwarf_set_tied_dbg(Dwarf_Debug dw_split_dbg,
01880     Dwarf_Debug dw_tied_dbg,
01881     Dwarf_Error* dw_error);
01882
01916 DW_API int dwarf_get_tied_dbg(Dwarf_Debug dw_dbg,
01917     Dwarf_Debug * dw_tieddbg_out,
01918     Dwarf_Error * dw_error);
01999 DW_API int dwarf_next_cu_header_e(Dwarf_Debug dw_dbg,
02000     Dwarf_Bool dw_is_info,
02001     Dwarf_Die *dw_cu_die,
02002     Dwarf_Unsigned *dw_cu_header_length,
02003     Dwarf_Half *dw_version_stamp,
02004     Dwarf_Off *dw_abbrev_offset,
02005     Dwarf_Half *dw_address_size,

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02006 Dwarf_Half *dw_length_size,
02007 Dwarf_Half *dw_extension_size,
02008 Dwarf_Sig8 *dw_type_signature,
02009 Dwarf_Unsigned *dw_typeoffset,
02010 Dwarf_Unsigned *dw_next_cu_header_offset,
02011 Dwarf_Half *dw_header_cu_type,
02012 Dwarf_Error *dw_error);
02013
02044 DW_API int dwarf_next_cu_header_d(Dwarf_Debug dw_dbg,
02045 Dwarf_Bool dw_is_info,
02046 Dwarf_Unsigned *dw_cu_header_length,
02047 Dwarf_Half *dw_version_stamp,
02048 Dwarf_Off *dw_abbrev_offset,
02049 Dwarf_Half *dw_address_size,
02050 Dwarf_Half *dw_length_size,
02051 Dwarf_Half *dw_extension_size,
02052 Dwarf_Sig8 *dw_type_signature,
02053 Dwarf_Unsigned *dw_typeoffset,
02054 Dwarf_Unsigned *dw_next_cu_header_offset,
02055 Dwarf_Half *dw_header_cu_type,
02056 Dwarf_Error *dw_error);
02057
02073 DW_API int dwarf_siblingof_c(Dwarf_Die dw_die,
02074 Dwarf_Die *dw_return_siblingdie,
02075 Dwarf_Error *dw_error);
02076
02111 DW_API int dwarf_siblingof_b(Dwarf_Debug dw_dbg,
02112 Dwarf_Die dw_die,
02113 Dwarf_Bool dw_is_info,
02114 Dwarf_Die *dw_return_siblingdie,
02115 Dwarf_Error *dw_error);
02116
02157 DW_API int dwarf_cu_header_basics(Dwarf_Die dw_die,
02158 Dwarf_Half *dw_version,
02159 Dwarf_Bool *dw_is_info,
02160 Dwarf_Bool *dw_is_dwo,
02161 Dwarf_Half *dw_offset_size,
02162 Dwarf_Half *dw_address_size,
02163 Dwarf_Half *dw_extension_size,
02164 Dwarf_Sig8 **dw_signature,
02165 Dwarf_Off *dw_offset_of_length,
02166 Dwarf_Unsigned *dw_total_byte_length,
02167 Dwarf_Error *dw_error);
02168
02188 DW_API int dwarf_child(Dwarf_Die dw_die,
02189 Dwarf_Die* dw_return_childdie,
02190 Dwarf_Error* dw_error);
02191
02199 DW_API void dwarf_dealloc_die(Dwarf_Die dw_die);
02200
02218 DW_API int dwarf_die_from_hash_signature(Dwarf_Debug dw_dbg,
02219 Dwarf_Sig8 * dw_hash_sig,
02220 const char * dw_sig_type,
02221 Dwarf_Die* dw_returned_CU_die,
02222 Dwarf_Error* dw_error);
02223
02254 DW_API int dwarf_offdie_b(Dwarf_Debug dw_dbg,
02255 Dwarf_Off dw_offset,
02256 Dwarf_Bool dw_is_info,
02257 Dwarf_Die* dw_return_die,
02258 Dwarf_Error* dw_error);
02259
02281 DW_API int dwarf_find_die_given_sig8(Dwarf_Debug dw_dbg,
02282 Dwarf_Sig8 *dw_ref,
02283 Dwarf_Die *dw_die_out,
02284 Dwarf_Bool *dw_is_info,
02285 Dwarf_Error *dw_error);
02286
02297 DW_API Dwarf_Bool dwarf_get_die_infotypes_flag(Dwarf_Die dw_die);
02327 DW_API int dwarf_die_abbrev_global_offset(Dwarf_Die dw_die,
02328 Dwarf_Off * dw_abbrev_offset,
02329 Dwarf_Unsigned * dw_abbrev_count,
02330 Dwarf_Error* dw_error);
02331
02342 DW_API int dwarf_tag(Dwarf_Die dw_die,
02343 Dwarf_Half* dw_return_tag,
02344 Dwarf_Error* dw_error);
02345
02358 DW_API int dwarf_dieoffset(Dwarf_Die dw_die,
02359 Dwarf_Off* dw_return_offset,
02360 Dwarf_Error* dw_error);
02361
02380 DW_API int dwarf_debug_addr_index_to_addr(Dwarf_Die dw_die,
02381 Dwarf_Unsigned dw_index,
02382 Dwarf_Addr * dw_return_addr,
02383 Dwarf_Error * dw_error);
02384

```

```

02393 DW_API Dwarf_Bool dwarf_addr_form_is_indexed(int dw_form);
02394
02418 DW_API int dwarf_CU_dieoffset_given_die(Dwarf_Die dw_die,
02419     Dwarf_Off* dw_return_offset,
02420     Dwarf_Error* dw_error);
02421
02442 DW_API int dwarf_get_cu_die_offset_given_cu_header_offset_b(
02443     Dwarf_Debug dw_dbg,
02444     Dwarf_Off dw_in_cu_header_offset,
02445     Dwarf_Bool dw_is_info,
02446     Dwarf_Off * dw_out_cu_die_offset,
02447     Dwarf_Error *dw_error);
02448
02466 DW_API int dwarf_die_CU_offset(Dwarf_Die dw_die,
02467     Dwarf_Off* dw_return_offset,
02468     Dwarf_Error* dw_error);
02469
02490 DW_API int dwarf_die_CU_offset_range(Dwarf_Die dw_die,
02491     Dwarf_Off* dw_return_CU_header_offset,
02492     Dwarf_Off* dw_return_CU_length_bytes,
02493     Dwarf_Error* dw_error);
02494
02512 DW_API int dwarf_attr(Dwarf_Die dw_die,
02513     Dwarf_Half dw_attrnum,
02514     Dwarf_Attribute * dw_returned_attr,
02515     Dwarf_Error* dw_error);
02516
02538 DW_API int dwarf_die_text(Dwarf_Die dw_die,
02539     Dwarf_Half dw_attrnum,
02540     char ** dw_ret_name,
02541     Dwarf_Error * dw_error);
02542
02562 DW_API int dwarf_diename(Dwarf_Die dw_die,
02563     char ** dw_diename,
02564     Dwarf_Error* dw_error);
02565
02583 DW_API Dwarf_Unsigned dwarf_die_abbrev_code(Dwarf_Die dw_die);
02584
02598 DW_API int dwarf_die_abbrev_children_flag(Dwarf_Die dw_die,
02599     Dwarf_Half * dw_ab_has_child);
02600
02624 DW_API int dwarf_validate_die_sibling(Dwarf_Die dw_sibling,
02625     Dwarf_Off* dw_offset);
02626
02627 /* convenience functions, alternative to using dwarf_attrlist */
02628
02647 DW_API int dwarf_hasattr(Dwarf_Die dw_die,
02648     Dwarf_Half dw_attrnum,
02649     Dwarf_Bool * dw_returned_bool,
02650     Dwarf_Error* dw_error);
02651
02687 DW_API int dwarf_offset_list(Dwarf_Debug dw_dbg,
02688     Dwarf_Off dw_offset,
02689     Dwarf_Bool dw_is_info,
02690     Dwarf_Off ** dw_offbuf,
02691     Dwarf_Unsigned * dw_offcount,
02692     Dwarf_Error * dw_error);
02693
02706 DW_API int dwarf_get_die_address_size(Dwarf_Die dw_die,
02707     Dwarf_Half * dw_addr_size,
02708     Dwarf_Error * dw_error);
02709
02710 /* Get both offsets (local and global) */
02730 DW_API int dwarf_die_offsets(Dwarf_Die dw_die,
02731     Dwarf_Off* dw_global_offset,
02732     Dwarf_Off* dw_local_offset,
02733     Dwarf_Error* dw_error);
02734
02751 DW_API int dwarf_get_version_of_die(Dwarf_Die dw_die,
02752     Dwarf_Half * dw_version,
02753     Dwarf_Half * dw_offset_size);
02754
02768 DW_API int dwarf_lowpc(Dwarf_Die dw_die,
02769     Dwarf_Addr * dw_returned_addr,
02770     Dwarf_Error* dw_error);
02771
02803 DW_API int dwarf_highpc_b(Dwarf_Die dw_die,
02804     Dwarf_Addr * dw_return_addr,
02805     Dwarf_Half * dw_return_form,
02806     enum Dwarf_Form_Class * dw_return_class,
02807     Dwarf_Error * dw_error);
02808
02834 DW_API int dwarf_dietype_offset(Dwarf_Die dw_die,
02835     Dwarf_Off * dw_return_offset,
02836     Dwarf_Bool * dw_is_info,
02837     Dwarf_Error * dw_error);
02838

```

```
02850 DW_API int dwarf_bytesize(Dwarf_Die dw_die,
02851     Dwarf_Unsigned * dw_returned_size,
02852     Dwarf_Error*    dw_error);
02853
02865 DW_API int dwarf_bitsize(Dwarf_Die dw_die,
02866     Dwarf_Unsigned * dw_returned_size,
02867     Dwarf_Error*    dw_error);
02868
02889 DW_API int dwarf_bitoffset(Dwarf_Die dw_die,
02890     Dwarf_Half * dw_attrnum,
02891     Dwarf_Unsigned * dw_returned_offset,
02892     Dwarf_Error*    dw_error);
02893
02907 DW_API int dwarf_srclang(Dwarf_Die dw_die,
02908     Dwarf_Unsigned * dw_returned_lang,
02909     Dwarf_Error * dw_error);
02910
02931 DW_API int dwarf_language_version_string(
02932     Dwarf_Unsigned dw_lang_name,
02933     int * dw_default_lower_bound,
02934     const char **dw_version_string);
02935
02948 DW_API int dwarf_arrayorder(Dwarf_Die dw_die,
02949     Dwarf_Unsigned * dw_returned_order,
02950     Dwarf_Error*    dw_error);
02980 DW_API int dwarf_attrlist(Dwarf_Die dw_die,
02981     Dwarf_Attribute** dw_attrbuf,
02982     Dwarf_Signed * dw_attrcount,
02983     Dwarf_Error*    dw_error);
02984
03003 DW_API int dwarf_hasform(Dwarf_Attribute dw_attr,
03004     Dwarf_Half dw_form,
03005     Dwarf_Bool * dw_returned_bool,
03006     Dwarf_Error* dw_error);
03007
03026 DW_API int dwarf_whatform(Dwarf_Attribute dw_attr,
03027     Dwarf_Half * dw_returned_final_form,
03028     Dwarf_Error* dw_error);
03029
03046 DW_API int dwarf_whatform_direct(Dwarf_Attribute dw_attr,
03047     Dwarf_Half * dw_returned_initial_form,
03048     Dwarf_Error* dw_error);
03049
03065 DW_API int dwarf_whatattr(Dwarf_Attribute dw_attr,
03066     Dwarf_Half * dw_returned_attrnum,
03067     Dwarf_Error* dw_error);
03068
03093 DW_API int dwarf_formref(Dwarf_Attribute dw_attr,
03094     Dwarf_Off* dw_return_offset,
03095     Dwarf_Bool *dw_is_info,
03096     Dwarf_Error *dw_error);
03097
03130 DW_API int dwarf_global_formref_b(Dwarf_Attribute dw_attr,
03131     Dwarf_Off *dw_return_offset,
03132     Dwarf_Bool *dw_offset_is_info,
03133     Dwarf_Error *dw_error);
03134
03145 DW_API int dwarf_global_formref(Dwarf_Attribute dw_attr,
03146     Dwarf_Off* dw_return_offset,
03147     Dwarf_Error* dw_error);
03148
03167 DW_API int dwarf_formsig8(Dwarf_Attribute dw_attr,
03168     Dwarf_Sig8 * dw_returned_sig_bytes,
03169     Dwarf_Error* dw_error);
03170
03189 DW_API int dwarf_formsig8_const(Dwarf_Attribute dw_attr,
03190     Dwarf_Sig8 * dw_returned_sig_bytes,
03191     Dwarf_Error* dw_error);
03192
03212 DW_API int dwarf_formaddr(Dwarf_Attribute dw_attr,
03213     Dwarf_Addr * dw_returned_addr,
03214     Dwarf_Error* dw_error);
03215
03235 DW_API int dwarf_get_debug_addr_index(Dwarf_Attribute dw_attr,
03236     Dwarf_Unsigned * dw_return_index,
03237     Dwarf_Error * dw_error);
03238
03252 DW_API int dwarf_formflag(Dwarf_Attribute dw_attr,
03253     Dwarf_Bool * dw_returned_bool,
03254     Dwarf_Error* dw_error);
03255
03271 DW_API int dwarf_formudata(Dwarf_Attribute dw_attr,
03272     Dwarf_Unsigned * dw_returned_val,
03273     Dwarf_Error*    dw_error);
03274
03289 DW_API int dwarf_formdata(Dwarf_Attribute dw_attr,
03290     Dwarf_Signed * dw_returned_val,
```

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03291     Dwarf_Error*    dw_error);
03292
03310 DW_API int dwarf_formdata16(Dwarf_Attribute dw_attr,
03311     Dwarf_Form_Data16 * dw_returned_val,
03312     Dwarf_Error*    dw_error);
03313
03332 DW_API int dwarf_formblock(Dwarf_Attribute dw_attr,
03333     Dwarf_Block ** dw_returned_block,
03334     Dwarf_Error*    dw_error);
03335
03350 DW_API int dwarf_formstring(Dwarf_Attribute dw_attr,
03351     char ** dw_returned_string,
03352     Dwarf_Error*    dw_error);
03353
03369 DW_API int dwarf_get_debug_str_index(Dwarf_Attribute dw_attr,
03370     Dwarf_Unsigned * dw_return_index,
03371     Dwarf_Error * dw_error);
03372
03391 DW_API int dwarf_formexprloc(Dwarf_Attribute dw_attr,
03392     Dwarf_Unsigned * dw_return_exprlen,
03393     Dwarf_Ptr * dw_block_ptr,
03394     Dwarf_Error * dw_error);
03395
03415 DW_API enum Dwarf_Form_Class dwarf_get_form_class(
03416     Dwarf_Half dw_version,
03417     Dwarf_Half dw_attrnum,
03418     Dwarf_Half dw_offset_size,
03419     Dwarf_Half dw_form);
03420
03436 DW_API int dwarf_attr_offset(Dwarf_Die dw_die,
03437     Dwarf_Attribute dw_attr,
03438     Dwarf_Off * dw_return_offset,
03439     Dwarf_Error * dw_error);
03440
03448 DW_API int dwarf_uncompress_integer_block_a(Dwarf_Debug dw_dbg,
03449     Dwarf_Unsigned dw_input_length_in_bytes,
03450     void * dw_input_block,
03451     Dwarf_Unsigned * dw_value_count,
03452     Dwarf_Signed ** dw_value_array,
03453     Dwarf_Error * dw_error);
03454
03462 DW_API void dwarf_dealloc_uncompressed_block(Dwarf_Debug dw_dbg,
03463     void * dw_value_array);
03464
03484 DW_API int dwarf_convert_to_global_offset(Dwarf_Attribute dw_attr,
03485     Dwarf_Off dw_offset,
03486     Dwarf_Off* dw_return_offset,
03487     Dwarf_Error* dw_error);
03488
03494 DW_API void dwarf_dealloc_attribute(Dwarf_Attribute dw_attr);
03495
03522 DW_API int dwarf_discr_list(Dwarf_Debug dw_dbg,
03523     Dwarf_Small * dw_blockpointer,
03524     Dwarf_Unsigned dw_blocklen,
03525     Dwarf_Dsc_Head * dw_dsc_head_out,
03526     Dwarf_Unsigned * dw_dsc_array_length_out,
03527     Dwarf_Error * dw_error);
03528
03554 DW_API int dwarf_discr_entry_u(Dwarf_Dsc_Head dw_dsc,
03555     Dwarf_Unsigned dw_entrynum,
03556     Dwarf_Half * dw_out_type,
03557     Dwarf_Unsigned * dw_out_discr_low,
03558     Dwarf_Unsigned * dw_out_discr_high,
03559     Dwarf_Error * dw_error);
03560
03566 DW_API int dwarf_discr_entry_s(Dwarf_Dsc_Head dw_dsc,
03567     Dwarf_Unsigned dw_entrynum,
03568     Dwarf_Half * dw_out_type,
03569     Dwarf_Signed * dw_out_discr_low,
03570     Dwarf_Signed * dw_out_discr_high,
03571     Dwarf_Error * dw_error);
03572
03650 DW_API int dwarf_srcfiles(Dwarf_Die dw_cu_die,
03651     char *** dw_srcfiles,
03652     Dwarf_Signed * dw_filecount,
03653     Dwarf_Error * dw_error);
03654
03681 DW_API int dwarf_srclines_b(Dwarf_Die dw_cudie,
03682     Dwarf_Unsigned * dw_version_out,
03683     Dwarf_Small * dw_table_count,
03684     Dwarf_Line_Context * dw_linecontext,
03685     Dwarf_Error * dw_error);
03686
03707 DW_API int dwarf_srclines_from_linecontext(
03708     Dwarf_Line_Context dw_linecontext,
03709     Dwarf_Line ** dw_linebuf,
03710     Dwarf_Signed * dw_linecount,

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03711     Dwarf_Error * dw_error);
03712
03729 DW_API int dwarf_srclines_two_level_from_linecontext(
03730     Dwarf_Line_Context dw_context,
03731     Dwarf_Line ** dw_linebuf ,
03732     Dwarf_Signed * dw_linecount,
03733     Dwarf_Line ** dw_linebuf_actuais,
03734     Dwarf_Signed * dw_linecount_actuais,
03735     Dwarf_Error * dw_error);
03736
03746 DW_API void dwarf_srclines_dealloc_b(Dwarf_Line_Context dw_context);
03747
03763 DW_API int dwarf_srclines_table_offset(Dwarf_Line_Context dw_context,
03764     Dwarf_Unsigned * dw_offset,
03765     Dwarf_Error * dw_error);
03766
03782 DW_API int dwarf_srclines_comp_dir(Dwarf_Line_Context dw_context,
03783     const char ** dw_compilation_directory,
03784     Dwarf_Error * dw_error);
03785
03801 DW_API int dwarf_srclines_subprog_count(Dwarf_Line_Context dw_context,
03802     Dwarf_Signed * dw_count,
03803     Dwarf_Error * dw_error);
03804
03823 DW_API int dwarf_srclines_subprog_data(Dwarf_Line_Context dw_context,
03824     Dwarf_Signed dw_index,
03825     const char ** dw_name,
03826     Dwarf_Unsigned * dw_decl_file,
03827     Dwarf_Unsigned * dw_decl_line,
03828     Dwarf_Error * dw_error);
03829
03854 DW_API int dwarf_srclines_files_indexes(
03855     Dwarf_Line_Context dw_context,
03856     Dwarf_Signed * dw_baseindex,
03857     Dwarf_Signed * dw_count,
03858     Dwarf_Signed * dw_endindex,
03859     Dwarf_Error * dw_error);
03860
03912 DW_API int dwarf_srclines_files_data_b(
03913     Dwarf_Line_Context dw_context,
03914     Dwarf_Signed dw_index_in,
03915     const char ** dw_name,
03916     Dwarf_Unsigned * dw_directory_index,
03917     Dwarf_Unsigned * dw_last_mod_time,
03918     Dwarf_Unsigned * dw_file_length,
03919     Dwarf_Form_Data16 ** dw_md5ptr,
03920     Dwarf_Error * dw_error);
03921
03936 DW_API int dwarf_srclines_include_dir_count(
03937     Dwarf_Line_Context dw_line_context,
03938     Dwarf_Signed * dw_count,
03939     Dwarf_Error * dw_error);
03940
03963 DW_API int dwarf_srclines_include_dir_data(
03964     Dwarf_Line_Context dw_line_context,
03965     Dwarf_Signed dw_index,
03966     const char ** dw_name,
03967     Dwarf_Error * dw_error);
03968
03997 DW_API int dwarf_srclines_version(Dwarf_Line_Context dw_line_context,
03998     Dwarf_Unsigned * dw_version,
03999     Dwarf_Small * dw_table_count,
04000     Dwarf_Error * dw_error);
04001
04017 DW_API int dwarf_linebeginstatement(Dwarf_Line dw_line,
04018     Dwarf_Bool * dw_returned_bool,
04019     Dwarf_Error * dw_error);
04020
04036 DW_API int dwarf_lineendsequence(Dwarf_Line dw_line,
04037     Dwarf_Bool * dw_returned_bool,
04038     Dwarf_Error * dw_error);
04039
04054 DW_API int dwarf_lineno(Dwarf_Line dw_line,
04055     Dwarf_Unsigned * dw_returned_linenum,
04056     Dwarf_Error * dw_error);
04057
04072 DW_API int dwarf_line_srcfileno(Dwarf_Line dw_line,
04073     Dwarf_Unsigned * dw_returned_filenum,
04074     Dwarf_Error * dw_error);
04075
04089 DW_API int dwarf_line_is_addr_set(Dwarf_Line dw_line,
04090     Dwarf_Bool * dw_is_addr_set,
04091     Dwarf_Error * dw_error);
04092
04107 DW_API int dwarf_lineaddr(Dwarf_Line dw_line,
04108     Dwarf_Addr * dw_returned_addr,
04109     Dwarf_Error* dw_error);
```

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04110
04125 DW_API int dwarf_lineoff_b(Dwarf_Line dw_line,
04126     Dwarf_Unsigned * dw_returned_lineoffset,
04127     Dwarf_Error* dw_error);
04128
04153 DW_API int dwarf_linesrc(Dwarf_Line dw_line,
04154     char ** dw_returned_name,
04155     Dwarf_Error* dw_error);
04156
04171 DW_API int dwarf_lineblock(Dwarf_Line dw_line,
04172     Dwarf_Bool * dw_returned_bool,
04173     Dwarf_Error* dw_error);
04174
04175 /* We gather these into one call as it's likely one
04176    will want all or none of them. */
04200 DW_API int dwarf_prologue_end_etc(Dwarf_Line dw_line,
04201     Dwarf_Bool * dw_prologue_end,
04202     Dwarf_Bool * dw_epilogue_begin,
04203     Dwarf_Unsigned * dw_isa,
04204     Dwarf_Unsigned * dw_discriminator,
04205     Dwarf_Error * dw_error);
04206 /* End line table operations */
04207
04213 DW_API int dwarf_linelogical(Dwarf_Line dw_line,
04214     Dwarf_Unsigned * dw_returned_logical,
04215     Dwarf_Error* dw_error);
04216
04223 DW_API int dwarf_linecontext(Dwarf_Line dw_line,
04224     Dwarf_Unsigned * dw_returned_context,
04225     Dwarf_Error* dw_error);
04226
04235 DW_API int dwarf_line_subprogno(Dwarf_Line /*line*/,
04236     Dwarf_Unsigned * /*ret_subprogno*/,
04237     Dwarf_Error * /*error*/);
04238
04245 DW_API int dwarf_line_subprog(Dwarf_Line /*line*/,
04246     char ** /*returned_subprog_name*/,
04247     char ** /*returned_filename*/,
04248     Dwarf_Unsigned * /*returned_lineno*/,
04249     Dwarf_Error * /*error*/);
04250
04271 DW_API int dwarf_check_lineheader_b(Dwarf_Die dw_cu_die,
04272     int * dw_errcount_out,
04273     Dwarf_Error * dw_error);
04274
04304 DW_API int dwarf_print_lines(Dwarf_Die dw_cu_die,
04305     Dwarf_Error * dw_error,
04306     int * dw_errorcount_out);
04307
04328 DW_API struct Dwarf_Printf_Callback_Info_s
04329     dwarf_register_printf_callback(Dwarf_Debug dw_dbg,
04330     struct Dwarf_Printf_Callback_Info_s * dw_callbackinfo);
04331
04391 DW_API int dwarf_get_ranges_b(Dwarf_Debug dw_dbg,
04392     Dwarf_Off dw_rangesoffset,
04393     Dwarf_Die dw_die,
04394     Dwarf_Off * dw_return_realoffset,
04395     Dwarf_Ranges ** dw_rangesbuf,
04396     Dwarf_Signed * dw_rangecount,
04397     Dwarf_Unsigned * dw_bytecount,
04398     Dwarf_Error * dw_error);
04399
04409 DW_API void dwarf_dealloc_ranges(Dwarf_Debug dw_dbg,
04410     Dwarf_Ranges * dw_rangesbuf,
04411     Dwarf_Signed dw_rangecount);
04412
04452 DW_API int dwarf_get_ranges_baseaddress(Dwarf_Debug dw_dbg,
04453     Dwarf_Die dw_die,
04454     Dwarf_Bool *dw_known_base,
04455     Dwarf_Unsigned *dw_baseaddress,
04456     Dwarf_Bool *dw_at_ranges_offset_present,
04457     Dwarf_Unsigned *dw_at_ranges_offset,
04458     Dwarf_Error *dw_error);
04459
04505 DW_API int dwarf_rnglists_get_rle_head(Dwarf_Attribute dw_attr,
04506     Dwarf_Half dw_theform,
04507     Dwarf_Unsigned dw_index_or_offset_value,
04508     Dwarf_Rnglists_Head * dw_head_out,
04509     Dwarf_Unsigned * dw_count_of_entries_in_head,
04510     Dwarf_Unsigned * dw_global_offset_of_rle_set,
04511     Dwarf_Error * dw_error);
04512
04555 DW_API int dwarf_get_rnglists_entry_fields_a(
04556     Dwarf_Rnglists_Head dw_head,
04557     Dwarf_Unsigned dw_entrynum,
04558     unsigned int * dw_entrylen,
04559     unsigned int * dw_rle_value_out,

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04560 Dwarf_Unsigned * dw_raw1,
04561 Dwarf_Unsigned * dw_raw2,
04562 Dwarf_Bool * dw_debug_addr_unavailable,
04563 Dwarf_Unsigned * dw_cooked1,
04564 Dwarf_Unsigned * dw_cooked2,
04565 Dwarf_Error * dw_error);
04566
04574 DW_API void dwarf_dealloc_rnglists_head(Dwarf_Rnglists_Head dw_head);
04575
04606 DW_API int dwarf_load_rnglists(Dwarf_Debug dw_dbg,
04607 Dwarf_Unsigned * dw_rnglists_count,
04608 Dwarf_Error * dw_error);
04609
04636 DW_API int dwarf_get_rnglist_offset_index_value(Dwarf_Debug dw_dbg,
04637 Dwarf_Unsigned dw_context_index,
04638 Dwarf_Unsigned dw_offsetentry_index,
04639 Dwarf_Unsigned * dw_offset_value_out,
04640 Dwarf_Unsigned * dw_global_offset_value_out,
04641 Dwarf_Error * dw_error);
04642
04649 DW_API int dwarf_get_rnglist_head_basics(Dwarf_Rnglists_Head dw_head,
04650 Dwarf_Unsigned * dw_rle_count,
04651 Dwarf_Unsigned * dw_rnglists_version,
04652 Dwarf_Unsigned * dw_rnglists_index_returned,
04653 Dwarf_Unsigned * dw_bytes_total_in_rle,
04654 Dwarf_Half * dw_offset_size,
04655 Dwarf_Half * dw_address_size,
04656 Dwarf_Half * dw_segment_selector_size,
04657 Dwarf_Unsigned * dw_overall_offset_of_this_context,
04658 Dwarf_Unsigned * dw_total_length_of_this_context,
04659 Dwarf_Unsigned * dw_offset_table_offset,
04660 Dwarf_Unsigned * dw_offset_table_entrycount,
04661 Dwarf_Bool * dw_rnglists_base_present,
04662 Dwarf_Unsigned * dw_rnglists_base,
04663 Dwarf_Bool * dw_rnglists_base_address_present,
04664 Dwarf_Unsigned * dw_rnglists_base_address,
04665 Dwarf_Bool * dw_rnglists_debug_addr_base_present,
04666 Dwarf_Unsigned * dw_rnglists_debug_addr_base,
04667 Dwarf_Error * dw_error);
04668
04684 DW_API int dwarf_get_rnglist_context_basics(Dwarf_Debug dw_dbg,
04685 Dwarf_Unsigned dw_index,
04686 Dwarf_Unsigned * dw_header_offset,
04687 Dwarf_Small * dw_offset_size,
04688 Dwarf_Small * dw_extension_size,
04689 unsigned int * dw_version,
04690 Dwarf_Small * dw_address_size,
04691 Dwarf_Small * dw_segment_selector_size,
04692 Dwarf_Unsigned * dw_offset_entry_count,
04693 Dwarf_Unsigned * dw_offset_of_offset_array,
04694 Dwarf_Unsigned * dw_offset_of_first_rangeentry,
04695 Dwarf_Unsigned * dw_offset_past_last_rangeentry,
04696 Dwarf_Error * dw_error);
04697
04707 DW_API int dwarf_get_rnglist_rle(Dwarf_Debug dw_dbg,
04708 Dwarf_Unsigned dw_contextnumber,
04709 Dwarf_Unsigned dw_entry_offset,
04710 Dwarf_Unsigned dw_endoffset,
04711 unsigned int * dw_entrylen,
04712 unsigned int * dw_entry_kind,
04713 Dwarf_Unsigned * dw_entry_operand1,
04714 Dwarf_Unsigned * dw_entry_operand2,
04715 Dwarf_Error * dw_error);
04741 DW_API int dwarf_get_loclist_c(Dwarf_Attribute dw_attr,
04742 Dwarf_Loc_Head_c * dw_loclist_head,
04743 Dwarf_Unsigned * dw_locentry_count,
04744 Dwarf_Error * dw_error);
04745
04746 #define DW_LKIND_expression 0 /* DWARF2,3,4,5 */
04747 #define DW_LKIND_loclist 1 /* DWARF 2,3,4 */
04748 #define DW_LKIND_GNU_exp_list 2 /* GNU DWARF4 .dwo extension */
04749 #define DW_LKIND_loclists 5 /* DWARF5 loclists */
04750 #define DW_LKIND_unknown 99
04751
04764 DW_API int dwarf_get_loclist_head_kind(
04765 Dwarf_Loc_Head_c dw_loclist_head,
04766 unsigned int * dw_lkind,
04767 Dwarf_Error * dw_error);
04768
04823 DW_API int dwarf_get_locdesc_entry_d(Dwarf_Loc_Head_c dw_loclist_head,
04824 Dwarf_Unsigned dw_index,
04825 Dwarf_Small * dw_lle_value_out,
04826 Dwarf_Unsigned * dw_rawlowpc,
04827 Dwarf_Unsigned * dw_rawhipc,
04828 Dwarf_Bool * dw_debug_addr_unavailable,
04829 Dwarf_Addr * dw_lowpc_cooked,
04830 Dwarf_Addr * dw_hipc_cooked,

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04831     Dwarf_Unsigned * dw_locexpr_op_count_out,
04832     Dwarf_Locdesc_c * dw_locentry_out,
04833     Dwarf_Small * dw_loclist_source_out,
04834     Dwarf_Unsigned * dw_expression_offset_out,
04835     Dwarf_Unsigned * dw_locdesc_offset_out,
04836     Dwarf_Error * dw_error);
04837
04857 DW_API int dwarf_get_locdesc_entry_e(Dwarf_Loc_Head_c dw_loclist_head,
04858     Dwarf_Unsigned dw_index,
04859     Dwarf_Small * dw_lle_value_out,
04860     Dwarf_Unsigned * dw_rawlowpc,
04861     Dwarf_Unsigned * dw_rawhipc,
04862     Dwarf_Bool * dw_debug_addr_unavailable,
04863     Dwarf_Addr * dw_lowpc_cooked,
04864     Dwarf_Addr * dw_hipc_cooked,
04865     Dwarf_Unsigned * dw_locexpr_op_count_out,
04866     Dwarf_Unsigned * dw_lle_bytecount,
04867     Dwarf_Locdesc_c * dw_locentry_out,
04868     Dwarf_Small * dw_loclist_source_out,
04869     Dwarf_Unsigned * dw_expression_offset_out,
04870     Dwarf_Unsigned * dw_locdesc_offset_out,
04871     Dwarf_Error * dw_error);
04872
04898 DW_API int dwarf_get_location_op_value_c(Dwarf_Locdesc_c dw_locdesc,
04899     Dwarf_Unsigned dw_index,
04900     Dwarf_Small * dw_operator_out,
04901     Dwarf_Unsigned * dw_operand1,
04902     Dwarf_Unsigned * dw_operand2,
04903     Dwarf_Unsigned * dw_operand3,
04904     Dwarf_Unsigned * dw_offset_for_branch,
04905     Dwarf_Error* dw_error);
04937 DW_API int dwarf_loclist_from_expr_c(Dwarf_Debug dw_dbg,
04938     Dwarf_Ptr dw_expression_in,
04939     Dwarf_Unsigned dw_expression_length,
04940     Dwarf_Half dw_address_size,
04941     Dwarf_Half dw_offset_size,
04942     Dwarf_Half dw_dwarf_version,
04943     Dwarf_Loc_Head_c* dw_loc_head,
04944     Dwarf_Unsigned * dw_listlen,
04945     Dwarf_Error * dw_error);
04946
04954 DW_API void dwarf_dealloc_loc_head_c(Dwarf_Loc_Head_c dw_head);
04955
04956 /* These interfaces allow reading the .debug_loclists
04957    section. Independently of DIEs.
04958    Normal use of .debug_loclists uses
04959    dwarf_get_loclist_c() to open access to any kind of location
04960    or loclist and uses dwarf_loc_head_c_dealloc() to
04961    deallocate that memory once one is finished with
04962    that data. So for most purposes you do not need
04963    to use these functions
04964    See dwarf_get_loclist_c() to open a Dwarf_Loc_Head_c
04965    on any type of location list or expression. */
04966
04967 /* Loads all the loclists headers and
04968    returns DW_DLV_NO_ENTRY if the section
04969    is missing or empty.
04970    Intended to be done quite early and
04971    it is automatically
04972    done if .debug_info is loaded.
04973    Doing it more than once is never necessary
04974    or harmful. There is no deallocation call
04975    made visible, deallocation happens
04976    when dwarf_finish() is called.
04977    With DW_DLV_OK it returns the number of
04978    loclists headers in the section through
04979    loclists_count. */
05009 DW_API int dwarf_load_loclists(Dwarf_Debug dw_dbg,
05010     Dwarf_Unsigned * dw_loclists_count,
05011     Dwarf_Error * dw_error);
05012
05038 DW_API int dwarf_get_loclist_offset_index_value(Dwarf_Debug dw_dbg,
05039     Dwarf_Unsigned dw_context_index,
05040     Dwarf_Unsigned dw_offsetentry_index,
05041     Dwarf_Unsigned * dw_offset_value_out,
05042     Dwarf_Unsigned * dw_global_offset_value_out,
05043     Dwarf_Error * dw_error);
05044
05059 DW_API int dwarf_get_loclist_head_basics(Dwarf_Loc_Head_c dw_head,
05060     Dwarf_Small * dw_lkind,
05061     Dwarf_Unsigned * dw_lle_count,
05062     Dwarf_Unsigned * dw_loclists_version,
05063     Dwarf_Unsigned * dw_loclists_index_returned,
05064     Dwarf_Unsigned * dw_bytes_total_in_rle,
05065     Dwarf_Half * dw_offset_size,
05066     Dwarf_Half * dw_address_size,
05067     Dwarf_Half * dw_segment_selector_size,

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05068 Dwarf_Unsigned * dw_overall_offset_of_this_context,
05069 Dwarf_Unsigned * dw_total_length_of_this_context,
05070 Dwarf_Unsigned * dw_offset_table_offset,
05071 Dwarf_Unsigned * dw_offset_table_entrycount,
05072 Dwarf_Bool * dw_loclists_base_present,
05073 Dwarf_Unsigned * dw_loclists_base,
05074 Dwarf_Bool * dw_loclists_base_address_present,
05075 Dwarf_Unsigned * dw_loclists_base_address,
05076 Dwarf_Bool * dw_loclists_debug_addr_base_present,
05077 Dwarf_Unsigned * dw_loclists_debug_addr_base,
05078 Dwarf_Unsigned * dw_offset_this_lle_area,
05079 Dwarf_Error * dw_error);
05080
05089 DW_API int dwarf_get_loclist_context_basics(Dwarf_Debug dw_dbg,
05090 Dwarf_Unsigned dw_index,
05091 Dwarf_Unsigned * dw_header_offset,
05092 Dwarf_Small * dw_offset_size,
05093 Dwarf_Small * dw_extension_size,
05094 unsigned int * dw_version,
05095 Dwarf_Small * dw_address_size,
05096 Dwarf_Small * dw_segment_selector_size,
05097 Dwarf_Unsigned * dw_offset_entry_count,
05098 Dwarf_Unsigned * dw_offset_of_offset_array,
05099 Dwarf_Unsigned * dw_offset_of_first_locentry,
05100 Dwarf_Unsigned * dw_offset_past_last_locentry,
05101 Dwarf_Error * dw_error);
05102
05107 DW_API int dwarf_get_loclist_lle(Dwarf_Debug dw_dbg,
05108 Dwarf_Unsigned dw_contextnumber,
05109 Dwarf_Unsigned dw_entry_offset,
05110 Dwarf_Unsigned dw_endoffset,
05111 unsigned int * dw_entrylen,
05112 unsigned int * dw_entry_kind,
05113 Dwarf_Unsigned * dw_entry_operand1,
05114 Dwarf_Unsigned * dw_entry_operand2,
05115 Dwarf_Unsigned * dw_expr_ops_blocksize,
05116 Dwarf_Unsigned * dw_expr_ops_offset,
05117 Dwarf_Small ** dw_expr_opsdata,
05118 Dwarf_Error * dw_error);
05198 DW_API int dwarf_debug_addr_table(Dwarf_Debug dw_dbg,
05199 Dwarf_Unsigned dw_section_offset,
05200 Dwarf_Debug_Addr_Table *dw_table_header,
05201 Dwarf_Unsigned *dw_length,
05202 Dwarf_Half *dw_version,
05203 Dwarf_Small *dw_address_size,
05204 Dwarf_Unsigned *dw_at_addr_base,
05205 Dwarf_Unsigned *dw_entry_count,
05206 Dwarf_Unsigned *dw_next_table_offset,
05207 Dwarf_Error *dw_error);
05208
05231 DW_API int dwarf_debug_addr_by_index(Dwarf_Debug_Addr_Table dw_dat,
05232 Dwarf_Unsigned dw_entry_index,
05233 Dwarf_Unsigned *dw_address,
05234 Dwarf_Error *dw_error);
05235
05243 DW_API void dwarf_dealloc_debug_addr_table(
05244 Dwarf_Debug_Addr_Table dw_dat);
05245
05282 DW_API int dwarf_get_macro_context(Dwarf_Die dw_die,
05283 Dwarf_Unsigned * dw_version_out,
05284 Dwarf_Macro_Context * dw_macro_context,
05285 Dwarf_Unsigned * dw_macro_unit_offset_out,
05286 Dwarf_Unsigned * dw_macro_ops_count_out,
05287 Dwarf_Unsigned * dw_macro_ops_data_length_out,
05288 Dwarf_Error * dw_error);
05289
05317 DW_API int dwarf_get_macro_context_by_offset(Dwarf_Die dw_die,
05318 Dwarf_Unsigned dw_offset,
05319 Dwarf_Unsigned * dw_version_out,
05320 Dwarf_Macro_Context * dw_macro_context,
05321 Dwarf_Unsigned * dw_macro_ops_count_out,
05322 Dwarf_Unsigned * dw_macro_ops_data_length,
05323 Dwarf_Error * dw_error);
05324
05325 /* New December 2020. libdwarf 0.1.0
05326 Sometimes its necessary to know
05327 a context total length including macro 5 header */
05340 DW_API int dwarf_macro_context_total_length(
05341 Dwarf_Macro_Context dw_context,
05342 Dwarf_Unsigned * dw_mac_total_len,
05343 Dwarf_Error * dw_error);
05344
05352 DW_API void dwarf_dealloc_macro_context(Dwarf_Macro_Context dw_mc);
05353
05359 DW_API int dwarf_macro_context_head(Dwarf_Macro_Context dw_mc,
05360 Dwarf_Half * dw_version,
05361 Dwarf_Unsigned * dw_mac_offset,

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05362     Dwarf_Unsigned * dw_mac_len,
05363     Dwarf_Unsigned * dw_mac_header_len,
05364     unsigned int * dw_flags,
05365     Dwarf_Bool * dw_has_line_offset,
05366     Dwarf_Unsigned * dw_line_offset,
05367     Dwarf_Bool * dw_has_offset_size_64,
05368     Dwarf_Bool * dw_has_operands_table,
05369     Dwarf_Half * dw_opcode_count,
05370     Dwarf_Error * dw_error);
05371
05394 DW_API int dwarf_macro_operands_table(Dwarf_Macro_Context dw_mc,
05395     Dwarf_Half dw_index, /* 0 to opcode_count -1 */
05396     Dwarf_Half * dw_opcode_number,
05397     Dwarf_Half * dw_operand_count,
05398     const Dwarf_Small ** dw_operand_array,
05399     Dwarf_Error * dw_error);
05400
05425 DW_API int dwarf_get_macro_op(Dwarf_Macro_Context dw_macro_context,
05426     Dwarf_Unsigned dw_op_number,
05427     Dwarf_Unsigned * dw_op_start_section_offset,
05428     Dwarf_Half * dw_macro_operator,
05429     Dwarf_Half * dw_forms_count,
05430     const Dwarf_Small ** dw_formcode_array,
05431     Dwarf_Error * dw_error);
05432
05470 DW_API int dwarf_get_macro_defundef(
05471     Dwarf_Macro_Context dw_macro_context,
05472     Dwarf_Unsigned dw_op_number,
05473     Dwarf_Unsigned * dw_line_number,
05474     Dwarf_Unsigned * dw_index,
05475     Dwarf_Unsigned * dw_offset,
05476     Dwarf_Half * dw_forms_count,
05477     const char ** dw_macro_string,
05478     Dwarf_Error * dw_error);
05479
05507 DW_API int dwarf_get_macro_startend_file(
05508     Dwarf_Macro_Context dw_macro_context,
05509     Dwarf_Unsigned dw_op_number,
05510     Dwarf_Unsigned * dw_line_number,
05511     Dwarf_Unsigned * dw_name_index_to_line_tab,
05512     const char ** dw_src_file_name,
05513     Dwarf_Error * dw_error);
05514
05530 DW_API int dwarf_get_macro_import(
05531     Dwarf_Macro_Context dw_macro_context,
05532     Dwarf_Unsigned dw_op_number,
05533     Dwarf_Unsigned * dw_target_offset,
05534     Dwarf_Error * dw_error);
05563 DW_API char* dwarf_find_macro_value_start(char * dw_macro_string);
05564
05590 DW_API int dwarf_get_macro_details(Dwarf_Debug dw_dbg,
05591     Dwarf_Off dw_macro_offset,
05592     Dwarf_Unsigned dw_maximum_count,
05593     Dwarf_Signed * dw_entry_count,
05594     Dwarf_Macro_Details ** dw_details,
05595     Dwarf_Error * dw_error);
05596
05639 DW_API int dwarf_get_fde_list(Dwarf_Debug dw_dbg,
05640     Dwarf_Cie** dw_cie_data,
05641     Dwarf_Signed* dw_cie_element_count,
05642     Dwarf_Fde** dw_fde_data,
05643     Dwarf_Signed* dw_fde_element_count,
05644     Dwarf_Error* dw_error);
05654 DW_API int dwarf_get_fde_list_eh(Dwarf_Debug dw_dbg,
05655     Dwarf_Cie** dw_cie_data,
05656     Dwarf_Signed* dw_cie_element_count,
05657     Dwarf_Fde** dw_fde_data,
05658     Dwarf_Signed* dw_fde_element_count,
05659     Dwarf_Error* dw_error);
05660
05680 DW_API void dwarf_dealloc_fde_cie_list(Dwarf_Debug dw_dbg,
05681     Dwarf_Cie * dw_cie_data,
05682     Dwarf_Signed dw_cie_element_count,
05683     Dwarf_Fde * dw_fde_data,
05684     Dwarf_Signed dw_fde_element_count);
05685
05713 DW_API int dwarf_get_fde_range(Dwarf_Fde dw_fde,
05714     Dwarf_Addr* dw_low_pc,
05715     Dwarf_Unsigned* dw_func_length,
05716     Dwarf_Small **dw_fde_bytes,
05717     Dwarf_Unsigned* dw_fde_byte_length,
05718     Dwarf_Off* dw_cie_offset,
05719     Dwarf_Signed* dw_cie_index,
05720     Dwarf_Off* dw_fde_offset,
05721     Dwarf_Error* dw_error);
05722
05728 DW_API int dwarf_get_fde_exception_info(Dwarf_Fde dw_fde,

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05729     Dwarf_Signed*   dw_offset_into_exception_tables,
05730     Dwarf_Error*     dw_error);
05731
05743 DW_API int dwarf_get_cie_of_fde(Dwarf_Fde dw_fde,
05744     Dwarf_Cie *      dw_cie_returned,
05745     Dwarf_Error*     dw_error);
05746
05780 DW_API int dwarf_get_cie_info_b(Dwarf_Cie dw_cie,
05781     Dwarf_Unsigned * dw_bytes_in_cie,
05782     Dwarf_Small*    dw_version,
05783     char **         dw_augmenter,
05784     Dwarf_Unsigned* dw_code_alignment_factor,
05785     Dwarf_Signed*   dw_data_alignment_factor,
05786     Dwarf_Half*     dw_return_address_register_rule,
05787     Dwarf_Small **  dw_initial_instructions,
05788     Dwarf_Unsigned* dw_initial_instructions_length,
05789     Dwarf_Half*     dw_offset_size,
05790     Dwarf_Error*    dw_error);
05791
05804 DW_API int dwarf_get_cie_index(Dwarf_Cie dw_cie,
05805     Dwarf_Signed* dw_index,
05806     Dwarf_Error * dw_error);
05807
05826 DW_API int dwarf_get_fde_instr_bytes(Dwarf_Fde dw_fde,
05827     Dwarf_Small ** dw_outinstrs,
05828     Dwarf_Unsigned * dw_outlen,
05829     Dwarf_Error *  dw_error);
05830
05863 DW_API int dwarf_get_fde_info_for_all_regs3_b(Dwarf_Fde dw_fde,
05864     Dwarf_Addr      dw_pc_requested,
05865     Dwarf_Regtable3* dw_reg_table,
05866     Dwarf_Addr*     dw_row_pc,
05867     Dwarf_Bool*     dw_has_more_rows,
05868     Dwarf_Addr*     dw_subsequent_pc,
05869     Dwarf_Error*    dw_error);
05870
05880 DW_API int dwarf_get_fde_info_for_all_regs3(Dwarf_Fde dw_fde,
05881     Dwarf_Addr      dw_pc_requested,
05882     Dwarf_Regtable3* dw_reg_table,
05883     Dwarf_Addr*     dw_row_pc,
05884     Dwarf_Error*    dw_error);
05885
05886 /* See discussion of dw_value_type, libdwarf.h. */
05946 DW_API int dwarf_get_fde_info_for_reg3_c(Dwarf_Fde dw_fde,
05947     Dwarf_Half      dw_table_column,
05948     Dwarf_Addr      dw_pc_requested,
05949     Dwarf_Small *   dw_value_type,
05950     Dwarf_Unsigned * dw_offset_relevant,
05951     Dwarf_Unsigned * dw_register,
05952     Dwarf_Signed *  dw_offset,
05953     Dwarf_Block *   dw_block_content,
05954     Dwarf_Addr *    dw_row_pc_out,
05955     Dwarf_Bool *    dw_has_more_rows,
05956     Dwarf_Addr *    dw_subsequent_pc,
05957     Dwarf_Error *   dw_error);
05958
05968 DW_API int dwarf_get_fde_info_for_reg3_b(Dwarf_Fde dw_fde,
05969     Dwarf_Half      dw_table_column,
05970     Dwarf_Addr      dw_pc_requested,
05971     Dwarf_Small *   dw_value_type,
05972     Dwarf_Unsigned * dw_offset_relevant,
05973     Dwarf_Unsigned * dw_register,
05974     Dwarf_Unsigned * dw_offset,
05975     Dwarf_Block *   dw_block_content,
05976     Dwarf_Addr *    dw_row_pc_out,
05977     Dwarf_Bool *    dw_has_more_rows,
05978     Dwarf_Addr *    dw_subsequent_pc,
05979     Dwarf_Error *   dw_error);
05980
06004 DW_API int dwarf_get_fde_info_for_cfa_reg3_c(Dwarf_Fde dw_fde,
06005     Dwarf_Addr      dw_pc_requested,
06006     Dwarf_Small *   dw_value_type,
06007     Dwarf_Unsigned* dw_offset_relevant,
06008     Dwarf_Unsigned* dw_register,
06009     Dwarf_Signed *  dw_offset,
06010     Dwarf_Block *   dw_block,
06011     Dwarf_Addr *    dw_row_pc_out,
06012     Dwarf_Bool *    dw_has_more_rows,
06013     Dwarf_Addr *    dw_subsequent_pc,
06014     Dwarf_Error *   dw_error);
06024 DW_API int dwarf_get_fde_info_for_cfa_reg3_b(Dwarf_Fde dw_fde,
06025     Dwarf_Addr      dw_pc_requested,
06026     Dwarf_Small *   dw_value_type,
06027     Dwarf_Unsigned* dw_offset_relevant,
06028     Dwarf_Unsigned* dw_register,
06029     Dwarf_Unsigned* dw_offset,
06030     Dwarf_Block *   dw_block,

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06031     Dwarf_Addr    * dw_row_pc_out,
06032     Dwarf_Bool    * dw_has_more_rows,
06033     Dwarf_Addr    * dw_subsequent_pc,
06034     Dwarf_Error   * dw_error);
06035
06044 DW_API int dwarf_get_fde_for_die(Dwarf_Debug dw_dbg,
06045     Dwarf_Die      dw_subr_die,
06046     Dwarf_Fde      * dw_returned_fde,
06047     Dwarf_Error*    dw_error);
06048
06056 DW_API int dwarf_get_fde_n(Dwarf_Fde* dw_fde_data,
06057     Dwarf_Unsigned  dw_fde_index,
06058     Dwarf_Fde      * dw_returned_fde,
06059     Dwarf_Error     * dw_error);
06060
06091 DW_API int dwarf_get_fde_at_pc(Dwarf_Fde* dw_fde_data,
06092     Dwarf_Addr      dw_pc_of_interest,
06093     Dwarf_Fde      * dw_returned_fde,
06094     Dwarf_Addr      * dw_lopc,
06095     Dwarf_Addr      * dw_hipc,
06096     Dwarf_Error*    dw_error);
06097
06117 DW_API int dwarf_get_cie_augmentation_data(Dwarf_Cie dw_cie,
06118     Dwarf_Small     ** dw_augdata,
06119     Dwarf_Unsigned  * dw_augdata_len,
06120     Dwarf_Error*    dw_error);
06121
06141 DW_API int dwarf_get_fde_augmentation_data(Dwarf_Fde dw_fde,
06142     Dwarf_Small     ** dw_augdata,
06143     Dwarf_Unsigned  * dw_augdata_len,
06144     Dwarf_Error*    dw_error);
06145
06179 DW_API int dwarf_expand_frame_instructions(Dwarf_Cie dw_cie,
06180     Dwarf_Small      * dw_instructionspointer,
06181     Dwarf_Unsigned    dw_length_in_bytes,
06182     Dwarf_Frame_Instr_Head * dw_head,
06183     Dwarf_Unsigned    * dw_instr_count,
06184     Dwarf_Error       * dw_error);
06185
06258 DW_API int dwarf_get_frame_instruction(
06259     Dwarf_Frame_Instr_Head dw_head,
06260     Dwarf_Unsigned          dw_instr_index,
06261     Dwarf_Unsigned          * dw_instr_offset_in_instrs,
06262     Dwarf_Small             * dw_cfa_operation,
06263     const char              ** dw_fields_description,
06264     Dwarf_Unsigned          * dw_u0,
06265     Dwarf_Unsigned          * dw_u1,
06266     Dwarf_Signed            * dw_s0,
06267     Dwarf_Signed            * dw_s1,
06268     Dwarf_Unsigned          * dw_code_alignment_factor,
06269     Dwarf_Signed            * dw_data_alignment_factor,
06270     Dwarf_Block             * dw_expression_block,
06271     Dwarf_Error             * dw_error);
06272
06294 DW_API int dwarf_get_frame_instruction_a(
06295     Dwarf_Frame_Instr_Head dw_/* head*/,
06296     Dwarf_Unsigned          dw_instr_index,
06297     Dwarf_Unsigned          * dw_instr_offset_in_instrs,
06298     Dwarf_Small             * dw_cfa_operation,
06299     const char              ** dw_fields_description,
06300     Dwarf_Unsigned          * dw_u0,
06301     Dwarf_Unsigned          * dw_u1,
06302     Dwarf_Unsigned          * dw_u2,
06303     Dwarf_Signed            * dw_s0,
06304     Dwarf_Signed            * dw_s1,
06305     Dwarf_Unsigned          * dw_code_alignment_factor,
06306     Dwarf_Signed            * dw_data_alignment_factor,
06307     Dwarf_Block             * dw_expression_block,
06308     Dwarf_Error             * dw_error);
06309
06318 DW_API void dwarf_dealloc_frame_instr_head(Dwarf_Frame_Instr_Head
06319     dw_head);
06320
06337 DW_API int dwarf_fde_section_offset(Dwarf_Debug dw_dbg,
06338     Dwarf_Fde      dw_in_fde,
06339     Dwarf_Off       * dw_fde_off,
06340     Dwarf_Off       * dw_cie_off,
06341     Dwarf_Error     * dw_error);
06342
06357 DW_API int dwarf_cie_section_offset(Dwarf_Debug dw_dbg,
06358     Dwarf_Cie      dw_in_cie,
06359     Dwarf_Off       * dw_cie_off,
06360     Dwarf_Error     * dw_error);
06361
06371 DW_API Dwarf_Half dwarf_set_frame_rule_table_size(
06372     Dwarf_Debug dw_dbg,
06373     Dwarf_Half  dw_value);

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06385 DW_API Dwarf_Half dwarf_set_frame_rule_initial_value(
06386     Dwarf_Debug dw_dbg,
06387     Dwarf_Half dw_value);
06397 DW_API Dwarf_Half dwarf_set_frame_cfa_value(
06398     Dwarf_Debug dw_dbg,
06399     Dwarf_Half dw_value);
06400
06410 DW_API Dwarf_Half dwarf_set_frame_same_value(
06411     Dwarf_Debug dw_dbg,
06412     Dwarf_Half dw_value);
06422 DW_API Dwarf_Half dwarf_set_frame_undefined_value(
06423     Dwarf_Debug dw_dbg,
06424     Dwarf_Half dw_value);
06478 DW_API int dwarf_get_abbrev(Dwarf_Debug dw_dbg,
06479     Dwarf_Unsigned dw_offset,
06480     Dwarf_Abbrev * dw_returned_abbrev,
06481     Dwarf_Unsigned* dw_length,
06482     Dwarf_Unsigned* dw_attr_count,
06483     Dwarf_Error* dw_error);
06484
06496 DW_API int dwarf_get_abbrev_tag(Dwarf_Abbrev dw_abbrev,
06497     Dwarf_Half* dw_return_tag_number,
06498     Dwarf_Error* dw_error);
06499
06513 DW_API int dwarf_get_abbrev_code(Dwarf_Abbrev dw_abbrev,
06514     Dwarf_Unsigned* dw_return_code_number,
06515     Dwarf_Error* dw_error);
06516
06530 DW_API int dwarf_get_abbrev_children_flag(Dwarf_Abbrev dw_abbrev,
06531     Dwarf_Signed* dw_return_flag,
06532     Dwarf_Error* dw_error);
06533
06567 DW_API int dwarf_get_abbrev_entry_b(Dwarf_Abbrev dw_abbrev,
06568     Dwarf_Unsigned dw_indx,
06569     Dwarf_Bool dw_filter_outliers,
06570     Dwarf_Unsigned * dw_returned_attr_num,
06571     Dwarf_Unsigned * dw_returned_form,
06572     Dwarf_Signed * dw_returned_implicit_const,
06573     Dwarf_Off * dw_offset,
06574     Dwarf_Error * dw_error);
06575
06609 DW_API int dwarf_get_str(Dwarf_Debug dw_dbg,
06610     Dwarf_Off dw_offset,
06611     char** dw_string,
06612     Dwarf_Signed * dw_strlen_of_string,
06613     Dwarf_Error* dw_error);
06614
06625 /* Allows applications to print the .debug_str_offsets
06626    section.
06627    Beginning at starting_offset zero,
06628    returns data about the first table found.
06629    The value *next_table_offset is the value
06630    of the next table (if any), one byte past
06631    the end of the table whose data is returned..
06632    Returns DW_DLV_NO_ENTRY if the starting offset
06633    is past the end of valid data.
06634
06635    There is no guarantee that there are no non-0 nonsense
06636    bytes in the section outside of useful tables,
06637    so this can fail and return nonsense or
06638    DW_DLV_ERROR if such garbage exists.
06639 */
06640
06657 DW_API int dwarf_open_str_offsets_table_access(Dwarf_Debug dw_dbg,
06658     Dwarf_Str_Offsets_Table * dw_table_data,
06659     Dwarf_Error * dw_error);
06660
06678 DW_API int dwarf_close_str_offsets_table_access(
06679     Dwarf_Str_Offsets_Table dw_table_data,
06680     Dwarf_Error * dw_error);
06681
06715 DW_API int dwarf_next_str_offsets_table(
06716     Dwarf_Str_Offsets_Table dw_table_data,
06717     Dwarf_Unsigned * dw_unit_length,
06718     Dwarf_Unsigned * dw_unit_length_offset,
06719     Dwarf_Unsigned * dw_table_start_offset,
06720     Dwarf_Half * dw_entry_size,
06721     Dwarf_Half * dw_version,
06722     Dwarf_Half * dw_padding,
06723     Dwarf_Unsigned * dw_table_value_count,
06724     Dwarf_Error * dw_error);
06725
06745 DW_API int dwarf_str_offsets_value_by_index(
06746     Dwarf_Str_Offsets_Table dw_table_data,
06747     Dwarf_Unsigned dw_index_to_entry,
06748     Dwarf_Unsigned * dw_entry_value,
06749     Dwarf_Error * dw_error);

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06750
06768 DW_API int dwarf_str_offsets_statistics(
06769     Dwarf_Str_Offsets_Table dw_table_data,
06770     Dwarf_Unsigned * dw_wasted_byte_count,
06771     Dwarf_Unsigned * dw_table_count,
06772     Dwarf_Error * dw_error);
06773
06785 DW_API Dwarf_Unsigned dwarf_errno(Dwarf_Error dw_error);
06792 DW_API char* dwarf_errmsg(Dwarf_Error dw_error);
06800 DW_API char* dwarf_errmsg_by_number(Dwarf_Unsigned dw_errnum);
06801
06815 DW_API void dwarf_error_creation(Dwarf_Debug dw_dbg ,
06816     Dwarf_Error * dw_error, char * dw_errmsg);
06817
06826 DW_API void dwarf_dealloc_error(Dwarf_Debug dw_dbg,
06827     Dwarf_Error dw_error);
06869 DW_API void dwarf_dealloc(Dwarf_Debug dw_dbg,
06870     void* dw_space, Dwarf_Unsigned dw_type);
06890 DW_API int dwarf_get_debug_sup(Dwarf_Debug dw_dbg,
06891     Dwarf_Half * dw_version,
06892     Dwarf_Small * dw_is_supplementary,
06893     char ** dw_filename,
06894     Dwarf_Unsigned * dw_checksum_len,
06895     Dwarf_Small ** dw_checksum,
06896     Dwarf_Error * dw_error);
06932 DW_API int dwarf_dnames_header(Dwarf_Debug dw_dbg,
06933     Dwarf_Off dw_starting_offset,
06934     Dwarf_Dnames_Head * dw_dn,
06935     Dwarf_Off * dw_offset_of_next_table,
06936     Dwarf_Error * dw_error);
06937
06945 DW_API void dwarf_dealloc_dnames(Dwarf_Dnames_Head dw_dn);
06946
06991 DW_API int dwarf_dnames_abbrevtable(Dwarf_Dnames_Head dw_dn,
06992     Dwarf_Unsigned dw_index,
06993     Dwarf_Unsigned *dw_abbrev_offset,
06994     Dwarf_Unsigned *dw_abbrev_code,
06995     Dwarf_Unsigned *dw_abbrev_tag,
06996     Dwarf_Unsigned dw_array_size,
06997     Dwarf_Half *dw_idxattr_array,
06998     Dwarf_Half *dw_form_array,
06999     Dwarf_Unsigned *dw_idxattr_count);
07000
07018 DW_API int dwarf_dnames_sizes(Dwarf_Dnames_Head dw_dn,
07019     Dwarf_Unsigned * dw_comp_unit_count,
07020     Dwarf_Unsigned * dw_local_type_unit_count,
07021     Dwarf_Unsigned * dw_foreign_type_unit_count,
07022     Dwarf_Unsigned * dw_bucket_count,
07023     Dwarf_Unsigned * dw_name_count,
07024     /* The following are counted in bytes */
07025     Dwarf_Unsigned * dw_abbrev_table_size,
07026     Dwarf_Unsigned * dw_entry_pool_size,
07027     Dwarf_Unsigned * dw_augmentation_string_size,
07028     char ** dw_augmentation_string,
07029     Dwarf_Unsigned * dw_section_size,
07030     Dwarf_Half * dw_table_version,
07031     Dwarf_Half * dw_offset_size,
07032     Dwarf_Error * dw_error);
07033
07044 DW_API int dwarf_dnames_offsets(Dwarf_Dnames_Head dw_dn,
07045     Dwarf_Unsigned * dw_header_offset,
07046     Dwarf_Unsigned * dw_cu_table_offset,
07047     Dwarf_Unsigned * dw_tu_local_offset,
07048     Dwarf_Unsigned * dw_foreign_tu_offset,
07049     Dwarf_Unsigned * dw_bucket_offset,
07050     Dwarf_Unsigned * dw_hashes_offset,
07051     Dwarf_Unsigned * dw_stringoffsets_offset,
07052     Dwarf_Unsigned * dw_entryoffsets_offset,
07053     Dwarf_Unsigned * dw_abbrev_table_offset,
07054     Dwarf_Unsigned * dw_entry_pool_offset,
07055     Dwarf_Error * dw_error);
07056
07085 DW_API int dwarf_dnames_cu_table(Dwarf_Dnames_Head dw_dn,
07086     const char * dw_type,
07087     Dwarf_Unsigned dw_index_number,
07088     Dwarf_Unsigned * dw_offset,
07089     Dwarf_Sig8 * dw_sig,
07090     Dwarf_Error * dw_error);
07091
07113 DW_API int dwarf_dnames_bucket(Dwarf_Dnames_Head dw_dn,
07114     Dwarf_Unsigned dw_bucket_number,
07115     Dwarf_Unsigned * dw_index,
07116     Dwarf_Unsigned * dw_indexcount,
07117     Dwarf_Error * dw_error);
07118
07168 DW_API int dwarf_dnames_name(Dwarf_Dnames_Head dw_dn,
07169     Dwarf_Unsigned dw_name_index,

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07170 Dwarf_Unsigned * dw_bucket_number,
07171 Dwarf_Unsigned * dw_hash_value,
07172 Dwarf_Unsigned * dw_offset_to_debug_str,
07173 char * * dw_ptrtostr,
07174 Dwarf_Unsigned * dw_offset_in_entrpool,
07175 Dwarf_Unsigned * dw_abbrev_number,
07176 Dwarf_Half * dw_abbrev_tag,
07177 Dwarf_Unsigned * dw_array_size,
07178 Dwarf_Half * dw_idxattr_array,
07179 Dwarf_Half * dw_form_array,
07180 Dwarf_Unsigned * dw_idxattr_count,
07181 Dwarf_Error * dw_error);
07182
07224 DW_API int dwarf_dnames_entrpool(Dwarf_Dnames_Head dw_dn,
07225 Dwarf_Unsigned * dw_offset_in_entrpool,
07226 Dwarf_Unsigned * dw_abbrev_code,
07227 Dwarf_Half * dw_tag,
07228 Dwarf_Unsigned * dw_value_count,
07229 Dwarf_Unsigned * dw_index_of_abbrev,
07230 Dwarf_Unsigned * dw_offset_of_initial_value,
07231 Dwarf_Error * dw_error);
07232
07292 DW_API int dwarf_dnames_entrpool_values(Dwarf_Dnames_Head dw_dn,
07293 Dwarf_Unsigned * dw_index_of_abbrev,
07294 Dwarf_Unsigned * dw_offset_in_entrpool_of_values,
07295 Dwarf_Unsigned * dw_arrays_length,
07296 Dwarf_Half * dw_array_idx_number,
07297 Dwarf_Half * dw_array_form,
07298 Dwarf_Unsigned * dw_array_of_offsets,
07299 Dwarf_Sig8 * dw_array_of_signatures,
07300 Dwarf_Bool * dw_single_cu,
07301 Dwarf_Unsigned * dw_cu_offset,
07302 Dwarf_Unsigned * dw_offset_of_next_entrpool,
07303 Dwarf_Error * dw_error);
07304
07331 DW_API int dwarf_get_aranges(Dwarf_Debug dw_dbg,
07332 Dwarf_Arange** dw_aranges,
07333 Dwarf_Signed * dw_arange_count,
07334 Dwarf_Error* dw_error);
07335
07355 DW_API int dwarf_get_arange(Dwarf_Arange* dw_aranges,
07356 Dwarf_Unsigned * dw_arange_count,
07357 Dwarf_Addr * dw_address,
07358 Dwarf_Arange * dw_returned_arange,
07359 Dwarf_Error* dw_error);
07360
07373 DW_API int dwarf_get_cu_die_offset(Dwarf_Arange dw_arange,
07374 Dwarf_Off * dw_return_offset,
07375 Dwarf_Error* dw_error);
07376
07389 DW_API int dwarf_get_arange_cu_header_offset(Dwarf_Arange dw_arange,
07390 Dwarf_Off * dw_return_cu_header_offset,
07391 Dwarf_Error* dw_error);
07392
07418 DW_API int dwarf_get_arange_info_b(Dwarf_Arange dw_arange,
07419 Dwarf_Unsigned* dw_segment,
07420 Dwarf_Unsigned* dw_segment_entry_size,
07421 Dwarf_Addr * dw_start,
07422 Dwarf_Unsigned* dw_length,
07423 Dwarf_Off * dw_cu_die_offset,
07424 Dwarf_Error * dw_error );
07474 DW_API int dwarf_get_globals(Dwarf_Debug dw_dbg,
07475 Dwarf_Global** dw_globals,
07476 Dwarf_Signed * dw_number_of_globals,
07477 Dwarf_Error * dw_error);
07478
07479 #define DW_GL_GLOBALS 0 /* .debug_pubnames and .debug_names */
07480 #define DW_GL_PUBTYPES 1 /* .debug_pubtypes */
07481 /* the following are IRIX ONLY */
07482 #define DW_GL_FUNCS 2 /* .debug_funcnames */
07483 #define DW_GL_TYPES 3 /* .debug_tynames */
07484 #define DW_GL_VARS 4 /* .debug_varnames */
07485 #define DW_GL_WEAKS 5 /* .debug_weaknames */
07508 DW_API int dwarf_get_pubtypes(Dwarf_Debug dw_dbg,
07509 Dwarf_Global** dw_pubtypes,
07510 Dwarf_Signed * dw_number_of_pubtypes,
07511 Dwarf_Error * dw_error);
07512
07538 DW_API int dwarf_globals_by_type(Dwarf_Debug dw_dbg,
07539 int dw_requested_section,
07540 Dwarf_Global **dw_contents,
07541 Dwarf_Signed *dw_count,
07542 Dwarf_Error *dw_error);
07543
07554 DW_API void dwarf_globals_dealloc(Dwarf_Debug dw_dbg,
07555 Dwarf_Global* dw_global_like,
07556 Dwarf_Signed dw_count);

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07557
07570 DW_API int dwarf_globname(Dwarf_Global dw_global,
07571     char ** dw_returned_name,
07572     Dwarf_Error* dw_error);
07573
07586 DW_API int dwarf_global_die_offset(Dwarf_Global dw_global,
07587     Dwarf_Off * dw_die_offset,
07588     Dwarf_Error * dw_error);
07589
07604 DW_API int dwarf_global_cu_offset(Dwarf_Global dw_global,
07605     Dwarf_Off* dw_cu_header_offset,
07606     Dwarf_Error* dw_error);
07607
07626 DW_API int dwarf_global_name_offsets(Dwarf_Global dw_global,
07627     char ** dw_returned_name,
07628     Dwarf_Off* dw_die_offset,
07629     Dwarf_Off* dw_cu_die_offset,
07630     Dwarf_Error* dw_error);
07631
07644 DW_API Dwarf_Half dwarf_global_tag_number(Dwarf_Global dw_global);
07645
07656 DW_API int dwarf_get_globals_header(Dwarf_Global dw_global,
07657     int * dw_category, /* DW_GL_GLOBAL for example */
07658     Dwarf_Off * dw_offset_pub_header,
07659     Dwarf_Unsigned * dw_length_size,
07660     Dwarf_Unsigned * dw_length_pub,
07661     Dwarf_Unsigned * dw_version,
07662     Dwarf_Unsigned * dw_header_info_offset,
07663     Dwarf_Unsigned * dw_info_length,
07664     Dwarf_Error * dw_error);
07665
07688 DW_API int dwarf_return_empty_pubnames(Dwarf_Debug dw_dbg,
07689     int dw_flag);
07690
07724 DW_API int dwarf_get_gnu_index_head(Dwarf_Debug dw_dbg,
07725     Dwarf_Bool dw_which_section,
07726     Dwarf_Gnu_Index_Head *dw_head,
07727     Dwarf_Unsigned *dw_index_block_count_out,
07728     Dwarf_Error *dw_error);
07736 DW_API void dwarf_gnu_index_dealloc(Dwarf_Gnu_Index_Head dw_head);
07775 DW_API int dwarf_get_gnu_index_block(Dwarf_Gnu_Index_Head dw_head,
07776     Dwarf_Unsigned dw_number,
07777     Dwarf_Unsigned *dw_block_length,
07778     Dwarf_Half *dw_version,
07779     Dwarf_Unsigned *dw_offset_into_debug_info,
07780     Dwarf_Unsigned *dw_size_of_debug_info_area,
07781     Dwarf_Unsigned *dw_count_of_index_entries,
07782     Dwarf_Error *dw_error);
07783
07815 DW_API int dwarf_get_gnu_index_block_entry(
07816     Dwarf_Gnu_Index_Head dw_head,
07817     Dwarf_Unsigned dw_blocknumber,
07818     Dwarf_Unsigned dw_entrynumber,
07819     Dwarf_Unsigned *dw_offset_in_debug_info,
07820     const char **dw_name_string,
07821     unsigned char *dw_flagbyte,
07822     unsigned char *dw_staticorglobal,
07823     unsigned char *dw_typeofentry,
07824     Dwarf_Error *dw_error);
07825
07886 DW_API int dwarf_gdbindex_header(Dwarf_Debug dw_dbg,
07887     Dwarf_Gdbindex * dw_gdbindexptr,
07888     Dwarf_Unsigned * dw_version,
07889     Dwarf_Unsigned * dw_cu_list_offset,
07890     Dwarf_Unsigned * dw_types_cu_list_offset,
07891     Dwarf_Unsigned * dw_address_area_offset,
07892     Dwarf_Unsigned * dw_symbol_table_offset,
07893     Dwarf_Unsigned * dw_constant_pool_offset,
07894     Dwarf_Unsigned * dw_section_size,
07895     const char ** dw_section_name,
07896     Dwarf_Error * dw_error);
07897
07905 DW_API void dwarf_dealloc_gdbindex(Dwarf_Gdbindex dw_gdbindexptr);
07906
07917 DW_API int dwarf_gdbindex_culist_array(
07918     Dwarf_Gdbindex dw_gdbindexptr,
07919     Dwarf_Unsigned * dw_list_length,
07920     Dwarf_Error * dw_error);
07921
07939 DW_API int dwarf_gdbindex_culist_entry(
07940     Dwarf_Gdbindex dw_gdbindexptr,
07941     Dwarf_Unsigned dw_entryindex,
07942     Dwarf_Unsigned * dw_cu_offset,
07943     Dwarf_Unsigned * dw_cu_length,
07944     Dwarf_Error * dw_error);
07945
07957 DW_API int dwarf_gdbindex_types_culist_array(
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07958     Dwarf_Gdbindex    dw_gdbindexptr,
07959     Dwarf_Unsigned *  dw_types_list_length,
07960     Dwarf_Error *     dw_error);
07961
07962 /* entryindex: 0 to types_list_length -1 */
07984 DW_API int dwarf_gdbindex_types_culist_entry(
07985     Dwarf_Gdbindex    dw_gdbindexptr,
07986     Dwarf_Unsigned *  dw_types_entryindex,
07987     Dwarf_Unsigned *  dw_cu_offset,
07988     Dwarf_Unsigned *  dw_tu_offset,
07989     Dwarf_Unsigned *  dw_type_signature,
07990     Dwarf_Error *     dw_error);
07991
08006 DW_API int dwarf_gdbindex_addressarea(
08007     Dwarf_Gdbindex    dw_gdbindexptr,
08008     Dwarf_Unsigned *  dw_addressarea_list_length,
08009     Dwarf_Error *     dw_error);
08010
08029 DW_API int dwarf_gdbindex_addressarea_entry(
08030     Dwarf_Gdbindex    dw_gdbindexptr,
08031     Dwarf_Unsigned *  dw_entryindex,
08032     Dwarf_Unsigned *  dw_low_address,
08033     Dwarf_Unsigned *  dw_high_address,
08034     Dwarf_Unsigned *  dw_cu_index,
08035     Dwarf_Error *     dw_error);
08036
08049 DW_API int dwarf_gdbindex_symboltable_array(
08050     Dwarf_Gdbindex    dw_gdbindexptr,
08051     Dwarf_Unsigned *  dw_syntab_list_length,
08052     Dwarf_Error *     dw_error);
08053
08073 DW_API int dwarf_gdbindex_symboltable_entry(
08074     Dwarf_Gdbindex    dw_gdbindexptr,
08075     Dwarf_Unsigned *  dw_entryindex,
08076     Dwarf_Unsigned *  dw_string_offset,
08077     Dwarf_Unsigned *  dw_cu_vector_offset,
08078     Dwarf_Error *     dw_error);
08079
08097 DW_API int dwarf_gdbindex_cuvector_length(
08098     Dwarf_Gdbindex    dw_gdbindexptr,
08099     Dwarf_Unsigned *  dw_cuvector_offset,
08100     Dwarf_Unsigned *  dw_innercount,
08101     Dwarf_Error *     dw_error);
08102
08119 DW_API int dwarf_gdbindex_cuvector_inner_attributes(
08120     Dwarf_Gdbindex    dw_gdbindexptr,
08121     Dwarf_Unsigned *  dw_cuvector_offset_in,
08122     Dwarf_Unsigned *  dw_innerindex,
08123     Dwarf_Unsigned *  dw_field_value,
08124     Dwarf_Error *     dw_error);
08125
08148 DW_API int dwarf_gdbindex_cuvector_instance_expand_value(
08149     Dwarf_Gdbindex    dw_gdbindexptr,
08150     Dwarf_Unsigned *  dw_field_value,
08151     Dwarf_Unsigned *  dw_cu_index,
08152     Dwarf_Unsigned *  dw_symbol_kind,
08153     Dwarf_Unsigned *  dw_is_static,
08154     Dwarf_Error *     dw_error);
08155
08171 DW_API int dwarf_gdbindex_string_by_offset(
08172     Dwarf_Gdbindex    dw_gdbindexptr,
08173     Dwarf_Unsigned *  dw_stringoffset,
08174     const char **     dw_string_ptr,
08175     Dwarf_Error *     dw_error);
08216 DW_API int dwarf_get_xu_index_header(Dwarf_Debug dw_dbg,
08217     const char * dw_section_type, /* "tu" or "cu" */
08218     Dwarf_Xu_Index_Header * dw_xuhdr,
08219     Dwarf_Unsigned * dw_version_number,
08220     Dwarf_Unsigned * dw_section_count,
08221     Dwarf_Unsigned * dw_units_count,
08222     Dwarf_Unsigned * dw_hash_slots_count,
08223     const char ** dw_sect_name,
08224     Dwarf_Error * dw_error);
08225
08234 DW_API void dwarf_dealloc_xu_header(Dwarf_Xu_Index_Header dw_xuhdr);
08235
08250 DW_API int dwarf_get_xu_index_section_type(
08251     Dwarf_Xu_Index_Header dw_xuhdr,
08252     const char ** dw_typename,
08253     const char ** dw_sectionname,
08254     Dwarf_Error * dw_error);
08255
08287 DW_API int dwarf_get_xu_hash_entry(Dwarf_Xu_Index_Header dw_xuhdr,
08288     Dwarf_Unsigned * dw_index,
08289     Dwarf_Sig8 * dw_hash_value,
08290     Dwarf_Unsigned * dw_index_to_sections,
08291     Dwarf_Error * dw_error);

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08292
08293 /* Columns 0 to L-1, valid. */
08316 DW_API int dwarf_get_xu_section_names(Dwarf_Xu_Index_Header dw_xuhdr,
08317     Dwarf_Unsigned dw_column_index,
08318     Dwarf_Unsigned* dw_SECT_number,
08319     const char ** dw_SECT_name,
08320     Dwarf_Error * dw_error);
08321
08350 DW_API int dwarf_get_xu_section_offset(
08351     Dwarf_Xu_Index_Header dw_xuhdr,
08352     Dwarf_Unsigned dw_row_index,
08353     Dwarf_Unsigned dw_column_index,
08354     Dwarf_Unsigned* dw_sec_offset,
08355     Dwarf_Unsigned* dw_sec_size,
08356     Dwarf_Error * dw_error);
08357
08379 DW_API int dwarf_get_debugfission_for_die(Dwarf_Die dw_die,
08380     Dwarf_Debug_Fission_Per_CU * dw_percu_out,
08381     Dwarf_Error * dw_error);
08382
08400 DW_API int dwarf_get_debugfission_for_key(Dwarf_Debug dw_dbg,
08401     Dwarf_Sig8 * dw_hash_sig,
08402     const char * dw_cu_type,
08403     Dwarf_Debug_Fission_Per_CU * dw_percu_out,
08404     Dwarf_Error * dw_error);
08405
08406 /* END debugfission dwp .debug_cu_index
08407    and .debug_tu_index meaningful operations. */
08408
08502 DW_API int dwarf_gnu_debuglink(Dwarf_Debug dw_dbg,
08503     char ** dw_debuglink_path_returned,
08504     unsigned char ** dw_crc_returned,
08505     char ** dw_debuglink_fullpath_returned,
08506     unsigned int * dw_debuglink_path_length_returned,
08507     unsigned int * dw_buildid_type_returned,
08508     char ** dw_buildid_owner_name_returned,
08509     unsigned char ** dw_buildid_returned,
08510     unsigned int * dw_buildid_length_returned,
08511     char *** dw_paths_returned,
08512     unsigned int * dw_paths_length_returned,
08513     Dwarf_Error* dw_error);
08514
08547 DW_API int dwarf_suppress_debuglink_crc(int dw_suppress);
08548
08567 DW_API int dwarf_add_debuglink_global_path(Dwarf_Debug dw_dbg,
08568     const char * dw_pathname,
08569     Dwarf_Error* dw_error);
08570
08598 DW_API int dwarf_crc32(Dwarf_Debug dw_dbg,
08599     unsigned char * dw_crcbuf,
08600     Dwarf_Error * dw_error);
08601
08625 DW_API unsigned int dwarf_basic_crc32(const unsigned char * dw_buf,
08626     unsigned long dw_len,
08627     unsigned int dw_init);
08646 #define DW_HARMLESS_ERROR_CIRCULAR_LIST_DEFAULT_SIZE 4
08647
08690 DW_API int dwarf_get_harmless_error_list(Dwarf_Debug dw_dbg,
08691     unsigned int dw_count,
08692     const char ** dw_errmsg_ptrs_array,
08693     unsigned int * dw_newerr_count);
08694
08715 DW_API unsigned int dwarf_set_harmless_error_list_size(
08716     Dwarf_Debug dw_dbg,
08717     unsigned int dw_maxcount);
08718
08730 DW_API void dwarf_insert_harmless_error(Dwarf_Debug dw_dbg,
08731     char * dw_newerror);
08731
08767 DW_API int dwarf_get_ACCESS_name(unsigned int dw_val_in,
08768     const char ** dw_s_out);
08771 DW_API int dwarf_get_ADDR_name(unsigned int dw_val_in,
08772     const char ** dw_s_out);
08775 DW_API int dwarf_get_AT_name(unsigned int dw_val_in,
08776     const char ** dw_s_out);
08779 DW_API int dwarf_get_ATCF_name(unsigned int dw_val_in,
08780     const char ** dw_s_out);
08783 DW_API int dwarf_get_ATE_name(unsigned int dw_val_in,
08784     const char ** dw_s_out);
08787 DW_API int dwarf_get_CC_name(unsigned int dw_val_in,
08788     const char ** dw_s_out);
08791 DW_API int dwarf_get_CFA_name(unsigned int dw_val_in,
08792     const char ** dw_s_out);
08795 DW_API int dwarf_get_children_name(unsigned int dw_val_in,
08796     const char ** dw_s_out);
08799 DW_API int dwarf_get_CHILDREN_name(unsigned int dw_val_in,
08800     const char ** dw_s_out);
08803 DW_API int dwarf_get_DEFAULTED_name(unsigned int dw_val_in,

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08804     const char ** dw_s_out);
08807 DW_API int dwarf_get_DS_name(unsigned int dw_val_in,
08808     const char ** dw_s_out);
08811 DW_API int dwarf_get_DSC_name(unsigned int dw_val_in,
08812     const char ** dw_s_out);
08817 DW_API int dwarf_get_GNUKIND_name(unsigned int dw_val_in,
08818     const char ** dw_s_out);
08823 DW_API int dwarf_get_EH_name(unsigned int dw_val_in,
08824     const char ** dw_s_out);
08827 DW_API int dwarf_get_END_name(unsigned int dw_val_in,
08828     const char ** dw_s_out);
08831 DW_API int dwarf_get_FORM_name(unsigned int dw_val_in,
08832     const char ** dw_s_out);
08839 DW_API int dwarf_get_FRAME_name(unsigned int dw_val_in,
08840     const char ** dw_s_out);
08845 DW_API int dwarf_get_GNUIVIS_name(unsigned int dw_val_in,
08846     const char ** dw_s_out);
08847
08850 DW_API int dwarf_get_ID_name(unsigned int dw_val_in,
08851     const char ** dw_s_out);
08854 DW_API int dwarf_get_IDX_name(unsigned int dw_val_in,
08855     const char ** dw_s_out);
08858 DW_API int dwarf_get_INL_name(unsigned int dw_val_in,
08859     const char ** dw_s_out);
08862 DW_API int dwarf_get_ISA_name(unsigned int dw_val_in,
08863     const char ** dw_s_out);
08866 DW_API int dwarf_get_LANG_name(unsigned int dw_val_in,
08867     const char ** dw_s_out);
08870 DW_API int dwarf_get_LLE_name(unsigned int dw_val_in,
08871     const char ** dw_s_out);
08877 DW_API int dwarf_get_LLEX_name(unsigned int dw_val_in,
08878     const char ** dw_s_out );
08879
08882 DW_API int dwarf_get_LNAME_name(unsigned int dw_val_in,
08883     const char ** dw_s_out);
08886 DW_API int dwarf_get_LNCT_name(unsigned int dw_val_in,
08887     const char ** dw_s_out);
08890 DW_API int dwarf_get_LNE_name(unsigned int dw_val_in,
08891     const char ** dw_s_out);
08894 DW_API int dwarf_get_LNS_name(unsigned int dw_val_in,
08895     const char ** dw_s_out);
08900 DW_API int dwarf_get_MACINFO_name(unsigned int dw_val_in,
08901     const char ** dw_s_out);
08906 DW_API int dwarf_get_MACRO_name(unsigned int dw_val_in,
08907     const char ** dw_s_out);
08910 DW_API int dwarf_get_OP_name(unsigned int dw_val_in,
08911     const char ** dw_s_out);
08914 DW_API int dwarf_get_ORD_name(unsigned int dw_val_in,
08915     const char ** dw_s_out);
08918 DW_API int dwarf_get_RLE_name(unsigned int dw_val_in,
08919     const char ** dw_s_out);
08922 DW_API int dwarf_get_SECT_name(unsigned int dw_val_in,
08923     const char ** dw_s_out);
08926 DW_API int dwarf_get_TAG_name(unsigned int dw_val_in,
08927     const char ** dw_s_out);
08930 DW_API int dwarf_get_UT_name(unsigned int dw_val_in,
08931     const char ** dw_s_out);
08934 DW_API int dwarf_get_VIRTUALITY_name(unsigned int dw_val_in,
08935     const char ** dw_s_out);
08938 DW_API int dwarf_get_VIS_name(unsigned int dw_val_in,
08939     const char ** dw_s_out);
08940
08951 DW_API int dwarf_get_FORM_CLASS_name(enum Dwarf_Form_Class dw_fc,
08952     const char ** dw_s_out);
09006 DW_API int dwarf_get_die_section_name(Dwarf_Debug dw_dbg,
09007     Dwarf_Bool dw_is_info,
09008     const char **dw_sec_name,
09009     Dwarf_Error *dw_error);
09010
09017 DW_API int dwarf_get_die_section_name_b(Dwarf_Die dw_die,
09018     const char ** dw_sec_name,
09019     Dwarf_Error * dw_error);
09020
09023 DW_API int dwarf_get_macro_section_name(Dwarf_Debug dw_dbg,
09024     const char ** dw_sec_name_out,
09025     Dwarf_Error * dw_err);
09026
09069 DW_API int dwarf_get_real_section_name(Dwarf_Debug dw_dbg,
09070     const char * dw_std_section_name,
09071     const char ** dw_actual_sec_name_out,
09072     Dwarf_Small * dw_marked_zcompressed,
09073     Dwarf_Small * dw_marked_zlib_compressed,
09074     Dwarf_Small * dw_marked_shf_compressed,
09075     Dwarf_Unsigned * dw_compressed_length,
09076     Dwarf_Unsigned * dw_uncompressed_length,
09077     Dwarf_Error * dw_error);
09078

```

```

09083 DW_API int dwarf_get_frame_section_name(Dwarf_Debug dw_dbg,
09084     const char ** dw_section_name_out,
09085     Dwarf_Error * dw_error);
09086
09092 DW_API int dwarf_get_frame_section_name_ghnu(Dwarf_Debug dw_dbg,
09093     const char ** dw_section_name_out,
09094     Dwarf_Error * dw_error);
09095
09099 DW_API int dwarf_get_aranges_section_name(Dwarf_Debug dw_dbg,
09100     const char ** dw_section_name_out,
09101     Dwarf_Error * dw_error);
09102
09106 DW_API int dwarf_get_ranges_section_name(Dwarf_Debug dw_dbg,
09107     const char ** dw_section_name_out,
09108     Dwarf_Error * dw_error);
09109
09110 /* These two get the offset or address size as defined
09111    by the object format (not by DWARF). */
09117 DW_API int dwarf_get_offset_size(Dwarf_Debug dw_dbg,
09118     Dwarf_Half * dw_offset_size,
09119     Dwarf_Error * dw_error);
09120
09126 DW_API int dwarf_get_address_size(Dwarf_Debug dw_dbg,
09127     Dwarf_Half * dw_addr_size,
09128     Dwarf_Error * dw_error);
09129
09133 DW_API int dwarf_get_string_section_name(Dwarf_Debug dw_dbg,
09134     const char ** dw_section_name_out,
09135     Dwarf_Error * dw_error);
09136
09140 DW_API int dwarf_get_line_section_name(Dwarf_Debug dw_dbg,
09141     const char ** dw_section_name_out,
09142     Dwarf_Error * dw_error);
09143
09157 DW_API int dwarf_get_line_section_name_from_die(Dwarf_Die dw_die,
09158     const char ** dw_section_name_out,
09159     Dwarf_Error * dw_error);
09160
09207 DW_API int dwarf_get_section_info_by_name_a(Dwarf_Debug dw_dbg,
09208     const char * dw_section_name,
09209     Dwarf_Addr * dw_section_addr,
09210     Dwarf_Unsigned* dw_section_size,
09211     Dwarf_Unsigned* dw_section_flags,
09212     Dwarf_Unsigned* dw_section_offset,
09213     Dwarf_Error * dw_error);
09214
09227 DW_API int dwarf_get_section_info_by_name(Dwarf_Debug dw_dbg,
09228     const char * dw_section_name,
09229     Dwarf_Addr * dw_section_addr,
09230     Dwarf_Unsigned* dw_section_size,
09231     Dwarf_Error * dw_error);
09232
09278 DW_API int dwarf_get_section_info_by_index_a(Dwarf_Debug dw_dbg,
09279     int dw_section_index,
09280     const char ** dw_section_name,
09281     Dwarf_Addr* dw_section_addr,
09282     Dwarf_Unsigned* dw_section_size,
09283     Dwarf_Unsigned* dw_section_flags,
09284     Dwarf_Unsigned* dw_section_offset,
09285     Dwarf_Error* dw_error);
09286
09299 DW_API int dwarf_get_section_info_by_index(Dwarf_Debug dw_dbg,
09300     int dw_section_index,
09301     const char ** dw_section_name,
09302     Dwarf_Addr* dw_section_addr,
09303     Dwarf_Unsigned* dw_section_size,
09304     Dwarf_Error* dw_error);
09305
09392 DW_API int dwarf_machine_architecture_a(Dwarf_Debug dw_dbg,
09393     Dwarf_Small *dw_ftype,
09394     Dwarf_Small *dw_obj_pointersize,
09395     Dwarf_Bool *dw_obj_is_big_endian,
09396     Dwarf_Unsigned *dw_obj_machine, /*Elf e_machine */
09397     Dwarf_Unsigned *dw_obj_type, /* Elf e_type */
09398     Dwarf_Unsigned *dw_obj_flags,
09399     Dwarf_Small *dw_path_source,
09400     Dwarf_Unsigned *dw_ub_offset,
09401     Dwarf_Unsigned *dw_ub_count,
09402     Dwarf_Unsigned *dw_ub_index,
09403     Dwarf_Unsigned *dw_comdat_groupnumber);
09404
09412 DW_API int dwarf_machine_architecture(Dwarf_Debug dw_dbg,
09413     Dwarf_Small *dw_ftype,
09414     Dwarf_Small *dw_obj_pointersize,
09415     Dwarf_Bool *dw_obj_is_big_endian,
09416     Dwarf_Unsigned *dw_obj_machine, /*architecture*/
09417     Dwarf_Unsigned *dw_obj_flags,

```

```

09418 Dwarf_Small *dw_path_source,
09419 Dwarf_Unsigned *dw_ub_offset,
09420 Dwarf_Unsigned *dw_ub_count,
09421 Dwarf_Unsigned *dw_ub_index,
09422 Dwarf_Unsigned *dw_comdat_groupnumber);
09423
09435 DW_API Dwarf_Unsigned dwarf_get_section_count(Dwarf_Debug dw_dbg);
09436
09455 DW_API int dwarf_get_section_max_offsets_d(Dwarf_Debug dw_dbg,
09456 Dwarf_Unsigned *dw_debug_info_size,
09457 Dwarf_Unsigned *dw_debug_abbrev_size,
09458 Dwarf_Unsigned *dw_debug_line_size,
09459 Dwarf_Unsigned *dw_debug_loc_size,
09460 Dwarf_Unsigned *dw_debug_aranges_size,
09461
09462 Dwarf_Unsigned *dw_debug_macinfo_size,
09463 Dwarf_Unsigned *dw_debug_pubnames_size,
09464 Dwarf_Unsigned *dw_debug_str_size,
09465 Dwarf_Unsigned *dw_debug_frame_size,
09466 Dwarf_Unsigned *dw_debug_ranges_size,
09467
09468 Dwarf_Unsigned *dw_debug_pubtypes_size,
09469 Dwarf_Unsigned *dw_debug_types_size,
09470 Dwarf_Unsigned *dw_debug_macro_size,
09471 Dwarf_Unsigned *dw_debug_str_offsets_size,
09472 Dwarf_Unsigned *dw_debug_sup_size,
09473
09474 Dwarf_Unsigned *dw_debug_cu_index_size,
09475 Dwarf_Unsigned *dw_debug_tu_index_size,
09476 Dwarf_Unsigned *dw_debug_names_size,
09477 Dwarf_Unsigned *dw_debug_loclists_size,
09478 Dwarf_Unsigned *dw_debug_rnglists_size);
09527 DW_API int dwarf_sec_group_sizes(Dwarf_Debug dw_dbg,
09528 Dwarf_Unsigned *dw_section_count_out,
09529 Dwarf_Unsigned *dw_group_count_out,
09530 Dwarf_Unsigned *dw_selected_group_out,
09531 Dwarf_Unsigned *dw_map_entry_count_out,
09532 Dwarf_Error *dw_error);
09533
09564 DW_API int dwarf_sec_group_map(Dwarf_Debug dw_dbg,
09565 Dwarf_Unsigned *dw_map_entry_count,
09566 Dwarf_Unsigned *dw_group_numbers_array,
09567 Dwarf_Unsigned *dw_sec_numbers_array,
09568 const char **dw_sec_names_array,
09569 Dwarf_Error *dw_error);
09584 DW_API int dwarf_encode_leb128(Dwarf_Unsigned dw_val,
09585 int *dw_nbytes,
09586 char *dw_space,
09587 int dw_splen);
09588 DW_API int dwarf_encode_signed_leb128(Dwarf_Signed dw_val,
09589 int *dw_nbytes,
09590 char *dw_space,
09591 int dw_splen);
09592 /* Same for LEB decoding routines.
09593 caller sets endptr to an address one past the last valid
09594 address the library should be allowed to
09595 access. */
09596 DW_API int dwarf_decode_leb128(char *dw_leb,
09597 Dwarf_Unsigned *dw_leblen,
09598 Dwarf_Unsigned *dw_outval,
09599 char *dw_endptr);
09600 DW_API int dwarf_decode_signed_leb128(char *dw_leb,
09601 Dwarf_Unsigned *dw_leblen,
09602 Dwarf_Signed *dw_outval,
09603 char *dw_endptr);
09620 DW_API const char * dwarf_package_version(void);
09621
09637 DW_API int dwarf_set_stringcheck(int dw_stringcheck);
09638
09660 DW_API int dwarf_set_reloc_application(int dw_apply);
09661
09686 DW_API void (*dwarf_get_endian_copy_function(Dwarf_Debug dw_dbg))
09687 (void *, const void *, unsigned long);
09688
09689 /* A global flag in libdwarf. Applies to all Dwarf_Debug */
09690 DW_API extern Dwarf_Cmdline_Options dwarf_cmdline_options;
09691
09706 DW_API void dwarf_record_cmdline_options(
09707 Dwarf_Cmdline_Options dw_dd_options);
09708
09727 DW_API int dwarf_set_de_alloc_flag(int dw_v);
09728
09757 DW_API int dwarf_library_allow_dup_attr(int dw_v);
09758
09780 DW_API Dwarf_Small dwarf_set_default_address_size(
09781 Dwarf_Debug dw_dbg,
09782 Dwarf_Small dw_value);

```

```
09783
09809 DW_API int dwarf_get_universalbinary_count(
09810     Dwarf_Debug dw_dbg,
09811     Dwarf_Unsigned *dw_current_index,
09812     Dwarf_Unsigned *dw_available_count);
09813
09832 DW_API int dwarf_object_detector_path_b(const char * dw_path,
09833     char *dw_outpath_buffer,
09834     unsigned long dw_outpathlen,
09835     char ** dw_gl_pathnames,
09836     unsigned int dw_gl_pathcount,
09837     unsigned int *dw_ftype,
09838     unsigned int *dw_endian,
09839     unsigned int *dw_offsetsize,
09840     Dwarf_Unsigned *dw_filesize,
09841     unsigned char *dw_pathsource,
09842     int * dw_errcode);
09843
09844 /* Solely looks for dSYM */
09845 DW_API int dwarf_object_detector_path_dSYM(const char * dw_path,
09846     char * dw_outpath,
09847     unsigned long dw_outpath_len,
09848     char ** dw_gl_pathnames,
09849     unsigned int dw_gl_pathcount,
09850     unsigned int *dw_ftype,
09851     unsigned int *dw_endian,
09852     unsigned int *dw_offsetsize,
09853     Dwarf_Unsigned *dw_filesize,
09854     unsigned char *dw_pathsource,
09855     int * dw_errcode);
09856
09857 DW_API int dwarf_object_detector_fd(int dw_fd,
09858     unsigned int *dw_ftype,
09859     unsigned int *dw_endian,
09860     unsigned int *dw_offsetsize,
09861     Dwarf_Unsigned *dw_filesize,
09862     int *dw_errcode);
09927 DW_API enum Dwarf_Sec_Alloc_Pref dwarf_set_load_preference(
09928     enum Dwarf_Sec_Alloc_Pref dw_load_preference);
09929
09969 DW_API int dwarf_get_mmap_count(Dwarf_Debug dw_dbg,
09970     Dwarf_Unsigned *dw_mmap_count,
09971     Dwarf_Unsigned *dw_mmap_size,
09972     Dwarf_Unsigned *dw_malloc_count,
09973     Dwarf_Unsigned *dw_malloc_size);
09977 #ifdef __cplusplus
09978 }
09979 #endif /* __cplusplus */
09980 #endif /* _LIBDWARF_H */
```


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