

libdwarf

Generated by Doxygen 1.9.1

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Chapter 1

A Consumer Library Interface to DWARF

Author

David Anderson

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Date

2024-06-24 v0.10.0

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 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 *libdwf*, 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

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

1.4 Error Handling in libdwf

Essentially every *libdwf* 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, &dbg, &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 *libdw* 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 *libdw* 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_COL` 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_tynames
.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 do 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_entsize;
};

```

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_a_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 [libdwarf.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 *libdwarf* 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_DLV_↵ 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 Recent Changes

We list these with newest first.

Changes 0.9.2 to 0.10.0

Released 24 June 2024

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 through 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_typenames 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* users. 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, Mac OS, 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_DL_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 n 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 syntatic 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

Module Index

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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

Module 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 an offset (`DW_RANGES_ENTRY`) or an address (`dwr_addr2` in `DW_RANGES_↵`
`_ADDRESS_SELECTION`) or both are zero (`DW_RANGES_END`). For DWARF5 each table starts with a header
followed by range list entries defined as here. `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_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](#)

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.

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_Die

[Dwarf_Die](#)

Used to reference a DWARF Debugging Information Entry.

9.3.2.17 Dwarf_Debug_Addr_Table

[Dwarf_Debug_Addr_Table](#)

Used to reference a table in section .debug_addr

9.3.2.18 Dwarf_Line

[Dwarf_Line](#)

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

9.3.2.19 Dwarf_Global

[Dwarf_Global](#)

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

9.3.2.20 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.

9.3.2.21 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.

9.3.2.22 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.

9.3.2.23 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.

9.3.2.24 Dwarf_Attribute

`Dwarf_Attribute`

Used to reference a Dwarf_Die attribute

9.3.2.25 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.

9.3.2.26 Dwarf_Fde

`Dwarf_Fde`

Used to reference .debug_frame or .eh_frame FDE.

9.3.2.27 Dwarf_Cie

`Dwarf_Cie`

Used to reference .debug_frame or .eh_frame CIE.

9.3.2.28 Dwarf_Arange

`Dwarf_Arange`

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

9.3.2.29 Dwarf_Gdbindex

`Dwarf_Gdbindex`

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

9.3.2.30 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.

9.3.2.31 Dwarf_Line_Context

`Dwarf_Line_Context`

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

9.3.2.32 Dwarf_Macro_Context

`Dwarf_Macro_Context`

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

9.3.2.33 Dwarf_Dnames_Head

`Dwarf_Dnames_Head`

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

9.3.2.34 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.

9.3.2.35 Dwarf_Macro_Details

`Dwarf_Macro_Details`

A handy short name for a `Dwarf_Macro_Details_S` struct.

9.3.2.36 Dwarf_Debug_Fission_Per_CU

[Dwarf_Debug_Fission_Per_CU](#)

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

9.3.2.37 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

9.3.2.38 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

9.3.2.39 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.

9.3.2.40 Dwarf_Rnglists_Head

[Dwarf_Rnglists_Head](#)

Used for access to a set of DWARF5 debug_rnglists entries.

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_VARNAME_DUPLICATE 164
- #define DW_DLE_DEBUG_VARNAME_NULL 165
- #define DW_DLE_DEBUG_VARNAME_VERSION_ERROR 166
- #define DW_DLE_DEBUG_VARNAME_LENGTH_BAD 167
- #define DW_DLE_VAR_NULL 168
- #define DW_DLE_VAR_CONTEXT_NULL 169
- #define DW_DLE_DEBUG_WEAKNAME_DUPLICATE 170
- #define DW_DLE_DEBUG_WEAKNAME_NULL 171
- #define DW_DLE_DEBUG_WEAKNAME_VERSION_ERROR 172
- #define DW_DLE_DEBUG_WEAKNAME_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
- `#define DW_DLE_AT_FIXUP_NULL` 242
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- #define DW_DLE_ELF_ENDIAN_BAD 421
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- `#define DW_DLE_SEEK_OFF_END` 444
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- `#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_LAST` 504
- `#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 504
```

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 <i>true_path_out</i> . If <i>true_path_buffer</i> len is zero or <i>true_path_out_buffer</i> 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 <i>true_path_out</i> will not match <i>path</i> and the initial byte will be non-null. The value put in <i>true_path_out</i> 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 <i>dw_error</i> argument.
<i>dw_errarg</i>	If <i>dw_errorhand</i> is non-null, then this value (a pointer or integer that means something to you) is passed to the <i>dw_errhand</i> function in case that is helpful to you.
<i>dw_dbg</i>	On success, <i>*dw_dbg</i> 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 <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

[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 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 NULL 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 DW_GROUPNUMBER_ANY unless one wishes to other than a standard group.
<i>dw_errhand</i>	Pass in NULL, normally. If non-null 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>	Pass in NULL, normally. If dw_errorhand 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_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 dw_dl_path_array.
<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 dw_error 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 is 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` is 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 <code>DW_GROUPNUMBER_ANY</code> unless one wishes to other than a standard group.
<i>dw_errhand</i>	Pass in <code>NULL</code> unless 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>	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.
<i>dw_error</i>	In case return is <code>DW_DLV_ERROR</code> <code>dw_error</code> 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 dw_error 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 base Dwarf_Debug this returns the tied Dwarf_Debug. Unlikely anyone uses this call as you had the tied and base dbg when calling [dwarf_set_tied_dbg\(\)](#).

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_ref, Dwarf_Die *dw_die_out, 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 .debug_info Pass in FALSE if reading through DWARF4 .debug_types.
<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.

Parameters

<i>dw_cu_header_length</i>	Returns the length of the just-read CU header.
<i>dw_version_stamp</i>	Returns the version number (2 to 5) of the CU header just read.
<i>dw_abbrev_offset</i>	Returns the .debug_abbrev offset from the the CU header just read.
<i>dw_address_size</i>	Returns the address size specified for this CU, usually either 4 or 8.
<i>dw_length_size</i>	Returns the offset size (the length of the size field from the header) specified for this CU, either 4 or 4.
<i>dw_extension_size</i>	If the section is standard 64bit DWARF then this value is 4. Else the value is zero.
<i>dw_type_signature</i>	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.
<i>dw_typeoffset</i>	For DW_UT_split_type or DW_UT_type this is the type offset from the CU header.
<i>dw_next_cu_header_offset</i>	The offset in the section of the next CU (unless there is a compiler bug this is rarely of interest).
<i>dw_header_cu_type</i>	Returns DW_UT_compile, or other DW_UT value.
<i>dw_error</i>	In case return is DW_DLV_ERROR dw_error 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_chiiddie,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_die</i>	We will return the first child of this DIE.
<i>dw_return_chiiddie</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_is_info or .debug_is_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

<i>dw_die</i>	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_hipc 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_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 dw_die.
<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

<i>dw_die</i>	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

<i>dw_die</i>	A valid DIE pointer (not NULL).
<i>dw_ab_has_child</i>	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

<i>dw_sibling</i>	Pass in a DIE returned by dwarf_siblingof_b() .
<i>dw_offset</i>	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.
<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 deallocate 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_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_explen, `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_attrnum,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_attr</i>	The Dwarf_Attribute of interest.
<i>dw_returned_attrnum</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_attnum 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_attnum 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>	Puts a pointer to a string in the DWARF information if the FORM of the attribute is some sort of string FORM.
<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_udata).

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 dw_dsc_head_out array.
<i>dw_error</i>	The usual error pointer.

Returns

DW_DLX_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 <code>dw_line</code> has the <code>is_stmt</code> register set) and FALSE if <code>is_stmt</code> 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 the source file name from the line table header and returns a pointer to that file name string through the pointer.
<i>dw_error</i>	The usual error pointer. Do not dealloc or free the string.

Returns

DW_DLV_OK if it succeeds.

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.

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 tieddbg (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 this
<i>dw_rangesbuf</i>	A pointer to an array of structs is returned here.
<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

9.13 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 rnglists.

- 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.
<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.

Parameters

<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 Dwarf_Locdesc_c.
<i>dw_index</i>	Pass in the operator index. zero through dw_locexpr_op_count_out-1.
<i>dw_operator_out</i>	On success returns the DW_OP operator, such as DW_OP_plus .
<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_Loc_Head 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_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)
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

<i>dw_die</i>	The CU DIE of interest.
<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_unit_offset_out</i>	On success returns the offset of the macro context.
<i>dw_macro_ops_count_out</i>	On success returns the number of macro operations in the context.
<i>dw_macro_ops_data_length_out</i>	On success returns the length in bytes of the operations in 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.

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.
<small>Generated by Doxygen</small> <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 dw_opcode_count-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 dw_index.
<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.

Parameters

<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 dealloc or free this 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_instructionpointer, 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 <i>code_alignment_factor</i> used to interpret CIE/FDE operations.
<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.

Parameters

<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_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)

Get Abbrev Entry Details.

9.19.1 Detailed Description

Allows reading section `.debug_abbrev` independently of CUs or DIEs. Normally not done (libdwarf 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 libdwarf 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

<code>dw_dbg</code>	The <code>Dwarf_Debug</code> of interest.
<code>dw_offset</code>	Pass in the offset where a <code>Debug_Abbrev</code> starts.
<code>dw_returned_abbrev</code>	On success, sets a pointer to a <code>Dwarf_Abbrev</code> through the pointer to allow further access.
<small>Generated by Doxygen</small> <code>dw_length</code>	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.
<code>dw_attr_count</code>	On success, returns the number of attributes in this abbreviation entry.
<code>dw_error</code>	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 <i>dw_error</i> 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 <i>dw_index</i> values are 0 through <i>dw_attr_count</i> -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_udata
<i>dw_returned_implicit_const</i>	On success, if the <i>dw_returned_form</i> is DW_FORM_implicit_const then <i>dw_returned_implicit_const</i> 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 <i>dw_error</i> 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 dw_table_value_count-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 dw_error 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

<code>dw_table_data</code>	Pass in the open table pointer.
<code>dw_wasted_byte_count</code>	Always returns 0 at present.
<code>dw_table_count</code>	On success returns the total number of tables seen so far in the section.
<code>dw_error</code>	On error <code>dw_error</code> 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_errnum)`
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

<i>dw_error</i>	The <i>dw_error</i> should be non-null and a valid Dwarf_Error.
-----------------	---

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

<i>dw_error</i>	The <i>dw_error</i> should be non-null and a valid Dwarf_Error.
-----------------	---

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

<i>dw_errornum</i>	The <i>dw_error</i> should be an integer from the DW_DLE set. For example, DW_DLE_DIE_NULL.
--------------------	---

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_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 a name table entry.
- 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)
Return a the set of values from an entrypool entry.
- 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)
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

<i>dw_dbg</i>	The Dwarf_Debug of interest.
<i>dw_starting_offset</i>	Read this section starting at offset zero.
<i>dw_dn</i>	On success returns a pointer to a set of data allowing access to the table.
<i>dw_offset_of_next_table</i>	On success returns Offset just past the end of the the opened table.
<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 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 <i>dw_abbrev_offset</i> .
<i>dw_abbrev_tag</i>	Returns the tag for the abbrev at offset <i>dw_abbrev_offset</i> .
<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 <i>dw_abbrev_code</i> . 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 <i>dw_abbrev_code</i> (paralleled to <i>dw_idxattr_array</i>). 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 <i>array_size</i> passed in is less than this value the array returned is incomplete. Array entries needed. Might be larger than <i>dw_array_size</i> , 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 <i>dw_error</i> 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 <i>dw_error</i> 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_entrpool</i>	Returns the offset in the entrpool
<i>dw_abbrev_number</i>	Returned from entrpool.
<i>dw_abbrev_tag</i>	Returned from entrpool 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_entrpool()

```

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 )

```

Returns the basic data about an entrpool record and enables correct calling of dwarf_dnames_entrpool_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_entrpool_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 dw_offset_of_initial_value above.

Parameters

<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 <i>.debug_info</i> 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.
<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.

Parameters

<i>dw_offset_into_debug_info</i>	On success set to the offset, in <code>.debug_info</code> , of the data for this block. The returned offset may be outside the bounds of the actual <code>.debug_info</code> section, such a possibility does not cause the function to return <code>DW_DLV_ERROR</code> .
<i>dw_size_of_debug_info_area</i>	On success set to the size in bytes, in <code>.debug_info</code> , of the area this block refers to. The returned <code>dw_dw_size_of_debug_info</code> plus <code>dw_offset_into_debug_info</code> may be outside the bounds of the actual <code>.debug_info</code> section, such a possibility does not cause the function to return <code>DW_DLV_ERROR</code> . Use dwarf_get_section_max_offsets_d() to learn the size of <code>.debug_info</code> 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 <code>dw_error</code> 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_entrnumber,
    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 <code>Dwarf_Gnu_Index_head</code> interest.
<i>dw_blocknumber</i>	Pass in the block number of the block of interest. 0 through <code>dw_index_block_count_out-1</code> .
<i>dw_entrnumber</i>	Pass in the entry number of the entry of interest. 0 through <code>dw_count_of_index_entries-1</code> .
<i>dw_offset_in_debug_info</i>	On success set to the offset in <code>.debug_info</code> relevant to this entry.
<i>dw_name_string</i>	On success set to the size in bytes, in <code>.debug_info</code> , 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 <code>dw_error</code> 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>

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

<code>dw_dbg</code>	The Dwarf_Debug of interest.	Generated by Doxygen
<code>dw_gdbindexptr</code>	On success returns a pointer to make access to table details possible.	
<code>dw_version</code>	On success returns the table version.	
<code>dw_cu_list_offset</code>	On success returns the offset of the cu_list in the section.	
<code>dw_types_cu_list_offset</code>	On success returns the offset of the types cu_list in the section.	
<code>dw_address_area_offset</code>	On success returns the area pool offset.	
<code>dw_symbol_table_offset</code>	On success returns the symbol table offset.	
<code>dw_constant_pool_offset</code>	On success returns the constant pool offset.	
<code>dw_section_size</code>	On success returns section size.	
<code>dw_section_name</code>	On success returns section name.	

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.
-----------------------	---

Parameters

<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 <i>dw_list_length</i> -1. If the value is greater than <i>dw_list_length</i> -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_symtab_list_length,
    Dwarf_Error * dw_error )
```

Parameters

<i>dw_gdbindexptr</i>	Pass in the Dwarf_Gdbindex pointer of interest.
<i>dw_symtab_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_symtab_list_length-1. If the value is greater than dw_symtab_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.
<i>dw_cuvector_offset_in</i>	Pass in the value of dw_cuvector_offset
<i>dw_innerindex</i>	Pass in the index of the CU vector in, from 0 through dw_innercount-1.
<i>dw_field_value</i>	On success returns a field of bits. To expand the bits call dwarf_gdbindex_cuvector_instance_expand_value.
<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 dw_field_value returned by dwarf_gdbindex_cuvector_inner_attributes.
<i>dw_cu_index</i>	On success returns the CU index from the dw_field_value
<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.
<i>dw_stringoffset</i>	Pass in the string offset returned by dwarf_gdbindex_symboltable_entry
<i>dw_string_ptr</i>	On success returns a a pointer to the null-terminated string.
<i>dw_error</i>	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 for 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 )
```

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.
<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.

libdwarf 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 dw_debuglink_fullpath_returned .
<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 dw_buildid_returned .
<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 free(dw_paths_returned).
<i>dw_paths_length_returned</i>	On success returns the length of the array of string pointers dw_paths_returned 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 dwarf_init_path_dl 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 the 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 dw_count is greater than zero the first dw_count 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 libdwarf 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_GNUIVIS_name](#) (unsigned int dw_val_in, const char **dw_s_out)
dwarf_get_GNUIVIS_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_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_gh_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` (`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 from Dwarf_Debug.

- `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 <code>.debug_info</code> , or if DWARF4 <code>.debug_types</code> 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 <code>.debug_info</code> or <code>.debug_info.dwo</code> .
<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 <code>.zdebug</code>
<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 <code>-int-</code> works in practice, but should really be <code>Dwarf_Unsigned</code> .
<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()

```
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 )
```

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.

`dwarf_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_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 <code>dw_ftype</code> is <code>DW_FTYPE_APPLEUNIVERSAL</code> 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 <code>dw_ftype</code> is <code>DW_FTYPE_APPLEUNIVERSAL</code> 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 <code>dw_ftype</code> is <code>DW_FTYPE_APPLEUNIVERSAL</code> the returned value will be set to the number of the specific object from the universal-binary, usable values are 0 through <code>dw_ub_count-1</code> . (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 <code>dw_ftype</code> is <code>DW_FTYPE_ELF</code> 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_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.

9.34.2.15 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

<code>dw_dbg</code>	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

<i>dw_dbg</i>	Pass in the Dwarf_Debug of interest.
<i>dw_section_count_out</i>	On success returns the number of DWARF sections in the object file. Can sometimes be many more than are of interest.
<i>dw_group_count_out</i>	On success returns the number of groups. Though usually one, it can be much larger.
<i>dw_selected_group_out</i>	On success returns the groupnumber that applies to this specific open Dwarf_Debug.
<i>dw_map_entry_count_out</i>	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.
<i>dw_error</i>	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_lebten, [Dwarf_Unsigned](#) *dw_outval, char *dw_endptr)
- int **dwarf_decode_signed_leb128** (char *dw_leb, [Dwarf_Unsigned](#) *dw_lebten, [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.
- [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↔ _v</i>	If zero passed in libdwarf will run somewhat faster and library memory allocations will not all be tracked and dwarf_finish() 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_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.

9.37.2.7 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

<code>dw_dbg</code>	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 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;
}

```

9.40 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 DW_DW_GROUPNUMBER_ANY 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;
}

```

9.41 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;
}

```

9.42 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;
}

```

9.43 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;
}
```

9.44 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);
}

```

9.45 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;
}

```

9.46 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;
}

```

9.47 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;
    }
}

```

9.48 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;
}

```

9.49 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 example-cuhdree() 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_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;
}

```

9.50 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 examplecuhrd(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;
}

```

9.51 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;
}

```

9.52 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;
}

```

9.53 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;
}

```


9.54 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;
}

```

9.55 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

```

9.56 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;
}

```

9.57 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,
        &rawvall1,&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;
}

```

9.58 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;
}

```

9.59 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_actuals,&linecount_actuals,
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_actuals; ++i) {
        /* use linebuf_actuals[i], these are the
           actuals entries */
    }
    dwarf_srclines_dealloc_b(line_context);
    line_context = 0;
    linebuf = 0;
    linecount = 0;
    linebuf_actuals = 0;
    linecount_actuals = 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_actuals = 0;
    linecount_actuals = 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_actuals = 0;
    linecount_actuals = 0;
}
}
return DW_DLV_OK;
}

```

9.60 Using dwarf_srclines_b() and linecontext

Example two using [dwarf_srclines_b\(\)](#)

See also

[dwarf_srclines_b](#)

[dwarf_srclines_from_linecontext](#)

[dwarf_srclines_dealloc_b](#)

```

*/
int exempld(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) {
        /* use line */
    }
    dwarf_srclines_dealloc_b(context);
    return DW_DLV_OK;
}

```

9.61 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;
}

```

9.62 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;
}

```

9.63 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;
}

```

9.64 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_WEAKS,
        &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;
}

```

9.65 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;
}

```

9.66 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;
}

```

9.67 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;
}

```

9.68 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_DLV_OK;
}

```

9.69 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);
Dwarf_Unsigned get_next_import_from_list(void);
void mark_this_offset_as_examined(
    Dwarf_Unsigned macro_unit_offset);
void add_offset_to_list(Dwarf_Unsigned 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;
}
/*

```

9.70 Reading .debug_macinfo (DWARF2-4)

Example reading .debug_macinfo, DWARF2-4.

```

/*
void functionusingsigned(Dwarf_Signed 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;
}

```

9.71 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;
}

```

9.72 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;
}

```

9.73 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;
}

```

9.74 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 dw_error 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;
}
/*

```

9.75 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

<code>dbg</code>	The Dwarf_Debug of interest.
<code>dw_error</code>	On error <code>dw_error</code> 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;
}

```

9.76 Example getting `.debug_ranges` data

Example accessing ranges data.

```

*/
void functionusingrange(Dwarf_Ranges *r);

int examplev(Dwarf_Debug dbg, Dwarf_Off rangesoffset,
    Dwarf_Die die, Dwarf_Error *error)
{
    Dwarf_Signed count = 0;
    Dwarf_Off realoffset = 0;
    Dwarf_Ranges *rangesbuf = 0;
    Dwarf_Unsigned bytecount = 0;
    int res = 0;
    res = dwarf_get_ranges_b(dbg, rangesoffset, die,
        &realoffset,
        &rangesbuf, &count, &bytecount, error);
    if (res != DW_DLV_OK) {

```

```

    return res;
}
{
    Dwarf_Signed i = 0;
    for ( i = 0; i < count; ++i ) {
        Dwarf_Ranges *cur = rangesbuf+i;
        /* Use cur. */
        functionusingrange(cur);
    }
    dwarf_dealloc_ranges(dbg, rangesbuf, count);
}
return DW_DLV_OK;
}

```

9.77 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;
}

```

9.78 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;
}

```

9.79 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;
}

```

9.80 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;
}

```

9.81 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;
}

```

9.82 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;
}

```

9.83 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;
}

```

9.84 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()d. */
}

```

9.85 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;
}

```

9.86 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;
}

```

9.87 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;
}

```

9.88 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, };
static Dwarf_Small infobytes[] = {
0x60, 0x00, 0x00, 0x00, 0x02, 0x00, 0x00, 0x00, 0x00,
0x08, 0x01, 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, 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, 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_entsize = 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 = {
    ginfo,
    gborder,
    glensize,
    gptrsize,
    gfilesize,
    gseccount,
    gloadsec,
    0 /* no relocating anything */
};
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_strxl: 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;
}

```

9.89 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](#) section_index, [Dwarf_Small](#) **return_data, int *error)
- int(* **om_relocate_a_section**)(void *obj, [Dwarf_Unsigned](#) section_index, [Dwarf_Debug](#) dbg, int *error)

10.7.1 Detailed Description

The functions we need to access object data from libdwarf are declared here.

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

[checkexamples.c](#) contains what user code should be. Hence the code typed in [checkexamples.c](#) is PUBLIC DO-MAIN 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 syntatic 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
```

11.1 /home/davea/dwarf/code/src/bin/dwarfexample/jitreader.c File Reference

11.2 /home/davea/dwarf/code/src/bin/dwarfexample/showsectiongroups.c File Reference

[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_". [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_ .

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