

## NAME

backtrace, backtrace\_symbols, backtrace\_symbols\_fd - support for application self-debugging

## SYNOPSIS

```
#include <execinfo.h>
```

```
int backtrace(void **buffer, int size);
```

```
char **backtrace_symbols(void *const *buffer, int size);
```

```
void backtrace_symbols_fd(void *const *buffer, int size, int fd);
```

## DESCRIPTION

**backtrace()** returns a backtrace for the calling program, in the array pointed to by *buffer*. A backtrace is the series of currently active function calls for the program. Each item in the array pointed to by *buffer* is of type *void \**, and is the return address from the corresponding stack frame. The *size* argument specifies the maximum number of addresses that can be stored in *buffer*. If the backtrace is larger than *size*, then the addresses corresponding to the *size* most recent function calls are returned; to obtain the complete backtrace, make sure that *buffer* and *size* are large enough.

Given the set of addresses returned by **backtrace()** in *buffer*, **backtrace\_symbols()** translates the addresses into an array of strings that describe the addresses symbolically. The *size* argument specifies the number of addresses in *buffer*. The symbolic representation of each address consists of the function name (if this can be determined), a hexadecimal offset into the function, and the actual return address (in hexadecimal). The address of the array of string pointers is returned as the function result of **backtrace\_symbols()**. This array is **malloc(3)**ed by **backtrace\_symbols()**, and must be freed by the caller. (The strings pointed to by the array of pointers need not and should not be freed.)

**backtrace\_symbols\_fd()** takes the same *buffer* and *size* arguments as **backtrace\_symbols()**, but instead of returning an array of strings to the caller, it writes the strings, one per line, to the file descriptor *fd*. **backtrace\_symbols\_fd()** does not call **malloc(3)**, and so can be employed in situations where the latter function might fail.

## RETURN VALUE

**backtrace()** returns the number of addresses returned in *buffer*, which is not greater than *size*. If the return value is less than *size*, then the full backtrace was stored; if it is equal to *size*, then it may have been truncated, in which case the addresses of the oldest stack frames are not returned.

On success, **backtrace\_symbols()** returns a pointer to the array **malloc(3)**ed by the call; on error, NULL is returned.

## VERSIONS

**backtrace()**, **backtrace\_symbols()**, and **backtrace\_symbols\_fd()** are provided in glibc since version 2.1.

## CONFORMING TO

These functions are GNU extensions.

## NOTES

These functions make some assumptions about how a function's return address is stored on the stack. Note the following:

- \* Omission of the frame pointers (as implied by any of **gcc(1)**'s nonzero optimization levels) may cause these assumptions to be violated.
- \* Inlined functions do not have stack frames.
- \* Tail-call optimization causes one stack frame to replace another.

The symbol names may be unavailable without the use of special linker options. For systems using the GNU linker, it is necessary to use the *-rdynamic* linker option. Note that names of "static" functions are not exposed, and won't be available in the backtrace.

**EXAMPLE**

The program below demonstrates the use of `backtrace()` and `backtrace_symbols()`. The following shell session shows what we might see when running the program:

```
$ cc -rdynamic prog.c -o prog
$ ./prog 3
backtrace() returned 8 addresses
./prog(myfunc3+0x5c) [0x80487f0]
./prog [0x8048871]
./prog(myfunc+0x21) [0x8048894]
./prog(myfunc+0x1a) [0x804888d]
./prog(myfunc+0x1a) [0x804888d]
./prog(main+0x65) [0x80488fb]
/lib/libc.so.6(__libc_start_main+0xdc) [0xb7e38f9c]
./prog [0x8048711]
```

**Program source**

```
#include <execinfo.h>
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>

void
myfunc3(void)
{
    int j, nptrs;
    #define SIZE 100
    void *buffer[100];
    char **strings;

    nptrs = backtrace(buffer, SIZE);
    printf("backtrace() returned %d addresses\n", nptrs);

    /* The call backtrace_symbols_fd(buffer, nptrs, STDOUT_FILENO)
       would produce similar output to the following: */

    strings = backtrace_symbols(buffer, nptrs);
    if (strings == NULL) {
        perror("backtrace_symbols");
        exit(EXIT_FAILURE);
    }

    for (j = 0; j < nptrs; j++)
        printf("%s\n", strings[j]);

    free(strings);
}

static void /* "static" means don't export the symbol... */
myfunc2(void)
{
    myfunc3();
}

void
myfunc(int ncalls)
{
    if (ncalls > 1)
        myfunc(ncalls - 1);
}
```

```
else
myfunc2();
}

int
main(int argc, char *argv[])
{
if (argc != 2) {
fprintf(stderr, "%s num-calls\n", argv[0]);
exit(EXIT_FAILURE);
}

myfunc(atoi(argv[1]));
exit(EXIT_SUCCESS);
}
```

**SEE ALSO**

[gcc\(1\)](#), [ld\(1\)](#), [dlopen\(3\)](#), [malloc\(3\)](#)

**COLOPHON**

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