

**NAME**

`getopt`, `getopt_long`, `getopt_long_only`, `optarg`, `optind`, `opterr`, `optopt` - Parse command-line options

**SYNOPSIS**

```
#include <unistd.h>

int getopt(int argc, char * const argv[],
           const char *optstring);

extern char *optarg;
extern int optind, opterr, optopt;

#include <getopt.h>

int getopt_long(int argc, char * const argv[],
               const char *optstring,
               const struct option *longopts, int *longindex);

int getopt_long_only(int argc, char * const argv[],
                    const char *optstring,
                    const struct option *longopts, int *longindex);
```

Feature Test Macro Requirements for glibc (see [feature\\_test\\_macros\(7\)](#)):

```
getopt(): _POSIX_C_SOURCE  $\geq$  2 || _XOPEN_SOURCE  

getopt_long(), getopt_long_only(): _GNU_SOURCE
```

**DESCRIPTION**

The `getopt()` function parses the command-line arguments. Its arguments `argc` and `argv` are the argument count and array as passed to the `main()` function on program invocation. An element of `argv` that starts with - (and is not exactly - or --) is an option element. The characters of this element (aside from the initial -) are option characters. If `getopt()` is called repeatedly, it returns successively each of the option characters from each of the option elements.

The variable `optind` is the index of the next element to be processed in `argv`. The system initializes this value to 1. The caller can reset it to 1 to restart scanning of the same `argv`, or when scanning a new argument vector.

If `getopt()` finds another option character, it returns that character, updating the external variable `optind` and a static variable `nextchar` so that the next call to `getopt()` can resume the scan with the following option character or `argv`-element.

If there are no more option characters, `getopt()` returns -1. Then `optind` is the index in `argv` of the first `argv`-element that is not an option.

`optstring` is a string containing the legitimate option characters. If such a character is followed by a colon, the option requires an argument, so `getopt()` places a pointer to the following text in the same `argv`-element, or the text of the following `argv`-element, in `optarg`. Two colons mean an option takes an optional arg; if there is text in the current `argv`-element (i.e., in the same word as the option name itself, for example, -oarg), then it is returned in `optarg`, otherwise `optarg` is set to zero. This is a GNU extension. If `optstring` contains **W** followed by a semicolon, then **-W foo** is treated as the long option **--foo**. (The **-W** option is reserved by POSIX.2 for implementation extensions.) This behavior is a GNU extension, not available with libraries before glibc 2.

By default, `getopt()` permutes the contents of `argv` as it scans, so that eventually all the nonoptions are at the end. Two other modes are also implemented. If the first character of `optstring` is + or the environment variable `POSIXLY_CORRECT` is set, then option processing stops as soon as a nonoption argument is encountered. If the first character of `optstring` is -, then each nonoption `argv`-element is handled as if it were the argument of an option with character code 1. (This is used by programs that were written to expect options and other `argv`-elements in any order and that care about the ordering of the two.) The special argument -- forces an end of

option-scanning regardless of the scanning mode.

If **getopt()** does not recognize an option character, it prints an error message to *stderr*, stores the character in *optopt*, and returns *?*. The calling program may prevent the error message by setting *opterr* to 0.

If **getopt()** finds an option character in *argv* that was not included in *optstring*, or if it detects a missing option argument, it returns *?* and sets the external variable *optopt* to the actual option character. If the first character (following any optional + or - described above) of *optstring* is a colon (:), then **getopt()** returns *:* instead of *?* to indicate a missing option argument. If an error was detected, and the first character of *optstring* is not a colon, and the external variable *opterr* is nonzero (which is the default), **getopt()** prints an error message.

### **getopt\_long()** and **getopt\_long\_only()**

The **getopt\_long()** function works like **getopt()** except that it also accepts long options, started with two dashes. (If the program accepts only long options, then *optstring* should be specified as an empty string (), not NULL.) Long option names may be abbreviated if the abbreviation is unique or is an exact match for some defined option. A long option may take a parameter, of the form **--arg=param** or **--arg param**.

*longopts* is a pointer to the first element of an array of *struct option* declared in *<getopt.h>* as

```
struct option {
    const char *name;
    int has_arg;
    int *flag;
    int val;
};
```

The meanings of the different fields are:

*name* is the name of the long option.

*has\_arg*

is: **no\_argument** (or 0) if the option does not take an argument; **required\_argument** (or 1) if the option requires an argument; or **optional\_argument** (or 2) if the option takes an optional argument.

*flag*

specifies how results are returned for a long option. If *flag* is NULL, then **getopt\_long()** returns *val*. (For example, the calling program may set *val* to the equivalent short option character.) Otherwise, **getopt\_long()** returns 0, and *flag* points to a variable which is set to *val* if the option is found, but left unchanged if the option is not found.

*val*

is the value to return, or to load into the variable pointed to by *flag*.

The last element of the array has to be filled with zeros.

If *longindex* is not NULL, it points to a variable which is set to the index of the long option relative to *longopts*.

**getopt\_long\_only()** is like **getopt\_long()**, but - as well as -- can indicate a long option. If an option that starts with - (not --) doesn't match a long option, but does match a short option, it is parsed as a short option instead.

## **RETURN VALUE**

If an option was successfully found, then **getopt()** returns the option character. If all command-line options have been parsed, then **getopt()** returns -1. If **getopt()** encounters an option character that was not in *optstring*, then *?* is returned. If **getopt()** encounters an option with a missing argument, then the return value depends on the first character in *optstring*: if it is *:*, then *:* is returned; otherwise *?* is returned.

**getopt\_long()** and **getopt\_long\_only()** also return the option character when a short option is recognized. For a long option, they return *val* if *flag* is NULL, and 0 otherwise. Error and -1

returns are the same as for **getopt()**, plus ? for an ambiguous match or an extraneous parameter.

## ENVIRONMENT

### POSIXLY CORRECT

If this is set, then option processing stops as soon as a nonoption argument is encountered.

### `_<PID>_GNU_nonoption_argv_flags_`

This variable was used by **bash(1)** 2.0 to communicate to glibc which arguments are the results of wildcard expansion and so should not be considered as options. This behavior was removed in **bash(1)** version 2.01, but the support remains in glibc.

## CONFORMING TO

### **getopt()**:

POSIX.2 and POSIX.1-2001, provided the environment variable **POSIXLY\_CORRECT** is set. Otherwise, the elements of *argv* aren't really const, because we permute them. We pretend they're const in the prototype to be compatible with other systems.

The use of + and - in *optstring* is a GNU extension.

On some older implementations, **getopt()** was declared in `<stdio.h>`. SUSv1 permitted the declaration to appear in either `<unistd.h>` or `<stdio.h>`. POSIX.1-2001 marked the use of `<stdio.h>` for this purpose as LEGACY. POSIX.1-2001 does not allow the declaration to appear in `<stdio.h>`.

### **getopt\_long()** and **getopt\_long\_only()**:

These functions are GNU extensions.

## NOTES

A program that scans multiple argument vectors, or rescans the same vector more than once, and wants to make use of GNU extensions such as + and - at the start of *optstring*, or changes the value of **POSIXLY\_CORRECT** between scans, must reinitialize **getopt()** by resetting *optind* to 0, rather than the traditional value of 1. (Resetting to 0 forces the invocation of an internal initialization routine that rechecks **POSIXLY\_CORRECT** and checks for GNU extensions in *optstring*.)

## BUGS

The POSIX.2 specification of **getopt()** has a technical error described in POSIX.2 Interpretation 150. The GNU implementation (and probably all other implementations) implements the correct behavior rather than that specified.

## EXAMPLE

### **getopt()**

The following trivial example program uses **getopt()** to handle two program options: *-n*, with no associated value; and *-t val*, which expects an associated value.

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

int
main(int argc, char *argv[])
{
    int flags, opt;
    int nsecs, tfnd;

    nsecs = 0;
    tfnd = 0;
    flags = 0;
    while ((opt = getopt(argc, argv, nt:)) != -1) {
        switch (opt) {
```

```

case n:
flags = 1;
break;
case t:
nsecs = atoi(optarg);
tfnd = 1;
break;
default: /* ? */
fprintf(stderr, Usage: %s [-t nsecs] [-n] namen,
argv[0]);
exit(EXIT_FAILURE);
}
}

printf(flags=%d; tfnd=%d; optind=%dn, flags, tfnd, optind);

if (optind >= argc) {
fprintf(stderr, Expected argument after optionsn);
exit(EXIT_FAILURE);
}

printf(name argument = %sn, argv[optind]);

/* Other code omitted */

exit(EXIT_SUCCESS);
}

```

**getopt\_long()**

The following example program illustrates the use of **getopt\_long()** with most of its features.

```

#include <stdio.h> /* for printf */
#include <stdlib.h> /* for exit */
#include <getopt.h>

int
main(int argc, char **argv)
{
int c;
int digit_optind = 0;

while (1) {
int this_option_optind = optind ? optind : 1;
int option_index = 0;
static struct option long_options[] = {
{add, required_argument, 0, 0 },
{append, no_argument, 0, 0 },
{delete, required_argument, 0, 0 },
{verbose, no_argument, 0, 0 },
{create, required_argument, 0, c},
{file, required_argument, 0, 0 },
{0, 0, 0, 0 }
};

c = getopt_long(argc, argv, abc:d:012,
long_options, &option_index);
if (c == -1)
break;

switch (c) {

```

```

    case 0:
    printf(option %s, long_options[option_index].name);
    if (optarg)
    printf( with arg %s, optarg);
    printf(n);
    break;

    case 0:
    case 1:
    case 2:
    if (digit_optind != 0 && digit_optind != this_option_optind)
    printf(digits occur in two different argv-elements.n);
    digit_optind = this_option_optind;
    printf(option %cn, c);
    break;

    case a:
    printf(option an);
    break;

    case b:
    printf(option bn);
    break;

    case c:
    printf(option c with value %sn, optarg);
    break;

    case d:
    printf(option d with value %sn, optarg);
    break;

    case ?:
    break;

    default:
    printf(?? getopt returned character code 0%o ??n, c);
    }
    }

    if (optind < argc) {
    printf(non-option ARGV-elements: );
    while (optind < argc)
    printf(%s , argv[optind++]);
    printf(n);
    }

    exit(EXIT_SUCCESS);
}

```

**SEE ALSO**

[getsubopt\(3\)](#)

**COLOPHON**

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