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Rocky Enterprise Linux 9.2 Manual Pages on command 'optarg.3'

\$ man optarg.3

GETOPT(3) Linux Programmer's Manual GETOPT(3)

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 >= 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 scanning 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.

While processing the option list, getopt() can detect two kinds of errors: (1) an option character that was not specified in optstring and (2) a missing option argument (i.e., an option at the end of the command line without an expected argument). Such errors are han?

dled and reported as follows:

- * By default, `getopt()` prints an error message on standard error, places the erroneous option character in `optopt`, and returns '?' as the function result.
- * If the caller has set the global variable `opterr` to zero, then `getopt()` does not print an error message. The caller can determine that there was an error by testing whether the function return value is '?'. (By default, `opterr` has a nonzero value.)
- * If the first character (following any optional '+' or '-' described above) of `optstring` is a colon (':'), then `getopt()` likewise does not print an error message. In addition, it returns ':' instead of '?' to indicate a missing option argument. This allows the caller to distinguish the two different types of errors.

`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.

ATTRIBUTES

For an explanation of the terms used in this section, see attributes(7).

????????????????????????????????????????????????????????????????????????????????????????

?Interface ? Attribute ? Value ?

????????????????????????????????????????????????????????????????????????????????????????

?getopt(), getopt_long(), ? Thread safety ? MT-Unsafe race:getopt env ?

?getopt_long_only() ? ? ?

????????????????????????????????????????????????????????????????????????????????????????????????

CONFORMING TO

getopt():

POSIX.1-2001, POSIX.1-2008, and POSIX.2, provided the environment variable POSIXLY_CORRECT is set. Otherwise, the elements of argv aren't really const, because these functions permute them. Nevertheless, const is used 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.1-1996 marked the use of <stdio.h> for this purpose as LEGACY. POSIX.1-2001 does not require 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.)

EXAMPLES

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] name\n",
                argv[0]);

            exit(EXIT_FAILURE);

    }
}

printf("flags=%d; tfnd=%d; nsecs=%d; optind=%d\n",
    flags, tfnd, nsecs, optind);

if (optind >= argc) {
    fprintf(stderr, "Expected argument after options\n");

    exit(EXIT_FAILURE);
}

printf("name argument = %s\n", 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 %c\n", c);
    break;
case 'a':
    printf("option a\n");
    break;
case 'b':
    printf("option b\n");
    break;
case 'c':
    printf("option c with value '%s'\n", optarg);
    break;
case 'd':
    printf("option d with value '%s'\n", 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

getopt(1), getsubopt(3)

COLOPHON

This page is part of release 5.10 of the Linux man-pages project. A description of the project, information about reporting bugs, and the latest version of this page, can be found at <https://www.kernel.org/doc/man-pages/>.

GNU

2020-06-09

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