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

\$ man system.3

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

NAME

system - execute a shell command

SYNOPSIS

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

```
int system(const char *command);
```

DESCRIPTION

The `system()` library function uses `fork(2)` to create a child process that executes the shell command specified in `command` using `execl(3)` as follows:

```
execl("/bin/sh", "sh", "-c", command, (char *) NULL);
```

`system()` returns after the command has been completed.

During execution of the command, `SIGCHLD` will be blocked, and `SIGINT` and `SIGQUIT` will be ignored, in the process that calls `system()`.

(These signals will be handled according to their defaults inside the child process that executes `command`.)

If `command` is `NULL`, then `system()` returns a status indicating whether a shell is available on the system.

RETURN VALUE

The return value of `system()` is one of the following:

- * If `command` is `NULL`, then a nonzero value if a shell is available, or 0 if no shell is available.
- * If a child process could not be created, or its status could not be retrieved, the return value is -1 and `errno` is set to indicate the error.
- * If a shell could not be executed in the child process, then the return value is as though the child shell terminated by calling `_exit(2)` with the status 127.
- * If all system calls succeed, then the return value is the termination status of the child shell used to execute `command`. (The termination status of a shell is the termination status of the last `command` it executes.)

In the last two cases, the return value is a "wait status" that can be examined using the macros described in `waitpid(2)`. (i.e., `WIFEXITED()`, `WEXITSTATUS()`, and so on).

`system()` does not affect the wait status of any other children.

ERRORS

`system()` can fail with any of the same errors as `fork(2)`.

ATTRIBUTES

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

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?Interface ? Attribute ? Value ?

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?`system()` ? Thread safety ? MT-Safe ?

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CONFORMING TO

POSIX.1-2001, POSIX.1-2008, C89, C99.

NOTES

`system()` provides simplicity and convenience: it handles all of the details of calling `fork(2)`, `exec(3)`, and `waitpid(2)`, as well as the nec-

essary manipulations of signals; in addition, the shell performs the usual substitutions and I/O redirections for command. The main cost of system() is inefficiency: additional system calls are required to create the process that runs the shell and to execute the shell.

If the `_XOPEN_SOURCE` feature test macro is defined (before including any header files), then the macros described in `waitpid(2)` (`WEXITSTATUS()`, etc.) are made available when including `<stdlib.h>`.

As mentioned, `system()` ignores `SIGINT` and `SIGQUIT`. This may make programs that call it from a loop uninterruptible, unless they take care themselves to check the exit status of the child. For example:

```
while (something) {
    int ret = system("foo");
    if (WIFSIGNALED(ret) &&
        (WTERMSIG(ret) == SIGINT || WTERMSIG(ret) == SIGQUIT))
        break;
}
```

According to POSIX.1, it is unspecified whether handlers registered using `pthread_atfork(3)` are called during the execution of `system()`. In the glibc implementation, such handlers are not called.

In versions of glibc before 2.1.3, the check for the availability of `/bin/sh` was not actually performed if command was `NULL`; instead it was always assumed to be available, and `system()` always returned 1 in this case. Since glibc 2.1.3, this check is performed because, even though POSIX.1-2001 requires a conforming implementation to provide a shell, that shell may not be available or executable if the calling program has previously called `chroot(2)` (which is not specified by POSIX.1-2001).

It is possible for the shell command to terminate with a status of 127, which yields a `system()` return value that is indistinguishable from the case where a shell could not be executed in the child process.

Caveats

Do not use `system()` from a privileged program (a `set-user-ID` or `set-group-ID` program, or a program with capabilities) because strange val?

ues for some environment variables might be used to subvert system integrity. For example, PATH could be manipulated so that an arbitrary program is executed with privilege. Use the exec(3) family of functions instead, but not execlp(3) or execvp(3) (which also use the PATH environment variable to search for an executable).

system() will not, in fact, work properly from programs with set-user-ID or set-group-ID privileges on systems on which /bin/sh is bash version 2: as a security measure, bash 2 drops privileges on startup. (Debian uses a different shell, dash(1), which does not do this when invoked as sh.)

Any user input that is employed as part of command should be carefully sanitized, to ensure that unexpected shell commands or command options are not executed. Such risks are especially grave when using system() from a privileged program.

SEE ALSO

sh(1), execve(2), fork(2), sigaction(2), sigprocmask(2), wait(2), exec(3), signal(7)

COLOPHON

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2019-03-06

SYSTEM(3)