IEEE Standards Interpretation for IEEE Std 1003.1™-2001 IEEE Standard Standard for Information Technology -- Portable Operating System Interface (POSIX®)

Interpretation Request #55
Topic: system() thread-safety, at_fork handlers **Relevant Sections:** XSH 2.9.1, system() Page: 0 Line: 0

1. It is unclear whether calling system(3) invokes atfork handlers in a conforming implementation. system(3) specifies

"The environment of the executed command shall be as if a child process were created using fork(), and the child process invoked the sh utility using execl() as follows:"

In particular, usage of the word "environment" is confusing here. It may refer just to environment variables, however, the "Application usage" sections indicates that also signal handlers should be arranged as if the process was created through fork() and execl(). This still makes not clear whether handlers installed through pthread_atfork() are invoked.

2.The system() function is defined to be a thread-safe function. The specification requires it to use features which have an affect at the process scope, which renders it non-thread-safe.

As per the system () interface definition, (XSH P1540 ,L46753-46754 "The system() function shall ignore the SIGINT and SIGQUIT signals, and shall block the SIGCHLD signal"), the implementation needs to ignore the SIGINT and SIGQUIT signals during the execution of system(). To achieve this the implementation needs to literally or effectively execute the sigaction() function which has process wide scope (XSH P1402, L42498,42499, the sigaction() function allows the calling process to examine and/or specify the action to be associated with a specific signal).

Since sigaction() can also be called in another thread to set a different signal action for SIGINT and SIGQUIT. This makes system() non-threadsafe.

1. The description of system() should change to "system() behaves as if a new process was created using fork(), and the child process invoked the sh utility using execl() ..."

In addition, the application usage section should make it clear that atfork handlers are invoked.

2. In System Interfaces, section 2.9.1, line 2089, add "system()" to the list of functions that need not be thread-safe.

Interpretation Response #55
1. The standard does not speak to the issue of at_fork() handlers, and as such no conformance distinction can be made between alternative implementations based on this. This is being referred to the sponsor.

2. The standard states the requirements for thread-safety for system(), and conforming implementations must conform to this. However, concerns have been raised about this which are being referred to the sponsor.

Rationale for Interpretation
None.