
**Information technology — Portable
Operating System Interface (POSIX®) —
Test methods for measuring conformance
to POSIX —**

**Part 1:
System interfaces**

**AMENDMENT 1: Realtime Extension
(C Language)**

*Technologies de l'information — Interface de système de fonctionnement
portable (POSIX®) — Méthodes d'essai pour mesurer la conformité au
POSIX —*

Partie 1: Interfaces de système

AMENDEMENT 1: Extension en temps réel (langage C)



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ISO/IEC 14515-1:2000/Amd.1:2003(E)
IEEE Std 2003.1b™-2000
(Amendment to IEEE Std 2003.1™-1992)

Information Technology—Portable Operating System Interface (POSIX®)—Part 1: Test method for measuring conformance to POSIX

Amendment 1: Realtime Extension (C Language)

Sponsor

Portable Applications Standards Committee
of the
IEEE Computer Society

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IEEE

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Abstract: This standard defines the test method specifications for IEEE Std 1003.b-1993 (based on the document corresponding to the merger of IEEE Std 1003.1-1990 and IEEE Std 1003.1b-1993). The test method specifications consist of assertions to be tested and related test procedures. As an amendment to IEEE Std 1003.1-1990, this standard is structured to amend those portions of IEEE Std 1003.1-1992 (the test method specification for IEEE Std 1003.1-1990) that correspond to the amended parts of IEEE Std 1003.1-1990. This standard is aimed primarily at providers of test methods for IEEE Std 1003.1b-1993 and at implementors of IEEE Std 1003.1b-1993.

Keywords: assertion, assertion test, C programming language, POSIX, POSIX Conformance Document, POSIX Conformance Test Procedure, POSIX Conformance Test Suite, realtime, test method specification, test result code

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Introduction

(This Introduction is not a normative part of IEEE Std 2003.1b-2000, IEEE Standard for Information Technology—Test Methods Specifications for Measuring Conformance to POSIX-Part 1: System Application Program Interface(API)-Amendment 1: Realtime Extension [C Language]).

This standard defines the test method specifications for IEEE Std 1003.1b-1993 (based on the document corresponding to the merger of IEEE Std 1003.1-1990 and IEEE Std 1003.1b-1993). The test method specifications consist of assertions to be tested and related test procedures. As an amendment to IEEE Std 1003.1-1990, this standard is structured to amend those portions of IEEE Std. 2003.1-1992 {4} (the test method specification for IEEE Std 1003.1-1990) that correspond to the amended parts of IEEE Std 1003.1-1990. This standard is aimed primarily at providers of test methods for IEEE Std 1003.1b-1993 and at implementors of IEEE Std 1003.1b-1993.

Organization of This Standard

This document is organized into five parts, as follows:

- (1) Statement of scope, normative references, conformance requirements, and test methods (Section 1)
- (2) Conventions and definitions (Section 2)
- (3) Assertions to test POSIX.1b {3} (Sections 2 through 15)
- (4) Conforming test results (Annex A)
- (5) Bibliography (Annex B)

This introduction, any footnotes, notes accompanying the test, and the *informative* annexes are not considered part of this standard. Annex A is normative. Annex B is informative.

How to Read This Standard

This document is organized using the same section numbering as POSIX.1b {3}, in order to facilitate finding the testing requirements for a particular element of POSIX.1b {3}. Subclause 1.4 has been added to this document to keep the section numbering consistent with POSIX.1b {3} and to provide a place to describe features relevant to the test methods. It is strongly recommended that the reader review 1.4 after reading 1.1, 1.2, and this introduction. Where possible, this document tries to use the same assertion numbering that was used as IEEE Std 2003.1-1992 {4}. This document skips over the assertion numbers where there are no assertions that correspond to an assertion in IEEE Std 2003.1-1992 {4}. The assertions have been numbered with a fractional part where more than one assertion takes the place of a single assertion in IEEE Std 2003.1-1992 {4}.

Related Standards Activities

Activities to extend this standard to address additional requirements are in progress, and similar efforts can be anticipated in the future.

The following areas are under active consideration at this time, or are expected to become active in the near future: ¹⁾

- (1) Language-independent service descriptions of this standard
- (2) C, Ada, and FORTRAN language bindings to (1)
- (3) Shell and utility facilities
- (4) Verification testing methods
- (5) Multithreaded process facilities
- (6) Secure/trusted system considerations
- (7) Network interface facilities
- (8) System administration
- (9) Graphical user interfaces
- (10) Profiles describing application or user-specific combinations of Open Systems standards for: supercomputing, multiprocessor, and batch extensions; transaction processing; realtime systems; and multiuser systems based on historical models
- (11) An overall guide to POSIX-based or related Open Systems standards and profiles.

Extensions are approved as "amendments" or "revisions" to this document, following IEEE Standards procedures.

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¹⁾

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Information Technology — Portable Operating System Interface (POSIX®) — Test methods for measuring conformance to POSIX —

Part 1: System interfaces

Amendment 1: Realtime Extension (C Language)

Section 1: General

1.1 Scope

This standard defines the test method specifications for measuring conformance of an implementation to POSIX.1b {3}²⁾. Assertions are the primary test method specification for measuring conformance to POSIX.1b {3}. Conformance to POSIX.1b {3} requires conformance to IEEE Std 1003.1b-1993 as it has been modified by POSIX.1b {3}. Therefore, the test method specifications for POSIX.1b {3} assume that the test method specifications of IEEE Std 2003.1-1992 {4} apply, except as modified by this standard.

This standard is intended for use by

- (1) Developers of POSIX.1b {3} test methods
- (2) Implementors of POSIX.1b {3} implementations
- (3) Application writers for POSIX.1b {3} conforming implementations
- (4) POSIX.1b {3} testing laboratories
- (5) Others interested in validating the conformance of a vendor-claimed POSIX.1b {3} implementation

²⁾ The numbers in braces correspond to those of the references in 1.2.

The purpose of this standard is to specify the assertions and related test method specifications for measuring conformance of an implementation to POSIX.1b {3}.

This standard specifies additions and modifications to IEEE Std 2003.1-1992 {4}.

Testing conformance of an implementation to a standard includes testing the claimed capabilities and behavior of the implementation with respect to the conformance requirements of the standard. These test methods are intended to provide a reasonable, practical assurance that the implementation conforms to the standard. Use of these test methods will not guarantee conformance of an implementation to POSIX.1b {3}; that normally would require exhaustive testing, which is impractical for both technical and economic reasons.

IEEE Std 2003.1b-2000 defines a means of measuring conformance to the POSIX.1b {3} technical specifications. Any question related to interpretation of technical specifications arising from the use of this standard is a question of interpretation of POSIX.1b {3}.

1.2 Normative References

The following standards contain provisions which, through references in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

- {1} ISO/IEC 646: 1991, *Information processing—ISO 7-bit coded character set for information interchange*³⁾.
- {2} ISO/IEC 9899: 1990, *Programming languages—C*.
- {3} IEEE Std 2003.1b-1993, *IEEE Standard for Information Technology—POSIX—Part 1: System Application Program Interface (API)—Amendment 1: Realtime Extension [C Language]*.
- {4} IEEE Std 2003.1-1992, *IEEE Standard for Information Technology—Test Methods for Measuring Conformance to POSIX—Part 1: System Interfaces*.
- {5} ISO/IEC 13210:1999 (IEEE Std 2003-1997), *Information technology—Requirements and Guidelines for Test Method Specifications and Test Method Implementations for Measuring Conformance to POSIX Standards*.

³⁾ ISO/IEC documents are available from the ISO Central Secretariat, Case Postal 56, 1 rue de Varembe, CH-1211, Genève 20, Switzerland/Suisse (<http://www.iso.ch/>). ISO/IEC publications are available in the United States from Global Engineering Documents, 15 Inverness Way East, Englewood, Colorado 80112, USA (<http://global.ihs.com/>). Electronic copies are available in the United States from the American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA (<http://www.ansi.org/>).

1.3 Conformance

1.3.1 Implementation Conformance

1.3.1.1 Requirements

There are only IEEE Std 2003.1-1992 {4} assertions in this subclause; there are no POSIX.1b {3} assertions.

1.3.1.2 Documentation

There are only IEEE Std 2003.1 {4} assertions in this subclause; there are no POSIX.1b {3} assertions.

1.3.1.3 Conforming Implementation Options

There are no requirements for conforming implementations in this subclause.

1.3.2 Application Conformance

There are no requirements for conforming implementations in this subclause.

1.3.3 Language -Dependent Services for the C Programming Language

There are only IEEE Std 2003.1-1992 {4} assertions in this subclause; there are no POSIX.1b {3} assertions.

1.3.3.1 Types of Conformance

There are no requirements for conforming implementations in this subclause.

1.3.3.2 C Standard Language-Dependent System Support

There are only IEEE Std 2003.1-1992 {4} assertions in this subclause; there are no POSIX.1b {3} assertions.

1.3.3.3 Common-Usage C Language-Dependent System Support

(IEEE Std 2003.1-1992 {4} DGA01

UNUSED

M_GD_CommonC_diffs (function) =

FOR: *function* ()

IF the implementation does not provide C Standard {2} support THEN

TEST: Subclause 8.1 of the POSIX.1b contains the details of all differences between the interface *function* () provided and that required by the C Standard {2}.

ELSE NO_OPTION

GD *CommonC_diffs*

FOR: *function* ()

M_GD_CommonC_diffs (function)

Conformance for conformance: PASS, NO_OPTION

1.3.4 Other C Language-Related Specifications

(IEEE Std 2003.1-1992 {4} GA01

UNUSED

M_GA_macro_args (function; header1; header2; header3; header4) =

IF the interface *function* () is defined as a macro THEN

SETUP: The headers <header1>, <header2>, <header3>, and <header4> are included.

TEST: When the macro *function* () is invoked with the correct argument types (or compatible argument types in the case that C Standard {2} support is provided), the macro evaluates its arguments only once, fully protected by parentheses when necessary, and protects its result value with extra parentheses when necessary.

ELSE *NO_OPTION*

GA_macro_args

FOR: All interfaces except *abort* (), *assert* (), *getc* (), *putc* (), *setjmp* (), *sig-setjmp* (), and *tzset* ().

M_GA_macro_args (function; header1; header2; header3; header4)

Conformance for conformance: *PASS, NO_OPTION*

M_GA_macro_result_decl (function_type; function; header1; header2; header3; header4) =

IF the interface *function* () is defined as a macro **THEN**

SETUP: The headers *<header1>*, *<header2>*, *<header3>*, and *<header4>* are included.

TEST: When the macro *function* () is invoked with the correct argument types (or compatible argument types in the case that C Standard {2} support is provided), it expands to an expression with the result type *function_type*.

ELSE *NO_OPTION*

GA_macro_result_decl

FOR: All functions implemented as macros

M_GA_macro_result_decl (function; header1; header2; header3; header4)

Conformance for conformance: *PASS, NO_OPTION*

1.3.5 Other Language-Related Specifications

There are no requirements for conforming implementations in this clause.

1.4 Test Methods

This clause defines conventions, terminology, testing methodology, and testing control variables used in this standard.

1.4.1 Conventions

The conventions used in specifying the assertions in this standard follow those of ISO/IEC 13210:1999 {5} with the extensions described below.

One convention used in this document is the use of *PCTS_* variables. Because of the IF... Otherwise structure in POSIX.1b {3}, it was necessary to combine the use of *{_POSIX_}* compile-time symbolic constants that indicate optional facilities in POSIX.1b {3} with the case where the implementor chooses to provide some of the functions specified to be present when the option is defined. For example, an implementation that provides the *sem_init*() function, but does not provide all facilities required for the *{_POSIX_SEMAPHORES_}* option to be set, would require a PCTS to be configured with the constant *PCTS_sem_init* to be **TRUE**. (Note, that this constant would also need to be **TRUE** if the *{_POSIX_SEMAPHORES_}* option is set.)

The following construct means that assertion 03, within the corresponding clause of IEEE Std 2003.1-1992 {4}, is not used by this standard:

(IEEE Std 2003.1-1992 {4} 03

UNUSED

Assertions cited by reference assertions are typically named rather than numbered. An attempt has been made to choose meaningful names.

Because the syntactic conventions used in this standard are those of ISO/IEC 13210:1999 {5}, general assertions and general documentation assertions are rewritten in this document, even if they are also found in IEEE Std 1003.1-1992 {4}.

1.4.1.1 Phrases

The following phrases are commonly used in this standard; they have the indicated meanings.

There are only IEEE Std 1003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

This means that under the immediately preceding heading there are no new conformance requirements specified in POSIX.1b {3} that need to be tested; hence, there are no assertions. It does not mean that there are requirements for a conforming implementation that were specified in IEEE Std 1003.1b-1993 that must be satisfied. The assertions for those requirements are specified in IEEE Std 1003.1-1992 {4}.

There are no requirements for conforming implementations in this clause.

This means that there are no requirements for a conforming implementation specified in either POSIX.1b {3} or in IEEE Std 1003.1b-1993 under the immediately preceding heading.

1.4.1.2 Macros

This standard uses macros in order to save space and to make it easier to read. Macros are given long meaningful names so that the reader can know what test is covered by the assertion the macro represents. The key to reading a macro is to read and understand its definition. Macro definitions are given by the macro name followed by an equals sign (=). The following is a macro definition for an assertion that specifies the test for the proper C Standard {2} prototype being declared:

```
M_GA_stdC_proto_decl(func_type; func_name; param1, param2, ...; header1; header2; header3; header
4)=
IF standard THEN
    SETUP: The headers <header1>, <header2>, <header3>, and
             <header 4> are included.
    TEST: The function prototype func_type func_name(param1, param2, ...) is declared.
ELSE NO_OPTION
```

When a macro is used to indicate a test for a specific function, the reader should substitute the parameters in the macro call for those in the same position in the macro definition.

1.4.1.3 Cross References

Each interface definition in POSIX.1b {3} contains a Section Cross-References clause, that lists other, related parts of the standard. None of these Section Cross-References clauses contain any requirements for conforming implementations; to conserve printing expense, the corresponding sections are omitted in this standard.

1.4.2 Abbreviations

For the purposes of this standard, the following abbreviations apply:

1.4.2.1 C Standard: ISO/IEC 9899:1990, *Programming languages-C* {2}.

1.4.2.2 IRV: The International Reference Version coded character set described in ISO/IEC 646:1991 {1}.

1.4.2.3 POSIX.1b: IEEE Std 1003.1b-1993 {3}.

1.4.2.4 POSIX.1tm: IEEE Std 1003.1-1992 {4}.

1.4.2.5 POSIX.tm: ISO/IEC 13210:1999 {5}.

1.4.2.6 POSIX.1b: POSIX Conformance Document, as specified in clause 1.3.1.2 of IEEE Std 1003.1b-1993 as amended by POSIX.1b {3}.

1.4.2.7 IUT: Implementation under test, the software that implements POSIX.1b {3}.

1.4.3 PCTS Variables

The variables that control what assertions to test and indicate which facilities an implementation provides are defined in Table 1-1.

There is at least one PCTS variable for each of the new interfaces defined by POSIX.1b {3}. The PCTS variable can be TRUE depending on one of two conditions: either the defined POSIX.1b {3} option (for example, POSIX_SEMAPHORES) is TRUE, or the implementation supports the interfaces even though it does not necessarily support all of the functionality associated with the implementation option. By combining these two conditions in the definition of the PCTS variable, the expression of conditions under which to test an assertion is made significantly easier.

Some of the interface variables contain the string "_GAP_" or "_RAP_". These strings indicate that the interface variable should be TRUE if there is a way to "get appropriate privilege" and to "release appropriate privilege," respectively.

It is recommended that a conforming test method provide a checklist, or the equivalent, to help users specify the values of the following PCTS symbols.

Table 1-1 – PCTS Symbols and Values

Symbol	Value
<i>PCTS_AIO_CANCELABLE_OPS</i>	TRUE if there are I/O operations that can be canceled by calling <i>aio_cancel()</i> , else FALSE .
<i>PCTS_AIO_MAX</i>	The lesser of { <i>ARG_MAX</i> }, as obtained from <i>sysconf()</i> , and 10 times { <i>_POSIX_ARG_MAX</i> }.
<i>PCTS_APPEND_WRITE_SAME_ORDER</i>	TRUE if the implementation does not relax the ordering restriction on asynchronous I/O appends occurring in the same order they were issued, else FALSE .
<i>PCTS_CHMOD_SGID</i>	TRUE if there are no implementation-defined restrictions that will cause the <i>S_ISGID</i> bit to be ignored in the <i>mode</i> argument to a <i>chmod()</i> call, else FALSE .
<i>PCTS_CHMOD_SUID</i>	TRUE if there are no implementation-defined restrictions that will cause the <i>S_ISUID</i> bit to be ignored in the <i>mode</i> argument to a <i>chmod()</i> call, else FALSE .
<i>PCTS_DELAYTIMER_MAX</i>	The lesser of { <i>DELAYTIMER_MAX</i> }, as obtained from <i>sysconf()</i> , and 8 times { <i>POSIX_DELAYTIMER_MAX</i> }.

Symbol	Value
<i>PCTS_DETECT_AIO_ERROR_AIOCBP</i>	TRUE if the implementation can detect that an <i>aiocbp</i> argument does not refer to an asynchronous I/O operation whose return status has not yet been retrieved.
<i>PCTS_DETECT_ENOSPC</i>	TRUE if the implementation can detect that an out-of-space condition occurs when writing to a device containing the specified file, else FALSE .
<i>PCTS_DETECT_EPERM_CLOCK_SETTIME</i>	TRUE if the implementation can detect that a process does not have the appropriate privileges to set the specified clock in a call to the <i>clock_settime()</i> function, else FALSE .
<i>PCTS_DETECT_INVALID_FLAGS_MMAP</i>	TRUE if the implementation can detect that the arguments of <i>addr</i> or <i>off</i> are not multiples of {PAGESIZE} in a call to the <i>mmap()</i> function, else FALSE .
<i>PCTS_DETECT_LOCKABLE_MEMORY_LIMIT_MLOCK</i>	TRUE if the implementation can detect that locking the pages mapped by the specified range would exceed an implementation-defined limit on the amount of memory that a process may lock, else FALSE .
<i>PCTS_DETECT_LOCKABLE_MEMORY_LIMIT_MLOCKALL</i>	TRUE if the implementation can detect that locking all of the pages currently mapped into the address space of a process would exceed an implementation-defined limit on the amount of memory that a process may lock, else FALSE .
<i>PCTS_DETECT_MESSAGE_DATA_CORRUPTION</i>	TRUE if the implementation can detect that a data corruption problem with a message in a message queue, else FALSE .
<i>PCTS_DETECT_NOT_MULTIPLE_OF_PAGESIZE</i>	TRUE if the implementation can detect that the <i>addr</i> argument is not a multiple of the page size {PAGESIZE}, else FALSE .
<i>PCTS_DETECT_NO_AP</i>	TRUE if the implementation can detect that the calling process does not have appropriate privilege to perform the requested operation, else FALSE . Used by the <i>mlock()</i> and <i>mlockall()</i> functions.

Symbol	Value
<i>PCTS_EINVAL_fchmod</i>	TRUE if the implementation can detect that the <i>fildev</i> argument refers to a pipe and the implementation disallows execution of <i>fchmod()</i> on a pipe, else FALSE .
<i>PCTS_EXTEND_ON_ftruncate</i>	TRUE if the implementation extends a file to the <i>length</i> specified in a call to the <i>ftruncate()</i> function if the file previously was smaller than this size, else FALSE .
<i>PCTS_GAP_mlock</i>	TRUE if a process can get the appropriate privilege to lock process memory with <i>mlock()</i> , else FALSE .
<i>PCTS_GAP_mlockall</i>	TRUE if a process can get the appropriate privilege to lock process memory with <i>mlockall()</i> , else FALSE .
<i>PCTS_GAP_MODES_fchmod</i>	TRUE if a process can get the appropriate privilege to change the file permission bits of a file using <i>fchmod()</i> , else FALSE .
<i>PCTS_GAP_mq_open</i>	TRUE if a process can get the appropriate privilege to send and receive messages in the message queue specified in <i>mq_open()</i> , else FALSE .
<i>PCTS_GAP_sem_init</i>	TRUE if a process can get the appropriate privilege to initialize a semaphore using <i>sem_init()</i> , else FALSE .
<i>PCTS_GAP_SGID_fchmod</i>	TRUE if a process can get the appropriate privilege, when the effective user ID of the calling process does not match the file owner, to change the <i>S_ISGID</i> file permission bits of the file using <i>fchmod()</i> , else FALSE .
<i>PCTS_GAP_sigqueue</i>	TRUE if a process can get the appropriate privilege to change send a signal to the receiving process using <i>sigqueue()</i> , else FALSE .
<i>PCTS_GAP_SUID_fchmod</i>	TRUE if a process can get the appropriate privilege, when the effective user ID of the calling process does not match the file owner, to change the <i>S_ISUID</i> file permission bits of the file using <i>fchmod()</i> , else FALSE .
<i>PCTS_GAP_clock_settime</i>	TRUE if a process can get the appropriate privilege to set a particular clock using <i>clock_settime()</i> , else FALSE .

Symbol	Value
<i>PCTS_GAP_sched_setparam</i>	TRUE if a process can get the appropriate privilege to set its own scheduling parameters or those of another using <i>sched_setparam()</i> , else FALSE .
<i>PCTS_GAP_sched_setscheduler</i>	TRUE if a process can get the appropriate privilege to change the scheduling parameters of another process or itself using <i>sched_setscheduler()</i> , else FALSE .
<i>PCTS_GTI_DEVICE</i>	TRUE if the implementation provides device types that support the General Terminal Interface, else FALSE .
<i>PCTS_INVALID_SIGNAL</i>	TRUE if the implementation has an invalid signal number, else FALSE .
<i>PCTS_MAP_FIXED</i>	TRUE if the implementation supports the use of the <i>MAP_FIXED</i> mode of memory mapping, else FALSE .
<i>PCTS_MAP_PRIVATE</i>	TRUE if the implementation supports the facilities indicated by the <i>MAP_PRIVATE</i> flag defined in the <code><sys/mman.h></code> , else FALSE .
<i>PCTS_MORE_SA_SIGINFO_SIGNALS</i>	TRUE if the implementation supports the setting of the <i>si_code</i> member of the <i>siginfo_t</i> structure by means other than calling <i>kill()</i> , <i>raise()</i> , and <i>abort()</i> (if <i>si_code</i> is set to <i>SI_USER</i>), <i>sigqueue()</i> , or <i>timer_settime()</i> , or by completion of an asynchronous I/O request, or by the arrival of a message on an empty message queue, else FALSE .
<i>PCTS_MQ_AS_FILE_TYPE</i>	TRUE if the implementation supports message queues as file type, else FALSE .
<i>PCTS_MQ_OPEN_MAX</i>	The lesser of { <i>MP_OPEN_MAX</i> }, as obtained from <i>sysconf()</i> , and 256.
<i>PCTS_MULTIPLE_OF_PAGESIZE</i>	TRUE if the implementation requires that <i>addr</i> be a multiple of the page size, { <i>PAGESIZE</i> }, else FALSE .
<i>PCTS_NAME_MAX</i>	The lesser of { <i>NAME_MAX</i> }, as obtained from <i>pathconf()</i> , and 2048.
<i>PCTS_NO_SYNC_IO_FILE</i>	TRUE if the implementation has file types for which synchronized I/O is not supported, else FALSE .

Symbol	Value
<i>PCTS_OPEN_MAX</i>	The lesser of {OPEN_MAX}, as obtained from <i>sysconf()</i> , and 256.
<i>PCTS_PATH_MAX</i>	The lesser of {PATH_MAX}, as obtained from <i>sysconf()</i> , and 4096.
<i>PCTS_PIPE_BUF</i>	The lesser of {PIPE_BUF}, as obtained from <i>sysconf()</i> , and 32767.
<i>PCTS_RAP_mlock</i>	TRUE if the implementation supports releasing appropriate privilege for <i>mlock()</i> , else FALSE .
<i>PCTS_RAP_mlockall</i>	TRUE if the implementation supports releasing appropriate privilege for <i>mlockall()</i> , else FALSE .
<i>PCTS_RAP_mq_open</i>	TRUE if the implementation supports releasing appropriate privilege for <i>mq_open()</i> , else FALSE .
<i>PCTS_RAP_sem_init</i>	TRUE if the implementation supports releasing appropriate privileges for <i>sem_init()</i> , else FALSE .
<i>PCTS_RAP_SGID_chmod</i>	TRUE if the implementation supports releasing appropriate privilege for managing the S_ISGID bit in a call to <i>chmod()</i> , else FALSE .
<i>PCTS_RAP_SGID_fchmod</i>	TRUE if the implementation supports releasing appropriate privilege for managing the S_ISUID bit in a call to <i>fchmod()</i> , else FALSE .
<i>PCTS_RAP_sigqueue</i>	TRUE if the implementation supports releasing appropriate privilege for <i>sigqueue()</i> , else FALSE .
<i>PCTS_RAP_clock_settime</i>	TRUE if the implementation supports releasing appropriate privilege for <i>clock-settime()</i> , else FALSE .
<i>PCTS_RAP_sched_setparam</i>	TRUE if the implementation supports releasing appropriate privilege for <i>sched-setparam()</i> , else FALSE .
<i>PCTS_ROFS</i>	TRUE if the implementation supports read-only file systems, else FALSE .
<i>PCTS_SEM_EBUSY</i>	TRUE if the implementation supports the detection of the [EBUSY] error condition for semaphores, else FALSE .

Symbol	Value
<i>PCTS_SEM_INVALID</i>	TRUE if the implementation supports a way to obtain an invalid semaphore, else FALSE .
<i>PCTS_SEM_IS_FD</i>	TRUE if the implementation supports semaphores as a file type, else FALSE .
<i>PCTS_SEM_NSEMS_MAX</i>	The lesser of {SEM_SEMS_MAX}, as obtained from <i>sysconf</i> (), and 1024.
<i>PCTS_SHM_AS_FILE_TYPE</i>	TRUE if the implementation supports shared memory objects as a distinct file type, else FALSE .
<i>PCTS_SIGQUEUE_MAX</i>	The lesser of {SIGQUEUE_MAX}, as obtained from <i>sysconf</i> (), and 64.
<i>PCTS_SIGTIMEDWAIT_VALUE</i>	TRUE if the implementation can detect when the <i>sigtimedwait</i> () function is called with a <i>timeout</i> argument specifying a <i>tv_nsec</i> value less than zero or greater than or equal to 1000 million, else FALSE .
<i>PCTS_TIMER_MAX</i>	The lesser of {TIMER_MAX}, as obtained from <i>sysconf</i> (), and 256.
<i>PCTS_UNSUPPORTED_SIGNAL</i>	TRUE if the implementation has an unsupported signal number else FALSE .
<i>PCTS_aio_cancel</i>	TRUE if <i>_POSIX_ASYNCHRONOUS_IO</i> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_aio_error</i>	TRUE if <i>_POSIX_ASYNCHRONOUS_IO</i> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_aio_fsync</i>	TRUE if <i>_POSIX_ASYNCHRONOUS_IO</i> and <i>_POSIX_SYNCHRONIZED_IO</i> are defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_aio_read</i>	TRUE if <i>_POSIX_ASYNCHRONOUS_IO</i> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .

Symbol	Value
<i>PCTS_aio_return</i>	TRUE if <code>_POSIX_ASYNCHRONOUS_IO</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_aio_suspend</i>	TRUE if <code>_POSIX_ASYNCHRONOUS_IO</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_aio_write</i>	TRUE if <code>_POSIX_ASYNCHRONOUS_IO</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_clock_getres</i>	TRUE if <code>POSIX_TIMERS</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_clock_gettime</i>	TRUE if <code>_POSIX_TIMERS</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_clock_settime</i>	TRUE if <code>_POSIX_TIMERS</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_fchmod</i>	TRUE if <code>_POSIX_MAPPED_FILES</code> or <code>_POSIX_SHARED_MEMORY_OBJECTS</code> are defined, or the implementation supports the function as described in POSIX.1b{3}, else FALSE .
<i>PCTS_fdatasync</i>	TRUE if <code>_POSIX_SYNCHRONIZED_IO</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_fsync</i>	TRUE if <code>_POSIX_ASYNCHRONOUS_IO</code> and <code>_POSIX_SYNCHRONIZED_IO</code> are defined or the implementation supports the function as described in POSIX.1b{3}, else FALSE .
<i>PCTS_ftruncate</i>	TRUE if <code>_POSIX_MAPPED_FILES</code> or <code>_POSIX_SHARED_MEMORY_OBJECTS</code> are defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_get_priority_max</i>	TRUE if <code>_POSIX_PRIORITY_SCHEDULING</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .

Symbol	Value
<i>PCTS_get_priority_min</i>	TRUE if <code>_POSIX_PRIORITY_SCHEDULING</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_lio_listio</i>	TRUE if <code>_POSIX_ASYNCHRONOUS_IO</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_mlock</i>	TRUE if <code>_POSIX_MEMLOCK_RANGE</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_mlockall</i>	TRUE if <code>_POSIX_MEMLOCK</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_mmap</i>	TRUE if <code>_POSIX_MAPPED_FILES</code> or <code>_POSIX_SHARED_MEMORY_OBJECTS</code> are defined, or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_mprotect</i>	TRUE if <code>_POSIX_MEMORY_PROTECTION</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_mq_close</i>	TRUE if <code>_POSIX_MESSAGE_PASSING</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_mq_getattr</i>	TRUE if <code>_POSIX_MESSAGE_PASSING</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_mq_notify</i>	TRUE if <code>_POSIX_MESSAGE_PASSING</code> and <code>_POSIX_REALTIME_SIGNALS</code> are defined, or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_mq_open</i>	TRUE if <code>_POSIX_MESSAGE_PASSING</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .

Symbol	Value
<i>PCTS_mq_receive</i>	TRUE if <code>_POSIX_MESSAGE_PASSING</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_mq_send</i>	TRUE if <code>_POSIX_MESSAGE_PASSING</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_mq_setattr</i>	TRUE if <code>_POSIX_MESSAGE_PASSING</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_mq_unlink</i>	TRUE if <code>_POSIX_MESSAGE_PASSING</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_msync</i>	TRUE if <code>_POSIX_MAPPED_FILES</code> and <code>_POSIX_SYNCHRONIZED_IO</code> are defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_msync_storage</i>	TRUE if the system under test has secondary storage to which <code>msync()</code> can synchronize pages, else FALSE .
<i>PCTS_munlock</i>	TRUE if <code>_POSIX_MEMLOCK_RANGE</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_munlockall</i>	TRUE if <code>_POSIX_MEMLOCK</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_munmap</i>	TRUE if <code>_POSIX_MAPPED_FILES</code> or <code>_POSIX_SHARED_MEMORY_OBJECTS</code> are defined, or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_nanosleep</i>	TRUE if <code>_POSIX_TIMERS</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_read</i>	TRUE if the implementation supports the <code>read()</code> function (always TRUE).

Symbol	Value
<i>PCTS_sched_get_priority_max</i>	TRUE if <code>_POSIX_PRIORITY_SCHEDULING</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_sched_get_priority_min</i>	TRUE if <code>_POSIX_PRIORITY_SCHEDULING</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_sched_getparam</i>	TRUE if <code>_POSIX_PRIORITY_SCHEDULING</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_sched_getscheduler</i>	TRUE if <code>_POSIX_PRIORITY_SCHEDULING</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_sched_rr_get_interval</i>	TRUE if <code>_POSIX_PRIORITY_SCHEDULING</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_sched_setparam</i>	TRUE if <code>_POSIX_PRIORITY_SCHEDULING</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_sched_setscheduler</i>	TRUE if <code>_POSIX_PRIORITY_SCHEDULING</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_sched_yield</i>	TRUE if <code>_POSIX_PRIORITY_SCHEDULING</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_sem_close</i>	TRUE if <code>_POSIX_SEMAPHORES</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_sem_destroy</i>	TRUE if <code>_POSIX_SEMAPHORES</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .

Symbol	Value
<i>PCTS_sem_getvalue</i>	TRUE if <code>_POSIX_SEMAPHORES</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_sem_init</i>	TRUE if <code>_POSIX_SEMAPHORES</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_sem_open</i>	TRUE if <code>_POSIX_SEMAPHORES</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_sem_post</i>	TRUE if <code>_POSIX_SEMAPHORES</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_sem_trywait</i>	TRUE if <code>_POSIX_SEMAPHORES</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_sem_unlink</i>	TRUE if <code>_POSIX_SEMAPHORES</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_sem_wait</i>	TRUE if <code>_POSIX_SEMAPHORES</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_shm_open</i>	TRUE if <code>_POSIX_SHARED_MEMORY_OBJECTS</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_shm_unlink</i>	TRUE if <code>_POSIX_SHARED_MEMORY_OBJECTS</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_sigqueue</i>	TRUE if <code>_POSIX_REALTIME_SIGNALS</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_sigtimedwait</i>	TRUE if <code>_POSIX_REALTIME_SIGNALS</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .

Symbol	Value
<i>PCTS_sigwaitinfo</i>	TRUE if <code>_POSIX_REALTIME_SIGNALS</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_timer_create</i>	TRUE if <code>_POSIX_TIMERS</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_timer_delete</i>	TRUE if <code>_POSIX_TIMERS</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_timer_getoverrun</i>	TRUE if <code>_POSIX_TIMERS</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_timer_gettime</i>	TRUE if <code>_POSIX_TIMERS</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_timer_settime</i>	TRUE if <code>_POSIX_TIMERS</code> is defined or the implementation supports the function as described in POSIX.1b {3}, else FALSE .
<i>PCTS_write</i>	TRUE if the implementation supports the <code>write ()</code> function. (always TRUE).

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Section 2: Terminology and General Requirements

2.1 Conventions

This standard uses the following typographic conventions:

- (1) The *italic* font is used for
 - Cross references to defined terms within 1.3, 2.2.1, and 2.2.2, symbolic parameters that are generally substituted with real values by the application
 - C language data types and function names (except in function Synopsis clauses)
 - Global external variable names
 - General Assertion and General Documentation Assertion references.
- (2) The **bold** font is used with a word in all capital letters, such as **PATH**, to represent an environmental variable. It is also used for the term “**NULL** pointer.”
- (3) The `constant-width` (Courier) font is used
 - For C language data types and function names within function Synopsis clauses
 - To illustrate examples of system input or output where exact usage is depicted
 - For references to utility names and C language headers.
- (4) Symbolic constants returned by many functions as error numbers are represented as
[ERRNO]
- (5) Symbolic constants or limits defined in certain headers are represented as
[LIMIT]
- (6) Test method macros are represented as **M_test_method_macro** ().

In some cases, tabular information is presented "inline"; in other cases it is presented in a separately labeled table. This arrangement was used purely for ease of typesetting, and there is no normative difference between these two cases.

The conventions listed above are for ease of reading only. Editorial inconsistencies in the use of typography are unintentional and have no normative meaning in this standard.

NOTES provided as parts of labeled tables and figures are integral parts of this standard (normative). Footnotes and notes within the body of the text are for information only (informative).

Numerical quantities are presented in international style; that is, the comma is used as a decimal sign, and units are from the International System (SI).

2.2 Definitions

2.2.1 Terminology

There are no requirements for conforming implementations in this clause.

2.2.2 General Terms

There are no requirements for conforming implementations in this clause.

2.2.2.1 absolute pathname: There are no requirements for conforming implementations in this clause.

2.2.2.2 access mode: There are no requirements for conforming implementations in this clause.

2.2.2.3 address space: There are no requirements for conforming implementations in this clause.

2.2.2.4 appropriate privileges: There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.2.2.5 arm (a timer): There are no requirements for conforming implementations in this clause.

2.2.2.6 asynchronous I/O completion: There are no requirements for conforming implementations in this clause.

2.2.2.7 asynchronous I/O operation: There are no requirements for conforming implementations in this clause.

2.2.2.8 background process: There are no requirements for conforming implementations in this clause.

2.2.2.9 background process group: There are no requirements for conforming implementations in this clause.

2.2.2.10 block special file: There are no requirements for conforming implementations in this clause.

2.2.2.11 blocked process: There are no requirements for conforming implementations in this clause.

2.2.2.12 character: There are no requirements for conforming implementations in this clause.

2.2.2.13 character special file: There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.2.2.14 child process: There are no requirements for conforming implementations in this clause.

2.2.2.15 clock: There are no requirements for conforming implementations in this clause.

2.2.2.16 clock tick: There are no requirements for conforming implementations in this clause.

2.2.2.17 controlling process: There are no requirements for conforming implementations in this clause.

2.2.2.18 controlling terminal: There are no requirements for conforming implementations in this clause.

2.2.2.19 current working directory: There are no requirements for conforming implementations in this clause.

2.2.2.20 device: There are no requirements for conforming implementations in this clause.

2.2.2.21 directory: There are no requirements for conforming implementations in this clause.

2.2.2.22 direct I/O: There are no requirements for conforming implementations in this clause.

2.2.2.23 directory entry [link]: There are no requirements for conforming implementations in this clause.

2.2.2.24 disarm (a timer): There are no requirements for conforming implementations in this clause.

2.2.2.25 drift rate (of a clock): There are no requirements for conforming implementations in this clause.

2.2.2.26 dot: There are no requirements for conforming implementations in this clause.

2.2.2.27 dot-dot: There are no requirements for conforming implementations in this clause.

2.2.2.28 effective group ID: There are no requirements for conforming implementations in this clause.

2.2.2.29 effective user ID: There are no requirements for conforming implementations in this clause.

2.2.2.30 empty directory: There are no requirements for conforming implementations in this clause.

2.2.2.31 empty string [null string]: There are no requirements for conforming implementations in this clause.

2.2.2.32 Epoch: There are no requirements for conforming implementations in this clause.

2.2.2.33 feature test macro: There are no requirements for conforming implementations in this clause.

2.2.2.34 FIFO special file [FIFO]: There are no requirements for conforming implementations in this clause.

2.2.2.35 file: There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.2.2.36 file description: There are no requirements for conforming implementations in this clause.

2.2.2.37 file descriptor: There are no requirements for conforming implementations in this clause.

2.2.2.38 file group class: There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.2.2.39 file mode: There are no requirements for conforming implementations in this clause.

2.2.2.40 filename:

(IEEE Std 2003.1-1992 {4} GA02

UNUSED

M_GA_portableFilenames(function()) =

TEST: The interface *function* () supports filenames containing any of the characters in the portable filename character set.

TR: Test for filenames containing the following characters:

A B D C E F G H I J K L M N O P Q R S T U V W X Y Z

a b c d e f g h i j k l m n o p q r s t u v w x y z

0 1 2 3 4 5 6 7 8 9 . _ -

The last three characters are the period, underscore, and hyphen, respectively.

GA_portableFilenames

FOR: *execl()*, *execle()*, *execv()*, *execve()*, *exelp()*, *execvp()*, *opendir()*, *chdir()*, *open()*, *creat()*, *link()*, *existing*, *link()* *new*, *mkdir()*, *mkfifo()*, *unlink()*, *rmdir()*, *rename()*, *old*, *rename()*, *new*, *stat()*, *access()*, *chmod()*, *chown()*, *utime()*, *pathconf()*, *fopen()*, *freopen()*, *remove()*, *tar* format creating utility, and *cpio* format creating utility.

M_GA_portableFilenames(function())

Conformance for definition: PASS

(IEEE Std 2003.1-1992 {4} GA03

UNUSED

M_GA_upperLowerNames(function()) =

TEST: The interface *function*() differentiates between uppercase and lowercase characters in filenames.

GA_upperLowerNames

FOR: *execl(), execl(), execv(), execve(), execlp(), execvp(), opendir(), chdir(), open(), creat(), link() existing, link() new, mkdir(), mkfifo(), unlink(), rmdir(), rename() old, rename() new, stat(), access(), chmod(), chown(), utime(), pathconf(), fopen(), freopen(), remove(), tar* format creating utility, and *cpio* format creating utility.

M_GA_upperLowerNames(function())

Conformance for definitions: PASS

2.2.2.41 file offset: There are no requirements for conforming implementations in this clause.

2.2.2.42 file other class: There are no requirements for conforming implementations in this clause.

2.2.2.43 file owner class: There are no requirements for conforming implementations in this clause.

2.2.2.44 file permission bits: There are no requirements for conforming implementations in this clause.

2.2.2.45 file serial number: There are no requirements for conforming implementations in this clause.

2.2.2.46 file system: There are no requirements for conforming implementations in this clause.

2.2.2.47 first open (of a file): *cpio* format creating utility. There are no requirements for conforming implementations in this clause.

2.2.2.48 foreground process: There are no requirements for conforming implementations in this clause.

2.2.2.49 foreground process group: There are no requirements for conforming implementations in this clause.

2.2.2.50 foreground process group ID: There are no requirements for conforming implementations in this clause.

2.2.2.51 group ID: There are no requirements for conforming implementations in this clause.

2.2.2.52 job control: There are no requirements for conforming implementations in this clause.

2.2.2.53 last close (of a file) There are no requirements for conforming implementations in this clause.

2.2.2.54 link: There are no requirements for conforming implementations in this clause.

2.2.2.55 link count: There are no requirements for conforming implementations in this clause.

2.2.2.56 login: There are no requirements for conforming implementations in this clause.

2.2.2.57 login name: There are no requirements for conforming implementations in this clause.

2.2.2.58 map: There are no requirements for conforming implementations in this clause.

2.2.2.59 memory object: There are no requirements for conforming implementations in this clause.

2.2.2.60 memory-resident: There are no requirements for conforming implementations in this clause.

2.2.2.61 message: There are no requirements for conforming implementations in this clause.

2.2.2.62 message queue: There are no requirements for conforming implementations in this clause.

2.2.2.63 mode: There are no requirements for conforming implementations in this clause.

2.2.2.64 null string: There are no requirements for conforming implementations in this clause.

2.2.2.65 open file: There are no requirements for conforming implementations in this clause.

2.2.2.66 open file description: There are no requirements for conforming implementations in this clause.

2.2.2.67 orphaned process group: There are no requirements for conforming implementations in this clause.

2.2.2.68 page: There are no requirements for conforming implementations in this clause.

2.2.2.69 parent directory: There are no requirements for conforming implementations in this clause.

2.2.2.70 parent process: There are no requirements for conforming implementations in this clause.

2.2.2.71 parent process ID: There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.2.2.72 path prefix: There are no requirements for conforming implementations in this clause.

2.2.2.73 pathname: There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.2.2.74 pathname component: There are no requirements for conforming implementations in this clause.

2.2.2.75 persistence: There are no requirements for conforming implementations in this clause.

2.2.2.76 pipe: There are no requirements for conforming implementations in this clause.

2.2.2.77 portable filename character set: There are no requirements for conforming implementations in this clause.

2.2.2.78 preallocation: There are no requirements for conforming implementations in this clause.

2.2.2.79 preempted process: There are no requirements for conforming implementations in this clause.

2.2.2.80 priority: There are no requirements for conforming implementations in this clause.

2.2.2.81 priority-based scheduling: There are no requirements for conforming implementations in this clause.

2.2.2.82 privilege: There are no requirements for conforming implementations in this clause.

2.2.2.83 process: There are no requirements for conforming implementations in this clause.

2.2.2.84 process group: There are no requirements for conforming implementations in this clause.

2.2.2.85 process group ID: There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.2.2.86 process group leader: There are no requirements for conforming implementations in this clause.

2.2.2.87 process group lifetime: There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.2.2.88 process ID: There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.2.2.89 process lifetime: There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.2.2.90 process list: There are no requirements for conforming implementations in this clause.

2.2.2.91 read-only file system: There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.2.2.92 real group ID: There are no requirements for conforming implementations in this clause.

2.2.2.93 real user ID: There are no requirements for conforming implementations in this clause.

2.2.2.94 referenced shared memory object: There are no requirements for conforming implementations in this clause.

2.2.2.95 regions: There are no requirements for conforming implementations in this clause.

2.2.2.96 regular file: There are no requirements for conforming implementations in this clause.

2.2.2.97 relative pathname: There are no requirements for conforming implementations in this clause.

2.2.2.98 resolution (time): There are no requirements for conforming implementations in this clause.

2.2.2.99 root directory: There are no requirements for conforming implementations in this clause.

2.2.2.100 runnable process: There are no requirements for conforming implementations in this clause.

2.2.2.101 running process: There are no requirements for conforming implementations in this clause.

2.2.2.102 saved set-group-ID: There are no requirements for conforming implementations in this clause.

2.2.2.103 saved set-user-ID: There are no requirements for conforming implementations in this clause.

2.2.2.104 scheduling: There are no requirements for conforming implementations in this clause.

2.2.2.105 scheduling policy:

D_1 TEST: The PCD.1b shall define in clause 2.2.2.105 the manner in which each of the scheduling policies may modify the priorities or otherwise affect the ordering of processes at each of the following occurrences

- (1) When a process is a running process and it becomes a blocked process
- (2) When a process is a running process and it becomes a preempted process
- (3) When a process is a blocked process and it becomes a runnable process
- (4) When a running process calls a function that can change the priority or scheduling policy of a process
- (5) In other scheduling-policy-defined circumstances.

Conformance for definitions: PASS

D_2 TEST: The PCD.1b defines in clause 2.2.2.105 under what other circumstances and in what manner each scheduling policy may modify the priorities or otherwise affect the ordering of processes.

Conformance for definitions: PASS

2.2.2.106 seconds since the Epoch: There are no requirements for conforming implementations in this clause.

2.2.2.107 semaphore: There are no requirements for conforming implementations in this clause.

2.2.2.108 semaphore lock operation:

R_1 FOR: `sem_init()` and `sem_open()`

IF `PCTS_sem_wait` **THEN**

IF `PCTS_function` **THEN**

SETUP: Create a semaphore using `function ()`.

TEST: When a call to *sem_wait(sem)* completes successfully, the interface returns a value of 0, and the semaphore designated by *sem* is locked by the semaphore lock operation.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion *sem_wait* in 11.2.7.2

2.2.2.109 semaphore unlock operation:

R_2 FOR: *sem_init()* and *sem_open()*

IF *PCTS_sem_post* **THEN**

IF *PCTS_function* **THEN**

SETUP: Create a semaphore using *function()*.

TEST: A successful call to *sem_post()* unlocks the semaphore referenced by *sem* by performing the semaphore unlock operation on that semaphore, and returns the value zero.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion *sem_post* in 11.2.7.2

2.2.2.110 session: There are no requirements for conforming implementations in this clause.

2.2.2.111 session leader: There are no requirements for conforming implementations in this clause.

2.2.2.112 session lifetime: There are no requirements for conforming implementations in this clause.

2.2.2.113 shared memory object: There are no requirements for conforming implementations in this clause.

2.2.2.114 signal: There are no requirements for conforming implementations in this clause.

2.2.2.115 slash: There are no requirements for conforming implementations in this clause.

2.2.2.116 supplementary group ID: There are only IDDD Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.2.2.117 successfully transferred: There are no requirements for conforming implementations in this clause.

2.2.2.118 synchronized I/O completion: There are no requirements for conforming implementations in this clause.

2.2.2.119 synchronized I/O data integrity completion:

GA_syncIODataIntegrityRead

FOR: *read()*, *aio_read()*, and *lio_listio()*

IF *PCTS_function* and {POSIX_SYNCH_IO} **THEN**

SETUP: Open a file by calling *open()* with *O_RSYNC* and *O_DSYNC* set in the *oflag* parameter.

TEST: At the time that the synchronized read operation initiated by calling *function()* occurs, any pending write requests affecting the data to be read are written to the physical medium containing the file prior to reading the data.

TR: Test for regular files.

ELSE NO_OPTION

Conformance for definitions: PASS, NO_TEST, NO_OPTION

GA_syncIODataIntegrityWbeforeR

FOR: *write()*, *aio_write()*, and *lio_lioio()*

IF *PCTS_function* and {POSIX_SYNCH_IO} **THEN**

SETUP: Open a file by calling *open()* with O_DSYNC set in the *oflag* parameter.

TEST: A write operation initiated by calling *function()* either completes by transferring an image of the data to the physical medium containing the file or, if unsuccessful, by diagnosing and returning an indicator of the error.

TR: Test for regular files and, if PCTS_GTI_DEVICE, terminals.

ELSE NO_OPTION

Conformance for definitions: PASS, NO_TEST, NO_OPTION

GA_syncIODataIntegrityWrite

FOR: *write()*, *aio_write()*, and *lio_listio()*

IF *PCTS_funtion* and {POSIX_SYNCH_IO} **THEN**

SETUP: Open a file by calling *open()* with O_DSYNC set in the *oflag* parameter.

TEST: A write operation initiated by calling *function()* either completes by transferring an image of the data to the physical medium containing the file or, if unsuccessful, by diagnosing and returning an indicator of the error.

TR: Test for regular files and, if PCTS_GTI_DEVICE, terminals.

ELSE NO_OPTION

Conformance for definitions: PASS, NO_TEST, NO_OPTION

2.2.2.120 synchronized I/O file integrity completion:

GA_syncIOFileIntegrityRead

FOR: *read()*, *aio_read()*, and *lio_listio()*

IF *PCTS_function* and {POSIX_SYNCH_IO} **THEN**

SETUP Open a file by calling *open()* with O_RSYNC and O_SYNC set in the *oflag* parameter.

TEST: At the time that the synchronized read operation initiated by calling *function()* occurs, any pending write requests affecting the data to be read are written to the physical medium containing the file prior to reading the data, and the following file attributes are also written to the physical medium containing the file prior to returning to the calling process:

1. File mode
2. File serial number
3. ID of device containing this file
4. Number of links
5. User ID of the owner of the file
6. Group ID of the group of the file
7. The file size in bytes
8. Time of last access

9. Time of last data modification

10. Time of last file status change

TR: Test for regular files.

ELSE NO_OPTION

Conformance for definitions: PASS, NO_TEST, NO_OPTION

GA_syncIOFileIntegrityWrite

FOR: write(), aio_write(), and lio_listio()

IF *PCTS_function* and {POSIX_SYNCH_IO} **THEN**

TEST: At the time that the synchronized write operation initiated by calling *function()* occurs, the data are written to the physical medium containing the file, and the following file attributes are also written to the physical medium containing the file prior to returning to the calling process:

1. File mode
2. File serial number
3. ID of device containing this file
4. Number of links
5. User ID of the owner of the file
6. Group ID of the group of the file
7. The file size in bytes
8. Time of last access
9. Time of last data modification
10. Time of last file status change

TR: Test for regular files

ELSE NO_OPTION

Conformance for definitions: PASS, NO_TEST, NO_OPTION

2.2.2.121 synchronized I/O operation: There are no requirements for conforming implementations in this clause.

2.2.2.122 synchronous I/O operation: There are no requirements for conforming implementations in this clause.

2.2.2.123 system: There are no requirements for conforming implementations in this clause.

2.2.2.124 system crash: There are no requirements for conforming implementations in this clause.

2.2.2.125 system process: There are no requirements for conforming implementations in this clause.

2.2.2.126 system reboot:

D_3 TEST: The PCD.1b defines in clause 2.2.2.126 the implementation-defined sequence of events (called a system reboot) that may result in the loss of transitory data; i.e., data that is not saved in permanent storage.

Conformance for definitions: PASS

2.2.2.127 terminal [terminal device]: There are no requirements for conforming implementations in this clause.

2.2.2.128 timer: There are no requirements for conforming implementations in this clause.

2.2.2.129 timer overrun: There are no requirements for conforming implementations in this clause.

2.2.2.130 user id: There are no requirements for conforming implementations in this clause.

2.2.2.131 user name: There are no requirements for conforming implementations in this clause.

2.2.2.132 working directory [current working directory]: There are no requirements for conforming implementations in this clause.

2.2.3 Abbreviations

There are no requirements for conforming implementations in this clause.

See clause 1.4.2 for abbreviations related to this standard.

2.3 General Concepts

2.3.1 extended security controls: There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.3.2 file access permissions:
(IEEE Std 2003.1-1992 {4} GA04)
UNUSED

***M_GA_AP_overrideFileAccess*(function()) =**
IF the IUT provides a mechanism for creating processes with the appropriate privilege to override a file access control mechanism **THEN**
 SETUP: The process has appropriate privileges for file access.
 TEST: A call to the interface *function()* that needs read, write, or search access to the *pathname* argument is granted access to the file when access would otherwise be denied.
ELSE NO_OPTION

GA_AP_overrideFileAccess
FOR: *access()*, *chdir()*, *chmod()*, *chown()*, *creat()*, *execl()*, *execle()*, *execv()*, *execve()*, *execlp()*, *execvp()*, *open()*, *opendir()*, *link()* existing, *link()* new, *mkdir()*, *mkfifo()*, *pathconf()*, *rename()* new, *rename()* old, *rmdir()*, *stat()*, *unlink()*, and *utime()*.
***M_GA_AP_overrideFileAccess*(function())**
Conformance for General Concepts; PASS, NO_TEST, NO_OPTION

(IEEE Std 2003.1-1992 {4} GA05)
UNUSED

***M_GA_AP_overrideExecAccess*(function()) =**
IF the IUT provides a mechanism for creating processes with the appropriate privilege to override a file access control mechanism **THEN**
 SETUP: The process has appropriate privilege for the file access, and execute permission is granted to at least one user of the file.
 TEST: A call to the interface *function()* that needs execute permission to the *path* or *file* argument is granted execute access to the file when access would otherwise be denied.
ELSE NO_OPTION

GA_AP_overrideExecAccess
FOR: *execl()*, *execle()*, *execv()*, *execve()*, *execlp()*, and *execvp()*.
***M_GA_AP_overrideExecAccess*(function())**
Conformance for General Concepts; PASS, NO_TEST, NO_OPTION

(IEEE Std 2003.1-1992 {4} GA06)
UNUSED

M_GA_AP_classAccess(function()) =

IF the IUT provides a mechanism for creating processes with the appropriate privilege to override a file access control mechanism **THEN**

SETUP: The process does not have appropriate privilege to override the file access control mechanism, and the process requires read, write, execute, or search access to the *pathname* or *file* argument of the interface *function()*.

TEST: A call to the interface *function()* is granted access to the file when the required access permission bit is set for the class (file owner class, file group class, or file other class) to which the process belongs.

ELSE NO_OPTION

GA_AP_classAccess

FOR: *access()*, *chdir()*, *chmod()*, *chown()*, *creat()*, *execl()*, *execle()*, *execv()*, *execve()*, *execvp()*, *open()*, *opendir()*, *link()* *existing*, *link()* *new*, *mkdir()*, *mkfifo()*, *pathconf()*, *rename()* *new*, *rename()* *old*, *rmdir()*, *stat()*, *unlink()*, and *utime()*.

M_GA_AP_ClassAccess(function())

Conformance for General Concepts: *PASS*, *NO_TEST*, *NO_OPTION*

(IEEE Std 2003.1-1992 {4}) GA07

UNUSED

M_GA_AdditionalAccessControl() =

IF IUT provides additional file access control mechanisms **THEN**

TEST: Any additional file access control mechanism shall only further restrict the access permissions defined by the file permission bits.

ELSE NO_OPTION

GA_AdditionalAccessControl

MP_GA_AdditionalAccessControl()

Conformance for General Concepts: *PASS*, *NO_TEST*, *NO_OPTION*

(IEEE Std 2003.1-1992 {4}) GA08

UNUSED

MP_GA_AlternateAccessControl() =

IF IUT provides alternate file access control mechanisms **THEN**

TEST: Any alternate file access control mechanism specifies file permission bits for the file owner class, file group class, and file other class of the file corresponding to the access permissions to be returned by *stat()* and *fstat()*.

ELSE NO_OPTION

GA_AlternateAccessControl

M_GA_AlternateAccessControl()

Conformance for General Concepts, *PASS*, *NO_TEST*, *NO_OPTION*

(IEEE Std 2003.1-1992 {4}) GA09

UNUSED

(IEEE Std 2003.1-1992 {4}) GA10

UNUSED

M_GA_AltAccessEnable() =

IF IUT provides alternate file access control mechanisms **THEN**

TEST: The alternate file access control mechanisms can be enabled only by explicit user action, on a per-file basis, by the file owner or a user with the appropriate privilege.

ELSE NO_OPTION

GA_AltAccessEnable

M_GA_AltAccessEnable()

Conformance for General Concepts: PASS, NO_TEST, NO_OPTION

(IEEE Std 2003.1-1992 {4}) GA11

UNUSED

M_GA_AltAccessDisable() =

IF IUT provides alternate file access control mechanisms **THEN**

TEST: The alternate file access control mechanisms will be disabled for a file after the file permission bits are changed for that file with *chmod()*.

ELSE *NO_OPTION*

GA_AltAccessDisable

M_GA_AltAccessDisable()

Conformance for General Concepts: PASS, NO_TEST, NO_OPTION

(IEEE Std 2003.1-1992 {4}) D03

UNUSED

2.3.3 file hierarchy: There are no requirements for conforming implementations in this clause.

2.3.4 filename portability: There are no requirements for conforming implementations in this clause.

2.3.5 file times update:

(IEEE Std 2003.1-1992 {4})R01

UNUSED

(IEEE Std 2003.1-1992 {4}) GA12

UNUSED

M_GA_StatTimeUpdate (*function()*) =

TEST: The interface *function()*, when called, updates all time-related fields marked for update and does not update any time-related fields not marked for update.

GA_StatTimeUpdate

FOR: *stat()* and *fstat()*.

M_GA_StatTimeUpdate (*function()*)

Conformance for General Concepts: PASS

M_GA_NoOpenTimeUpdate (*function()*) =

TEST: All fields that are marked for update are updated when the file is no longer open by any process.

GA_NoOpenTimeUpdate

FOR: *close()* and *fclose()*.

M_GA_NoOpenTimeUpdate (*function()*)

Conformance for General Concepts: PASS

(NOTE: This assertion is missing in 2003.1.)

(IEEE Std 2003.1-1992 {4})_GA13

UNUSED

M_GA_NoROFSTimeUpdate (*function()*) =

TEST: Time-related field updates are not done for files on read-only file systems.

GA_NoROFSTimeUpdate

FOR: *acc()*, *chmod()*, *chown()*, *creat()*, *link()* existing, *link()* new, *mkdir()*, *mkfifo()*, *open()*, *rename()* new, *rename()* old, *rmdir()*, *unlink()*, and *utime()*.

M_GA_noROFSTimeUpdate (*function()*)

Conformance for General Concepts: PASS

2.3.6 pathname resolution:

NOTE: In each of the pathname resolution General Assertions below, for the elements *rmdir()*, *rename()* new, and *unlink()*, the current working directory should be an empty directory in order to preclude the occurrence of avoidable error conditions. Some implementations will consider the attempt to remove the current working directory an error, and will indicate this with the error indication.

(IEEE Std 2003.1-1992 {4}) GA14

UNUSED

M_GA_PRDot(function()) =

TEST: A call to the interface *function()* with a *path* or *file* argument where the first filename component is "." and the argument does not begin with a "/". [slash resolves the *path* or *file* argument by locating the second filename component (when specified) in the current working directory.]

GA_PRDot

FOR: *access()*, *chdir()*, *chmod()*, *chown()*, *creat()*, *execl()*, *execle()*, *execv()*, *execve()*, *execlp()*, *execvp()*, *fopen()*, *freopen()*, *open()*, *opendir()*, *link()* existing, *link()* new, *mkdir()*, *mkfifo()*, *pathconf()*, *remove()*, *rename()* new, *rename()* old, *rmdir()*, *stat()*, *unlink()* and *utime()*.

M_GA_PRDot(function())

Conformance for General Concepts: PASS

(IEEE Std 2003.1-1992 {4}) GA15

UNUSED

M_GA_PRSlash(function()) =

TEST: A call to the interface *function()*, with a *path* or *file* argument pointing to the string "/", resolves the *path* or *file* argument to the root directory of the process.

GA_PRSlash

FOR: *access()*, *chdir()*, *chmod()*, *chown()*, *creat()*, *execl()*, *execle()*, *execv()*, *execve()*, *execlp()*, *execvp()*, *fopen()*, *freopen()*, *open()*, *opendir()*, *link()* existing, *link()* new, *mkdir()*, *mkfifo()*, *pathconf()*, *remove()*, *rename()* new, *rename()* old, *rmdir()*, *stat()*, *unlink()*, and *utime()*.

M_GA_PRSlash(function())

Conformance for General Concepts: pass

(IEEE Std 2003.1-1992 {4}) GA16

UNUSED

M_GA_PR3Slash(function()) =

TEST: A call to the interface *function()*, with a *path* or *file* argument pointing to the string "///", resolves the *path* or *file* argument to the root directory of the process.

GA_PR3Slash

FOR: *access()*, *chdir()*, *chmod()*, *chown()*, *creat()*, *execl()*, *execle()*, *execv()*, *execve()*, *execlp()*, *execvp()*, *fopen()*, *freopen()*, *open()*, *opendir()*, *link()* existing, *link()* new, *mkdir()*, *mkfifo()*, *pathconf()*, *remove()*, *rename()* new, *rename()* old, *rmdir()*, *stat()*, *unlink()*, and *utime()*.

M_GA_PR3Slash(function())

Conformance for General Concepts: PASS

(IEEE Std 2003.1-1992 {4}) GA17

UNUSED

M_GA_PRSlashesPath(function()) =

TEST: A call to the interface *function()*, with a *path* or *file* argument pointing to a string that starts with either a single slash ("/") or three or more slashes, resolves the *path* or *file* argument

by locating the first filename component of the argument in the root directory of the process.

GA_PRSlashesPath

FOR: *access(), chdir(), chmod(), chown(), creat(), execl(), execl(), execv(), execve(), execlp(), execvp(), fopen(), freopen(), open(), opendir(), link() existing, link() new, mkdir(), mkfifo(), pathconf(), remove(), rename() new, rename() old, rmdir(), stat(), unlink(), and utime().*

M_GA_PRSlashesPath(function())

Conformance for General Concepts: PASS

(IEEE Std 2003.1-1992 {4}) GA18

UNUSED

M_GA_PRDotDot(function()) =

TEST: A call to the interface *function()* (), with a *path* or *file* argument, where the first filename component is "..", the argument does not begin with a "/" (slash), and the current working directory is not the root directory of the process, resolves the *path* or *file* argument by locating the second filename component (when specified) in the parent directory of the current working directory.

GA_PRDotDot

FOR: *access(), chdir(), chmod(), chown(), creat(), execl(), execl(), execv(), execve(), execl(), execvp(), fopen(), freopen(), open(), opendir(), link() existing, link() new, mkdir(), mkfifo(), pathconf(), remove(), rename() new, rename() old, rmdir(), stat(), unlink(), and utime().*

M_GA_PRDotDot(function())

Conformance for General Concepts: PASS

(IEEE Std 2003.1-1992 {4}) GA19

UNUSED

M_GA_PRRelativeSlash(function()) =

TEST: A call to the interface *function()* (), with a *path* or *file* argument pointing to the string "F1/", and where "F1" is a directory, resolves the *path* or *file* argument by locating F1 "F1" in the current working directory.

GA_PRRelativeSlash

FOR: *access(), chdir(), chmod(), chown(), creat(), execl(), execl(), execv(), execve(), execl(), execvp(), fopen(), freopen(), open(), opendir(), link() existing, link() new, mkdir(), mkfifo(), pathconf(), remove(), rename() new, rename() old, rmdir(), stat(), unlink(), and utime().*

M_GA_PRRelativeSlash(function())

Conformance for General Concepts: PASS

(IEEE Std 2003.1-1992 {4}) GA20

UNUSED

M_GA_PRRelativeSlashSlash(function()) =

TEST: A call to the interface *function()* () with a *path* or *file* argument pointing to the string "F1/" and "F1" is a directory resolves the *path* or *file* argument by locating "F1" in the current working directory.

GA_PRRelativeSlashSlash

FOR: *access(), chdir(), chmod(), chown(), creat(), execl(), execl(), execv(), execve(), execl(), execvp(), fopen(), freopen(), open(), opendir(), link() existing, link() new, mkdir(), mkfifo(), pathconf(), remove(), rename() new, rename() old, rmdir(), stat(), unlink(), and utime().*

M_GA_PRRelativeSlashSlash(function())

Conformance for General Concepts: PASS

M_GA_PRRenameRelativeSlashSlash(function()) =

TEST: A call to the interface *function()* (), with a *new* argument pointing to the string "F1//", and where "F1" is an empty directory, resolves the *new* argument by locating "F1" in the current working directory.

GA_PRRenameRelativeSlashSlash

FOR: *rename()**new*

M_GA_PRRenameRelativeSlashSlash(function())

Conformance for general Concepts: PASS

(IEEE Std 2003.1-1992 {4})GA21

UNUSED

M_GA_PRRelativeCWD(function()) =

TEST: A call to the interface *function()* (), with a *path* or *file* argument pointing to the string "F1/F2", resolves the *path* or *file* argument by locating "F2" in the directory "F1" in the current working directory.

GA_PRRelativeCWD

FOR: *access()*, *chdir()*, *chmod()*, *chown()*, *creat()*, *execl()*, *execle()*, *execv()*, *execve()*, *execle()*, *execvp()*, *fopen()*, *freopen()*, *open()*, *opendir()*, *link()* *existing*, *link()* *new*, *mkdir()*, *mkfifo()*, *pathconf()*, *remove()*, *rename()* *new*, *rename()* *old*, *rmdir()*, *stat()*, *unlink()*, and *utime()*.

M_GA_PRRelativeCWD(function())

Conformance for General Concepts: PASS

(IEEE Std 2003.1-1992 {4})_ GA22

UNUSED

M_GA_PRRelativeDotCWD(function()) =

TEST: A call to the interface *function()* (), with a *path* or *file* argument pointing to the string "F1./F2", resolves the *path* or *file* argument by locating "F2" in the directory "F1" in the current working directory.

GA_PRRelativeDotCWD

FOR: *access()*, *chdir()*, *chmod()*, *chown()*, *creat()*, *execl()*, *execle()*, *execv()*, *execve()*, *execle()*, *execvp()*, *fopen()*, *freopen()*, *open()*, *opendir()*, *link()* *existing*, *link()* *new*, *mkdir()*, *mkfifo()*, *pathconf()*, *remove()*, *rename()* *new*, *rename()* *old*, *rmdir()*, *stat()*, *unlink()*, and *utime()*.

M_GA_PRRelativeDotCWD(function())

Conformance for General Concepts: PASS

(IEEE Std 2003.1-1992 {4}) GA23

UNUSED

M_GA_PRRelativeDotDotCWD(function()) =

TEST: A call to the interface *function()* (), with a *path* or *file* argument pointing to the string "F1../F1/F2", resolves the *path* or *file* argument by locating "F2" in the directory "F1" in the current working directory.

GA_PRRelativeDotDotCWD

FOR: *access()*, *chdir()*, *chmod()*, *chown()*, *creat()*, *execl()*, *execle()*, *execv()*, *execve()*, *execle()*, *execvp()*, *fopen()*, *freopen()*, *open()*, *opendir()*, *link()* *existing*, *link()* *new*, *mkdir()*, *mkfifo()*, *pathconf()*, *remove()*, *rename()* *new*, *rename()* *old*, *rmdir()*, *stat()*, *unlink()*, and *utime()*.

M_GA_PRRelativeDotDotCWD(function())

Conformance for General Concepts: PASS

(IEEE Std 2003.1-1992 {4}) GA24

UNUSED

M_GA_PRRelativeSlashSlashCWD(function()) =

TEST: A call to the interface *function()* (), with a *path* or *file* argument pointing to the string "F1/F2", resolves the *path* or *file* argument by locating "F2" in the directory "F1" in the current working directory.

GA_PRRelativeSlashSlashCWD

FOR: *access()*, *chdir()*, *chmod()*, *chown()*, *creat()*, *execl()*, *execle()*, *execv()*, *execve()*, *execle()*, *execvp()*, *fopen()*, *freopen()*, *open()*, *opendir()*, *link()* existing, *link()* new, *mkdir()*, *mkfifo()*, *pathconf()*, *remove()*, *rename()* new, *rename()* old, *rmdir()*, *stat()*, *unlink()*, and *utime()*.

M_GA_PRRelativeSlashSlashCWD(*function()*)

Conformance for General Concepts: PASS

(IEEE Std 2003.1-1992 {4}) GA25

UNUSED

M_GA_PPRnoTrunc(*function()*) =

IF {POSIX_NO_TRUNC} is not supported in the specified directory **THEN**

TEST: A call to the interface *function()* (), with a *path* or *file* argument that has a pathname component of more than {NAME_MAX} bytes in a directory for which {POSIX_NO_TRUNC} is not supported, resolves the pathname component by truncating it to {NAME_MAX} bytes.

ELSE NO_OPTION

GA_PRNoTrunc

FOR: *access()*, *chdir()*, *chmod()*, *chown()*, *creat()*, *execl()*, *execle()*, *execv()*, *execve()*, *execle()*, *execvp()*, *fopen()*, *freopen()*, *open()*, *opendir()*, *link()* existing, *link()* new, *mkdir()*, *mkfifo()*, *pathconf()*, *remove()*, *rename()* new, *rename()* old, *rmdir()*, *stat()*, *unlink()*, and *utime()*.

M_GA_PRNoTrunc(*function()*)

Conformance for General Concepts: PASS, NO_OPTION

M_GA_PRnoTruncError(*function()*) =

IF {POSIX_NO_TRUNC} is supported in the specified directory **THEN**

TEST: A call to the interface *function()* (), with a *path* or *file* argument that has a pathname component of more than {NAME_MAX} bytes in a directory for which {POSIX_NO_TRUNC} is supported, generates an [ENAMETOOLONG] error.

ELSE NO_OPTION

GA_PRNoTruncError

FOR: *access()*, *chdir()*, *chmod()*, *chown()*, *creat()*, *execl()*, *execle()*, *execv()*, *execve()*, *execle()*, *execvp()*, *fopen()*, *freopen()*, *open()*, *opendir()*, *link()* existing, *link()* new, *mkdir()*, *mkfifo()*, *pathconf()*, *remove()*, *rename()* new, *rename()* old, *rmdir()*, *stat()*, *unlink()*, and *utime()*.

M_GA_PRNoTruncError(*function()*)

Conformance for General Concepts: PASS, NO_OPTION

2.4 Error Numbers

(IEEE Std 2003.1-1992 P{4}) 02

UNUSED

2

SETUP: Include the header `<errno.h>`.

TEST: The error numbers[E2BIG], [EACCESS], [EAGAIN], [EBADF], [EBADMSG], [EBUSY], [ECANCELED], [ECHILD], [EDEADLK], [EDOM], [EEXIST], [EFAULT], [EFBIG], [EINPROGRESS], [EINTR], [EINTR], [EINVAL], [EIO], [EISDIR], [EMFILE], [EMLINK], [EMSGSIZE], [ENAMETOOLONG], [ENFILE], [ENODEV], [ENOENT], [ENOEXEC], [ENOLCK], [ENOMEM], [ENOSPC], [ENOSYS], [ENOTDIR], [ENOTEMPTY], [ENOTTY], [ENXIO], [EPERM], [EPIPE], [ERANGE], [EROFS], [ESPIPE], [ESRCH], and [EXDEV] are defined, are nonzero, are distinct from each other, and can be represented in *errno*.

Conformance for Error numbers: PASS

(IEEE Std 2003.1-1992 {4} DGA02

UNUSED

M_GD_OptionalErrors(function()) =

IF the IUT supports the detection of an optional error condition **THEN**

TEST: The PCD.1b contains the details of the optional error conditions detected in the clause of the PCD.1b where the error values of the interface *function()* are described.

ELSE NO_OPTION

GD_OptionalErrors

FOR: *access()*, *chown()*, *chosedir()*, *execl()*, *execle()*, *execv()*, *execve()*, *execlp()*, *execvp()*, *fcntl()*, *fork()*, *fpathconf()*, *getcwd()*, *opendir()*, *pathconf()*, *readdir()*, *sigaddset()*, *sigdelset()*, and *(sigismember())*.

M_GD_OptionalErrors(function())

Conformance for Error Numbers: PASS, NO_OPTION

(IEEE Std 2003.1-1992 {4} GA26

UNUSED

M_GA_OptionalErrorsUndetected(function()) =

IF the IUT does not support the detection of an optional error condition **THEN**

TEST: The action specified by a call to the interface *function()* that would otherwise generate an optional error condition will succeed.

ELSE NO_OPTION

GA_OptionalErrorsUndetected

FOR: *access()*, *chown()*, *chosedir()*, *execl()*, *execle()*, *execv()*, *execve()*, *execlp()*, *execvp()*, *fcntl()*, *fork()*, *fpathconf()*, *getcwd()*, *opendir()*, *pathconf()*, *readdir()*, *sigaddset()*, *sigdelset()*, and *(sigismember())*.

M_GA_OptionalErrorsUndetected(function())

Conformance for Error Numbers: PASS, NO_OPTION

2.5 Primitive System Data Types

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.6 Environment Description

(IEEE Std 2003.1-1992 {4} GA27

UNUSED

M_GA_ExecNoSlash () =

TEST: The interfaces *execlp()* and *execvp()* use the path prefixes in the **PATH** environment variable only when their *file* argument does not contain a slash.

GA_ExecNoSlash

FOR: *execlp()* and *execvp()*.

M_GA_ExecNoSlash()

Conformance for Environment Description: PASS

(IEEE Std 2003.1-1992 {4} GA28

UNUSED

M_GA_ExecColon () =

TEST: The search path used by the interfaces *execlp()* and *execvp()* uses the path prefixes in the **PATH** environment variable that are separated by a colon.

GA_ExecColon

FOR: *execlp()* and *execvp()*.

M_GA_ExecColon()

Conformance for Environment Description: PASS

(IEEE Std 2003.1-1992 {4}) GA29

UNUSED

M_GA_ExecInsertSlash() =

TEST: The interfaces *execlp()* and *execvp()* insert a “/” between a nonzero-length path prefix in the **PATH** environment variable and the filename in the file argument when searching for an executable file.

GA_ExecInsertSlash

FOR: *execlp()* and *execvp()*.

M_GA_ExecInsertSlash()

Conformance for environment Description: PASS

(IEEE Std 2003.1-1992 {4}) GA30

UNUSED

M_GA_execTwoColons() =

TEST: The search path used by the interfaces *execlp()* and *execvp()* uses the current working directory as the path prefix corresponding to two adjacent colons, “:”, in the **PATH** environment variable.

GA_ExecTwoColons

FOR: *execlp()* and *execvp()*.

M_GA_ExecTwoColons()

Conformance for Environment Description: PASS

(IEEE Std 2003.1-1992 {4}) GA31

UNUSED

M_GA_ExecInitialColon() =

TEST: The search path used by the interfaces *execlp()* and *execvp()* uses the current working directory as the path prefix when the value of the **PATH** environment variable starts with a “:.”

GA_ExecInitialColon

FOR: *execlp()* and *execvp()*.

M_GA_ExecInitialColon()

Conformance for Environment Description: PASS

(IEEE Std 2003.1-1992 {4}) GA32

UNUSED

M_GA_ExecTrailingColon() =

TEST: The search path used by the interfaces *execlp()* and *execvp()* uses the current working directory as the path prefix when the value of the **PATH** environment variable ends with a “:.”

GA_ExecTrailingColon

FOR: *execlp()* and *execvp()*.

M_GA_ExecTrailingColon()

Conformance for Environment Description: PASS

(IEEE Std 2003.1-1992 {4}) GA33

UNUSED

M_GA_ExecPathSearchOrder() =

TEST: The interfaces *execlp()* and *execvp()* search the path prefixes in the **PATH** environment variable from the beginning to the end until an executable program by the specified name is found.

GA_ExecPathSearchOrder

FOR: *execlp()* and *execvp()*

M_GA_ExecPathSearchOrder()

Conformance for Environment Description: PASS

(IEEE Std 2003.1-1992 {4}) GA34

UNUSED

M_GA_EnvironCaseSensitive(function) =

TEST: The interface function retains the unique identities of uppercase and lowercase letters in the environment and does not fold them together.

GA_EnvironCaseSensitive

FOR: *execl()*, *execle()*, *execv()*, *execve()*, *execlp()*, *execvp()* and *getenv()*.

M_GA_EnvironCaseSensitive(function())

Conformance for Environment Description: PASS

(IEEE Std 2003.1-1992 {4}) GA35

UNUSED

M_GA_EnvironPortNames() =

TEST: The interface supports environment variable names consisting of characters in the portable filename character set.

GA_EnvironPortNames

FOR: *execl()*, *execle()*, *execv()*, *execve()*, *execlp()*, *execvp()* and *getenv()*.

M_GA_EnvironPortNames(function())

Conformance for Environment Description: PASS

2.7 C Language Definitions

2.7.1 Symbols From the C Standard

(IEEE Std 2003.1-1992 {4}) 04

UNUSED

4 **TEST:** Each of the headers *<stdio.h>*, *<dirent.h>*, *<fcntl.h>*, *<grp.h>*, *<limits.h>*, *<locale.h>*, *<mqueue.h>*, *<pwd.h>*, *<sched.h>*, *<semaphore.h>*, *<signal.h>*, *<sys/mman.h>*, *<sys/stat.h>*, *<sys/times.h>*, *<sys/wait.h>*, *<termios.h>*, *<time.h>*, *<unistd.h>*, and *<utime.h>* can be included more than once, in any combination, in any order, and a symbol may be defined in more than one header with the same value.

NOTE: The C Standard {2} headers that do not have additional requirements placed on them by IEEE Std 1003.1b-1993 are not included, because their testing should be done when measuring conformance to the C Standard {2}.

Conformance for C Language Definitions: PASS

4.1 **TEST:** The header *<sys/types.h>* can be included more than once, in any combination with other headers so long as the first instance of its inclusion precedes any other header that depends upon its prior inclusion; also a symbol may be defined in more than one header with the same value.

Conformance for C Language Definitions: PASS

2.7.2 POSIX.1 Symbols

(IEEE Std 2003.1-1992 {4}) 05

UNUSED

- 5 FOR:** Headers <stdio.h>, <dirent.h>, <fcntl.h>, <grp.h>, <limits.h>, <locale.h>, <mqueue.h>, <pwd.h>, <sched.h>, <semaphore.h>, <signal.h>, <sys/mman.h>, <sys/stat.h>, <sys/times.h>, <sys/wait.h>, <termios.h>, <time.h>, <unistd.h> and <utime.h>

IF the feature test macro `_POSIX_C_SOURCE` is defined to have at least the value 199309L **THEN**

TEST: All symbols required by IEEE Std 1003.1b-1993 to appear when a header is included shall be made visible when the `_POSIX_C_SOURCE` feature test macro is defined.

NOTE: The assertion test would require an unreasonable amount of time or resources on most implementations.

ELSE NO_OPTION

Conformance for C Language Definitions: PASS, NO_TEST, NO_OPTION

- 6 FOR:** <stdio.h>, <dirent.h>, <fcntl.h>, <grp.h>, <limits.h>, <locale.h>, <mqueue.h>, <pwd.h>, <sched.h>, <semaphore.h>, <signal.h>, <sys/mman.h>, <sys/stat.h>, <sys/times.h>, <sys/wait.h>, <termios.h>, <time.h>, <unistd.h> and <utime.h>

TEST: When a header is included, additional symbols not required or explicitly permitted by IEEE Std 1003.1b-1993 or the C Standard {2} to be in that header shall not be made visible, except when enabled by another feature test macro or by having defined `_POSIX_C_SOURCE` with a value larger than 199309L

NOTE: The assertion test would require an unreasonable amount of time or resources on most implementations.

Conformance for C Language Definitions: PASS, NO_TEST

(IEEE Std 2003.1-1992 {4})C01*UNUSED*

- D_1 IF** the IUT supports feature test macros in addition to `_POSIX_C_SOURCE` **THEN**

TEST: The PCD.1b either documents the additional feature test macros in clause 2.7.2 or it does not document them at all.

ELSE NO_OPTION

Conformance for C Language Definitions: PASS, NO_OPTION

2.7.2.1 C Standard Language-Dependent Support

- 7 SETUP:** A program does not use any feature test macros.
TEST: The IUT makes visible only those identifiers specified as reserved identifiers in the C Standard {2}.
NOTE: The assertion test requires setup procedures that involve an unreasonable amount of effort by the user of a test method.

Conformance for C Language Definitions: PASS, NO_TEST

- 8 FOR:** Each feature test macro present.
TEST: The IUT makes visible only those identifiers specified by that feature test macro and those of the C Standard {2} when a header is included.
NOTE: The assertion test requires setup procedures that involve an unreasonable amount of effort by the user of a test method.

Conformance for C Language Definitions: PASS, NO_TEST

2.7.2.2 Common-Usage-Dependent Support

- 9** **SETUP:** A program defines `_POSIX_C_SOURCE` before any header is included.
TEST: No symbols other than those from the C Standard {2} and those made visible by feature test macros defined for the program (including `_POSIX_C_SOURCE`) are visible, except that symbols from the namespace reserved for the implementation, as defined by the C Standard {2}, are also permitted.
NOTE: The symbols beginning with two underscores are examples of this.

The assertion test requires setup procedures that involve an unreasonable amount of effort by the user of a test method.

Conformance for C Language Definitions: *PASS, NO_TEST*

2.7.3 Headers and Function Prototypes

(IEEE Std 2003.1-1992 {4} GA36

UNUSED

M_GA_stdC_proto_decl(func_type; function; parameters; header1; header2; header3; header4) =

IF standard **THEN**

SETUP: The headers `<header1>`, `<header2>`, `<header3>`, and `<header 4>` are included.

TEST: The function prototype *func_type function (parameters)* is declared.

ELSE *NO_OPTION*

GA_stdC_proto_decl

FOR: All elements except `assert()`, `setjmp()`, and `sigsetjmp()`.

M_GA_stdC_proto_decl(func_type; function; parameters; header1; header2; header3; header 4)

Conformance for C Language Definitions: *PASS, NO_OPTION*

M_GA_commonC_result_decl(func_type; function; header1; header2; header3; header4) =

IF the implementation does not provide C Standard {2} support **THEN**

SETUP: The headers `<header1>`, `<header2>`, `<header3>`, and `<header 4>` are included.

TEST: The function *function()* is declared with the result type *func_type*, or an equivalent type if the result type is void.

ELSE *NO_OPTION*

GA_commonC_result_decl

FOR: All elements with a result type other than *int*.

M_GA_commonC_result_decl(func_type; function; header1; header2; header3; header4)

Conformance for C Language Definitions: *PASS, NO_OPTION*

M_GA_commonC_int_result_decl(func_type; function; header1; header2; header3; header4) =

IF the implementation does not provide C Standard {2} support **THEN**

SETUP: The headers `<function>`, `<header1>`, `<header2>`, and `<header3>` are included.

TEST: The interface *func_type()* is either declared with a result type equivalent to *int* or not declared at all.

ELSE *NO_OPTION*

GA_commonC_int_result_decl

FOR: All elements with a result type of *int*.

M_GA_commonC_int_result_decl(func_type; function; header1; header2; header3; header4)

Conformance for C Language Definitions: *PASS, NO_OPTION*

M_GA_setjmpDecl() =

IF the interface `setjmp()` is not defined as a macro **THEN**

TEST: The function prototype *int setjmp(jmp_buf env)* is declared with external linkage when the header *<setjmp.h>* is included.

ELSE NO_OPTION

GA_setjmpDecl

FOR: *setjmp()*.

M_GA_setjmpDecl()

Conformance for C Language Definitions: PASS, NO_OPTION

M_GA_sigsetjmpDecl()

IF the interface *sigsetjmp()* is not defined as a macro **THEN**

TEST: The function prototype *int sigsetjmp(sigjmp_buf env, int savemask)* is declared with external linkage when the header *<setjmp.h>* is included.

ELSE NO_OPTION

GA_sigsetjmpDecl

FOR: *sigsetjmp()*.

M_GA_sigsetjmpDecl()

Conformance for C Language Definitions: PASS, NO_OPTION

M_GA_macro_args(function; header1; header2; header3; header4)=

IF the interface *function()* is defined as a macro **THEN**

SETUP: The headers *<header1>*, *<header2>*, *<header3>*, and *<header4>* are included.

TEST: When the macro *function()* is invoked with the correct argument types (or compatible argument types in the case that C Standard {2} support is provided), the macro evaluates its arguments only once, fully protected by parentheses when necessary, and protects its result value with extra parentheses when necessary.

ELSE NO_OPTION

GA_macro_args

M_GA_macro_args(function; header1; header2; header3; header4)

Conformance for C Language Definitions: PASS, NO_OPTION

D_2 IF the implementation does not provide C Standard {2} support **THEN**

TEST: The PCD.1b documents in clause 2.7.3 the equivalent constructs used when *void* is specified in IEEE Std 1003.1b-1993 as a result type for a function prototype, or it is not documented anywhere.

ELSE NO_OPTION

Conformance for C Language Definitions: PASS, NO_OPTION

2.8 Numerical Limits

There are no requirements for conforming implementations in this clause.

2.8.1 C Language Limits

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.8.2 Minimum Values

(IEEE Std 2003.1-1992 {4}) 02

UNUSED

2 TEST: The symbols in Table 2-1 shall be defined with the values shown when the header *<limits.h>* is included.

NOTE: Table 2-1 is the same as Table 2-3 in IEEE Std 1003.1b-1993.

Conformance for Numerical Limits: PASS

2.8.3 Run-Time Increasable Values

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.8.4 Run-Time Invariant Values (Possibly Indeterminate)

(IEEE Std 2003.1-1992 {4}) 04

UNUSED

(IEEE Std 2003.1-1992 {4}) 05

UNUSED

(IEEE Std 2003.1-1992 {4}) 06

UNUSED

(IEEE Std 2003.1-1992 {4}) 07

UNUSED

(IEEE Std 2003.1-1992 {4}) 08

UNUSED

Table 2-1 – Minimum Values

Name	Description	Value
{_POSIX_AIO_LISTIO_MAX}	The number of I/O operations that can be specified in a list I/O call.	2
{_POSIX_AIO_MAX}	The number of outstanding asynchronous I/O operations.	1
{_POSIX_ARG_MAX}	The length of the arguments for one of the <i>exec</i> functions, in bytes, including environment data.	4096
{_POSIX_CHILD_MAX}	The number of simultaneous processes per real user ID.	6
{_POSIX_DELAYTIMER_MAX}	The number of timer expiration overruns.	32
{_POSIX_LINK_MAX}	The value of a file's link count.	8
{_POSIX_MAX_CANON}	The number of bytes in a terminal canonical input queue.	255
{_POSIX_MAX_INPUT}	The number of bytes for which space will be available in a terminal input queue.	255
{_POSIX_MQ_OPEN_MAX}	The number of message queues that can be open for a single process.	8
{_POSIX_MQ_PRIO_MAX}	The maximum number of message priorities supported by the implementation.	32
{_POSIX_NAME_MAX}	The number of bytes in a filename.	14
{_POSIX_NGROUPS_MAX}	The number of simultaneous supplementary group IDs per process.	0
{_POSIX_OPEN_MAX}	The number of files that one process can have open at one time.	16
{_POSIX_PATH_MAX}	The number of bytes in a pathname.	255

Name	Description	Value
{_POSIX_PIPE_BUF}	The number of bytes that can be written atomically when writing to a pipe.	512
{_POSIX_RTSIG_MAX}	The number of realtime signal numbers reserved for application use.	8
{_POSIX_SEM_NSEMS_MAX}	The number of semaphores that a process may have.	256
{_POSIX_SEM_VALUE_MAX}	The maximum value a semaphore may have.	32767
{_POSIX_SIGQUEUE_MAX}	The number of queued signals that a process may send and have pending at the receiver(s) at any time.	32
{_POSIX_SSIZE_MAX}	The value that can be stored in an object of type <i>ssize_t</i> .	32767
{_POSIX_STREAM_MAX}	The number of streams that one process can have open at one time.	8
{_POSIX_TIMER_MAX}	The per-process number of timers.	32
{_POSIX_TZNAME_MAX}	The maximum number of bytes supported for the name of a time zone (not of the <i>TZ</i> variable).	3

(IEEE Std 2003.1-1992 {4} 09)

UNUSED

(IEEE Std 2003.1-1992 {4} D02)

UNUSED

4 TEST: The values defined in Table 2-2 are equal to or less than those either defined in `<limits.h>` or provided by the `sysconf()` interface.

NOTE: Table 2-2 is the same as Table 2-5 in IEEE Std 1003.1b-1993.

Conformance for Numerical Limits: PASS

Table 2-2 – Run-Time Invariant Values (Possibly Indeterminate)

Name	Description	Minimum Value
{AIO_LISTIO_MAX}	Maximum number of I/O operations in a single list I/O call supported by the implementation.	{POSIX_AIO_LISTIO_MAX}
{AIO_MAX}	Maximum number of outstanding asynchronous I/O operations supported by the implementation.	{_POSIX_AIO_MAX}
{AIO_PRIO_DELTA_MAX}	The maximum amount by which a process can decrease its asynchronous I/O priority level from its own scheduling priority.	0
{ARG_MAX}	Maximum length of arguments for the <i>exec</i> functions, in bytes, including environment data.	{_POSIX_ARG_MAX}
{CHILD_MAX}	Maximum number of simultaneous processes per real user ID.	{_POSIX_CHILD_MAX}

Name	Description	Minimum Value
{DELAYTIMER_MAX}	Maximum number of timer expiration overruns.	{_POSIX_DELAYTIMER_MAX}
{MQ_OPEN_MAX}	The maximum number of open message queue descriptors a process may hold.	{_POSIX_MQ_OPEN_MAX}
{MQ_PRIO_MAX}	The maximum number of message priorities supported by the implementation.	{POSIX_MQ_PRIO_MAX}
{OPEN_MAX}	Maximum number of files that one process can have open at any given time.	{_POSIX_OPEN_MAX}
{PAGESIZE}	Granularity in bytes of memory mapping and process memory locking.	1
{RTSIG_MAX}	Maximum number of realtime signals reserved for application use in this implementation.	{_POSIX_RTSIG_MAX}
{SEM_NSEMS_MAX}	Maximum number of semaphores that a process may have.	{_POSIX_SEM_NSEMS_MAX}
{SEM_VALUE_MAX}	The maximum value a semaphore may have.	{_POSIX_SEM_VALUE_MAX}
{SIGQUEUE_MAX}	Maximum number of queued signals that a process may send and have pending at the receiver(s) at any time.	{POSIX_SIGQUEUE_MAX}
{STREAM_MAX}	The number of streams that one process can have open at one time. If defined, it shall have the same value as {FOPEN_MAX} from the C Standard [2].	{_POSIX_STREAM_MAX}
{TIMER_MAX}	Maximum number of timers per process supported by the implementation.	{_POSIX_TIMER_MAX}
{TZNAME_MAX}	The maximum number of bytes supported for the name of a time zone (not of the TZ variable).	{_POSIX_TZNAME_MAX}

5 IF a definition of one of the values in Table 2-2 is omitted from <limits.h>

THEN

TEST: The corresponding omitted value is equal to or greater than the stated minimum in Table 2-2, and the actual value is provided by the `sysconf()` interface.

ELSE NO_OPTION

Conformance for Numerical Limits: PASS, NO_OPTION

D_2 TEST: The run-time invariant values for the identifiers specified in Table 2-2 are documented in clause 2.8.4 of the PCD.1b.

Conformance for Numerical Limits: PASS

2.8.5 Pathname Variable Values

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.8.6 Invariant Values

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.8.7 Maximum Values

18 TEST: The symbols in Table 2-3 shall be defined in `<limits.h>`, when it is included, and have the values shown.

NOTE: Table 2-3 is the same as Table 2-7a in IEEE Std 1003.1b-1993.
Conformance for Numerical Limits: PASS

Table 2-3 – Maximum Values

Name	Description	Value
{_POSIX_CLOCKRES_MIN}	The CLOCK_REALTIME clock resolution, in nanoseconds.	20 000 000

2.9 Symbolic Constants

(IEEE Std 2003.1-1992 {4} D01
UNUSED

(IEEE Std 2003.1-1992 {4} D02
UNUSED

(IEEE Std 2003.1-1992 {4} D03
UNUSED

(IEEE Std 2003.1-1992 {4} D04
UNUSED

D_1 FOR: Any of the symbols specified in Table 2-4 that are defined in `<unistd.h>`.

TEST: The value associated with the symbol, the conditions under which the value may change, and the limits of such variations are documented in clause 2.9 of the PCD.1b.

NOTE: Table 2-4 is the same as Table 2-10 in IEEE Std 1003.1b-1993.
Conformance for Symbolic Constants: PASS

D-2 FOR: Any of the symbols specified in Table 2-5 that are defined in `<unistd.h>`.

TEST: The value associated with the symbol, the conditions under which the value may change, and the limits of such variations are documented in clause 2.9 of the PCD.1b.

NOTE: Table 2-5 is the same as Table 2-11 in IEEE Std 1003.1b-1993.
Conformance for Symbolic Constants: PASS

2.9.1 Symbolic Constants for the `access()` Function

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

2.9.2 Symbolic Constant for the `lseek()` Function

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; no POSIX.1b {3} assertions.

2.9.3 Compile-Time Symbolic Constants for Portability Specifications

(IEEE Std 2003.1-1992 {4} R02*UNUSED***(IEEE Std 2003.1-1992 {4} R03***UNUSED*

- 1 TEST:** The values of the constants specified in Table 2-4 are not less restrictive than those provided by the corresponding value returned by `sysconf()`.
Conformance for Symbolic Constants: PASS

Table 2-4 – Compile-Time Symbolic Constants

Name	Description
{_POSIX_ASYNCHRONOUS_IO}	If this symbol is defined, the implementation supports the Asynchronous Input and Output option.
{_POSIX_FSYNC}	If this symbol is defined, the implementation supports the File Synchronization option.
{_POSIX_JOB_CONTROL}	If this symbol is defined, the implementation supports the Job Control option.
{_POSIX_MAPPED_FILES}	If this symbol is defined, the implementation supports the Memory Mapped Files option.
{_POSIX_MEMLOCK}	If this symbol is defined, the implementation supports the Process Memory Locking option.
{_POSIX_MEMLOCK_RANGE}	If this symbol is defined, the implementation supports the Range Memory Locking option.
{_POSIX_MEMORY_PROTECTION}	If this symbol is defined, the implementation supports the Message Protection option.
{_POSIX_MESSAGE_PASSING}	If this symbol is defined, the implementation supports the Message Passing option.
{_POSIX_PRIORITIZED_IO}	If this symbol is defined, the implementation supports the Prioritized Input and Output option.
{_POSIX_PRIORITY_SCHEDULING}	If this symbol is defined, the implementation supports the Process Scheduling option.
{_POSIX_REALTIME_SIGNALS}	If this symbol is defined, the implementation supports the Realtime Signals Extension option.
{_POSIX_SAVED_IDS}	If this symbol is defined, each process has a saved set-user-ID and a saved set-group-ID.
{_POSIX_SEMAPHORES}	If this symbol is defined, the implementation supports the Semaphores option.
{_POSIX_SHARED_MEMORY_OBJECTS}	If this symbol is defined, the implementation supports the Shared Memory Objects option.
{_POSIX_SYNCHRONIZED_IO}	If this symbol is defined, the implementation supports the Synchronized Input and Output option.
{_POSIX_TIMERS}	If this symbol is defined, the implementation supports the Timers option.

{_POSIX_VERSION}	The integer value 199309L; this value shall be used for systems that conform to this standard.

(IEEE Std 2003.1-1992 {4}) 05*UNUSED*

- 2 **TEST:** The symbol {POSIX_VERSION} is defined and has the value 199309L when <unistd.h> is included.
Conformance for Symbolic Constants: PASS
- 3 **IF** the symbol {_POSIX_MEMLOCK_RANGE} is defined in <unistd.h> **THEN**
 TEST: The symbol {_POSIX_MEMLOCK} shall be defined in <unistd.h>
ELSE NO_OPTION
Conformance for Symbolic Constants: PASS, NO-OPTION
- 4 **IF** the symbol {_POSIX_MEMORY_PROTECTION} is defined in <unistd.h> **THEN**
 TEST: At least one of the symbols {_POSIX_MAPPED_FILES} or
 {_POSIX_SHARED_MEMORY_OBJECTS} shall be defined in <unistd.h>.
ELSE NO_OPTION
Conformance for Symbolic Constants: PASS, NO_OPTION
- 5 **IF** the symbol {_POSIX_SYNCHRONIZED_IO} is defined in <unistd.h> **THEN**
 TEST: The symbol {_POSIX_FSYNC} shall be defined in <unistd.h>.
ELSE NO_OPTION
Conformance for Symbolic Constants: PASS, NO_OPTION

2.9.4 Execution-Time Symbolic Constants for Portability Specifications**(IEEE Std 2003.1-1992 {4}) D05***UNUSED***(IEEE Std 2003.1-1992 {4}) D06***UNUSED***(IEEE Std 2003.1-1992 {4}) D07***UNUSED***(IEEE Std 2003.1-1992 {4}) R04***UNUSED***(IEEE Std 2003.1-1992 {4}) R05***UNUSED***(IEEE Std 2003.1-1992 {4}) R06***UNUSED***(IEEE Std 2003.1-1992 {4}) 06***UNUSED***(IEEE Std 2003.1-1992 {4}) 07***UNUSED***(IEEE Std 2003.1-1992 {4}) 08***UNUSED*

- 6 TEST:** The PCD.1b documents in clause 2.9.4 whether each of the values associated with the symbols in Table 2-5 are defined in the header `<unistd.h>`, and if each value defined is -1 or other than -1.

NOTE: Table 2-5 is the same as Table 2-11 in IEEE Std 1003.1b-1993.
Conformance for Symbolic Constants: PASS

- 7 FOR:** Any of the symbols in Table 2-5 that have the value -1 in the header `<unistd.h>`.
TEST: The IUT shall not provide the corresponding option on any file.
NOTE: Table 2-5 is the same as Table 2-11 in IEEE Std 1003.1b-1993.

There is no known reliable test method for this assertion.
Conformance for Symbolic Constants: PASS, NO_TEST

- 8 FOR:** Any of the symbols in Table 2-5 that have a value other than -1 in the header `<unistd.h>`.
TEST: The IUT shall provide the corresponding option on all applicable files.
NOTE: Table 2-5 is the same as Table 2-11 in IEEE Std 1003.1b-1993.

There is no known reliable test method for this assertion.
Conformance for Symbolic Constants: PASS, NO_TEST

Table 2-5 – Execution-Time Symbolic Constants

Name	Description
<code>{_POSIX_ASYNC_IO}</code>	Asynchronous input or output operations may be performed for the associated file.
<code>{_POSIX_SHOWN_RESTRICTED}</code>	The implementation supports the Change File Owner Restriction. The use of the <code>chown()</code> function is restricted to a process with appropriate privileges, and to changing the group ID of a file only to the effective group ID of the process or to one of its supplementary group IDs.
<code>{_POSIX_NO_TRUNC}</code>	Pathname components longer than <code>{NAME_MAX}</code> generate an error.
<code>{_POSIX_PRIO_IO}</code>	Prioritized input or output operations may be performed for the associated file.
<code>{_POSIX_SYNC_IO}</code>	Synchronized input or output operations may be performed for the associated file.
<code>{_POSIX_VDISABLE}</code>	Terminal special characters defined in 7.1.1.9 in POSIX.1b {3} can be disabled using this character value, if it is defined. See <code>tcgetattr()</code> and <code>tcsetattr()</code> .

Section 3: Process Primitives

3.1 Process Creation and Execution

3.1.1 Process Creation

Function: *fork()*.

3.1.1.1 Symbols

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.1.1.2 Description

- 1 **IF** *PCTS_sem_init()* **THEN**
 TEST: Any semaphores that are open in the parent process when it makes a *fork()* call shall also be open in the child process.
 ELSE NO_OPTION
 Conformance for fork: PASS, NO_OPTION
- 2 **IF** *PCTS_sem_open* **THEN**
 IF *PCTS_GAP_sem_init* **THEN**
 TEST: Any semaphores that are open in the parent process when it makes a *fork()* call shall also be open in the child process.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for fork: PASS, NO_TEST_SUPPORT, NO_OPTION
- 3 **FOR:** *mlock()* and *mlockall()*
 IF *PCTS_function* **THEN**
 TEST: A child process shall not inherit any address space memory locks established by the parent process via calls to *function()* after a *fork()* call.
 NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function ()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.
 ELSE NO_OPTION
 Conformance for fork: PASS, NO_OPTION
- 4 **IF** *PCTS_mmap* **THEN**
 TEST: Memory mappings created in the parent process are retained in the child process after a *fork()* call.
 ELSE NO_OPTION
 Conformance for fork: PASS, NO_OPTION

- 5 **IF** *PCTS_mmap* **THEN**
 TEST: MAP_PRIVATE mappings inherited from the parent after a *fork()* call shall also be
 MAP_PRIVATE mappings in the child, and any modifications to the data in these
 mappings made by the parent prior to calling *fork()* shall be visible to the child.
 ELSE NO_OPTION
 Conformance for fork: PASS, NO_OPTION
- 6 **IF** *PCTS_mmap* **THEN**
 TEST: Any modifications to the data in MAP_PRIVATE mappings made by the parent after
 fork() returns shall be visible only to the parent.
 ELSE NO_OPTION
 Conformance for fork: PASS, NO_OPTION
- 7 **IF** *PCTS_mmap* **THEN**
 TEST: Modifications to the data in MAP_PRIVATE mappings made by the child shall be
 visible only to the child.
 ELSE NO_OPTION
 Conformance for fork: PASS, NO_OPTION
- 8 **IF** *PCTS_sched_setschedulerI* or *PCTS_sched_setparam* **THEN**
 IF *PCTS_sched_getscheduler* or *PCTS_sched_getparam* **THEN**
 TEST: For the SCHED_FIFO and SCHED_RR scheduling policies, the child process
 shall inherit the policy and priority settings of the parent process during a
 fork() function.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for fork: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION
- 9 **IF** *PCTS_sched_setscheduler* or *PCTS_sched_setparam* **THEN**
 TEST: The PCD.1b documents the policy and priority settings on *fork()* for all scheduling
 policies other than SCHED_FIFO and SCHED_RR in 3.1.1.2.
 ELSE NO_OPTION
 Conformance for fork: PASS, NO_OPTION
- 10 **IF** *PCTS_timer_create* **THEN**
 IF *PCTS_timer_settime* and *PCTS_timer_gettime* **THEN**
 TEST: Per-process timers created by the parent are not inherited by the child
 process after a *fork()* call.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for fork: PASS, NO_TEST_SUPPORT, NO_OPTION
- 11 **IF** *PCTS_mq_open* **THEN**
 IF *PCTS_mq_send* and *PCTS_mq_receive* **THEN**
 TEST: A child process has its own copy of the message queue descriptors of its
 parent, and each of the message queue descriptors of the child refers to the
 same open message queue description as the corresponding message
 descriptor of the parent.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for fork: PASS, NO_TEST_SUPPORT, NO_OPTION
- 12 **IF** {_POSIX_ASYNCHRONOUS_IO} **THEN**
 TEST: No asynchronous input or asynchronous output operations are inherited by the
 child process after a *fork()* call.
 ELSE NO_OPTION
 Conformance for fork: PASS, NO_TEST, NO_OPTION
- 13 **FOR:** *PCTS_aio_read*, *PCTS_aio_write*, *PCTS_lio_listio*

IF *PCTS_function* **THEN**
 IF *PCTS_aio_cancel*, **THEN**
 TEST: Asynchronous input or asynchronous output operations created by calling *function* () are not inherited by the child process after a *fork* () call.
 NOTE: The assertion is to be tested once for each function specified in the **FOR** clause. The assertion is to be read by substituting *function*() with the current function specified in the **FOR** clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.
 ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
 Conformance for *fork*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*

3.1.1.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.1.1.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.1.2 Execute a File

Functions: *execl*(), *execv*(), *execle*(), *execve*(), *execlp*(), *execvp*().

3.1.2.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.1.2.1 Description

- 1 **FOR:** *execl*(), *execv*(), *execle*(), *execve*(), *execlp*(), *execvp*().
 IF *PCTS_sem_open* **THEN**
 SETUP: Open a named semaphore, then call *function*().
 TEST: Any named semaphores that are open in the calling process shall be closed as if by appropriate calls to *sem_close*().
 NOTE: The assertion is to be tested once for each function specified in the **FOR** clause. The assertion is to be read by substituting *function*() with the current function specified in the **FOR** clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.
 ELSE NO_OPTION
 Conformance for *execl*, *execv*, *execle*, *execve*, *execlp*, *execvp*: *PASS*, *NO_OPTION*
- 2 **FOR:** *execl*(), *execv*(), *execle*(), *execve*(), *execlp*(), *execvp*().
 IF (*PCTS_mlockall* and *PCTS_GAP_mlockall*) or (*PCTS_mlock* and *PCTS_GAP_mlock*) **THEN**
 SETUP: Establish memory locks before calling *function*().
 TEST: Memory locks are removed after a call to *function*().
 TR: Establish the memory locks using as many of the interfaces *mlockall*() and *mlock*() as are implemented.
 NOTE: The interface *munlock*() can be used in the program loaded by *function*() to determine whether or not memory locks were removed.
 ELSE NO_OPTION
 Conformance for *execl*, *execv*, *execle*, *execve*, *execlp*, *execvp*: *PASS*, *NO_OPTION*
- 3 **FOR:** *execl*(), *execv*(), *execle*(), *execve*(), *execlp*(), *execvp*()
 IF *PCTS_mlockall* and *PCTS_mlock* **THEN**
 IF *PCTS_GAP_mlockall* and *PCTS_GAP_mlock* **THEN**

- SETUP:** Create locked pages in the address space of the process that will call *function()*, and also map and lock the same pages into the address space of another process.
- TEST:** The memory page locks for memory pages that are mapped into the address space of other processes and locked by them are unaffected by a process that has locks on those same pages and that calls *function()*.
- TR:** Establish the memory locks using as many of the interfaces *mlockall()* and *mlock()* as are implemented.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *execl*, *execv*, *execle*, *execve*, *execlp*, *execvp*: PASS, NO_TEST_SUPPORT, NO_OPTION

D_1 FOR: *execl()*, *execv()*, *execle()*, *execve()*, *execlp()*, *execvp()*

IF *PCTS_mmap* or *PCTS_shm_open* and a PCD.1b documents the following **THEN**

TEST: PCD.1b that documents the effect on memory locks in the *function()* fails does so in 3.1.2.2.

ELSE NO_OPTION

Conformance for *execl*, *execv*, *execle*, *execve*, *execlp*, *execvp*: PASS, NO_OPTION

4 FOR: *execl()*, *execv()*, *execle()*, *execve()*, *execlp()*, *execvp()*

IF *PCTS_mmap* or *PCTS_shm_open* **THEN**

TEST: Memory mappings created in a process are unmapped before the address space is rebuilt for the new process image after a call to *function()*.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

Conformance for *execl*, *execv*, *execle*, *execve*, *execlp*, *execvp*: PASS, NO_TEST, NO_OPTION

5 FOR: *execl()*, *execv()*, *execle()*, *execve()*, *execlp()*, *execvp()*

IF *PCTS_sched_setscheduler* and *PCTS_getscheduler* **THEN**

TEST: The policy and priority settings for the SCHED_FIFO and SCHED_RR scheduling policies are not changed for a process that calls *function()*.

ELSE NO_OPTION

Conformance for *execl*, *execv*, *execle*, *execve*, *execlp*, *execvp*: PASS, NO_OPTION

D_2 FOR: *execl()*, *execv()*, *execle()*, *execve()*, *execlp()*, *execvp()*

IF *PCTS_sched_setscheduler* and *PCTS_getscheduler* **THEN**

TEST: The PCD.1b documents for scheduling policies, other than SCHED_FIFO and SCHED_RR, the policy and priority settings after a call to *function()* in 3.1.2.2.

ELSE NO_OPTION

Conformance for *execl*, *execv*, *execle*, *execve*, *execlp*, *execvp*: PASS, NO_OPTION

6 FOR: *execl()*, *execv()*, *execle()*, *execve()*, *execlp()*, *execvp()*

IF *PCTS_timer_create* and *PCTS_timer_settime* **THEN**

TEST: Per-process timers created by the calling process are deleted before replacing the current process image with the new process image after a call to *function()*.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

Conformance for *execl*, *execv*, *execle*, *execve*, *execlp*, *execvp*: PASS, NO_TEST, NO_OPTION

7 FOR: *execl()*, *execv()*, *execle()*, *execve()*, *execlp()*, *execvp()*

IF *PCTS_timer_create* and *PCTS_timer_settime* **THEN**

TEST: Per-process timers created by the calling process are deleted after a call to *function()*.

NOTE: This can be tested by setting a timer before the *function()* call and waiting in the new process image for the timer's signal. If no signal arrives after a sufficiently long time, the timer was destroyed or the equivalent. To determine if the timer was actually destroyed, try to create {TIMER_MAX} timers. If able to do so, the timer has been destroyed.

ELSE NO_OPTION

Conformance for *execl*, *execv*, *execle*, *execve*, *execlp*, *execvp*: PASS, NO_OPTION

8 FOR: *execl*(), *execv*(), *execle*(), *execve*(), *execlp*(), *execvp*()

IF *PCTS_mq_open* **THEN**

IF *PCTS_mq_close* and *PCTS_mq_send* and *PCTS_mq_receive* **THEN**

SETUP: Create two processes; one will call *function*(), and the other will test the message queue with the new process image created by *function*().

TEST: After a call to *function*(), all open message queue descriptors in the calling process shall be closed, and the association between the message queue descriptor and the message queue is removed.

TR: Test for at least two message queues.

NOTE: This may not be testable if the use of message queue descriptors is undefined after a close.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *execl*, *execv*, *execle*, *execve*, *execlp*, *execvp*: PASS, NO_TEST_SUPPORT, NO_OPTION

9 FOR: *execl*(), *execv*(), *execle*(), *execve*(), *execlp*(), *execvp*()

IF *PCTS_mq_open* **THEN**

IF ({_POSIX_MESSAGE_PASSING} and {_POSIX_REALTIME_SIGNALS}) or (*PCTS_mq_close* and *PCTS_mq_send* and *PCTS_mq_notify*) **THEN**

SETUP: Create two processes; one will call *function*(), and the other will test the message queue with the new process image created by *function*().

TEST: After a call to *function*(), all open message queue descriptors in the calling process shall be closed; an attached message queue notification request is removed, and the message queue is available for another process to attach a notification.

NOTE: This may not be testable if the use of message queue descriptors is undefined after a close.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *execl*, *execv*, *execle*, *execve*, *execlp*, *execvp*: PASS, NO_TEST_SUPPORT, NO_OPTION

10 FOR: *execl*(), *execv*(), *execle*(), *execve*(), *execlp*(), *execvp*()

IF {_POSIX_ASYNCHRONOUS_IO} **THEN**

TEST: Any asynchronous I/O operations that are not canceled after calling *function*() complete as if the *function*() call had not yet occurred, but any associated signal notifications are suppressed.

ELSE NO_OPTION

Conformance for *execl*, *execv*, *execle*, *execve*, *execlp*, *execvp*: PASS, NO_TEST, NO_OPTION

D_3 FOR: *execl*(), *execv*(), *execle*(), *execve*(), *execlp*(), *execvp*()

IF {_POSIX_ASYNCHRONOUS_IO} and PCD.1b documents the following **THEN**

TEST: PCD.1b that documents whether the *function*() itself blocks awaiting asynchronous I/O completion does so in 3.1.2.2.

ELSE NO_OPTION

Conformance for *execl*, *execv*, *execle*, *execve*, *execlp*, *execvp*: PASS, NO_OPTION

11 FOR: *execl*(), *execv*(), *execle*(), *execve*(), *execlp*(), *execvp*()

IF {_POSIX_ASYNCHRONOUS_IO} **THEN**

TEST: The new process image created after a *function*() call is not affected by the presence of outstanding asynchronous I/O operations at the time the *function*() is called.

ELSE NO_OPTION

Conformance for *execl*, *execv*, *execle*, *execve*, *execlp*, *execvp*: PASS, NO_TEST, NO_OPTION

D_4 FOR: *execl(), execv(), execl(), execve(), execlp(), execvp()*

IF { *_POSIX_ASYNCHRONOUS_IO* } **THEN**

TEST: The PCD.1b documents whether any asynchronous I/O operation is canceled, and which I/O may be canceled upon a call to *function()*, in 3.1.2.2.

ELSE NO_OPTION

Conformance for execl, execv, execl, execve, execlp, execvp: PASS, NO_OPTION

3.1.2.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b assertions.

3.1.2.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.2 Process Termination

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.2.1 Wait for Process Termination

Functions: *wait()*, *waitpid()*.

3.2.1.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.2.1.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.2.1.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.2.1.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.2.2 Terminate a Process

Function: *_exit()*.

3.2.2.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.2.2.2 Description

1 IF *PCTS_sem_open* **THEN**

IF *PCTS_sem_trywait* and *PCTS_sem_getvalue* **THEN**

SETUP: Create { *PCTS_SEM_NSEMS_MAX* } named semaphores with large initial values and lock each one at least once.

TEST: After a call to *_exit()*, all open named semaphores in the calling process have no effect on the state of such semaphores.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *_exit*: PASS, NO_TEST_SUPPORT, NO_OPTION

- 2 **FOR:** *mlock()* and *mlockall()*
IF *PCTS_function()* **THEN**
IF *PCTS_GAP_function()* **THEN**
SETUP: Lock all pages of the process in memory.
TEST: Any memory locks established by the process via calls to *function()* are removed after a call to *_exec()*.
NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *_exit*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 3 **FOR:** *mlock()* and *mlockall()*
IF *PCTS_function()* **THEN**
IF *PCTS_GAP_function()* **THEN**
SETUP: Use *function()* to create locked pages in the address space of the process calling *_exit()* that are also mapped into the address spaces of other processes and are locked by them.
TEST: The memory locks established by the other processes are unaffected by the call by this process to *-exit()*.
TR: Test for at least two other processes.
NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *_exit*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 4 **IF** *PCTS_mmap* **THEN**
TEST: Memory mappings created in the process are unmapped before the process is destroyed after a call to *_exec()*.
ELSE NO_OPTION
Conformance for *_exit*: PASS, NO_TEST, NO_OPTION
- 5 **IF** *PCTS_mq_open* **THEN**
IF *PCTS_mq_notify* **THEN**
SETUP: Create a message queue, a process to call *exit()*, and another process to check on the state of the message queue. Call *mq_notify()* from the process that will call *_exit()*.
TEST: All open message queue descriptors in the process calling *_exit()* are closed, which allows other processes to issue successful *mq_notify()* calls.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *_exit*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 6 **IF** { *_POSIX_ASYNCHRONOUS_IO* } **THEN**
TEST: Those asynchronous I/O operations that are not canceled after a call to *_exit()* completes, as if the *_exit()* operation had not yet occurred, but any associated signal notifications are suppressed.
NOTE: There is no known portable test method for this assertion.
ELSE NO_OPTION
Conformance for *_exit*: PASS, NO_TEST, NO_OPTION

D_1 IF a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not the `_exit()` operation itself blocks awaiting the completion of asynchronous I/O does so in 3.2.2.2.

ELSE NO_OPTION

Conformance for `_exit`: PASS, NO_OPTION

D_2 TEST: The PCD.1b documents whether any asynchronous I/O is canceled, and which asynchronous I/O may be canceled upon a call to `_exit()` in 3.2.2.

Conformance for `_exit`: PASS

3.2.2.3 Returns

There are no requirements for conforming implementations in this clause.

3.3 Signals

3.3.1 Signal Concepts

3.3.1.1 Signal Names

NOTE: Tables 3-1, 3-2, and 3-3 are kept in the same order in this clause as in POSIX.1b {3} to facilitate the following the correspondence between assertions in this standard and the requirements specified in POSIX.1b {3}.

Table 3-1 – Required Signals

Symbolic Constant	Default Action	Description
SIGABRT	1	Abnormal termination signal, such as is initiated by the <code>abort()</code> function.
SIGALRM	1	Timeout signal, such as initiated by the <code>alarm()</code> function.
SIGFPE	1	Erroneous arithmetic operations, such as division by zero or an operation resulting in overflow.
SIGHUP	1	Hangup detected on controlling terminal or death of controlling process.
SIGINT	1	Interactive attention signal.
SIGKILL	1	Termination signal (cannot be caught or ignored).
SIGPIPE	1	Write on a pipe with no readers.
SIGQUIT	1	Interactive termination signal.
SIGSEGV	1	Detection of an invalid memory reference.
SIGTERM	1	Termination signal.
SIGUSR1	1	Reserved as application-defined signal 1.
SIGUSR2	1	Reserved as application-defined signal 2.

NOTE: The default actions are

- 1 Abnormal termination of the process.

1 SETUP: Include the header `<signal.h>`.
TEST: The constants shown in Table 3-3 are defined.
 Conformance for `signal.h`: PASS

- 2 **IF** {_POSIX_MEMORY_PROTECTION} **THEN**
SETUP: Include the header <signal.h>.
TEST: The signals shown in Table 3-3 behave with the specified default action.

Table 3-2 – Job Control Signals

Symbolic Constant	Default Action	Description
SIGCHLD	2	Child process terminated or stopped.
SIGCONT	4	Continue if stopped.
SIGSTOP	3	Stop signal (cannot be caught or ignored).
SIGTSTP	3	Interactive stop signal.
SIGTTIN	3	Read from control terminal attempted by a member of a background process group.
SIGTTOU	3	Write to control terminal attempted by a member of a background process group.

NOTE: The default actions are

- 2 Ignore the signal.
- 3 Stop the process.
- 4 Continue the process if it is currently stopped; otherwise, ignore the signal.

Table 3-3 – Memory Protection Signals

Symbolic Constant	Default Action	Description
SIGBUS	1	Access to an undefined portion of a memory object.

TR: Test for child processes and processes that are not children of the calling process.

ELSE NO_OPTION

Conformance for signal.h: PASS, NO_OPTION

- 3 **SETUP:** Include the header <signal.h>.
TEST: The macros SIGRTMIN and SIGRTMAX are defined and evaluate to integral expressions.
Conformance for signal.h: PASS

- 4 **SETUP:** Include the header <signal.h>.
TEST: The signal numbers in the range SIGRTMIN to SIGRTMAX do not overlap with any of the signals specified in Tables 3-1, 3-2, or 3-3.
Conformance for signal.h: PASS

- 5 **SETUP:** Include the header <signal.h>.
TEST: The range SIGRTMIN through SIGRTMAX inclusive includes at least {RTSIG_MAX} signal numbers.
Conformance for signal.h: PASS

- D_1 TEST:** The PCD.1b documents whether the realtime signal behavior for the queuing of signals and the passing of application defined values is supported for each of the signals defined in Tables 3-1, 3-2, and 3-3 in 3.3.1.1.
Conformance for signal.h: PASS

3.3.1.2 Signal Generation and Delivery

- 6** **SETUP:** Include the header `<signal.h>`.
TEST: The *sigevent* structure is defined, *sigev_value* is equal to or greater than SIGRTMIN or less than SIGRTMAX, and contains at least the following members:

Member Type	Member Name	Description
<i>int</i>	<i>sigev_notify</i>	Notification type
<i>int</i>	<i>sigev_signo</i>	Signal number
<i>union sigval</i>	<i>sigev_value</i>	Signal value

Conformance for signal.h: PASS

D_2 IF a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents any extensions that are added to the *sigevent* structure, and how they are enabled, does so in 3.3.1.2.

TR: Only extensions permitted in 1.3.1.1, item (2) in IEEE Std 1003.1b-1993 may be added.

ELSE NO_OPTION

Conformance for signal.h: PASS, NO_OPTION

7 **SETUP:** Include the header `<signal.h>`.

TEST: The symbols SIGEV_NONE and SIGEV_SIGNAL are defined.

Conformance for signal.h: PASS

D_3 IF a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents additional notification mechanisms to use when asynchronous events occur does so in 3.3.1.2.

ELSE NO_OPTION

Conformance for signal.h: PASS, NO_OPTION

M_GA_sigev_value() =

IF {_POSIX_REALTIME_SIGNALS} **THEN**

TEST: The *sigev_value* member of the *sigevent* structure is passed to a signal-catching function at the time of the signal delivery as the *si_value*- member of the *siginfo_t* structure.

TR: Test for all catchable signals.

ELSE NO_OPTION

GA_sigev_value

FOR: *lio_listio()*, *timer_create()*, *mq_notify()*, *aio_read()*, *aio_write()*, and *aio_fsync()*

M_GA_sigev_value()

Conformance for signal.h: PASS, NO_OPTION

M_GA_sigqueueValue() =

IF {_POSIX_REALTIME_SIGNALS} **THEN**

TEST: The *value* parameter to *sigqueue()* is passed to a signal-catching function at the time of the signal delivery as the *si_value* member of the *siginfo_t* structure.

TR: Test for all catchable signals.

ELSE NO_OPTION

GA_sigqueueValue

FOR: *sigqueue()*

M_GA_sigqueueValue()

Conformance for signal.h: PASS, NO_OPTION

8 **SETUP:** Include the header `<signal.h>`.

TEST: The *sigval* is defined and contains at least the following members:

Member Type	Member Name	Description
<i>int</i>	<i>sival_int</i>	Integer signal value
<i>void*</i>	<i>sival_ptr</i>	Pointer signal value

Conformance for *signal.h*: PASS

M_GA_sigPending(function)=

- SETUP:** Cause the *function()* interface to generate a signal after having set an application-specified value to be transmitted along with the signal.
- TEST:** After a signal is generated by the *function()* interface the signal shall be marked pending and, if the SA_SIGINFO flag is set for that signal, the signal shall be queued to the process along with the application-specified signal value.
- TR:** Test for all catchable signals both with SA_SIGINFO set and not set.

GA_sigPending

FOR: *sigqueue()*, *lio_listio()*, *timer_create()*, *mq_notify()*, *aio_read()*, *aio_write()*, and *aio_fsync()*

M_GA_sigPending(function)

Conformance for *signal.h*: PASS, NO_OPTION

M_GA_sigPendingQueued(function)=

- SETUP:** Cause the *function()* interface to generate a series of signals after having set a different application-specified value for each signal to be transmitted along with the signal.
- TEST:** Multiple occurrences of signals generated by the *function()* interface, with the SA_SIGINFO flag set for that signal, will be queued in FIFO order.
- TR:** Test for all catchable signals.

GA_sigPendingQueued

FOR: *sigqueue()*, *lio_listio()*, *timer_create()*, *mq_notify()*, *aio_read()*, *aio_write()*, and *aio_fsync()*

D_4 IF a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether signals generated by the *sigqueue()* function, or any signal-generating function that supports the specification of an application-defined value, are queued when the SA_SIGINFO flag is not set for that signal, and does so in 3.3.1.2.

ELSE NO_OPTION

Conformance for *signal.h*: PASS, NO_OPTION

M_GA_queuedAndRegularSignals(function)=

- SETUP:** Cause the *function()* interface to generate a signal after having set a different application-specified value for each signal to be transmitted along with the signal.
- TEST:** Signals generated by the *kill()* function or other events that cause signals to occur, such as *alarm()* timer expiration or terminal activity, and for which the implementation does not support queuing, have no effect on signals already queued for the same signal number.
- TR:** Test for all catchable signals and all the conditions specified in the **TEST**.

GA_queuedAndRegularSignals

FOR: *sigqueue()*, *lio_listio()*, *timer_create()*, *mq_notify()*, *aio_read()*, *aio_write()*, and *aio_fsync()*

M_GA_queuedAndRegularSignals(function)

Conformance for *signal.h*: PASS, NO_OPTION

9

IF _POSIX_REALTIME_SIGNALS THEN

IF *PCTS_sigqueue* **THEN**

SETUP: Create multiple unblocked signals, all in the range SIGRTMIN to SIGRTMAX, that are pending.

TEST: The implementation delivers the pending unblocked signal with the lowest signal number within that range.

TR: Test with each signal in the range of the lowest unblocked signal.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for signal.h: PASS, NO_TEST_SUPPORT, NO_OPTION

10 IF *_POSIX_REALTIME_SIGNALS* **THEN**

IF *PCTS_sigqueue* **THEN**

SETUP: Create a pending signal and additional signals queued to the same signal number.

TEST: After a pending signal is delivered, the signal shall remain pending until all queued signals have been delivered, at which time the pending indication is reset.

TR: Test for all catchable signals.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for signal.h: PASS, NO_TEST_SUPPORT, NO_OPTION

11 IF *_POSIX_REALTIME_SIGNALS* **THEN**

IF *PCTS_sigqueue* **THEN**

SETUP: Create a pending signal.

TEST: After a pending signal is delivered and there are no queued signals to the same signal number, the pending indication is reset.

TR: Test for all catchable signals.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for signal.h: PASS, NO_TEST_SUPPORT, NO_OPTION

3.3.1.3 Signal Actions

12 IF {*_POSIX_REALTIME_SIGNALS*} **THEN**

IF *PCTS_sigqueue* **THEN**

TEST: The default action for the realtime signals in the range SIGRTMIN through SIGRTMAX is to terminate the process abnormally.

TR: Test for all signals in the range.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for signal.h: PASS, NO_TEST_SUPPORT, NO_OPTION

13 IF {*_POSIX_JOB_CONTROL*} and {*_POSIX_REALTIME_SIGNALS*} **THEN**

TEST: Setting a signal action to SIG_DEL for a SIGCHLD signal that is pending causes the pending signal to be discarded, whether or not it is blocked; in addition, any queued values pending are discarded.

ELSE *NO_OPTION*

Conformance for signal.h: PASS, NO_OPTION

14 IF {*_POSIX_JOB_CONTROL*} and {*_POSIX_REALTIME_SIGNALS*} **THEN**

TEST: Setting a signal action to SIG_DFL for a SIGCHLD signal that is pending causes the resources used to queue any pending signals and values to be released and made available to queue other signals.

NOTE: There is no known portable test method for this assertion.

ELSE *NO_OPTION*

Conformance for signal.h: PASS, NO_TEST, NO_OPTION

D_5 IF A PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the behavior of a process after it ignores a SIGFPE, SIGILL, SIGSEGV, or SIGBUS signal that was not generated by the *kill()* function, the *sigqueue()* function, or the *raise()* function as defined by the C Standard {2} does so in 3.3.1.3.

ELSE NO_OPTION

Conformance for signal.h: PASS, NO_OPTION

15 IF {_POSIX_REALTIME_SIGNALS} **THEN**

IF PCTS_sigqueue **THEN**

TEST: Setting a signal action to SIG_IGN for a signal that is pending causes the pending signal to be discarded, whether or not it is blocked; in addition, any queued values pending are discarded.

TR: Test for all catchable signals consistent with the implemented options.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for signal.h: PASS, NO_TEST_SUPPORT, NO_OPTION

16 IF {_POSIX_REALTIME_SIGNALS} **THEN**

IF PCTS_sigqueue **THEN**

TEST: If the implementation limits the number of outstanding queued signals to {SIGQUEUE_MAX}, this test can verify that the signal can be sent after setting the action to SIG_IGN in the target process. Setting a signal action to SIG_IGN for a signal that is pending causes the resources used to queue the pending signal and its associated value to be released and made available to queue other signals.

NOTE: There is no known portable test method for this assertion.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for signal.h: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION

17 IF {_POSIX_MEMORY_PROTECTION} **THEN**

IF PCTS_sigqueue **THEN**

TEST: Upon delivery of a signal specified in Table 3-3, the receiving process executes the signal-catching function at the specified address.

TR: Test for all signals in Table 3-3.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for signal.h: PASS, NO_TEST_SUPPORT, NO_OPTION

18 IF PCTS_sigqueue **THEN**

SETUP: Clear the SA_SIGINFO flag and establish a signal-catching function based on the following prototype:

void func(int signo);

TEST: The signal-catching function is passed *signo* as a parameter.

TR: Test for all catchable signals consistent with the implemented options.

ELSE NO_OPTION

Conformance for signal.h: PASS, NO_OPTION

19 IF PCTS_sigqueue THEN

SETUP: Set the SA_SIGINFO flag and establish a signal-catching function based on the following prototype:

```
void func(int signo, siginfo_t *info,
          void *context);
```

TEST: The signal-catching function is passed *signo* (the signal number of the signal being delivered) and *info* (a pointer to a *siginfo_t* structure).

TR: Test for all catchable signals consistent with the implemented options.

ELSE NO_OPTION

Conformance for *signal.h*: PASS, NO_OPTION

20 SETUP: Include the header `<signal.h>`.

TEST: A structure type *siginfo_t* is defined and contains at least the following members:

Member Type	Member Name	Description
<i>int</i>	<i>si_signo</i>	Signal number
<i>int</i>	<i>si_code</i>	Cause of the signal
<i>union sigval</i>	<i>si_value</i>	Signal value

Conformance for *signal.h*: PASS

21 IF PCTS_sigqueue THEN

SETUP: With the SA_SIGINFO flag set, create a signal-catching function; then generate a signal for that signal-catching function to handle.

TEST: The *si_signo* member of the *siginfo_t* structure contains the signal number and the signal number is the same as the *signo* parameter passed to the signal-catching function.

TR: Test for all catchable signals consistent with implemented options.

ELSE NO_OPTION

Conformance for *signal.h*: PASS, NO_OPTION

22 SETUP: With the SA_SIGINFO flag set, create a signal-catching function and set an application-specific value to be passed to it. Then generate a signal for that signal-catching function to handle by calling the *kill()* function.

TEST: The *si_code* member of the *siginfo_t* structure contains *SI_USER* and the *si_signo* member of the *siginfo_t* structure contains the signal number and the signal number is the same as the *signo* parameter passed to the signal-catching function.

Conformance for *signal.h*: PASS

D_6 IF A PCD.1b documents the following THEN

TEST: A PCD.1b that documents whether the *si_code* number of the *siginfo_t* structure is set to *SI_USER*, if the signal was sent by the *raise()* or *abort()* functions as defined in the C Standard {2}, or any similar functions provided as implementation extensions, does so in 3.3.1.3.

ELSE NO_OPTION

Conformance for *signal.h*: PASS, NO_OPTION

23 IF PCTS_SIGQUEUE THEN

SETUP: With the SA_SIGINFO flag set, declare a signal-catching function and choose an application-specific value to be passed to it. Then generate a signal for that signal-catching function to handle by calling the *SI_QUEUE* function.

TEST: The *si_code* member of the *siginfo_t* structure contains *SI_QUEUE*, a code identifying the cause of the signal as being generated by the *sigqueue()* function,

and the *si_signo* member of the *siginfo_t* structure contains the signal number and the signal number is the same as the *signo* parameter passed to the signal-catching function.

ELSE NO_OPTION

Conformance for signal.h: PASS, NO_OPTION

24 IF PCTS_timer_settime THEN

IF PCTS_timer_create THEN

SETUP: With the SA_SIGINFO flag set, declare a signal-catching function and choose an application-specific value to be passed to it. Then generate a signal for that signal-catching function to handle by setting up a timer expiration for a timer set by *timer_settime*().

TEST: The *se_code* member of the *siginfo_t* structure contains SI_TIMER, a code identifying the cause of the signal generation as the expiration of a timer set by *timer_settime*(), and the *si_signo* member of the *siginfo_t* structure contains the signal number and it is the same as the *signo* parameter passed to the signal-catching function.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for signal.h: PASS, NO_TEST_SUPPORT, NO_OPTION

25 IF {_POSIX_ASYNCHRONOUS_IO} and {POSIX_REALTIME_SIGNALS} THEN

SETUP: With the SA_SIGINFO flag set, declare a signal-catching function and choose an application-specific value to be passed to it. Then generate a signal for that signal-catching function to handle by completing an asynchronous I/O request.

TEST: The *si_code* member of the *siginfo_t* structure contains SI_ASYNCIO, a code identifying the cause of the signal generation as the completion of an asynchronous I/O request, and the *si_signo* member of the *siginfo_t* structure contains the signal number and it is the same as the *signo* parameter passed to the signal-catching function.

ELSE NO_OPTION

Conformance for signal.h: PASS, NO_OPTION

26 IF {_POSIX_MESSAGE_PASSING} and {POSIX_REALTIME_SIGNALS} THEN

SETUP: With the SA_SIGINFO flag set, declare a signal-catching function and choose an application-specific value to be passed to it. Then generate a signal for that signal-catching function to handle by making a message arrive on an empty message queue.

TEST: The *si_code* member of the *siginfo_t* structure contains the code SI_MESGQ, which means the signal was generated by the arrival of a message on an empty message queue, and the *si_signo* member of the *siginfo_t* structure contains the signal number and it is the same as the *signo* parameter passed to the signal-catching function.

ELSE NO_OPTION

Conformance for signal.h: PASS, NO_OPTION

D.7 TEST: The PCD.1b documents the implementation-defined value, which is not equal to any of the values SI_USER, SI_QUEUE, SI_TIMER, SI_ASYNCIO, and SI_MESGQ, and which is also set in the *si_code* if a signal was not generated by one of the following functions or events:

1. The *kill*() function
2. The *raise*() or *abort*() functions as defined in the C Standard {2}, if they set *si_code* to SI_USER
3. The *sigqueue*() function
4. The *timer_settime*() function

5. The completion of an asynchronous I/O request

6. The arrival of a message on an empty message queue in 3.3.1.3

Conformance for signal.h: PASS

27 **IF** *PCTS_MORE_SA_SIGINFO_SIGNALS* and *{_POSIX_REALTIME_SIGNALS}* **THEN**
SETUP: Establish a signal-catching function with the *SA_SIGINFO* flag set. Then generate that signal by a means other than calling *kill()*, *raise()*, and *abort()* (if they set to *sigqueue()*, or *timer_settime()* or by completion of an asynchronous I/O request or by the arrival of a message on an empty message queue.
TEST: The *si_code* is set to an implementation-defined value that is not equal to any of the values defined in IEEE Std 1003.1b-1993 for *si_code*.
TR: Test for each such implementation-defined value.
NOTE: It is possible to perform this test by calling a target system-specific function that contains the tests.

ELSE NO_OPTION

Conformance for signal.h: PASS, NO_OPTION

28 **IF** *{_POSIX_REALTIME_SIGNALS}* **THEN**
IF *PCTS_sigqueue* **THEN**
SETUP: Create a signal so that *si_code* contains the value *SI_QUEUE*.
TEST: The *si_value* contains the application-specified signal value.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for signal.h: PASS, NO_TEST_SUPPORT, NO_OPTION

29 **IF** *{_POSIX_REALTIME_SIGNALS}* **THEN**
IF *PCTS_timer_settime* and *PCTS_timer_create* **THEN**
SETUP: Create a signal so that *si_code* contains the value *SI_TIMER*.
TEST: The *si_value* contains the application-specified signal value.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for signal.h: PASS, NO_TEST_SUPPORT, NO_OPTION

30 **IF** *{_POSIX_ASYNCHRONOUS_IO}* **THEN**
SETUP: Create a signal so that *si_code* contains the value *SI_ASYNCIO*.
TEST: The *si_value* contains the application-specified signal value.
ELSE NO_OPTION
Conformance for signal.h: PASS, NO_OPTION

31 **IF** *{_POSIX_MESSAGE_PASSING}* **THEN**
SETUP: Create a signal so that *si_code* contains the value *SI_MESGQ*.
TEST: The *si_value* contains the application-specified signal value.
ELSE NO_OPTION
Conformance for signal.h: PASS, NO_OPTION

D_8 IF a PCD.1b documents the following **THEN**
TEST: A PCD.1b that documents the *context* parameter to a signal-catching function does so in 3.3.1.3.

ELSE NO_OPTION

Conformance for signal.h: PASS, NO_OPTION

D_9 IF a PCD.1b documents the following **THEN**
TEST: A PCD.1b that documents the behavior of a process after it returns normally from a signal-catching function for a *SIGFPE*, *SIGHILL*, *SIGSEGV*, or *SIGBUS* signal that was not generated by the *kill()* function, the *sigqueue()* function, or the *raise()* function, as defined by the C Standard {2}, does so in 3.3.1.3.

ELSE NO_OPTION

Conformance for signal.h: PASS, NO_OPTION

- 32 **IF** *PCTS_aio_error* **THEN**
 TEST: The function *aio_error()* is reentrant with respect to signals; that is, applications may invoke them, without restriction, from signal-catching functions.
 ELSE NO_OPTION
 Conformance for *signal.h*: PASS, NO_OPTION
- 33 **IF** *PCTS_aio_return* **THEN**
 TEST: The function *aio_return()* is reentrant with respect to signals; that is, applications may invoke them, without restriction, from signal-catching functions.
 ELSE NO_OPTION
 Conformance for *signal.h*: PASS, NO_OPTION
- 34 **IF** *PCTS_aio_suspend* **THEN**
 TEST: The function *aio_suspend()* is reentrant with respect to signals; that is, applications may invoke them, without restriction, from signal-catching functions.
 ELSE NO_OPTION
 Conformance for *signal.h*: PASS, NO_OPTION
- 35 **IF** *PCTS_clock_gettime* **THEN**
 TEST: The function *clock_gettime()* is reentrant with respect to signals; that is, applications may invoke them, without restriction, from signal-catching functions.
 ELSE NO_OPTION
 Conformance for *signal.h*: PASS, NO_OPTION
- 36 **IF** *PCTS_fdatasync* **THEN**
 TEST: The function *fdatasync()* is reentrant with respect to signals; that is, applications may invoke them, without restriction, from signal-catching functions.
 ELSE NO_OPTION
 Conformance for *signal.h*: PASS, NO_OPTION
- 37 **IF** *PCTS_sem_post* **THEN**
 TEST: The function *sem_post()* is reentrant with respect to signals; that is, applications may invoke them, without restriction, from signal-catching functions.
 ELSE NO_OPTION
 Conformance for *signal.h*: PASS, NO_OPTION
- 38 **IF** *PCTS_sig_queue* **THEN**
 TEST: The function *sig_queue()* is reentrant with respect to signals; that is, applications may invoke them, without restriction, from signal-catching functions.
 ELSE NO_OPTION
 Conformance for *signal.h*: PASS, NO_OPTION
- 39 **IF** *PCTS_timer_getoverrun* **THEN**
 TEST: The function *timer_getoverrun()* is reentrant with respect to signals; that is, applications may invoke them, without restriction, from signal-catching functions.
 ELSE NO_OPTION
 Conformance for *signal.h*: PASS, NO_OPTION
- 40 **IF** *PCTS_timer_gettime* **THEN**
 TEST: The function *timer_gettime()* is reentrant with respect to signals; that is, applications may invoke them, without restriction, from signal-catching functions.
 ELSE NO_OPTION
 Conformance for *signal.h*: PASS, NO_OPTION
- 41 **IF** *PCTS_timer_settime* **THEN**
 TEST: The function *timer_settime()* is reentrant with respect to signals; that is, applications may invoke them, without restriction, from signal-catching functions.

ELSE NO_OPTION*Conformance for signal.h: PASS, NO_OPTION***3.3.1.4 Signal Effects on Other Functions**

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

NOTE: There are assertions in IEEE Std 2003.1-1992 {4} for this clause that mention specific functions. There may need to be additional assertions here that correspond to those assertions in IEEE Std 2003.1-1992 {4} and cover the new functions of IEEE Std 1003.1b-1993.

3.3.2 Send a Signal to a Process

Function: *kill()*.

3.3.2.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.2.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.2.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.2.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.3 Manipulate Signal Sets

Functions: *sigemptyset()*, *sigfillset()*, *sigaddset()*, *sigdelset()*, *sigismember()*.

3.3.3.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.3.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.3.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.3.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.4 Examine and Change Signal Action

Function: *sigaction()*.

3.3.4.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.4.2 Description

- 1 **SETUP:** Call *sigaction()* with the SA_SIGINFO flag cleared in the *sa_flags* field of the *sigaction* structure to establish a signal-catching function.
TEST: The *sa_handler* field identifies the action to be associated with the specified signal.
TR: Test for all catchable signals consistent with implemented options.
Conformance for sigaction: PASS
- 2 **IF** {_POSIX_REALTIME_SIGNALS} **THEN**
 SETUP: Call *sigaction()* with the SA_SIGINFO flag set in the *sa_flags* field of the *sigaction* structure to establish a signal-catching function.
 TEST: The *sa_sigaction* field specifies a signal-catching function.
 TR: Test for all catchable signals consistent with implemented options.
ELSE NO_OPTION
Conformance for sigaction: PASS, NO_OPTION
- 3 **SETUP:** Call *sigaction()* with the SA_SIGINFO bit cleared, and the *sa_handler* field specifying a signal-catching function, and then perform the test. Then call it again with the SA_SIGINFO bit set and perform the test.
TEST: The *sa_mask* field identifies a set of signals that are added to the signal mask of the process before the signal-catching function is invoked.
TR: Test for all catchable signals consistent with implemented options. Do not test for SIGKILL and SIGSTOP.
Conformance for sigaction: PASS
- 4 **SETUP:** Include the header <signal.h>.
TEST: The following flag bits are defined and can be set in *sa_flags*:

Symbolic Constant	Description
SA_NOCLDSTOP	Do not generate SIGCHLD when children stop.
SA_SIGINFO	Invoke the signal-catching function with three arguments instead of one.

Conformance for sigaction: PASS

- D_1 TEST:** The PCD.1b documents the disposition of subsequent occurrences of *sig*, when it is already pending, if SA_SIGINFO is not set in *sa_flags*; and does so in 3.3.4.2.
Conformance for sigaction: PASS

- 5 **IF** {POSIX_REALTIME_SIGNALS} **THEN**
 SETUP: Set SA_SIGINFO in *sa_flags* and establish a signal-catching function by calling *sigaction()*.
 TEST: Subsequent occurrences of *sig* generated by *sigqueue()* or as a result of any signal-generating function that supports the specification of an application-defined value – when *sig* is already pending – is queued in FIFO order until delivered; the signal-catching function is invoked with three arguments; and the application specified value is passed to the signal-catching function as the *si_value* member of the *siginfo_t* structure.
 TR: Test for the following functions:
 1. If {_POSIX_REALTIME_SIGNALS} is defined then *kill()*
 2. If PCTS_sigqueue then *sigqueue()*

3. If *PCTS_lio_listio* then *lio_listio()*
4. If *PCTS_timer_create* and *PCTS_timer_settime* then *timer_settime()*
5. If *PCTS_mq_open* and *PCTS_mq_send* and *PCTS_mq_notify*, then *mq_notify()*.

ELSE NO_OPTION

Conformance for sigaction: PASS, NO_OPTION

3.3.4.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.4.4 Errors

6 IF {POSIX_REALTIME_SIGNALS} is not supported **THEN**

TEST: A call to *sigaction()* with the SA_SIGINFO bit flag set in the *sa_flags* field of the *sigaction* structure returns a value of -1 and sets *errno* to [ENOTSUP].

ELSE NO_OPTION

Conformance for sigaction: PASS, NO_OPTION

3.3.5 Examine and Change Blocked Signals

Function: *sigprocmask()*.

3.3.5.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.5.2 Description

D_1 IF a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the result of generating a SIGFPE, SIGILL, SIGSEGV, or SIGBUS signal while they are blocked, when the signal was not generated by the *kill()* function, the *sigqueue()* function, or the *raise()* function as defined by the C Standard {2} does so in 3.3.5.2.

ELSE NO_OPTION

Conformance for sigprocmask: PASS, NO_OPTION

3.3.5.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.5.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.6 Examine Pending Signals

Function: *sigpending()*.

3.3.6.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.6.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.6.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.6.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.7 Wait for a Signal

Function: *sigsuspend()*.

3.3.7.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.7.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.7.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.7.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

3.3.8 Synchronously Accept a Signal

Function: *sigwaitinfo()*, *sigtimedwait()*.

3.3.8.1 Synopsis

1

*M_GA_stdC_proto_decl(int; sigwaitinfo: const sigset_t *set, siginfo_t *info; signal.h;;)*

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for sigwaitinfo: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(sigwaitinfo; signal.h;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for sigwaitinfo: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; sigwaitinfo; signal.h;;)

SEE: Assertion GA_macro_result in 1.3.4.

Conformance for sigwaitinfo: PASS, NO_OPTION

4

M_GA_macro_args(sigwaitinfo; signal.h;;)

SEE: Assertion GA_macro_args in 2.7.3.

Conformance for sigwaitinfo: PASS, NO_OPTION

5

M_GA_stdC_proto_decl(int; sigtimedwait; , const sigset_t *set, siginfo_t *info, const struct timespec *timeout; signal.h;;)

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for sigtimedwait: PASS[5, 6], NO_OPTION

6

M_GA_commonC_int_result_decl(sigtimedwait; , const sigset_t *set, siginfo_t *info, const struct timespec *timeout; signal.h;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for sigtimedwait: PASS, NO_OPTION

7

M_GA_macro_result_decl(int; sigtimedwait; signal.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.

Conformance for sigtimedwait: PASS, NO_OPTION

8

M_GA_macro_args (sigtimedwait; signal.h;;)

SEE: Assertion GA_macro_args in 2.7.3.

Conformance for sigtimedwait: PASS, NO_OPTION

3.3.8.2 Description

9 **IF** PCTS_sigwaitinfo **THEN**

TEST: The function sigwaitinfo() waits for the pending signal from the set of signals specified by the set parameter and returns the selected signal number.

TR : Test for only one signal at a time by specifying them in set; then send two signals, one of which is the signal specified in set. Test this for signals in the range SIGRTMIN to SIGRTMAX. Then do the same test separately for all non-realtime signals supported by the implementation.

ELSE NO_OPTION

Conformance for sigwaitinfo: PASS, NO_OPTION

10 **FOR:** PCTS_sigwaitinfo and PCTS_sigtimedwait

IF PCTS_function **THEN**

TEST: When there are multiple pending signals in the range SIGRTMIN to SIGRTMAX, which have been specified in the set argument to function(), the signal number returned is the lowest numbered one.

NOTE: This can be tested by creating two processes, one to send signals and one to wait for them by calling function(). Block the multiple signals to be tested. Then send those signals. Then wait for signals by calling function().

ELSE NO_OPTION

Conformance for sigwaitinfo, sigtimedwait: PASS, NO_OPTION

D_1 FOR: PCTS_sigwaitinfo and PCTS_sigtimedwait

IF PCTS_function and a PCD.1 documents the following **THEN**

TEST: A PCD.1b that documents the selection order between realtime and nonrealtime signals, or between multiple pending nonrealtime signals, does so in 3.3.8.2.

ELSE NO_OPTION

Conformance for sigwaitinfo, sigtimedwait: PASS, NO_OPTION

11 **FOR:** PCTS_sigwaitinfo and PCTS_sigtimedwait

IF PCTS_function **THEN**

SETUP: Call function() with no signal in set pending at the time of the call.

TEST: The process calling function() is suspended until one or more signals in set become pending (in which case the selected signal number is returned) or until it is interrupted by an unblocked, caught signal.

TR: Test for both cases: when no signals are pending, and when the call is interrupted by an unblocked, caught signal.

ELSE NO_OPTION

Conformance for sigwaitinfo, sigtimedwait: PASS, NO_OPTION

12 FOR: *PCTS_sigwaitinfo* and *PCTS_sigtimedwait*

IF *PCTS_function* **THEN**

SETUP: Call *function()* with the *info* argument non-NULL.

TEST: The selected signal number is stored in the *si_signo* member. The cause of the signal is stored in the *si_code* member of the *siginfo_t* structure pointed to by the *info* argument. The selected signal number is returned.

ELSE NO_OPTION

Conformance for sigwaitinfo, sigtimedwait: PASS, NO_OPTION

13 FOR: *PCTS_sigwaitinfo* and *PCTS_sigtimedwait*

IF *PCTS_function* **THEN**

SETUP: Queue different application-specified values for the signal to be selected by a call to *function()* with a non-NULL value in the *info* argument.

TEST: The first queued value is dequeued and stored in the *si_value* member of the *siginfo_t* structure pointed to by the *info* argument after a call to *function()* with a non-NULL *info* argument. The selected signal number is returned.

TR: Test that all queued values are retrieved in queued order.

ELSE NO_OPTION

Conformance for sigwaitinfo, sigtimedwait: PASS, NO_OPTION

14 FOR: *PCTS_sigwaitinfo* and *PCTS_sigtimedwait*

IF *PCTS_function* **THEN**

TEST: The system resource used to queue the signal selected by *function()* is released and made available to queue other signals when *sigwaitinfo()* returns with the selected signal number.

ELSE NO_OPTION

Conformance for sigwaitinfo, sigtimedwait: PASS, NO_OPTION

D_2 FOR: *PCTS_sigwaitinfo* and *PCTS_sigtimedwait*

IF *PCTS_function* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the content of the *si_value* member of the *info* argument when no value is queued does so in 3.3.8.2.

ELSE NO_OPTION

Conformance for sigwaitinfo, sigtimedwait: PASS, NO_OPTION

15 FOR: *PCTS_sigwaitinfo* and *PCTS_sigtimedwait*

IF *PCTS_function* **THEN**

TEST: After dequeuing all pending signals selected by *function()*, the pending indication for each signal is reset.

ELSE NO_OPTION

Conformance for sigwaitinfo, sigtimedwait: PASS, NO_OPTION

16 IF *PCTS_sigtimedwait* **THEN**

SETUP: Call *sigtimedwait()* when none of the signals specified by the *set* arguments are pending.

TEST: The function *sigtimedwait()* waits for the time interval specified in the *timespec* structure referenced by *timeout* before returning.

ELSE NO_OPTION

Conformance for sigtimedwait: PASS, NO_OPTION

17 IF *PCTS_sigtimedwait* **THEN**

SETUP: Call *sigtimedwait()* with the *timespec* structure pointed to by *timeout* being zero-valued and none of the signals specified by *set* pending.

TEST: The *sigtimedwait()* returns immediately with an error.

ELSE NO_OPTION

Conformance for sigtimedwait: PASS, NO_OPTION

D_3 IF *PCTS_sigtimedwait* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the behavior of *sigtimedwait()*, when the *timeout* argument to *sigtimedwait()* is the **NULL** pointer, does so in 3.3.8.2.

ELSE NO_OPTION

Conformance for *sigtimedwait*: *PASS, NO_OPTION*

18 FOR: *PCTS_sigwaitinfo* and *PCTS_sigtimedwait*

IF *PCTS_function* **THEN**

TEST: While *function()* is waiting and a signal occurs that is eligible for delivery (i.e., not blocked by the process signal mask), that signal is handled asynchronously and the wait is interrupted.

ELSE NO_OPTION

Conformance for *sigwaitinfo*, *sigtimedwait*: *PASS, NO_OPTION*

D_4 FOR: *PCTS_sigwaitinfo* and *PCTS_sigtimedwait*

IF not {*_POSIX_REALTIME_SIGNALS*} and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents its support or lack of support for *function()* does so in 3.3.8.2.

ELSE NO_OPTION

Conformance for *sigwaitinfo*, *sigtimedwait*: *PASS, NO_OPTION*

3.3.8.3 Returns

R_1 TEST: Upon successful completion (i.e., one of the signals specified by *set* is pending or is generated), *sigwaitinfo()* and *sigtimedwait()* return the selected signal number.

SEE: All assertions in 3.3.8.2.

R_2 TEST: The functions *sigwaitinfo()* and *sigtimedwait()* return a value of -1 and set *errno* to indicate the error.

SEE: All assertions in 3.3.8.4.

3.3.8.4 Errors

19 FOR: *PCTS_sigwaitinfo* and *PCTS_sigtimedwait*

IF *PCTS_function* **THEN**

SETUP: Call *function()* to wait on an unblocked signal that will be caught.

TEST: The function *function()* returns -1 and sets *errno* to [EINTR] when the wait was interrupted by an unblocked, caught signal.

TR: Test for each catchable signal consistent with the implemented options.

ELSE NO_OPTION

Conformance for *sigwaitinfo*, *sigtimedwait*: *PASS, NO_OPTION*

20 FOR: *PCTS_sigwaitinfo* and *PCTS_sigtimedwait*

IF not *PCTS_function* **THEN**

TEST: A call to *function()* returns -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *sigwaitinfo*, *sigtimedwait*: *PASS, NO_OPTION*

21 IF not *PCTS_sigtimedwait* **THEN**

TEST: A call to *sigtimedwait()* returns -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *sigtimedwait*: *PASS, NO_OPTION*

22 IF *PCTS_sigwaitinfo* and *PCTS_SIGTIMEDWAIT_VALUE* **THEN**

TEST: The *sigtimedwait()* function when called with a timeout argument specifying a *tv_nsec* value less than zero or greater than or equal to 1000 million, and when no signal is pending in *set* and it is necessary to wait, returns -1 and sets *errno* to [EINVAL].

ELSE NO_OPTION

Conformance for sigwaitinfo: PASS, NO_OPTION

D_5 IF *PCTS_sigwaitinfo* and *PCTS_SIGTIMEDWAIT_VALUE* **THEN**

TEST: A PCD.1b that documents the detection of a *timeout* argument specifying a *tv_nsec* value less than zero, or greater than or equal to 1000 million, and the conditions under which the error is detected, does so in 3.3.8.4.

ELSE *NO_OPTION*

Conformance for sigwaitinfo: PASS, NO_OPTION

3.3.9 Queue a Signal to a Process

Function: *sigqueue()*.

3.3.9.1 Synopsis

1

M_GA_stdC_proto_decl(int; sigqueue; pid_t pid, int signo, const union sigval value; signal.h;;;)

SEE: Assertion *GA_stC_proto_decl* in 2.7.3.

Conformance for sigqueue: PASS[1,2], NO_OPTION

2

MG_GA_commonC_int_result_decl(sigqueue; signal.h;;;)

SEE: Assertion *GA_commonC_int_result_decl* in 2.7.3.

Conformance for sigqueue: PASS[1,2], NO_OPTION

3

MG_GA_macro_result_decl(int; sigqueue; signal.h;;;)

SEE: Assertion *GA_macro_result_decl* in 1.3.4.

Conformance for sigqueue: PASS, NO_OPTION

4

MG_GA_macro_args(sigqueue; signal.h;;;)

SEE: Assertion *GA_macro_args* in 2.7.3.

Conformance for sigqueue: PASS, NO_OPTION

3.3.9.2 Description

sigqueue_priv()=

Create two processes, one to send the signal and one to receive it, such that if *PCTS_GAP_sigqueue*, the real or effective user ID of the calling process, does not match the real or effective user ID of the process to which the signal is being sent, or if *{_POSIX_SAVED_IDS}* is the real or effective user ID of the calling process matches the real or saved set-user-ID of the process to which the signal is being sent; otherwise, the real or effective user ID of the calling process matches the real or effective user ID of the process to which the signal is being sent.

5

IF *PCTS_sigqueue* **THEN**

SETUP:

sigqueue_priv()

TEST: The *sigqueue()* function causes the signal specified by *signo* to be sent with the value specified by *value* to the process specified by *pid*.

TR: Test for all catchable signals consistent with implemented options. Also, test for the supported combinations of real and effective user IDs as well as for appropriate privilege and saved set-user-IDs, if they are supported by the implementation.

ELSE *NO_OPTION*

Conformance for sigqueue: PASS, NO_OPTION

- 6** **IF** *PCTS_sigqueue* **THEN**
 IF {SIGQUEUE_MAX} <= *PCTS_SIGQUEUE_MAX* **THEN**
 SETUP:
 sigqueue_priv()
 TEST: The *sigqueue()* function can queue a total of {SIGQUEUE_MAX} signals to one or more processes.
 TR: Test for one and two processes.
- Test for all catchable signals consistent with implemented options. Also, test for the supported combinations of real and effective user IDs as well as for appropriate privilege and saved set-user-IDs, if they are supported by the implementation.
- ELSE NO_TEST_SUPPORT**
ELSE NO_OPTION
Conformance for *sigqueue*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 7** **IF** *PCTS_sigqueue* **THEN**
 IF {SIGQUEUE_MAX} > *PCTS_SIGQUEUE_MAX* **THEN**
 SETUP:
 sigqueue_priv()
 TEST: The *sigqueue()* function can queue a total of *PCTS_SIGQUEUE_MAX* signals to one or more processes.
 TR: Test for one and two processes.
- Test for all catchable signals consistent with implemented options. Also, test for the supported combinations of real and effective user IDs as well as for appropriate privilege and saved set-user-IDs, if they are supported by the implementation.
- ELSE NO_TEST_SUPPORT**
ELSE NO_OPTION
Conformance for *sigqueue*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 8** **IF** *PCTS_sigqueue* **THEN**
 SETUP:
 sigqueue_priv()
 TEST: If the *signo* argument in *sigqueue()* is zero (the null signal), error checking is performed but no signal is actually sent.
ELSE NO_OPTION
Conformance for *sigqueue*: PASS, NO_OPTION
- 9** **IF** *PCTS_sigqueue* **THEN**
 SETUP:
 sigqueue_priv()
 Block the signal specified in *signo* for the receiving process and clear the SA_SIGINFO flag for it.
 TEST: A call to *sigqueue()* returns immediately.
 TR: Test for all catchable signals consistent with implemented options. Also, test for the supported combinations of real and effective user IDs, as well as for appropriate privilege and saved set-user-IDs, if they are supported by the implementation.
ELSE NO_OPTION
Conformance for *sigqueue*: PASS, NO_OPTION
- 10** **IF** *PCTS_sigqueue* **THEN**
 SETUP:
 sigqueue_priv()
 Block the signal specified in *signo* for the receiving process and set the SA_SIGINFO flag for it.
 TEST: A call to *sigqueue()* returns immediately, and if the resources are available to queue the signal, the signal is left queued and pending.

TR: Test for all catchable signals consistent with the implemented options. Also, test for the supported combinations of real and effective user IDs, as well as for appropriate privilege and saved set-user-IDs, if they are supported by the implementation.

ELSE NO_OPTION

Conformance for sigqueue: PASS, NO_OPTION

11 IF PCTS_sigqueue THEN

SETUP:

sigqueue_priv()

Do not set SA_SIGINFO for *signo*

TEST: The *signo* is sent at least once to the receiving process.

TR: Test for all catchable signals consistent with the implemented options. Also, test for the supported combinations of real and effective user IDs, as well as for appropriate privilege and saved set-user-IDs, if they are supported by the implementation.

ELSE NO_OPTION

Conformance for sigqueue: PASS, NO_OPTION

D_1 IF PCTS_sigqueue and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents whether or not the *value* parameter is sent to the receiving process as a result of calling the *sigqueue()* function when SA_SIGINFO is not set for *signo*, and the conditions under which the *value* is sent, does so in 3.3.9.2.

ELSE NO_OPTION

Conformance for sigqueue: PASS, NO_OPTION

12 IF PCTS_sigqueue THEN

SETUP:

Set *pid* so that it causes *signo* to be generated for the sending process, and do not block *signo*.

TEST: Either *signo*, or at least the pending, unblocked signal with the lowest number, is delivered to the sending process before the *sigqueue()* function returns.

TR: Test for all catchable signals consistent with the implemented options. Also, test for the supported combinations of real and effective user IDs, as well as for appropriate privilege and saved set-user-IDs, if they are supported by the implementation.

ELSE NO_OPTION

Conformance for sigqueue: PASS, NO_OPTION

D-2 IF not {_POSIX_REALTIME_SIGNALS} and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents its support or lack of support for *sigqueue()* does so in 3.3.8.2.

ELSE NO_OPTION

Conformance for sigqueue: PASS, NO_OPTION

3.3.9.3 Returns

R-1 IF PCTS_sigqueue THEN

TEST: Upon successful completion of a call to *sigqueue()*, the specified signal has been queued, and the function returns a value of zero.

ELSE NO_OPTION

SEE: Assertions in 3.3.9.2.

R-2 IF PCTS_sigqueue THEN

TEST: An unsuccessful call to *sigqueue()* returns a value of -1 and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: Assertions in 3.3.9.4.

3.3.9.4 Errors

- 13** **IF** *PCTS_sigqueue* **THEN**
 TEST: A call to *sigqueue()* returns -1 and sets *errno* to [EAGAIN] when no resources are available to queue the signal.
 NOTE: There is no known portable test method for this assertion.
 ELSE *NO_OPTION*
 Conformance for *sigqueue*: *PASS, NO_TEST, NO_OPTION*
- 14** **IF** *PCTS_sigqueue* **THEN**
 TEST: A call to *sigqueue()* returns -1 and sets *errno* to [EAGAIN] when the process has already queued {SIGQUEUE_MAX} signals that are still pending at the receiver(s).
 NOTE: There is no known portable test method for this assertion.
 TR: Test limit for signals sent to one process and to two processes.
 ELSE *NO_OPTION*
 Conformance for *sigqueue*: *PASS, NO_OPTION*
- 15** **IF** *PCTS_sigqueue* **THEN**
 TEST: A call to *sigqueue()* returns -1 and sets *errno* to [EAGAIN] when a systemwide resource limit has been exceeded.
 NOTE: There is no known portable test method for this assertion.
 ELSE *NO_OPTION*
 Conformance for *sigqueue*: *PASS, NO_TEST, NO_OPTION*
- 16** **IF** *PCTS_sigqueue* **THEN**
 IF *PCTS_INVALID_SIGNAL* or *PCTS_UNSUPPORTED_SIGNAL* **THEN**
 TEST: A call to *sigqueue()* returns -1 and sets *errno* to [EINVAL] when the value of the *signo* argument is an invalid or unsupported signal number.
 TR: Test for both invalid and unsupported signals, if each exists.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *sigqueue*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 17** **IF** not *PCTS_sigqueue* **THEN**
 TEST: A call to *sigqueue()* returns -1 and sets *errno* to [ENOSYS] when the function *sigqueue()* is not supported by this implementation.
 ELSE *NO_OPTION*
 Conformance for *sigqueue*: *PASS, NO_OPTION*
- 18** **IF** *PCTS_sigqueue* **THEN**
 IF *PCTS_RAP_sigqueue* **THEN**
 TEST: A call to *sigqueue()* returns -1 and sets *errno* to [EPERM] when the process does not have the appropriate privilege to send the signal to the receiving process.
 TR: Use *sigqueue_priv()*.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *sigqueue*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 19** **IF** *PCTS_sigqueue* **THEN**
 TEST: A call to *sigqueue()* returns -1 and sets *errno* to [ESDRCH] when the process *pid* does not exist.
 ELSE *NO_OPTION*
 Conformance for *sigqueue*: *PASS, NO_OPTION*

3.4 Timer Operations

There are no requirements for conforming implementations in this clause.

3.4.1 Schedule Alarm

Function: *alarm()*.

3.4.1.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b (3) assertions.

3.4.1.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b (3) assertions.

3.4.1.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b (3) assertions.

3.4.1.4 Errors

There are no requirements for conforming implementations in this clause.

3.4.2 Suspend Process Execution

Function: *pause()*.

3.4.2.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b (3) assertions.

3.4.2.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b (3) assertions.

3.4.2.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b (3) assertions.

3.4.2.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b (3) assertions.

3.4.3 Delay Process Execution

Function: *sleep()*.

3.4.3.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b (3) assertions.

3.4.3.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b (3) assertions.

3.4.3.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b (3) assertions.

3.4.3.4 Errors

There are no requirements for conforming implementations in this clause.

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Section 4: Process Environment

There are no POSIX.1b {3} assertions in Section 4, except for 4.8.1.2.

4.8 Configurable System Variables

4.8.1 Get Configurable System Variables

Function: *sysconf()*.

4.8.1.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b (3) assertions.

4.8.1.2 Description

NOTE: There is no Table 4-1 in this section. Table 4-2 in this standard is the same as Table 4-2 in POSIX.1b {3}.

(IEEE Std 2003.1-1992 {4} 04

UNUSED

- 1 **SETUP:** Include the header `<unistd.h>`.
 TEST: The symbolic constants in the *name* Value column of Table 4-2 are defined and have different values.
 NOTE: The assertion is tested once for each constant specified in the FOR clause. The assertion is to be read by substituting *CONSTANT* with the current constant specified in the FOR clause. The name of the compound constant also is to be substituted for each occurrence in the constructs *_SC_CONSTANT* and *_POSIX_CONSTANT*.

Conformance for sysconf: PASS

- 2 **FOR:** {AIO_LISTIO_MAX}, {AIO_MAX}, {AIO_PRIO_DELTA_MAX}, {DELAYTIMER_MAX},
 {MQ_OPEN_MAX}, {MQ_PRIO_MAX}, {PAGESIZE}, {RTSIG_MAX}, {SEM_NSEMS_MAX},
 {SEM_VALUE_MAX}, {SIGQUEUE_MAX}, {TIMER_MAX},

IF *CONSTANT* is defined in `<limits.h>` **THEN**

SETUP: Include the header `<limits.h>`.

TEST: A call *sysconf(_SC_CONSTANT)* either returns -1 without changing the value of *errno* or returns a value greater than or equal to {*CONSTANT*}.

NOTE: The assertion is tested once for each constant specified in the FOR clause. The assertion is to be read by substituting *CONSTANT* with the current constant specified in the FOR clause. The name of the compound constant also is to be substituted for each occurrence in the constructs *_SC_CONSTANT* and *_POSIX_CONSTANT*.

ELSE NO_TEST_SUPPORT

Conformance for sysconf: PASS, NO_TEST_SUPPORT

IF CONSTANT is **not** defined in <limits.h> **THEN**

TEST: A call `sysconf(_SC_CONSTANT)` either returns -1 without changing the value of `errno` or returns a value greater than or equal to `{_POSIX_CONSTANT}`.

ELSE *NO_TEST_SUPPORT*

4 FOR: { _POSIX_ASYNCHRONOUS_IO }, { _POSIX_FSYNC },
{ _POSIX_MAPPED_FILES }, { _POSIX_MEMLOCK },
{ _POSIX_MEMLOCK_RANGE }, { _POSIX_MEMORY_PROTECTION },
{ _POSIX_MESSAGE_PASSING }, { _POSIX_PRIORITIZED_IO },
{ _POSIX_PRIORITY_SCHEDULING }, { _POSIX_REALTIME_SIGNALS },
{ _POSIX_SEMAPHORES }, { _POSIX_SHARED_MEMORY_OBJECTS },
{ POSIX_SYNCHRONIZED_IO }, { _POSIX_TIMERS },

NOTE: The assertion is tested once for each constant specified in the FOR clause. The assertion is to be read by substituting `CONSTANT` with the current constant specified in the FOR clause. The name of the compound constant also is to be substituted for each occurrence in the constructs `_SC_CONSTANT` and `_POSIX_CONSTANT`.

Conformance for sysconf: PASS, NO_TEST_SUPPORT

Variable	name Value
{AIO_LISTIO_MAX}	{_SC_AIO_LISTIO_MAX}
{AIO_MAX}	{_SC_AIO_MAX}
{AIO_PRIO_DELTA_MAX}	{_SC_AIO_PRIO_DELTA_MAX}
{ART_MAX}	{_SC_ARG_MAX}
{CHILD_MAX}	{_SC_CHILD_MAX}
clock ticks/second	{_SC_CLK_TCK}
{DELAYTIMER_MAX}	{_SC_DELAYTIMER_MAX}
{MQ_OPEN_MAX}	{_SC_MQ_OPEN_MAX}
{MQ_PRIO_MAX}	{_SC_MQ_PRIO_MAX}
{NGROUPS_MAX}	{_SC_NGROUPS_MAX}
{OPEN_MAX}	{_SC_OPEN_MAX}
{PAGESIZE}	{_SC_PAGESIZE}
{RTSIG_MAX}	{_SC_RTSIG_MAX}
{SEM_NSEMS_MAX}	{_SC_SEM_NSEMS_MAX}
{SEM_VALUE_MAX}	{_SC_SEM_VALUE_MAX}
{SIGQUEUE_MAX}	{_SC_SIGQUEUE_MAX}
{STREAM_MAX}	{_SC_STREAM_MAX}
{TIMER_MAX}	{_SC_TIMER_MAX}
{TZNAME__MAX}	{_SC_TZNAME_MAX}
{_POSIX_ASYNCHRONOUS_IO}	{_SC_ASYNCHRONOUS_IO}
{_POSIX_FSYNC}	{_SC_FSYNC}
{_POSIX_JOB_CONTROL}	{_SC_JOB_CONTROL}
{_POSIX_MAPPED_FILES}	{_SC_MAPPED_FILES}
{_POSIX_MEMLOCK}	{_SC_MEMLOCK}
{_POSIX_MEMLOCK_RANGE}	{_SC_MEMLOCK_RANGE}
{_POSIX_MEMORY_PROTECTION}	{_SC_MEMORY_PROTECTION}
{_POSIX_MESSAGE_PASSING}	{_SC_MESSAGE_PASSING}
{_POSIX_PRIORITIZED_IO}	{_SC_PRIORITIZED_IO}
{_POSIX_PRIORITY_SCHEDULING}	{_SC_PRIORITY_SCHEDULING}
{_POSIX_REALTIME_SIGNALS}	{_SC_REALTIME_SIGNALS}
{_POSIX_SAVED_IDS}	{_SC_SAVED_IDS}
{_POSIX_SEMAPHORES}	{_SC_SEMAPHORES}
{_POSIX_SHARED_MEMORY_OBJECTS}	{_SC_SHARED_MEMORY_OBJECTS}
{_POSIX_SYNCHRONIZED_IO}	{_SC_SYNCHRONIZED_IO}
{_POSIX_TIMERS}	{_SC_TIMERS}
{_POSIX_VERSION}	{_SC_VERSION}

5 **FOR:** { _POSIX_ASYNCHRONOUS_IO }, { _POSIX_FSYNC },
{ _POSIX_MAPPED_FILES }, { _POSIX_MEMLOCK },
{ _POSIX_MEMLOCK_RANGE }, { _POSIX_MEMORY_PROTECTION },
{ _POSIX_MESSAGE_PASSING }, { _POSIX_PRIORITIZED_IO },
{ _POSIX_PRIORITY_SCHEDULING }, { _POSIX_REALTIME_SIGNALS },
{ _POSIX_SEMAPHORES }, { _POSIX_SHARED_MEMORY_OBJECTS },
{ POSIX_SYNCHRONIZED_IO }, { POSIX_TIMERS },

IF **CONSTANT** is **not** defined in <unistd.h> **THEN**

SETUP: Include the header `<unistd.h>`.

TEST: A call `sysconf(_SC_CONSTANT)` returns -1 without changing the value of `errno`.

NOTE: The assertion is tested once for each constant specified in the FOR clause. The assertion is to be read by substituting `CONSTANT` with the current constant specified in the FOR clause. The name of the compound constant also is to be

substituted for each occurrence in the constructs `_SC_CONSTANT` and
`_POSIX_CONSTANT`.

ELSE NO_TEST_SUPPORT

Conformance for sysconf: PASS, NO_TEST_SUPPORT

4.8.1.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b (3) assertions.

4.8.1.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b (3) assertions.

4.8.1.5 Special Symbol {CLK_TCK}

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b (3) assertions.

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Section 5: Files and Directories

There are no requirements for conforming implementations in this clause.

5.1 Directories

5.1.1 Format of Directory Entries

There are no requirements for conforming implementations in this clause.

5.1.2 Directory Operations

Functions: *opendir()*, *readdir()*, *rewinddir()*, *closedir()*.

5.1.2.1 Synopsis

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.1.2.2 Description

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.1.2.3 Returns

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.1.2.4 Errors

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.2 Working Directory

5.2.1 Change Current Working Directory

Function: *chdir()*

5.2.1.1 Synopsis

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.2.1.2 Description

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.2.1.3 Returns

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.2.1.4 Errors

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.2.2 Get Working Directory Pathname

Function: *getcwd()*.

5.2.2.1 Synopsis

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.2.2.2 Description

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.2.2.3 Returns

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.2.2.4 Errors

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.3 General File Creation

5.3.1 Open a File

Function: *open()*.

5.3.1.1 Synopsis

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.3.1.2 Description

NOTE: The General Assertion *GA_syncIOdataintegritywrite* is defined in 2.2.2.119. It is tested in *write()*, *aio_write()*, and *lio_listio()*, instead of in *open()*, because they are more appropriate places to test it. The General Assertion *GA_syncIOdataintegrityRead* is defined in 2.2.2.119. It is tested in *read()*, *aio_read()*, and *lio_listio()*, instead of in *open()*, because they are more appropriate places to test it. The General Assertion *GA_syncIOFileintegrityread* is defined in 2.2.1.120. It is tested in *read()*, *aio_read()*, and *lio-listio()*, instead of in *open()*, because they are more appropriate places to test it. The General Assertion *GA_syncIOdataintegritywrite* is defined in 2.2.2.120. It is tested in *write()*, *aio_write()*, and *listio()*, instead of in *open()*, because they are more appropriate places to test it.

Also, the *O_SYSYNC*, *O_RSYNC*, and *O_SYNC* constants are tested for existence and value in 6.5.1.1.

GA_syncOpenWrite

FOR: *write()*, *aio_write()*, and *lio-listio()*

IF { *_POSIX_SYNCHRONIZED_IO* } **THEN**

SETUP: Open a file by calling *open()* with both *O_SYNC* and *O_DSYNC* set in the *oflag* parameter.

TEST: The file behaves as if only the *O_SYNC* flag was set.

TR: Test for regular files.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

Conformance for open: PASS, NO_TEST_NO_OPTION

5.3.1.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.3.1.4 Errors

1 **IF** {_POSIX_SYNCHRONIZED_IO} **THEN**
 IF PCTS_NO_SYNC_IO_FILE **THEN**
 SETUP: Call *open()*(*path*, *oflag* | *oflag1*).
 TEST: The *open()* returns -1 and sets *errno* to [EINVAL].
 NOTE: This implementation does not support synchronized I/O for this file.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for open: PASS, NO_TEST_SUPPORT, NO_OPTION

5.3.1.5 Errors

2 **IF** {_POSIX_SYNCHRONIZED_IO} **THEN**
 IF PCTS_NO_SYNC_IO_FILE **THEN**
 SETUP: Call *open()*(*path*, *oflag* | *oflag1*).
 TEST: The *open()* returns -1 and sets *errno* to [EINVAL].
 NOTE: This implementation does not support synchronized I/O for this file.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for open: PASS, NO_TEST_SUPPORT, NO_OPTION

5.3.2 Create New File or Rewrite an Existing One

Function: *creat()*.

5.3.2.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.3.2.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.3.3 Set File Creation Mask

Function: *umask()*.

5.3.3.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.3.3.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.3.3.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.3.3.4 Errors

There are no requirements for conforming implementations in this clause.

5.3.4 Link to a File

Function: *link()*.

5.3.4.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.3.4.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.3.4.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.3.4.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.4 Special File Creation

5.4.1 Make a Directory

Function: *mkdir()*.

5.4.1.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.4.1.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.4.1.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.4.1.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.4.2 Make a FIFO Special File

Function: *mkfifo()*.

5.4.2.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.4.2.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.4.2.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.4.2.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.5 File Removal

5.5.1 Remove Directory Entries

Function: *unlink()*.

5.5.1.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.5.1.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.5.1.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.5.1.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.5.2 Remove a Directory

Function: *rmdir()*.

5.5.2.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.5.2.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.5.2.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.5.2.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.5.3 Rename a File

Function: *rename()*.

5.5.3.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.5.3.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.5.3.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.5.3.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.6 File Characteristics

5.6.1 File Characteristics: Header and Data Structure

<sys/stat.h>

There are only IEEE Std 2003.1-1992 {4} assertions in this clause: there are no POSIX.1b {3} assertions.

5.6.1.1 <sys/stat.h> File Types

D_1 If a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether message queues, semaphores, or shared memory objects are implemented as distinct file types, and does so in 5.6.1.1.

ELSE NO_OPTION

Conformance for stat.h: PASS, NO_OPTION

1 **SETUP:** Include the header <sys/stat.h>.

TEST: The macros *S_TYPEISMQ()*, *S_TYPEISSEM()*, and *S_TYPEISSHM()* are defined.

Conformance for stat.h: PASS

2 **IF** *PCTS_MQ_AS_FILE_TYPE* **THEN**

SETUP: Include the header <sys/stat.h>. Also, create a message queue and put its information into the *stat* structure referenced by the *buf* parameter.

TEST: The macro call *S_TYPEISMQ(buf)* evaluates to a nonzero value.

ELSE NO_TEST_SUPPORT

Conformance for stat.h: PASS, NO_TEST_SUPPORT

3 **IF** *PCTS_MQ_AS_FILE_TYPE* **THEN**

SETUP: Include the header <sys/stat.h>. Do not put the information associated with a message queue type file into the *stat* structure referenced by the *buf* parameter.

TEST: The macro call *S_TYPEISMQ(buf)* evaluates to a zero value.

ELSE NO_TEST_SUPPORT

Conformance for stat.h: PASS, NO_TEST_SUPPORT

4 **IF** Not *PCTS_MQ_AS_FILE_TYPE* **THEN**

SETUP: Include the header <sys/stat.h>. Do not put the information associated with a message queue type file into the *stat* structure referenced by the *buf* parameter.

TEST: The macro call *S_TYPEISMQ(buf)* evaluates to a zero value.

ELSE NO_TEST_SUPPORT

Conformance for stat.h: PASS, NO_TEST_SUPPORT

5 **IF** *PCTS_SEM_IS_FD* **THEN**

- SETUP:** Include the header `<sys/stat.h>`. Also, create a semaphore and put its information into the `stat` structure referenced by the `buf` parameter.
- TEST:** The macro call `S_TYPEISSEM(buf)` evaluates to a nonzero value.
- ELSE NO_TEST_SUPPORT**
Conformance for stat.h: PASS, NO_TEST_SUPPORT
- 6 IF PCTS_SEM_IS_FD THEN**
- SETUP:** Include the header `<sys/stat.h>`. Do not put the information associated with a semaphore type file into the `stat` structure referenced by the `buf` parameter.
- TEST:** The macro call `S_TYPEISSEM(buf)` evaluates to a zero value.
- ELSE NO_TEST_SUPPORT**
Conformance for stat.h: PASS, NO_TEST_SUPPORT
- 7 IF PCTS_SEM_IS_FD THEN**
- SETUP:** Include the header `<sys/stat.h>`. Do not put the information associated with a semaphore type file into the `stat` structure referenced by the `buf` parameter.
- TEST:** The macro call `S_TYPEISSEM(buf)` evaluates to a zero value.
- ELSE NO_TEST_SUPPORT**
Conformance for stat.h: PASS, NO_TEST_SUPPORT
- 8 IF PCTS_SHM_AS_FILE_TYPE THEN**
- SETUP:** Include the header `<sys/stat.h>`. Also, create a shared memory object and put its information into the `stat` structure referenced by the `buf` parameter.
- TEST:** The macro call `S_TYPEISSHM(buf)` evaluates to a nonzero value.
- ELSE NO_TEST_SUPPORT**
Conformance for stat.h: PASS, NO_TEST_SUPPORT
- 9 IF PCTS_SHM_AS_FILE_TYPE THEN**
- SETUP:** Include the header `<sys/stat.h>`. Do not put the information associated with a shared memory object type file into the `stat` structure referenced by the `buf` parameter.
- TEST:** The macro call `S_TYPEISSHM(buf)` evaluates to a zero value.
- ELSE NO_TEST_SUPPORT**
Conformance for stat.h: PASS, NO_TEST_SUPPORT
- 10 IF PCTS_SHM_AS_FILE_TYPE THEN**
- SETUP:** Include the header `<sys/stat.h>`. Do not put the information associated with a shared memory object type file into the `stat` structure referenced by the `buf` parameter.
- TEST:** The macro call `S_TYPEISSHM(buf)` evaluates to a nonzero value.
- ELSE NO_TEST_SUPPORT**
Conformance for stat.h: PASS, NO_TEST_SUPPORT

5.6.1.2 `<sys/stat.h>` File Modes

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.6.1.3 `<sys/stat.h>` Time Entries

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.6.2 Get File Status

Functions: `stat()`, `fstat()`.

5.6.2.1 Synopsis

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.6.2.2 Description

- 1** **SETUP:** Open a shared memory object using *shm_open()*. Call *fstat()* with the *filides* parameter referring to that shared memory object.
- TEST:** The *stat* structure pointed to by the *buf* argument has the *S_IRUSR*, *S_IWUSR*, *S_IRGRP*, *S_IWGRP*, *S_IROTH*, and *S_IWOTH* file permission bits updated correctly.
- Conformance for *fstat*: *PASS*

5.6.2.3 Returns

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.6.2.4 Errors

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.6.3 Check File Accessibility

Function: *access()*.

5.6.3.1 Synopsis

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.6.3.2 Description

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.6.3.3 Returns

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.6.3.4 Errors

There are only IEEE Std 2003.1 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.6.4 Change File Modes

Function: *chmod()*, *fchmod ()*.

5.6.4.1 Synopsis

- 1**
- M_GA_stdC_proto_decl(int;fchmod;,int;filides, mode_t mode; sys/stat.h;;;)*
SEE: Assertion *GA_stdC_proto_decl* in 2.7.3
 Conformance for *fchmod*: *PASS[1, 2], NO_OPTION*
- 2**
- M_GA_commonC_int_result_decl(fchmod; sys/stat.h;;;)*
SEE: Assertion *GA_commonC_int_result_decl* in 2.7.3
 Conformance for *fchmod*: *PASS[1, 2], NO_OPTION*
- 3**

M_GA_macro_result_decl(int;fchmod; sys/stat.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4
Conformance for *fchmod*: PASS, NO_OPTION

4

M_GA_macro_args(fchmod; sys/stat.h;;)

SEE: Assertion GA_macro_macro_args in 2.7.3
Conformance for *fchmod*: PASS, NO_OPTION

5.6.4.2 Description

5

IF PCTSfchmod THEN

SETUP: Open a file where the effective user ID of the calling process matches the file owner.

TEST: A call *fchmod(fildes, mode)* sets the file permission bits from the corresponding bits in the *mode* argument.

TR: For regular files: test all file permission bits.
For shared memory objects: test only the S_IRUSR, S_IWUSR, S_IRGRP, S_IWGRP, S_IROTH, and S_IWOTH file permission bits.

ELSE NO_OPTION

Conformance for *fchmod*: PASS, NO_OPTION

6

IF PCTS_fchmod THEN

IF PCTS_GAP_MODES_fchmod THEN

SETUP: Open a file where the effective user ID of the calling process does not match the file owner, and acquire the appropriate privilege to change the file permission bits of the file using *fchmod()*.

TEST: A call *fchmod(fildes, mode)* sets the file permission bits from the corresponding bits in the *mode* argument.

TR : For regular files: test all file permission bits.

For shared memory objects: test only the S_IRUSR, S_IWUSR, S_IRGRP, S_IWGRP, S_IROTH, and S_IWOTH file permission bits.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *fchmod*: PASS, NO_TEST_SUPPORT, NO_OPTION

7

IF PCTS_fchmod and PCTS_CHMOD_SUID THEN

SETUP: Open a file where the effective user ID of the calling process matches the file owner.

TEST: A call *fchmod(fildes, mode)* sets the S_ISUID bit from the corresponding bit in the *mode* argument.

TR: For regular files: test all file permission bits.
For shared memory objects: test only the S_IRUSR, S_IWUSR, S_IRGRP, S_IWGRP, S_IROTH, and S_IWOTH file permission bits.

ELSE NO_OPTION

Conformance for *fchmod*: PASS, NO_OPTION

8

IF PCTS_fchmod and PCTS_CHMOD_SUID THEN

IF PCTS_GAP_SUID_fchmod THEN

SETUP: Open a file where the effective user ID of the calling process does not match the file owner, and acquire the appropriate privilege to change the file permission bits of the file using *fchmod()*.

TEST: A call *fchmod(fildes, mode)* sets the S_ISUID bit from the corresponding bit in the *mode* argument.

TR: For regular files: test all file permission bits.
For shared memory objects: test only the S_IRUSR, S_IWUSR, S_IRGRP, S_IWGRP, S_IROTH, and S_IWOTH file permission bits.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for fchmod:PASS, NO_TEST_SUPPORT, NO_OPTION

9 IF PCTS_fchmod and PCTS_CHMOD_SGID THEN

SETUP: Open a file where the effective user ID of the calling process matches the file owner.

TEST: A call *fchmod(fildes, mode)* sets the S_ISGID bit from the corresponding bit in the *mode* argument.

TR: For regular files: test all file permission bits.
For shared memory objects: test only the S_IRUSR, S_IWUSR, S_IRGRP, S_IWGRP, S_IROTH, and S_IWOTH file permission bits.

ELSE NO_OPTION

Conformance for fchmod:PASS, NO_OPTION

10 IF PCTS_fchmod and PCTS_CHMOD_SGID THEN

IF PCTS_GAP_SGID_fchmod THEN

SETUP: Open a file where the effective user ID of the calling process does not match the file owner, and acquire the appropriate privilege to change the file permission bits of the file using *fchmod()*.

TEST: A call *fchmod(fildes, mode)* sets the S_ISGID bit from the corresponding bit in the *mode* argument.

TR: For regular files: test all file permission bits.

For shared memory objects: test only the S_IRUSR, S_IWUSR, S_IRGRP, S_IWGRP, S_IROTH, and S_IWOTH file permission bits.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for fchmod:PASS, NO_TEST_SUPPORT, NO_OPTION

11 IF PCTS_fchmod THEN

IF PCTS_RAP_SGID_fchmod THEN

SETUP: Open a regular file such that the group ID of the file does not match the effective group ID or one of the supplementary group IDs of the process, and one or more of the S_IXUSR, S_IXGRP, or S_IXOTH bits of the file mode are set. Release appropriate privileges to change the S_ISGID bit in the mode of the file.

TEST: Bit S_ISGID (set group ID on execution) in the mode of the file is cleared upon successful return from *fchmod()*.

TR: Test for each of the following bits being set individually in the file mode: S_IXUSR, S_IXGRP, and S_IXOTH.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for fchmod:PASS, NO_TEST_SUPPORT, NO_OPTION

12 IF PCTS_RAP_SGID_chmod THEN

SETUP: Open a regular such that the group ID of the file does not match the effective group ID, or one of the supplementary group IDs of the process and one or more of the S_IXUSR, S_IXGRP, or S_IXOTH bits of the file mode are set. Release appropriate privileges to change the S_ISGID bit in the mode of the file.

TEST: Bit S_ISGID (set group ID on execution) in the mode of the file is cleared upon successful return from *chmod()*.

TR: Test for each of the following bits being set individually in the file mode: S_IXUSR, S_IXGRP, and S_IXOTH.

ELSE NO_TEST_SUPPORT

Conformance for chmod:PASS, NO_TEST_SUPPORT,

13 IF PCTS_fchmod THEN

TEST: Upon successful completion, the *fchmod()* function marks for update the *st_ctime* field of the file.

ELSE NO_OPTION

Conformance for *fchmod*: PASS, NO_OPTION

5.6.4.3 Returns

R_1 IF PCTS_fchmod THEN

TEST: Upon successful completion, the *fchmod()* function returns a value of zero.

ELSE NO_OPTION

SEE: Assertions in 5.6.4.2.

R_2 IF PCTS_fchmod THEN

TEST: Upon an unsuccessful completion, the *fchmod()* function returns a value of -1, sets *errno* to indicate the error, and no change to the file *mode* occurs.

ELSE NO_OPTION

SEE: Assertions in 5.6.4.4.

5.6.4.4 Errors

14 IF PCTS_fchmod THEN

SETUP: Call *fchmod()* with a *fildes* argument that is not a valid file descriptor.

TEST: A call to the *fchmod()* function on such a *fildes* returns a value of -1, sets *errno* to [EBADF], and no change to the file *mode* occurs.

ELSE NO_OPTION

Conformance for *fchmod*: PASS, NO_OPTION

15 IF not PCTS_fchmod THEN

TEST: A call to the *fchmod()* function on such a *fildes* returns a value of -1, sets *errno* to [ENOSYS], and no change to the file *mode* occurs.

ELSE NO_OPTION

Conformance for *fchmod*: PASS, NO_OPTION

16 IF PCTS_fchmod THEN

SETUP: The effective user ID does not match the owner of the file, and the calling process does not have the appropriate privileges.

TEST: A call to the *fchmod()* function on such a *fildes* returns a value of -1, sets *errno* to [EPERM], and no change to the file *mode* occurs.

ELSE NO_OPTION

Conformance for *fchmod*: PASS, NO_OPTION

17 IF PCTS_fchmod THEN

IF PCTS_ROFS THEN

SETUP: Open a file that resides on a read-only file system.

TEST: A call to the *fchmod()* function on such a *fildes* returns a value of -1, sets *errno* to [EROFS], and no change to the file *mode* occurs.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *fchmod*: PASS, NO_TEST_SUPPORT, NO_OPTION

18 IF PCTS_fchmod and PCTS_EINVAL_fchmod THEN

SETUP: Open a file such that the *fildes* argument refers to a pipe.

TEST: A call to the *fchmod()* function on such a *fildes* returns a value of -1, sets *errno* to [EINVAL], and no change to the file *mode* occurs.

ELSE NO_OPTION

Conformance for *fchmod*: PASS, NO_OPTION

5.6.5 Change Owner and Group of a File

Function: *chown()*.

5.6.5.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.6.5.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.6.5.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.6.5.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.6.6 Set File Access and Modification Times

Function: *utime()*.

5.6.6.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.6.6.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.6.6.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.6.6.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.6.7 Truncate a File to a Specified Length

Function: *ftruncate()*.

1

M_GA_stdC_proto_decl(int; ftruncate; int fildes, off_t length; unistd.h;;)

SEE: Assertion GA_stdC_proto_decl in 2.7.3

Conformance for *ftruncate*: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(ftruncate; unistd.h;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3

Conformance for *ftruncate*: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; ftruncate; unistd.h;;)

SEE: Assertion GA_macro__result_decl in 1.3.4

Conformance for *ftruncate*: PASS, NO_OPTION

4

M_GA_macro_args(ftruncate; unistd.h;;)

SEE: Assertion GA_macro__args in 2.7.3

Conformance for *ftruncate*: PASS, NO_OPTION

5.6.7.2 Description

5

IF *PCTS_ftruncate* **THEN**

SETUP: Open a regular file where the size of each file exceeds the *length* specified in the *ftruncate()* call to be tested.

TEST: The call *ftruncate(fildes, length)* causes the regular file known by the file descriptor *fildes* to be truncated to *length*.

TR: Test for write-only and read-write access to the file.

ELSE NO_OPTION

Conformance for *ftruncate*: PASS, NO_OPTION

D_1 IF *PCTS_ftruncate* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether the file is changed, or its size increased after a call *ftruncate(fildes, length)* if the file previously was smaller than *length*, does so in 5.6.7.2.

ELSE NO_OPTION

Conformance for *ftruncate*: PASS, NO_OPTION

6

IF *PCTS_ftruncate* **THEN**

IF *PCTS_EXTEND_ON_ftruncate* **THEN**

SETUP: Open a regular file whose size is less than the size to which it will be truncated.

TEST: The call *ftruncate(fildes, length)*, where *length* is greater than the size of the file, causes the extended area to appear as if it were zero-filled.

TR: Test for write-only and read-write access to the file.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *ftruncate*: PASS, NO_TEST_SUPPORT, NO_OPTION

7

IF *PCTS_ftruncate* and *PCTS_shm_open* **THEN**

TEST: A call *ftruncate(fildes, length)*, where *fildes* references a shared memory object, sets the size of the shared memory object to *length*.

TR: Test for shared memory objects both larger and smaller than *length*.

ELSE NO_OPTION

Conformance for *ftruncate*: PASS, NO_OPTION

D_2 IF *PCTS_ftruncate* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the result of calling *ftruncate()* on a file that is not a regular file or a shared memory object does so in 5.6.7.2.

ELSE NO_OPTION

Conformance for *ftruncate*: PASS, NO_OPTION

- 8** **IF** *PCTS_ftruncate* and *PCTS_mmap* **THEN**
 IF *_POSIX_MEMORY_PROTECTION* **THEN**
 SETUP: Memory map a file so that the effect of *ftruncate*() is to decrease the size of a file and whole pages beyond the new end were previously mapped.
 TEST: The whole mapped pages beyond the new end after a call to *ftruncate*() are discarded and references to them result in delivery of a SIGBUS signal.
- ELSE NO_TEST_SUPPORT**
ELSE NO_OPTION
Conformance for *ftruncate*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 9** **IF** *PCTS_ftruncate* and *PCTS_shm_open* and *PCTS_mmap* **THEN**
 IF *_POSIX_MEMORY_PROTECTION* **THEN**
 SETUP: Memory map a shared memory object so that the effect of *ftruncate*() is to decrease the size of the shared memory object and whole pages beyond the new end were previously mapped.
 TEST: The whole mapped pages beyond the new end after a call to *ftruncate*() are discarded and references to them result in delivery of a SIGBUS signal.
- ELSE NO_TEST_SUPPORT**
ELSE NO_OPTION
Conformance for *ftruncate*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 10** **IF** *PCTS_ftruncate* **THEN**
 TEST: The value of the seek pointer is not to be modified by a ll to *ftruncate*().
ELSE NO_OPTION
Conformance for *ftruncate*: PASS, NO_OPTION
- 11** **IF** *PCTS_ftruncate* **THEN**
 TEST: Upon successful completion, the *ftruncate*() function marks for update the *st_ctime* and *st_mtime* fields of the file.
ELSE NO_OPTION
Conformance for *ftruncate*: PASS, NO_OPTION
- 12** **IF** *PCTS_ftruncate* **THEN**
 TEST: The file is unaffected by an unsuccessful call to *ftruncate*().
TR: Test the size of the file, as well as the *st_ctime* and *st_mtime* fields of the file.
ELSE NO_OPTION
Conformance for *ftruncate*: PASS, NO_OPTION

5.6.7.3 Returns

- R_1** **IF** *PCTS_ftruncate* **THEN**
 TEST: Upon successful completion, the *ftruncate*() function returns to zero.
ELSE NO_OPTION
SEE: Assertions in 5.6.7.2.

- R_2** **IF** *PCTS_ftruncate* **THEN**
 TEST: An unsuccessful call to the *ftruncate*() function returns -1 and sets *errno* to indicate the error.
ELSE NO_OPTION
SEE: Assertions in 5.6.7.4.

5.6.7.4 Errors

- 13** **IF** *PCTS_ftruncate* **THEN**
 TEST: A call to *ftruncate*(), where the *fildev* argument is not a valid file descriptor open for writing, returns -1 and sets *errno* to [EBADF].
TR: Test the size of the file, as well as the *st_ctime* and *st_mtime* fields of the file.

ELSE NO_OPTION*Conformance for ftruncate: PASS, NO_OPTION***14 IF PCTS_ftruncate THEN****TEST:** A call to *ftruncate()*, where the *fildev* argument does not refer to a file on which this operation is possible, returns -1 and sets *errno* to [EINVAL]**ELSE NO_OPTION***Conformance for ftruncate: PASS, NO_OPTION***15 IF PCTS_ftruncate THEN****TEST:** A call to *ftruncate()*, where the file resides on a read-only file system, returns -1 and sets *errno* to [EROFS]**ELSE NO_OPTION***Conformance for ftruncate: PASS, NO_OPTION*

5.7 Configurable Pathname Variables

5.7.1 Get Configurable Pathname Variables

Functions: *pathconf()*, *fpathconf()*.

5.7.1.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.7.1.2 Description

1 SETUP: Include the header `<unistd.h>`.**TEST:** The constants `{_PC_ASYNC_IO}` and `{_PC_SYNC_IO}` are defined.*Conformance for pathconf: PASS***2 FOR:** *pathconf()*, and *fpathconf()***IF** `{_POSIX_ASYNC_IO}` is defined when `<unistd.h>` is included **THEN****SETUP:** Include the header `<unistd.h>`**TEST:** A call *function()* with a *name* parameter equal to `{_POSIX_ASYNC_IO}` returns a value equal to `{_POSIX_ASYNC_IO}`.**ELSE NO_OPTION***Conformance for pathconf, fpathconf: PASS, NO_OPTION***3 FOR:** *pathconf()* and *fpathconf()***SETUP:** Include the header `<unistd.h>`**TEST:** A call *function()* with a *name* parameter equal to `{_POSIX_ASYNC_IO}` that refers to a file other than a directory returns a value corresponding to the option `{_POSIX_ASYNC_IO}` for that file.*Conformance for pathconf, fpathconf: PASS***4 FOR:** *pathconf()* and *fpathconf()***IF** `{_POSIX_PRIO_IO}` is defined when `<unistd.h>` is included **THEN****SETUP:** Include the header `<unistd.h>`.**TEST:** A call *function()* with a *name* parameter equal to `{_POSIX_PRIO_IO}` returns a value equal to `{_POSIX_PRIO_IO}`.**ELSE NO_OPTION***Conformance for pathconf, fpathconf: PASS, NO_OPTION***5 FOR:** *pathconf()* and *fpathconf()***SETUP:** Include the header `<unistd.h>`.

TEST: A call *function()* with a *name* parameter equal to `{_POSIX_PRIO_IO}` that refers to a file other than a directory returns a value corresponding to the option `{_POSIX_PRIO_IO}` for that file.

Conformance for pathconf, fpathconf: PASS

- 6** **FOR:** *pathconf()* and *fpathconf()*
IF `{_POSIX_SYNC_IO}` is defined when `<unistd.h>` included **THEN**
SETUP: Include the header `<unistd.h>`.
TEST: A call *function()* with a *name* parameter equal to `{_PC_SYNC_IO}` returns a value equal to `{_PC_SYNC_IO}`.
ELSE NO_OPTION
Conformance for pathconf, fpathconf: PASS, NO_OPTION

- 7** **FOR:** *pathconf()* and *fpathconf()*
SETUP: Include the header `<unistd.h>`.
TEST: A call *function()* with a *name* parameter equal to `{_PC_SYNC_IO}` that refers to a file other than a directory returns a value corresponding to the option `{_POSIX_SYNC_IO}` for that file.
Conformance for pathconf, fpathconf: PASS

D_1 IF a PCD.lb documents the following **THEN**

TEST: A PCD.lb that documents whether an implementation supports an association of the variable name with the specified file, if the *path* argument to *pathconf()* or *fildes* argument to *pathconf()* refers to a directory, does so in 5.7.1.3.

ELSE NO_OPTION

Conformance for pathconf, fpathconf: PASS, NO_OPTION

5.7.1.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

5.7.1.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

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Section 6: Input and Output Primitives

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b{3} assertions.

6.1 Pipes

6.1.1 Create an Inter-Process Channel

Function: *pipe()*.

6.1.1.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b{3} assertions.

6.1.1.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

6.1.1.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b{3} assertions.

6.1.1.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

6.2 File Descriptor Manipulation

6.2.1 Duplicate an Open File Descriptor

Function: *dup()*, *dup2()*.

6.2.1.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b{3} assertions.

6.2.1.2 Description

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

6.2.1.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b{3} assertions.

6.2.1.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b{3} assertions.

6.3 File Descriptor Deassignment

6.3.1 Close a File

Function: *close()*

6.3.1.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b{3} assertions

6.3.1.2 Description

- 1 **IF** { _POSIX_ASYNCHRONOUS_IO } **THEN**
 TEST: An asynchronous I/O operation that is not canceled completes as if the *close()* operation had not yet occurred.
 ELSE NO_OPTION
 Conformance for *close*: PASS, NO_TEST, NO_OPTION
- 2 **IF** { _POSIX_ASYNCHRONOUS_IO } **THEN**
 TEST: All operations that are not canceled complete as if the *close()* blocked until the operations completed
 ELSE NO_OPTION
 Conformance for *close*: PASS, NO_TEST, NO_OPTION
- D-1 **TEST:** The PCD.1b documents whether any I/O operations are canceled, and which I/O operation may be canceled upon a call to the *close()* function, and does so in 6.3.1.2.
 Conformance for *close*: PASS
- 3 **IF** *PCTS_shm_open* and *PCTS_mmap* **THEN**
 SETUP: Create and map a memory object that remains referenced at the last close.
 TEST: After a call to *close()*, the entire contents of the memory object persist until the memory object becomes unreferenced.
 TR: Test for shared memory.

 If { POSIX_MAPPED_FILES }; test for memory mapped files.
 ELSE NO_OPTION
 Conformance for *close*: PASS, NO_OPTION
- 4 **IF** *PCTS_shm_open* and *PCTS_mmap* **THEN**
 SETUP: Create a memory object and map it in at least two processes. Then unlink the memory object. Perform the last close of the memory object such that the close results in the memory object becoming unreferenced.
 TEST: A call to *close()* removes the memory object.
 ELSE NO_OPTION
 Conformance for *close*: PASS, NO_OPTION

6.3.1.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause, there are no POSIX.1b {3} assertions.

6.3.1.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b{3} assertions.

6.4 Input and Output

6.4.1 Read from a File

Function: *read()*

6.4.1.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b{3} assertions

6.4.1.2 Description

- 1 **IF** *PCTS_read* and {POSIX_SYNCHRONIZED_IO} **THEN**
 SETUP: Open a file by calling *open()* with O_RSYNC and O_DSYNC set in the *oflag* parameter.
 TEST: A read operation initiated by calling *read()* either completes by transferring an image of the data to the requesting process or, if unsuccessful, by diagnosing and returning an indicator of the error.
 TR: Test for regular files and, if PCTS_GTI_DEVICE, terminals.
 NOTE: There is no known portable test method for this assertion.
 ELSE NO_OPTION
 SEE: Assertion GA_syncIODataIntegrityRead in 2.2.2.119.
 Conformance for read: PASS, NO_TEST, NO_OPTION

- 2 **IF** *PCTS_read* and {POSIX_SYNCHRONIZED_IO} **THEN**
 SETUP: Open a file by calling *open()* with O_RSYNC and O_DSYNC set in the *oflag* parameter.
 TEST: When the synchronized read operation is initiated by calling *read()*, any pending write requests affecting the data to be read are written to the physical medium containing the file prior to reading the data.
 TR: Test for regular files.
 NOTE: There is no known portable test method for this assertion.
 ELSE NO_OPTION
 SEE: Assertion GA_syncIODataIntegrityWbeforeR in 2.2.2.119.
 Conformance for read: PASS, NO_TEST, NO_OPTION

- 3 **IF** *PCTS_read* and {POSIX_SYNCHRONIZED_IO} **THEN**
 SETUP: Open a file by calling *open()* with O_RSYNC and O_DSYNC set in the *oflag* parameter.
 TEST: When the synchronized read operation is initiated by calling *read()*, any pending write request affecting the data to be read are written to the physical medium containing the file prior to reading the data, and the following file attributes are also written to the physical medium containing the file prior to returning to the calling process:
 1. File mode
 2. File serial number
 3. ID of device containing this file
 4. Number of links
 5. User ID of the owner of the file
 6. Group ID of the group of the file
 7. The file size in bytes
 8. Time of last access

9. Time of last data modification

10. Time of last file status change.

TR: Test for regular files.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

SEE: Assertion GA_syncIOFileIntegrityRead in 2.2.2.120.

Conformance for read: PASS, NO_TEST, NO_OPTION

D-1 IF a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the result of a call to the *read()* function when *filides* refers to a shared memory object does so in 6.4.1.2.

ELSE NO_OPTION

Conformance for read: PASS, NO_OPTION

6.4.1.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

6.4.1.4. Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

6.4.2 Write to a File

Function: *write()*.

6.4.2.1. Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

6.4.2.2. Description

1 IF *PCTS_write* and {POSIX_SYNCHRONIZED_IO} **THEN**

SETUP: Open a file by calling *open()* with O_DSYNC set in the *oflag* parameter.

TEST: A write operation initiated by calling *write()* either completes by transferring an image of the data to the physical medium containing the file or, if unsuccessful, by diagnosing and returning an indicator of the error.

TR: Test for regular files and, if PCTS_GTI_DEVICE, terminals.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

SEE: Assertion GA_syncIODataIntegrityWrite in 2.2.2.119.

Conformance for write: PASS, NO_TEST, NO_OPTION

2 IF *PCTS_write* and {POSIX_SYNCHRONIZED_IO} *PCTS_write* and {POSIX_SYNCHRONIZED_IO} **THEN**

SETUP: Open a file by calling *open()* with O_SYNC set in the *oflag* parameter.

TEST: At the time that the synchronized write operation initiated by calling *write()* occurs, the data are written to the physical medium containing the file and the following file attributes are also written to the physical medium containing the file prior to returning to the calling process:

1. File mode
2. File serial number
3. ID of the device containing this file
4. Number of links
5. User ID of the owner of the file

6. Group ID of the group of the file
7. The file size in bytes
8. Time of last access
9. Time of last data modification
10. Time of last file status change.

TR: Test for regular files.

NOTE: There is no known portable test method for this assertion.

ELSE *NO_OPTION*

SEE: Assertion GA_syncIOFileIntegrityWrite in 2.2.2.120.

Conformance for write: PASS, NO_TEST, NO_OPTION

D-1 **IF** a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the result of a call to the *write()* function when *files* refers to a shared memory object does so in 6.4.2.2.

ELSE *NO_OPTION*

Conformance for write: PASS, NO_OPTION

6.4.2.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

6.4.2.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

6.5 Control Operations on Files

6.5.1 Data Definitions for File Control Operations

- 1** **SETUP:** Include the header `<fcntl.h>`.
TEST: The constants `O_DSYNC`, `O_RSYNC`, and `O_SYNC` are defined and are unique values with respect to each other and to `O_CREAT`, `O_EXCL`, `O_NOCTTY`, `O_TRUNC`, `O_APPEND`, `O_NONBLOCK`, `O_RDONLY`, `O_RDWR`, and `O_WRONLY`.
Conformance for fcntl.h: PASS

NOTE: IEEE Std 2003.1-1992 {4} was not as explicit as the above assertion regarding the uniqueness of the constants.

6.5.2 File Control

Function: *fcntl()*.

6.5.2.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

6.5.2.2 Description

All of the assertions for the Description clause of *fcntl()*, except for those relating to file locking and setting file status flags, were rewritten from IEEE Std 2003.1-1992 {4} because of the requirement that they apply to shared memory objects and the change in the form of assertions between IEEE Std 2003.1-1992 {4} and this standard.

(IEEE Std 2003.1-1992 {4})04

UNUSED

(IEEE Std 2003.1-1992 {4})05
UNUSED

(IEEE Std 2003.1-1992 {4})06
UNUSED

IEEE Std 2003.1-1992 {4})07
UNUSED

IEEE Std 2003.1-1992 {4})08
UNUSED

IEEE Std 2003.1-1992 {4})09
UNUSED

IEEE Std 2003.1-1992 {4})10
UNUSED

IEEE Std 2003.1-1992 {4})11
UNUSED

IEEE Std 2003.1-1992 {4})12
UNUSED

- 4 TEST:** A call *fcntl(fildes, F_DUPFD, arg)* creates a new file descriptor that
1. Is the lowest numbered one available greater than or equal to the argument *arg*
 2. Refers to the same open file description (file pointer, access mode, and file status flags) as the original file descriptor
 3. Shares the same locks as the original file descriptor, if *fildes* does not refer to a shared memory object
 4. Has the `FD_CLOEXEC` flag clear.
- TR:** Test for a regular file. If *PCTS_shm_open*: Test for *fildes* referring to a shared memory object.
Conformance for *fcntl*: PASS
- 5 TEST:** A call *fcntl(fildes, F_GETFD)* returns the status of the file descriptor flags.
TR: Test for a regular file. If *PCTS_shm_open*: Test for *fildes* referring to a shared memory object.
Conformance for *fcntl*: PASS
- 6 FOR:** *execl()*, *execv()*, *execle()*, *execve()*, *execlp()* and *execvp()*.
TEST: A call *fcntl(fildes, F_SETFD, arg)*, where the `FD_CLOEXEC` flag in *arg* is nonzero, sets the close-on-exec flag for the file associated with *fildes* and *function()*.
TR: Test for a regular file. If *PCTS_shm_open*: Test for *fildes* referring to a shared memory object.
Conformance for *fcntl*: PASS
- 7 FOR:** *execl()*, *execv()*, *execle()*, *execve()*, *execlp()*, and *execvp()*.
TEST: A call *fcntl(fildes, F_SETFD, arg)*, where the `FD_CLOEXEC` flag in *arg* is nonzero, sets the close-on-exec flag for the file associated with *fildes* and *function()*.
TR: Test for a regular file. If *PCTS_shm_open*: Test for *fildes* referring to a shared memory object.
Conformance for *fcntl*: PASS

- 8 TEST:** A call *fcntl(fildes, F_GETFL)* returns the file status flags *O_APPEND*, *O_DSYNC*, *O_NONBLOCK*, *O_RSUNC*, and *O_SYNC*, and the file access modes *O_RDONLY*, *O_RDWR* and *O_WRONLY*.
TR: Test for a regular file. If *PCTS_shm_open*: Test for *fildes* referring to a shared memory object.
Conformance for fcntl: PASS
- 9 TEST:** A call *fcntl(fildes, F_SETFL, 0)* sets the status flags for the file referenced by *fildes* to 0.
TR: Test for regular files.
Conformance for fcntl: PASS
- 10 TEST:** A call *fcntl(fildes, F_SETFL, arg)* sets the status flags for the file referenced by *fildes* to values in *arg*.
TR: Test with *arg* having the values *O_APPEND* and *O_NONBLOCK*, individually and together, for regular files.
 If *{_POSIX_SYNCHRONIZED_IO}*: Test with *arg* having the values *O_APPEND*, *O_DSYNC*, *O_NONBLOCK*, *O_RSUNC*, and *O_SYNC*, individually and all together, on a file supporting *{_POSIX_SYNCHRONIZED_IO}*.
Conformance for fcntl: PASS
- D-1 IF** *PCTS_shm_open* and PCD.1b that documents the following **THEN**
TEST: A PCD.1b that documents the effect of the values *F_SETFL*, *F_GETLK*, *F_SETLK*, and *F_SETLKW* for the argument *cmd* of the function *fcntl()*, when the file descriptor *fildes* refers to a shared member object, does so in 6.5.2.2.
ELSE NO_OPTION
Conformance for fcntl: PASS, NO_OPTION.

6.5.2.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

6.5.2.4 Errors

(IEEE Std 2003.1-1992 {4})41

UNUSED

(IEEE Std 2003.1-1992 {4})42

UNUSED

(IEEE Std 2003.1-1992 {4})48

UNUSED

(IEEE Std 2003.1-1992 {4})49

UNUSED

- 41 TEST:** A call *fcntl(fildes, F_DUPFD, arg)*, where *arg* is negative, returns -1 and sets *errno* to [EINVAL].
TR: Test for a regular file. If *PCTS_shm_open*: Test for *fildes* referring to a shared memory object.
Conformance for fcntl: PASS
- 42 IF** a call *sysconf()* with an argument of *{_SC_OPEN_MAX}* does not return -1 **THEN**
TEST: A call *fcntl(fildes, F_DUPFD, arg)*, where *arg* is greater than or equal to [OPEN_MAX], returns -1 and sets *errno* to [EINVAL].
TR: Test for a regular file. If *PCTS_shm_open*: Test for *fildes* referring to a shared memory object.
ELSE NO_TEST_SUPPORT
Conformance for fcntl: PASS, NO_TEST_SUPPORT

- 42.1** **IF** a call `sysconf()` with an argument of `{_SC_OPEN_MAX}` returns -1 **THEN**
 TEST: A call `fcntl(fildes, F_DUPFD, arg)`, where *arg* is equal to `[PCTS_OPEN_MAX]`, returns a valid file descriptor and does not set *errno* to `[EINVAL]`.
 TR: Test for a regular file. If `PCTS_shm_open`: Test for *fildes* referring to a shared memory object.
 ELSE NO_TEST_SUPPORT
 Conformance for `fcntl`: *PASS, NO_TEST_SUPPORT*
- 42.2** **IF** `PCTS_NO_SYNC_IO_FILE` **THEN**
 TEST: A call `fcntl(fildes, F_SETL, arg)`, where any of the file status flags `O_DSYNC`, `O_RSYNC`, OR `O_SYNC` are set in the *arg* argument, returns -1 and sets *errno* to `[EINVAL]`.
 TR: Test for a file that does not support synchronized I/O.
 ELSE NO_OPTION
 Conformance for `fcntl`: *PASS, NO_OPTION*
- 48** **IF** `{OPEN_MAX} ≤ PCTS_OPEN_MAX` **THEN**
 SETUP: Open `{OPEN_MAX}` files.
 TEST: A call `fcntl(fildes, F_DUPD, arg)` returns -1 and sets *errno* to `[EMFILE]`.
 TR: Test for a regular file. If `PCTS_shm_open`: Test for *fildes* referring to a shared memory object.
 ELSE NO_TEST_SUPPORT
 Conformance for `fcntl`: *PASS, NO_TEST_SUPPORT*
- 48.1** **IF** `{OPEN_MAX} > PCTS_OPEN_MAX` **THEN**
 SETUP: Open `PCTS_OPEN_MAX` files.
 TEST: A call `fcntl(fildes, F_DUPD, arg)` returns a valid file descriptor and does not set *errno* to `[EMFILE]`.
 TR: Test for a regular file. If `PCTS_shm_open`: Test for *fildes* referring to a shared memory object.
 ELSE NO_TEST_SUPPORT
 Conformance for `fcntl`: *PASS, NO_TEST_SUPPORT*
- 49** **IF** `{OPEN_MAX} ≤ PCTS_OPEN_MAX` **THEN**
 SETUP: Open `{OPEN_MAX}` files then make a file descriptor available whose value will be less than that specified in the *arg* support to `fcntl()`.
 TEST: A call `fcntl(fildes, F_DUPD, arg)`, where *arg* is greater than the lowest available file descriptor, returns -1 and sets *errno* to `[EMFILE]`.
 TR: Test for a regular file. If `PCTS_shm_open`: Test for *fildes* referring to a shared memory object.
 ELSE NO_TEST_SUPPORT
 Conformance for `fcntl`: *PASS, NO_TEST_SUPPORT*
- 49.1** **IF** `{OPEN_MAX} > PCTS_OPEN_MAX` **THEN**
 SETUP: Open `PCTS_OPEN_MAX` files then make a file descriptor available whose value will be less than that specified in the *arg* argument to `fcntl()`.
 TEST: A call `fcntl(fildes, F_DUPD, arg)` returns a valid file descriptor greater than or equal to the *arg* argument and does not set *errno* to `[EMFILE]`.
 TR: Test for a regular file. If `PCTS_shm_open`: Test for *fildes* referring to a shared memory object.
 ELSE NO_TEST_SUPPORT
 Conformance for `fcntl`: *PASS, NO_TEST_SUPPORT*

6.5.3 Reposition Read/Write File Offset

Function: `lseek()`.

6.5.3.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

6.5.3.2 Description

D-1 IF a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the result of calling the *lseek()* function when *files* refers to a shared memory object does so in 6.5.3.2.

ELSE *NO_OPTION*

Conformance for lseek: PASS, NO_OPTION

6.5.3.3. Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

6.5.3.4. Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

6.6 File Synchronization

D-1 **TEST:** The PCD.1b documents the hardware characteristics, upon which the implementation relies to ensure that data is successfully transferred for synchronized I/O operation, and does so in 6.6.

Conformance for syncio: PASS

6.6.1 Synchronize the State of a File

Function: *fsync()*.

6.6.1.1 Synopsis

1

M_GA_stdC_proto_decl(int;fsync; intfiles; unistd.h;;;)

SEE: Assertion GA_stdC_proto_decl in 2.7.3

Conformance for fsync: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(fsyntax; unistd.h;;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3

Conformance for fsync: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; fsyntax; unistd.h;;;)

SEE: Assertion GA_macro_result_decl in 1.3.4

Conformance for fsync: PASS, NO_OPTION

4

M_GA_macro_args (fsyntax; unistd.h;;;)

SEE Assertion GA_macro_args in 2.7.3

Conformance for fsync: PASS, NO_OPTION

6.6.1.2 Description**D-1 IF PCTS_ftime THEN**

TEST: The PCD.1b documents the manner in which the *ftime()* function transfers all data to the storage device associated with the open file description specified by the *fildev* argument in 6.6.1.2

ELSE NO_OPTION**5 IF PCTS_ftime THEN**

SETUP: Write data to a file so that an error condition will not exist when *ftime()* is called.

TEST: The *ftime()* function does not return until the system has completed transferring all data to the storage device associated with the open file description specified by the *fildev* argument.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTIONConformance for *ftime*: PASS, NO_TEST, NO_OPTION**R-1 IF PCTS_ftime THEN**

TEST: A call to the *ftime()* function returns an error that is detected.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION**SEE:** Assertions in 6.6.1.4**D-2 IF PCTS_ftime THEN**

TEST: The PCD.1b documents sufficient information for the user to determine whether it is possible to configure an application and installation to ensure that the data is stored with the degree of required stability for the intended use of the *ftime()* function in 6.6.1.2.

ELSE NO_OPTIONConformance for *ftime*: PASS, NO_OPTION**6 IF PCTS_ftime and {POSIX_SYNCHRONIZED_IO} THEN**

SETUP: Open a file for read-write access without specifying the *O_DSYNC*, *O_RSYNC*, or *O_DSYNC* in the *oflags* argument of *open()*. Then write some data to the file and read from another place in the file.

TEST: A call to the *ftime()* function forces all currently queued I/O operations associated with the file indicated by file descriptor *fildev* to the synchronized I/O file integrity completion state; that is, any pending write requests affecting the data to be read are written to the physical medium containing the file prior to reading the data. The following file attributes are also written to the physical medium containing the file prior to returning to the calling process:

1. File mode
2. File serial number
3. ID of device containing this file
4. Number of links
5. User ID of the owner of the file
6. Group ID of the group of the file
7. The file size in bytes
8. Time of last access
9. Time of last data modification
10. Time of last file status change.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION*Conformance for fsync: PASS, NO_TEST, NO_OPTION***7 IF PCTS_fsync and {POSIX_SYNCHRONIZED_IO} THEN****SETUP:** Open a file for read-write access without specifying the O_DSYNC, O_RSYNC, or O_DSYNC in the *oflags* argument of *open()*. Then write some data to the file.**TEST:** A call to the *fsync()* function forces all currently queued I/O operations associated with the file indicated by file descriptor *fildev* to the synchronized I/O file integrity completion state; that is the data are written to the physical medium containing the file, and the following file attributes are also written to the physical medium containing the file prior to returning to the calling process:

1. File mode
2. File serial number
3. ID of device containing this file
4. Number of links
5. User ID of the owner of the file
6. Group ID of the group of the file
7. The file size in bytes
8. Time of last access
9. Time of last data modification
10. Time of last file status change.

NOTE: There is no known portable test method for this assertion.**ELSE NO_OPTION***Conformance for fsync: PASS, NO_TEST, NO_OPTION***6.6.1.3 Returns****R-2 IF PCTS_fsync THEN****TEST:** Upon successful completion, the *fsync()* function returns 0.**ELSE NO_OPTION****SEE:** Assertions in 6.6.1.2.**8 TEST:** Upon unsuccessful completion, the *fsync()* returns -1 and set *errno* to indicate the error.**SEE:** Assertions in 6.6.1.4.*Conformance for fsync: PASS***6.6.1.4 Errors****9 IF PCTS_fsync THEN****SETUP:** Call the *fsync()* function with a *fildev* argument that is not a valid file descriptor.**TEST:** *fsync()* returns -1 and set *errno* to [EBADF].**ELSE NO_OPTION***Conformance for fsync: PASS, NO_OPTION***10 IF PCTS_fsync THEN****IF PCTS_NO_SYNC_IO_FILE THEN****SETUP:** Call the *fsync()* function with the *fildev* argument that is pointing to a file that does not support synchronized I/O.**TEST:** *fsync()* returns -1 and set *errno* to [EINVAL].**ELSE NO_TEST_SUPPORT**

ELSE NO_OPTION

Conformance for fsync: PASS, NO_TEST_SUPPORT, NO_OPTION

- 11 IF** not PCTS_fsync **THEN**
SETUP: Call the fsync() function, even though it is not supported by this implementation.
TEST: fsync() returns -1 and set errno to [ENOSYS].
ELSE NO_OPTION
Conformance for fsync: PASS, NO_OPTION

- 12 IF** PCTS_fsync **THEN**
TEST: In the event that any of the queued I/O operations fail, fsync() returns the error conditions defined for read() and write().
ELSE NO_OPTION
Conformance for fsync: PASS, NO_TEST, NO_OPTION

6.6.2 Synchronize the Data of a File

Function: fdatsync().

6.6.2.1 Synopsis

- 1**
M_GA_stdC_Proto_decl(int; fdatsync: int fildes; unistd.h;;;)
SEE: Assertion GA_stdC_proto_decl in 2.7.3
Conformance for fdatsync: PASS[1, 2] NO_OPTION
- 2**
M_GA_commonC_int_result_decl(int; fdatsync: int fildes; unistd.h;;;)
SEE: Assertion GA_commonC_int_result_decl in 2.7.3
Conformance for fdatsync: PASS[1, 2] NO_OPTION
- 3**
M_GA_macro_result_decl(int; fdatsync: int fildes; unistd.h;;;)
SEE: Assertion GA_macro_result_decl in 1.3.4
Conformance for fdatsync: PASS[1, 2] NO_OPTION
- 4**
M_GA_macro_args(int; fdatsync: int fildes; unistd.h;;;)
SEE: Assertion GA_macro_result_decl in 2.7.3
Conformance for fdatsync: PASS[1, 2] NO_OPTION

6.6.2.2 Description

- 5 IF** PCTS_fdatsync **THEN**
SETUP: Write data to a file so that an error condition will not exist when fdatsync() is called.
TEST: The fdatsync() function does not return until the system has completed transferring all data to the storage device associated with the open file description specified by the fildes argument.
NOTE: There is no known portable test method for this assertion.
ELSE NO_OPTION
Conformance for fdatsync: PASS, NO_TEST, NO_OPTION
- R_1 IF** PCTS_fdatsync **THEN**
TEST: A call to the fdatsync() function returns an error that is detected.
NOTE: There is no known portable test method for this assertion.
ELSE NO_OPTION
SEE: Assertions in 6.6.2.4

- 6 IF PCTS_fdatasync THEN**
SETUP: Open a file for read-write access without specifying O_DSYNC, O_RSYNC, or O_DSYNC in the *oflags* argument of *open()*. Then write some data to the file and read from another place in the file.
TEST: A call to the *fdatasync()* function forces all currently queued I/O operations associated with the file indicated by file descriptor *fildev* to the synchronized I/O data integrity completion state; that is, it completes by transferring an image of the data to the requesting process, and any pending write requests affecting the data to be read are written to the physical medium containing the file prior to reading the data.
NOTE: There is no known portable test method for this assertion.
ELSE NO_OPTION
Conformance for fdatasync: PASS, NO_TEST, NO_OPTION
- 7 IF PCTS_fdatasync THEN**
SETUP: Open a file for read-write access without specifying O_DSYNC, O_RSYNC, or O_DSYNC in the *oflags* argument of *open()*. Then write some data to the file.
TEST: A call to the *fdatasync()* function forces all currently queued I/O operations associated with the file indicated by file descriptor *fildev* to the synchronized I/O data integrity completion state; that is the data are written to the physical medium containing the file.
NOTE: There is no known portable test method for this assertion.
ELSE NO_OPTION
Conformance for fdatasync: PASS, NO_TEST, NO_OPTION

6.6.2.3 Returns

- R_2 IF PCTS_fdatasync THEN**
TEST: Upon successful completion, the *fdatasync()* function returns 0.
ELSE NO_OPTION
SEE: Assertions in 6.6.2.2.
- 8 TEST:** Upon unsuccessful completion, the *fdatasync()* returns -1 and sets *errno* to indicate the error.
SEE: Assertions in 6.6.2.4.
Conformance for fdatasync: PASS

6.6.2.4 Errors

- 9 IF PCTS_fdatasync THEN**
SETUP: Call the *fdatasync()* function with a *fildev* argument that is not a valid file descriptor.
TEST: *fdatasync()* returns -1 and sets *errno* to [EBADF].
NOTE: There is no known portable test method for this assertion.
ELSE NO_OPTION
Conformance for fdatasync: PASS, NO_OPTION
- 10 IF PCTS_fdatasync THEN**
IF PCTS_NO_SYNC_IO_FILE THEN
SETUP: Call the *fdatasync()* function with the *fildev* argument pointing to a file that does not support synchronized I/O.
TEST: *fdatasync()* returns -1 and sets *errno* to [EINVAL].
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for fdatasync: PASS, NO_OPTION
- 11 IF not PCTS_fdatasync THEN**
SETUP: Call the *fdatasync()* function even though it is not supported by this implementation.

TEST: *fdatasync()* returns -1 and sets *errno* to [ENOSYS].

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

Conformance for *fdatasync*: PASS, NO_OPTION

12 **IF** PCTS_*fdatasync* **THEN**

TEST: In the event that any of the queued I/O operations fail, *fdatasync()* returns the error conditions defined for *read()* and *write()*.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

Conformance for *fdatasync*: PASS, NO_TEST, NO_OPTION

6.7 Asynchronous Input and Output

6.7.1 Data Definitions for Asynchronous Input and Output

There are no requirements for conforming implementations in this clause.

6.7.1.1 Asynchronous I/O Control Block

1 **SETUP:** Include the header `<aio.h>`.

TEST: An asynchronous I/O control block structure *aio_cb* is defined and has at least the following members with the indicated types:

Member Type	Member Name	Description
<i>int</i>	<i>aio_fildes</i>	File descriptor
<i>off_t</i>	<i>aio_offset</i>	File offset
<i>volatile void*</i>	<i>aio_buf</i>	Location of buffer
<i>size_t</i>	<i>aio_nbytes</i>	Length of transfer
<i>int</i>	<i>aio_reqprio</i>	Request priority offset
<i>struct sigevent</i>	<i>aio_sigevent</i>	Signal number and value
<i>int</i>	<i>aio_lio_opcode</i>	Operation to be performed

Conformance for *aio.h*: PASS

D-1 **TEST:** The PCD.1b documents any added extensions [as permitted in 1.3.1.1 item (2)] made to the *aio_cb* asynchronous I/O control block structure, including the definition of an environment in which an application can be run with the behavior specified by POSIX.1b {3}, in 6.7.1.1

Conformance for *aio.h*: PASS

2 **TEST:** Added extensions to the *aio_cb* structure, are enabled as required by 1.3.1.1 that is, a Strictly Conforming Application does not need to be modified to execute in such a modified environment.

NOTE: There is no known portable test method for this assertion.

Conformance for *aio.h*: PASS, NO_TEST

3 **FOR:** *aio_read()*, *aio_write()*, and *aio_lio_listio()*

IF PCTS_*function* **THEN**

SETUP: Open a file so that O_APPEND is not set for the file descriptor *aio_fildes*, and *aio_fildes* is associated with a device that is capable of seeking.

TEST: The operation requested by *function()* takes place at the absolute position in the file as given by *aio_offset*, as if *lseek()* were called immediately prior to the operation with an *offset* argument equal to *aio_offset* and a *whence* argument equal to SEEK_SET.

ELSE NO_OPTION

Conformance for *aio.h*: *PASS, NO_OPTION*

- 4** **FOR:** *aio_write()*, and *aio_lio_listio()*
IF *PCTS_function* **THEN**
 IF *PCTS_APPEND_WRITE_SAME_ORDER* **THEN**
 SETUP: Open a file so that *O_APPEND* is set for the file descriptor. Open another file where *aio_fildes* is associated with a device that is incapable of seeking.
 TEST: Write operations for the *function()* function append to the file in the same order as the calls were made.
 TR: Test for both files in the *SETUP*. Be sure to use the same priority for all writes.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *aio.h*: *PASS, NO_TEST_SUPPORT, NO_OPTION*

D_2 TEST: The PCD.1b documents all circumstances that relax the restriction to have write append operations occur in the same order as the write calls, in 6.7.1.1.
 Conformance for *aio.h*: *PASS*

- 5** **FOR:** *aio_read()*, *aio_write()*, and *aio_lio_listio()*
IF *PCTS_function* and {*_POSIX_PRIORITIZED_IO*}
 and {*_POSIX_PRIORITY_SCHEDULING*} **THEN**
 TEST: Asynchronous I/O is queued in priority order, with the priority of each asynchronous operation based on the current scheduling priority of the calling process.
 ELSE *NO_OPTION*
 Conformance for *aio.h*: *PASS, NO_OPTION*
- 6** **FOR:** *aio_read()*, *aio_write()*, and *aio_lio_listio()*
IF *PCTS_function* and {*_POSIX_PRIORITIZED_IO*}
 and {*_POSIX_PRIORITY_SCHEDULING*} **THEN**
 TEST: The *aio_reqprio* member can be used to lower, but not raise, the asynchronous I/O operation priority when it is within the range zero through {*AIO_PRIO_DELTA_MAX*}, inclusive.
 ELSE *NO_OPTION*
 Conformance for *aio.h*: *PASS, NO_OPTION*

- 7** **FOR:** *aio_read()*, *aio_write()* and *aio_lio_listio()*
IF *PCTS_function* and {*POSIX_PRIORITY_SCHEDULING*} **THEN**
 IF *PCTS_GTI_DEVICE* **THEN**
 TEST: The priority of an asynchronous request is computed as process scheduling priority minus *aio_reqprio*.
 TR: Test for a character special file.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *aio.h*: *PASS, NO_TEST_SUPPORT, NO_OPTION*

- 8** **FOR:** *aio_read()* *aio_write*, and *aio_lio_listio()*
IF *PCTS_function* and {*POSIX_PRIORITIZED_IO*} **THEN**
 IF *PCTS_GTI_DEVICE* **THEN**
 TEST: Requests issued by *function()*, with the same priority, to a character special file are processed by the underlying device in FIFO order.
 TR: Test for both files in the *SETUP*. Be sure to use the same priority for all writes.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *aio.h*: *PASS, NO_TEST_SUPPORT, NO_OPTION*

D_3 IF a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the order of processing of asynchronous I/O requests of the same priority issued to files that are not character special files does so in 6.7.1.1.

ELSE NO_OPTION

Conformance for aio.h: PASS, NO_OPTION

9 FOR: aio_read(), aio_write(), and aio_lio_listio()
IF PCTS_function and {POSIX_PRIORITIZED_IO} and {POSIX_PRIORITY_SCHEDULING} **THEN**

TEST: The value of aio_reqprio has no effect on process scheduling priority.

ELSE NO_OPTION

Conformance for aio.h: PASS, NO_OPTION

10 FOR: aio_read(), aio_write(), and aio_lio_listio()
IF PCTS_function and {POSIX_PRIORITIZED_IO} and {POSIX_PRIORITY_SCHEDULING} **THEN**

SETUP: Create prioritized asynchronous I/O requests to the same file that are blocked waiting for a resource required for that I/O operation.

TEST: The higher-priority asynchronous I/O requests are granted the resource before lower-priority I/O requests.

ELSE NO_OPTION

Conformance for aio.h: PASS, NO_OPTION

D_4 TEST: The PCD.1b documents the relative priority of asynchronous and synchronous I/O requests in 6.7.1.1.

Conformance for aio.h: PASS

11 IF {_POSIX_PRIORITIZED_IO} **THEN**

TEST: The PCD.1b documents for which files I/O prioritization is supported in 6.7.1.1.

ELSE NO_OPTION

Conformance for aio.h: PASS, NO_OPTION

12 FOR: aio_read(), aio_write(), and aio_lio_listio()
IF PCTS_function **THEN**

SETUP: Use an aiocb where the aio_sigevent.sigev_notify member is SIGEV_NONE

TEST: After a call to the function() function, no signal is posted upon I/O completion, and the error status for the operation and the return status for the operation are set appropriately.

ELSE NO_OPTION

Conformance for aio.h: PASS, NO_OPTION

13 FOR: aio_read(), aio_write(), and aio_lio_listio()
IF PCTS_function **THEN**

SETUP: Use an aiocb where the aio_sigevent.sigev_notify member is SIGEV_SIGNAL.

TEST: After a call to the function() function and upon I/O completion, the signal specified in aio_sigevent.sigev_signo is sent to the process.

ELSE NO_OPTION

Conformance for aio.h: PASS, NO_OPTION

14 FOR: aio_read(), aio_write(), and aio_lio_listio()
IF PCTS_function {_POSIX_REALTIME_SIGNALS} **THEN**

SETUP: Use an aiocb where the aio_sigevent.sigev_notify member is SIGEV_SIGNAL. Set the signal number to be queued in the range from SIGRTMIN to SIGRTMAX and then set the SA_SIGINFO flag for that signal number.

TEST: After a call to the function() and upon I/O completion, the signal is queued to the process, and the value specified in aio_sigevent.sigev_value is the si_value component of the generated signal.

ELSE NO_OPTION

Conformance for aio.h: PASS, NO_OPTION

NOTE: The following requirements of POSIX.1b {3} are explicitly required by the relevant functions and, therefore, are not considered General Assertions and are to be tested in the functions with the following requirements:

The return status of the asynchronous operation is the number of bytes transferred by the I/O operation. If the error status is set to indicate an error completion, then the return status is set to the return value that the corresponding *read()*, *write()*, or *fsynch()* call would have returned. When the error status is not equal to [EINPROGRESS], the return status shall reflect the return status of the corresponding synchronous operation.

6.7.1.2 Manifest Constants

- 15 **SETUP:** Include the header `<aio.h>`.
TEST: The symbols `AIO_CANCELED`, `AIO_NOTCANCELED`, and `AIO_ALLDONE` are defined and have unique values relative to each other.
Conformance for aio.h: PASS
- 16 **SETUP:** Include the header `<aio.h>`.
TEST: The symbols `LIO_WAIT` and `LIO_NOWAIT` are defined and have unique values relative to each other.
Conformance for aio.h: PASS
- 17 **SETUP:** Include the header `<aio.h>`.
TEST: The symbols `LIO_READ`, `LIO_WRITE`, and `LIO_NOP` are defined and have unique values relative to each other.
Conformance for aio.h: PASS

6.7.2 Asynchronous Read

Function; *aio_read()*.

6.7.2.1 Synopsis

- 1
M_GA_stdC_proto_decl(int; aio_read; struct aiocb *aiocbp; aio.h;;)
SEE: Assertion `GA_stdC_proto_decl` in 2.7.3
Conformance for aio_read: PASS[1, 2], NO_OPTION
- 2
M_GA_commonC_int_result_decl(aio_read; aio.h;;)
SEE: Assertion `GA_commonC_int_result_decl` in 2.7.3
Conformance for aio_read: PASS[1, 2], NO_OPTION
- 3
M_GA_macro_result_decl(int; aio_read; aio.h;;)
SEE: Assertion `GA_macro_result_decl` in 1.3.4
Conformance for aio_read: PASS, NO_OPTION
- 4
M_GA_macro_args(aio_read; aio.h;;)
SEE: Assertion `GA_macro_args` in 2.7.3
Conformance for aio_read: PASS, NO_OPTION

6.7.6.2 Description

- 5 **IF** *PCTS_aio_read* **THEN**
TEST: A call to the *aio_read()* function reads *aiocbp->aio_nbytes* from the file associated with *aiocbp->aio_fildes* into the buffer pointed to by *aiocbp->aio_buf*.
ELSE NO_OPTION
Conformance for *aio_read*: PASS, NO_OPTION

- 6 **IF** *PCTS_aio_read* **THEN**
IF *PCTS_GTI_DEVICE* **THEN**
TEST: A call to the *aio_read()* function returns when the read request has been initiated or queued to the file or device, even when the data cannot be delivered immediately.
TR: Test for a character special device.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *aio_read*: PASS, NO_TEST_SUPPORT, NO_OPTION

- 7 **IF** *PCTS_aio_read* and {_POSIX_Prioritized_IO} **THEN**
IF *PCTS_GTI_DEVICE* **THEN**
SETUP: Use a file for which prioritized I/O is supported.
TEST: The asynchronous operation caused by the *aio_read()* function is submitted at a priority equal to the scheduling priority of the process minus *aiocbp->aio_reqprio*.
NOTE: There is no known portable test method for this assertion.
ELSE NO_OPTION
Conformance for *aio_read*: PASS, NO_OPTION

- 8 **IF** *PCTS_aio_read* and {_POSIX_Prioritized_IO} **THEN**
IF *PCTS_GTI_DEVICE* **THEN**
SETUP: Use a file for which prioritized I/O is supported.
TEST: The asynchronous operation caused by the *aio_read()* function is submitted at a priority equal to the scheduling priority of the process minus *aiocbp->aio_reqprio*.
TR: Test for a character special file.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *aio_read*: PASS, NO_TEST_SUPPORT, NO_OPTION

- 9 **IF** *PCTS_aio_read* and *PCTS_aio_error* **THEN**
TEST: The *aiocbp* value used in a call to the *aio_read()* function, when used as an argument to *aio_error()*, returns the error status of the asynchronous operation while it is proceeding.
NOTE: There is no known portable test method for this assertion.
ELSE NO_OPTION
Conformance for *aio_read*: PASS, NO_TEST, NO_OPTION

- 10 **IF** *PCTS_aio_read* and *PCTS_aio_error* **THEN**
IF *PCTS_GTI_DEVICE* **THEN**
TEST: The *aiocbp* value used in a call to the *aio_read()* function, when used as an argument to *aio_error()*, returns the error status of the asynchronous operation while it is proceeding.
TR: Test for a character special file.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *aio_read*: PASS, NO_TEST_SUPPORT, NO_OPTION

- 11 **IF** *PCTS_aio_read* and *PCTS_aio_return* **THEN**
TEST: The *aiocbp* value used in a call to the *aio_read()* function, when used as an argument to *aio_return()*, returns the return status of the asynchronous operation while it is proceeding.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

Conformance for aio_read: PASS, NO_TEST, NO_OPTION

12 IF PCTS_aio_read and PCTS_aio_return THEN

IF PCTS_GTI_DEVICE THEN

TEST: The *aiocbp* value used in a call to the *aio_read()* function, when used as an argument to *aio_return()*, returns the return status of the asynchronous operation while it is proceeding.

TR: Test for a character special file.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for aio_read: PASS, NO_TEST SUPPORT, NO_OPTION

R_1 IF PCTS_aio_read THEN

TEST: A call *aio_read()* returns an error condition encountered during queuing, without having initiated or queued the request.

ELSE NO_OPTION

SEE: Assertions in 6.7.2.4

13 IF PCTS_aio_read THEN

TEST: A call *aio_read()* causes the requested operation to take place at the absolute position in the file as given by *aio_offset*, as if *lseek()* were called immediately prior to the operation with an *offset* equal to *aio_offset* and a *whence* equal to *SEEK_SET*.

ELSE NO_OPTION

Conformance for aio_read: PASS, NO_OPTION

D_1 IF PCTS_aio_read and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the value of the file offset for the file after a successful call to enqueue an asynchronous I/O operation, does so in 6.7.2.2.

ELSE NO_OPTION

Conformance for aio_read: PASS, NO_OPTION

D_2 IF PCTS_aio_read and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the behavior of a call to the *aio_read()* when the buffer pointed to by *aiocbp* -> *aio_buf* or the control block pointed to by *aiocbp* becomes an illegal address prior to asynchronous I/O completion, does so in 6.7.2.2.

ELSE NO_OPTION

Conformance for aio_read: PASS, NO_OPTION

D_3 IF PCTS_aio_read and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the results of simultaneous asynchronous operations using the same *aiocbp*, does so in 6.7.2.2.

ELSE NO_OPTION

Conformance for aio_read: PASS, NO_OPTION

15 IF PCTS_aio_read and {_POSIX_SYNCHRONIZED_IO} THEN

SETUP: Open a file by calling *open()* with *O_RSYNC* and *O_DSYNC* set in the *oflag* parameter.

TEST: A read operation initiated by calling *aio_read()* either completes by transferring an image of the data to the requesting process or, if unsuccessful, by diagnosing and returning an indicator of the error.

TR: Test for regular files and, if *PCTS_GTI_DEVICE*, terminals

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

SEE: Assertion *GA_syncIODataIntegrityRead* in 2.2.2.119.

Conformance for aio_read: PASS, NO_TEST, NO_OPTION

- 16** IF *PCTS_aio_read* and {_POSIX_SYNCHRONIZED_IO} THEN
SETUP: Open a file by calling *open()* with O_RSYNC and O_SYNC set in the *oflag* parameter.
TEST: At the time that the synchronized read operation initiated by calling *aio_read()* occurs, any pending write requests affecting the data to be read are written to the physical medium containing the file prior to reading the data.
TR: Test for regular files.
NOTE: There is no known portable test method for this assertion.
ELSE NO_OPTION
SEE: Assertion GA_syncIODataIntegritywbeforeR in 2.2.2.119.
Conformance for aio_read: PASS, NO_TEST, NO_OPTION
- 17** IF *PCTS_aio_read* and {_POSIX_SYNCHRONIZED_IO} THEN
SETUP: Open a file by calling *open()* with O_RSYNC and O_SYNC set in the *oflag* parameter.
TEST: At the time that the synchronized read operation initiated by calling *aio_read()* occurs, any pending write requests affecting the data to be read are written to the physical medium containing the file prior to reading the data, and the following file attributes are also written to the physical medium containing the file prior to returning to the calling process:
1. File mode
 2. File serial number
 3. ID of device containing this file
 4. Number of links
 5. User ID of the owner of the file
 6. Group ID of the group of the file
 7. The file size in bytes
 8. Time of last access
 9. Time of last data modification
 10. Time of last file status change.
- TR:** Test for regular files.
NOTE: There is no known portable test method for this assertion.
ELSE NO_OPTION
SEE: Assertion GA_syncIOFileIntegrityRead in 2.2.2.120.
Conformance for aio_read: PASS, NO_TEST, NO_OPTION
- D_4** IF *PCTS_aio_read* and a PCD.1b documents the following THEN
TEST: A PCD.1b that documents the result of any system action that changes the process memory space, while an asynchronous I/O is outstanding to the address range being changed, does so in 6.7.2.2.
ELSE NO_OPTION
Conformance for aio_read: PASS, NO_OPTION

6.7.2.3 Returns

- R_2** IF *PCTS_aio_read* THEN
TEST: The *aio_read()* function returns the value zero to the calling process after the I/O operation is successfully queued.
ELSE NO_OPTION
SEE: Assertions in 6.7.2.2.

R_3 IF *PCTS_aio_read* THEN

TEST: The *aio_read()* function returns the value -1 to the calling process and sets *errno* to indicate the error when the I/O operation is not successfully queued.

ELSE NO_OPTION

SEE: Assertions in 6.7.2.4.

6.7.2.4 Errors**18 IF *PCTS_aio_read* THEN**

IF {AIO_MAX} ≤ *PCTS_AIO_MAX* THEN

SETUP: Queue {AIO_MAX} asynchronous I/O operations before calling *aio_read()*.

TEST: A call to the *aio_write()* function returns -1 and sets *errno* to [EAGAIN].

NOTE: There is no known portable test method for this assertion.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_read*: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION

19 IF *PCTS_aio_read* THEN

IF {AIO_MAX} ≤ *PCTS_AIO_MAX* and *PCTS_GTI_DEVICE* THEN

SETUP: Queue {AIO_MAX} asynchronous I/O operations before calling *aio_read()*.

TEST: A call to the *aio_read()* function returns -1 and sets *errno* to [EAGAIN].

TR: Test for a character special device.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_read*: PASS, NO_TEST_SUPPORT, NO_OPTION

20 IF *PCTS_aio_read* THEN

IF {AIO_MAX} *PCTS_AIO_MAX* and *PCTS_GTI_DEVICE* THEN

SETUP: Queue *PCTS_AIO_MAX* - 1 asynchronous I/O operations before calling *aio_read()*.

TEST: A call to the *aio_read()* function returns 0 and does not set *errno* to [EAGAIN].

TR: Test for a character special device.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_read*: PASS, NO_TEST_SUPPORT, NO_OPTION

21 IF not *PCTS_aio_read* THEN

TEST: A call to the *aio_read()* function returns -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *aio_read*: PASS, NO_OPTION

ebadf1 IF *PCTS_aio_read* THEN

IF *PCTS_aio_error* and *PCTS_aio_return* THEN

TEST: After a call to the *aio_read()* function, where the *aioebp->aio_fildes* argument is not a valid file descriptor, the implementation either detects the condition synchronously, then the *aio_read()* function returns -1 and sets *errno* to [EBADF]; or it detects the condition asynchronously, then the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EBADF].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_read*: PASS, NO_TEST_SUPPORT, NO_OPTION

ebadf2

IF *PCTS_aio_read* THEN

IF *PCTS_aio_error* and *PCTS_aio_return* THEN

TEST: After a call to the *aio_read()* function, where the *aioebp->aio_fildes* argument is not open for reading, the implementation either detects the

condition synchronously, then the *aio_read()* function returns -1 and sets *errno* to [EBADF]; or it detects the condition asynchronously, then the return status for the asynchronous operation is set to -1, and the error status of the asynchronous operation is set to [EBADF].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_read*: PASS, NO_TEST_SUPPORT, NO_OPTION

EINVAL1

IF PCTS_aio_read THEN

IF PCTS_aio_error and PCTS_aio_return THEN

TEST: After a call to the *aio_read()* function, where the file offset value implied by *aiocbp->aio_offset* would be invalid, or *aiocbp->aio_reqprio* is not a valid value, or *aiocbp->aio_nbytes* is an invalid value, the implementation either detects the condition synchronously, then the *aio_read()* function returns -1 and sets *errno* to [EINVAL]; or it detects the condition asynchronously, then the return status of the asynchronous operation is set -1, and the error status of the asynchronous operation is set to [EINVAL].

TR: Test separately for each of the three conditions above.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_read*: PASS, NO_TEST_SUPPORT, NO_OPTION

22

IF PCTS_aio_read THEN

IF PCTS_aio_cancel and PCTS_aio_error and PCTS_aio_return THEN

SETUP: Call the *aio_read()* function so that it successfully queues the I/O operation.

TEST: After a read operation is canceled by a call to the *aio_cancel()* function, the return status of the asynchronous operation returned by a call to the *aio_return()* function is -1, and the error status returned by a call to the *aio_error()* function is [EINTR] or [ECANCELED].

TR: Test for a pipe and a FIFO.
If PCTS_GTI_DEVICE, test for a character special file.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_read*: PASS, NO_TEST_SUPPORT, NO_OPTION

R_4 IF PCTS_aio_read THEN

IF PCTS_aio_error and PCTS_aio_return THEN

TEST: After a call to the *aio_read()* function, where the *aiocbp->aio_fildes* argument is not a valid file descriptor, the implementation either detects the condition synchronously, then the *aio_read()* function returns -1 and sets *errno* to [EBADF]; or it detects the condition asynchronously, then the return status of the asynchronous operation is set to -1, and the value of the call to *aio_error()* is set to [EBADF].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion ebadf1 in 6.7.2.4.

R_5 IF PCTS_aio_read THEN

IF PCTS_aio_error THEN

TEST: After a call to the *aio_read()* function, where the *aiocbp->aio_fildes* argument is not open for reading, the implementation either detects the condition asynchronously, then the *aio_read()* function returns -1 and sets *errno* to [EBADF]; or it detects the condition asynchronously, then the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EBADF].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion ebadf1 in 6.7.2.4.

- 23** **IF** *PCTS_aio_read* and *PCTS_aio_cancel* **THEN**
 IF *PCTS_aio_error* and *PCTS_aio_return* **THEN**
 SETUP: Call the *aio_read()* function so that it successfully queues the I/O operation.
 TEST: A read operation, that is canceled after a call to the *aio_cancel()* function and before the I/O is completed, results in a return status returned by a call to the *aio_return()* function that is -1 and an error status returned by a call to the *aio_error()* function that is [ECANCELED].
 TR: Test for both a pipe and a FIFO.

 If *PCTS_GTI_DEVICE*, test for a character special file.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

 Conformance for *aio_read*: PASS, NO_TEST_SUPPORT, NO_OPTION

- R_6** **IF** *PCTS_aio_read* **THEN**
 IF *PCTS_aio_error* and *PCTS_aio_return* **THEN**
 TEST: After a call to the *aio_read()* function, where the file offset value implied by *aio_cbp->aio_offset* would be invalid, the implementation detects the condition asynchronously, then the return status of the asynchronous operation is set to -1 and the value of the call to *aio_error()* is set to [EBADF].
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 SEE: Assertion einval in 6.7.2.4.

6.7.3 Asynchronous Write

Function: *aio_write()*.

6.7.3.1 Synopsis

- 1**
 *M_GA_stdC_proto_decl(int; aio_write; struct aiocb * aiocbp; aio.h;;)*
 SEE: Assertion GA_stdC_proto_decl in 2.7.3
 Conformance for *aio_write*: PASS[1, 2], NO_OPTION
- 2**
 M_GA_commonC_int_result_decl(aio_write; aio.h;;)
 SEE: Assertion GA_commonC_int_result_decl in 2.7.3
 Conformance for *aio_write*: PASS[1, 2], NO_OPTION
- 3**
 M_GA_macro_result_decl(int; aio_write; aio.h;;)
 SEE: Assertion GA_macro_result_decl in 1.3.4
 Conformance for *aio_write*: PASS[1, 2], NO_OPTION
- 4**
 M_GA_macro_args (aio_write; aio.h;;)
 SEE: Assertion GA_macro_args in 2.7.3
 Conformance for *aio_write*: PASS, NO_OPTION

6.7.3.2 Description

- 5** **IF** *PCTS_aio_write* **THEN**
 TEST: A call to the *aio_write()* function writes *aio_cbp->aio_nbytes* to the file associated with *aio_cbp->aio_fildes* from the buffer pointed to by *aio_cbp->aio_buf*.

ELSE NO_OPTION
Conformance for *aio_write*: PASS, NO_OPTION

- 6** **IF** *PCTS_aio_write* **THEN**
 IF *PCTS_GTI_DEVICE* **THEN**
 TEST: A call to the *aio_write()* function returns when the write request has been initiated or queued to the file or device.
 TR: Test for a character special device.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *aio_write*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 7** **IF** *PCTS_aio_write* and {_POSIX_Prioritized_IO} **THEN**
 SETUP: Use a file for which prioritized I/O is supported.
 TEST: The asynchronous operation caused by the *aio_write()* function is submitted at a priority equal to the scheduling priority of the process minus *aiocbp* -> *aio_reqprio*.
 NOTE: There is no known portable test method for this assertion.

 ELSE NO_OPTION
 Conformance for *aio_write*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 8** **IF** *PCTS_aio_write* and {_POSIX_Prioritized_IO} **THEN**
 IF *PCTS_GTI_DEVICE* **THEN**
 SETUP: Use a file for which prioritized I/O is supported.
 TEST: The asynchronous operation caused by the *aio_write()* function is submitted at a priority equal to the scheduling priority of the process minus *aiocbp* -> *aio_reqprio*.
 TR: Test for a character special file.
 NOTE: There is no known portable test method for this assertion.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *aio_write*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 9** **IF** *PCTS_aio_write* and *PCTS_aio_error* **THEN**
 TEST: The *aiocbp* value used in a call to the *aio_write()* function, when used as an argument to *aio_error()*, returns the error status of the asynchronous operation while it is proceeding.
 NOTE: There is no known portable test method for this assertion.
 ELSE NO_OPTION
 Conformance for *aio_write*: PASS, NO_TEST, NO_OPTION
- 10** **IF** *PCTS_aio_write* and *PCTS_aio_error* **THEN**
 IF *PCTS_GTI_DEVICE* **THEN**
 TEST: The *aiocbp* value used in a call to the *aio_write()* function, when used as an argument to *aio_error()*, returns the error status of the asynchronous operation while it is proceeding.
 TR: Test for a character special file.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *aio_write*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 11** **IF** *PCTS_aio_write* and *PCTS_aio_return* **THEN**
 TEST: The *aiocbp* value used in a call to the *aio_write()* function, when used as an argument to *aio_return()*, returns the error status of the asynchronous operation while it is proceeding.
 NOTE: There is no known portable test method for this assertion.
 ELSE NO_OPTION
 Conformance for *aio_write*: PASS, NO_TEST, NO_OPTION

- 12** **IF** *PCTS_aio_write* and *PCTS_aio_return* **THEN**
 IF *PCTS_GTI_DEVICE* **THEN**
 TEST: The *aiocbp* value used in a call to the *aio_write()* function, when used as an argument to *aio_return()*, returns the return status of the asynchronous operation while it is proceeding.
 TR: Test for a character special file.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *aio_write*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- D_1** **IF** *PCTS_aio_write* and a PCD.1b documents the following **THEN**
 TEST: A PCD.1b that documents the behavior of a call to the *aio_write()*, when the buffer pointed to by *aiocbp*->*aio_buf* or the control block pointed to by *aiocbp*, becomes an illegal process prior to asynchronous I/O completion, does so in 6.7.3.2.
 ELSE *NO_OPTION*
 Conformance for *aio_write*: *PASS, NO_OPTION*
- 13** **IF** *PCTS_aio_write* **THEN**
 SETUP: Use a file where the *O_APPEND* flag is not set for the file descriptor *aio_fildes*.
 TEST: A call *aio_write()* causes the requested operation to take place at the absolute position in the file as given by *aio_offset*, as if *lseek()* were called immediately prior to the operation with an *offset* equal to *aio_offset* and a *whence* equal to *SEEK_SET*.
 ELSE *NO_OPTION*
 Conformance for *aio_write*: *PASS, NO_OPTION*
- 14** **IF** *PCTS_aio_write* **THEN**
 SETUP: Use a file where the *O_APPEND* flag is set for the file descriptor.
 TEST: Write operations caused by calling the *aio_write()* function append to the file in the same order as the calls were made.
 ELSE *NO_OPTION*
 Conformance for *aio_write*: *PASS, NO_OPTION*
- D_2** **IF** *PCTS_aio_write* and a PCD.1b documents the following **THEN**
 TEST: A PCD.1b that documents the value of the file offset for the file after a successful call to enqueue an asynchronous I/O operation does so in 6.7.3.2.
 ELSE *NO_OPTION*
 Conformance for *aio_write*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 15** **IF** *PCTS_aio_write* **THEN**
 TEST: The *aiocbp*->*aio_lio_opcode* field is ignored by *aio_write()*.
 ELSE *NO_OPTION*
 Conformance for *aio_write*: *PASS, NO_OPTION*
- D_3** **IF** *PCTS_aio_write* and a PCD.1b documents the following **THEN**
 TEST: A PCD.1b that documents the results of simultaneous asynchronous operations using the same *aiocbp* does so in 6.7.3.2.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *aio_write*: *PASS, NO_OPTION*
- 16** **IF** *PCTS_aio_write* and { *_POSIX_SYNCHRONIZED_IO* } **THEN**
 SETUP: Open a file by calling *open()* with *O_DSYNC* set in the *oflag* parameter.
 TEST: A write operation initiated by calling *aio_write()* either completes by transferring an image of the data to the physical medium containing the file or, if unsuccessful, by diagnosing and returning an indicator of the error.
 TR: Test for regular files and, if *PCTS_GTI_DEVICE*, terminals.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

SEE: Assertion GA_syncIODataIntegrityWrite in 2.2.2.119

Conformance for *aio_write*: PASS, NO_TEST, NO_OPTION

17 IF *PCTS_aio_write* and {_POSIX_SYNCHRONIZED_IO} **THEN** *PCTS_aio_write* and {_POSIX_SYNCHRONIZED_IO}

SETUP: Open a file by calling *open()* with O_SYNC set in the *oflag* parameter.

TEST: When a synchronized write operation is initiated by calling *aio_write()*, the data are written to the physical medium containing the file, and the following file attributes are also written to the physical medium containing the file prior to returning to the calling process:

1. File mode
2. File serial number
3. ID of device containing this file
4. Number of links
5. User ID of the owner of the file
6. Group ID of the group of the file
7. The file size in bytes
8. Time of last access
9. Time of last data modification
10. Time of last file status change.

TR: Test for regular files.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

SEE: Assertion GA_syncIOFileIntegrityWrite in 2.2.2.120

Conformance for *aio_write*: PASS, NO_TEST, NO_OPTION

D_4 IF *PCTS_aio_write* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the result of any system action that changes the process memory space, while an asynchronous I/O is outstanding to the address range being changed, does so in 6.7.3.2.

ELSE NO_OPTION

Conformance for *aio_write*: PASS, NO_OPTION

6.7.3.3 Returns

R_1 IF *PCTS_aio_write* **THEN**

TEST: The *aio_write()* function returns the value zero to the calling process after the I/O operation is successfully queued.

ELSE NO_OPTION

SEE: Assertions in 6.7.3.2.

R_2 IF *PCTS_aio_write* **THEN**

TEST: The *aio_write()* function returns the value -1 to the calling process and sets *errno* to indicate the error when the I/O operation is not successfully queued.

ELSE NO_OPTION

SEE: Assertions in 6.7.3.4.

6.7.3.4 Errors

- 18** **IF** *PCTS_aio_write* **THEN**
 IF {*AIO_MAX*} $\leq$ *PCTS_AIO_MAX* **THEN**
 SETUP: Queue {*AIO_MAX*} asynchronous I/O operations before calling *aio_write*().
 TEST: A call to the *aio_write*() function returns -1 and sets *errno* to [EAGAIN].
 NOTE: There is no known portable test method for this assertion.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *aio_write*: *PASS*, *NO_TEST*, *NO_TEST_SUPPORT*, *NO_OPTION*
- 19** **IF** *PCTS_aio_write* **THEN**
 IF {*AIO_MAX*} $\leq$ *PCTS_AIO_MAX* and **THEN**
 SETUP: Queue {*AIO_MAX*} asynchronous I/O operations before calling *aio_write*().
 TEST: A call to the *aio_write* function returns -1 and sets *errno* to [EAGAIN]
 TR: Test for a character special device.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *aio_write*: *PASS*, *NO_TEST*, *NO_TEST_SUPPORT*, *NO_OPTION*
- 20** **IF** *PCTS_aio_write* **THEN**
 IF {*AIO_MAX*} *PCTS_AIO_MAX* and *PCTS_GTI_DEVICE* **THEN**
 SETUP: Queue *PCTS_AIO_MAX* asynchronous I/O operations before calling *aio_write*().
 TEST: A call to the *aio_write*() function returns 0 and does not set *errno* to [EAGAIN].
 TR: Test for a character special device.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *aio_write*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*
- 21** **IF** not *PCTS_aio_write* **THEN**
 TEST: A call to the *aio_write*() function returns -1 and sets *errno* to [ENOSYS].
 ELSE *NO_OPTION*
 Conformance for *aio_write*: *PASS*, *NO_OPTION*
- ebadf1** **IF** *PCTS_aio_write* **THEN**
 IF *PCTS_aio_error* and *PCTS_aio_return* **THEN**
 TEST: After a call to the *aio_write*() function, where the *aiocbp*->*aio_fildes* argument is not a valid file descriptor, the implementation either detects the condition synchronously, then the *aio_write*() function returns -1 and sets *errno* to [EBADF]; or it detects the condition asynchronously, then the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EBADF].
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *aio_write*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*
- ebadf2** **IF** *PCTS_aio_write* **THEN**
 IF *PCTS_aio_error* and *PCTS_aio_return* **THEN**
 TEST: After a call to the *aio_write*() function, where the *aiocbp*->*aio_fildes* argument is not open for writing, the implementation either detects the condition synchronously, then the *aio_write*() function returns -1 and sets *errno* to [EBADF]; or it detects the condition asynchronously, then the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EBADF].
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *aio_write*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*

- EINVAL** **IF** *PCTS_aio_write* **THEN**
 IF *PCTS_aio_error* and *PCTS_aio_return* **THEN**
 TEST: After a call to the *aio_write()* function, where the file offset value implied by *aiocbp->aio_offset* would be invalid, or *aiocbp->aio_reqprio* is not a valid value, or *aiocbp->aio_nbytes* is an invalid value, the implementation either detects the condition synchronously, then the *aio_write()* function returns -1 and sets *errno* to [EINVAL]; or it detects the condition asynchronously, then the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EINVAL]
 TR: Test separately for each of the three conditions above.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *aio_write*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 22 **IF** *PCTS_aio_write* **THEN**
 IF *PCTS_aio_error* and *PCTS_aio_return* **THEN**
 SETUP: Call the *aio_write()* function so that it successfully queues the I/O operation for a pipe or FIFO that has the O_NONBLOCK flag set for the file descriptor and with the *aiocbp->aio_nbytes* less than or equal to {PIPE_BUF} and where there is insufficient capacity to accept the data.
 TEST: The return status of the asynchronous operation returned by a call to the *aio_return()* function is -1 and the error status returned by a call to the *aio_error()* function is [EAGAIN].
 TR: Test for both a pipe and FIFO. If {PIPE_BUF} is greater than *PCTS_PIPE_BUF*, test with values of *aiocbp->aio_nbytes* up to and including *PCTS_PIPE_BUF*.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *aio_write*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 23 **IF** *PCTS_aio_write* **THEN**
 IF *PCTS_aio_cancel* and *PCTS_aio_error* and *PCTS_aio_return* **THEN**
 SETUP: Call the *aio_write()* function so that it successfully queues the I/O operation.
 TEST: After a write operation is canceled by a call to the *aio_cancel()* function and no data were transferred, the return status of the asynchronous operation returned by a call to the *aio_return()* function is -1 and the error status returned by a call to the *aio_error()* function is [EINTR] or [ECANCELED].
 TR: Test for both a pipe and a FIFO.
 If *PCTS_GTI_DEVICE*, test for a character special file.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *aio_write*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 24 **IF** *PCTS_aio_write* **THEN**
 IF the implementation supports a maximum file size **THEN**
 TEST: An attempt to write a file that would exceed an implementation-defined maximum size by calling the *aio_write()* function and where the write operation is successfully queued, causes the error status for the asynchronous operation to be [EFBIG].
 NOTE: The assertion test would require an unreasonable amount of time or resources on most implementations.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *aio_write*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 25 **IF** *PCTS_aio_write* and {_POSIX_JOB_CONTROL} **THEN**
 IF *PCTS_aio_error* and *PCTS_aio_return* **THEN**

SETUP: Make the testing process part of the background process group; set TOSTOP; ignore or block SIGTTOU signals; and make the process group of the process orphaned. Call the *aio_write()* function so that it successfully queues the I/O operation to write from its controlling terminal.

TEST: The write operation will fail; the return status of the asynchronous operation returned by a call to the *aio_return()* function is -1 and the error status returned by a call to the *aio_error()* function is [EIO].

TR: Test for both a pipe and a FIFO.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_write*: PASS, NO_TEST_SUPPORT, NO_OPTION

26 IF PCTS_aio_write THEN

IF PCTS_aio_error and PCTS_aio_return and PCTS_DETECT_ENOSPC THEN

SETUP: Fill a device so that there is no more space available on it for data. Call the *aio_write()* function so that it successfully queues the I/O operation.

TEST: After a call to the *aio_write()* function, the implementation either detects the condition synchronously, the *aio_write()* function returns -1 and sets *errno* to [EBADF]; or it detects the condition asynchronously, the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EBADF].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_write*: PASS, NO_TEST_SUPPORT, NO_OPTION

27 IF PCTS_aio_write THEN

IF PCTS_aio_error and PCTS_aio_return THEN

SETUP: Call the *aio_write()* function so that it successfully queues the I/O operation.

TEST: After a call to the *aio_write()* function to write to a pipe or FIFO that is not open for reading for any process, the implementation either detects the condition synchronously, the *aio_write()* function returns -1 and sets *errno* to [EBADF]; or it detects the condition asynchronously, the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EBADF].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_write*: PASS, NO_TEST_SUPPORT, NO_OPTION

R_3 IF PCTS_aio_write THEN

IF PCTS_aio_error and PCTS_aio_return THEN

TEST: After a call to the *aio_write()* function, where the *aiocbp->aio_fildes* argument is not a valid file descriptor, the implementation either detects the condition asynchronously, the *aio_write()* function returns -1 and sets *errno* to [EBADF]; or it detects the condition asynchronously, the error status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EBADF].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion ebadf1 in 6.7.3.4.

R_4 IF PCTS_aio_write THEN

IF PCTS_aio_error THEN

TEST: After a call to the *aio_write()* function, where the *aiocbp->aio_fildes* argument is not open for writing, the implementation either detects the condition synchronously, then the *aio_write()* function returns -1 and sets *errno* to [EBADF]; or it detects the condition asynchronously, then the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EBADF].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion ebadf1 in 6.7.3.4.

28 IF PCTS_aio_write and PCTS_aio_cancel THEN

IF PCTS_aio_error and PCTS_aio_return THEN

SETUP: Call the *aio_write()* function so that it successfully queues the I/O operation.

TEST: A write operation, that is canceled after call to the *aio_cancel()* function and before the I/O is completed, results in a return status returned by a call to the *aio_return()* function of -1 and the error status returned by a call to the *aio_error()* function of [ECANCELED].

TR: Test for both a pipe and a FIFO.

If *PCTS_GTI_DEVICE*, test for a character special file.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_write*: PASS, NO_TEST_SUPPORT, NO_OPTION

R_5 IF PCTS_aio_write THEN

IF PCTS_aio_error and PCTS_aio_return THEN

TEST: After a call to the *aio_write()* function, where file offset value implied by *aio_cbp->aio_offset* would be invalid, the implementation detects the condition asynchronously, then the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EINVAL].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion einval in 6.7.3.4.

6.7.4 List Directed I/O

Function *lio_listio()*.

6.7.4.1 Synopsis

1

*M_GA_stdC_proto_decl(int; lio_listio; int mode, struct aiocb *const list[], int nent, struct sigevent *sig; aio.h;;)*

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for *lio_listio*: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(lio_listio; aio.h;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for *lio_listio*: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; lio_listio; aio.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.

Conformance for *lio_listio*: PASS, NO_OPTION

4

M_GA_macro_args (lio_listio; aio.h;;)

SEE: Assertion GA_macro_args in 2.7.3.

Conformance for *lio_listio*: PASS, NO_OPTION

6.7.4.2 Description

5 IF PCTS_lio_listio THEN

TEST: A successful call to the *lio_listio()* function, where the *mode* argument is *LIO_WAIT*, waits until all I/O is complete, ignores the *sig* argument, and returns 0.

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_OPTION

6 IF PCTS_lio_listio THEN

TEST: A successful call to the *lio_listio()* function, where the *mode* argument is *LIO_NOWAIT* and the *sig* argument is **NULL**, returns immediately, does not deliver a signal upon completion of all I/O operations, and returns 0.

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_OPTION

7 IF PCTS_lio_listio THEN

TEST: A successful call to the *lio_listio()* function, where the *mode* argument is *LIO_NOWAIT*, the *sig* argument is not **NULL**, and the *sigeven* structure referenced by *sig* is zero, returns immediately, does not deliver a signal upon completion of all I/O operations, and returns 0.

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_OPTION

8 IF PCTS_lio_listio THEN

TEST: A successful call to the *lio_listio()* function, where the *mode* argument is *LIO_NOWAIT*, the *sig* argument is not **NULL**, and the *sigeven* structure referenced by *sig* is not zero, then the signal number indicated by *sigeven* is delivered when all the requests in *list* have completed and the call immediately returns a value of zero.

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_OPTION

D_1 IF PCTS_lio_listio and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the order in which the I/O requests enumerated by *list* are submitted does so in 6.7.4.2.

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_OPTION

9 IF PCTS_lio_listio THEN

TEST: A successful call to the *lio_listio()* function, with **NULL** elements in the *list* argument, ignores the **NULL** elements and returns to zero.

TR: Test with **NULL** elements interspersed in the *list*.

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_OPTION

10 IF PCTS_lio_listio THEN

TEST: A successful call to the *lio_listio()* function, where the *aio_lio_opcode* field of an *aio* structure specifies the *LIO_NOP* operation, causes the *list* entry to be ignored.

TR: Test with multiple file descriptors and buffers in a single call with *LIO_NOP* operations.

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_OPTION

lio_read_op

IF PCTS_lio_listio THEN

TEST: A successful call to the *lio_listio()* function, where the *aio_lio_opcode* field of an *aio* structure specifies the *LIO_READ* operation, causes an I/O operation to be submitted as if by a call to *aio_read* with the *aio* structure.

TR: Test with multiple file descriptors and buffers in a single call. If *POSIX_PRIORITY_SCHEDULING*, test with multiple scheduling priorities.

ELSE NO_OPTION

Conformance for lio_listio: PASS, NO_OPTION

lio_write_op

IF PCTS_lio_listio THEN

TEST: A successful call to the *lio_listio()* function where the *aio_lio_opcode* field of an *aiocb* structure specifies the LIO_WRITE operation causes an I/O operation to be submitted as if by a call to *aio_write* with the *aiocb* equal to the address of the *aiocb* structure.

TR: Test with multiple file descriptors and buffers in a single call. If *POSIX_PRIORITY_SCHEDULING*, test with multiple scheduling priorities.

ELSE NO_OPTION

Conformance for lio_listio: PASS, NO_OPTION

R_1 IF PCTS_lio_listio THEN

TEST: The *list* element further describes the I/O operation to be performed in a manner identical to that of the corresponding *aiocb* structure when used by the *aio_read()* and *aio_write()* functions.

ELSE NO_OPTION

SEE: The *lio_read_op* and *lio_write_op* assertions.

11 IF PCTS_lio_listio and { _POSIX_SYNCHRONIZED_IO } THEN

SETUP: Open a file by calling *open()* with *O_RSYNC* and *O_DSYNC* set in the *oflag* parameter.

TEST: A read operation initiated by calling *lio_listio()* either completes by transferring an image of the data to the requesting process, or if unsuccessful, by diagnosing and returning an indicator of the error.

TR: Test for regular files and, if *PCTS_GTI_DEVICE*, terminals.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

SEE: Assertion *GA_syncIODataIntegrityRead* in 2.2.2.119.

Conformance for lio_listio: PASS, NO_TEST, NO_OPTION

12 IF PCTS_lio_listio and { _POSIX_SYNCHRONIZED_IO } THEN

SETUP: Open a file by calling *open()* with *O_RSYNC* and *O_SYNC* set in the *oflag* parameter.

TEST: At the time that the synchronized read operation initiated by calling *lio_listio()* occurs, any pending write requests affecting the data to be read are written to the physical medium containing the file prior to reading the data, and the following file attributes are also written to the physical medium containing the file prior to returning to the calling process:

1. File mode
2. File serial number
3. ID of device containing this file
4. Number of links
5. User ID of the owner of the file
6. Group ID of the group of the file
7. The file size in bytes
8. Time of last access
9. Time of last data modification

10. Time of last file status change.

TR: Test for regular files .

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

SEE: Assertion GA_syncIOFileIntegrityRead in 2.2.2.120.

Conformance for *lio_listio*: PASS, NO_TEST, NO_OPTION

13 IF *PCTS_lio_listio* and {_POSIX_SYNCHRONIZED_IO} **THEN**

SETUP: Open a file by calling *open()* with O_DSYNC set in the *oflag* parameter.

TEST: A write operation initiated by calling *lio_listio()* either completes by transferring an image of the data to the physical medium containing the file or, if unsuccessful, by diagnosing and returning an indicator of the error.

TR: Test for regular files and, if PCTS_GTI_DEVICE, terminals.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

SEE: Assertion GA_syncIODataIntegrityWrite in 2.2.2.119.

Conformance for *lio_listio*: PASS, NO_TEST, NO_OPTION

14 IF *PCTS_lio_listio* and {_POSIX_SYNCHRONIZED_IO} **THEN** *PCTS_lio_listio* and {_POSIX_SYNCHRONIZED_IO}

SETUP: Open a file by calling *open()* with O_SYNC set in the *oflag* parameter.

TEST: At the time that the synchronized write operation initiated by calling *lio_listio()* occurs, the data are written to the physical medium containing the file, and the following file attributes are also written to the physical medium containing the file prior to returning to the calling process:

1. File mode
2. File serial number
3. ID of device containing this file
4. Number of links
5. User ID of the owner of the file
6. Group ID of the group of the file
7. The file size in bytes
8. Time of last access
9. Time of last data modification
10. Time of last file status change.

TR: Test for regular files.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

SEE: Assertion GA_syncIOFileIntegrityWrite in 2.2.2.120.

Conformance for *lio_listio*: PASS, NO_TEST, NO_OPTION

6.7.4.3 Returns

R_2 IF *PCTS_lio_listio* **THEN**

TEST: A call to the *lio_listio()* function, where the *mode* argument has the value LIO_NOWAIT, returns the value zero and queues the I/O operations.

ELSE NO_OPTION

SEE: Assertions in 6.7.4.2.

R_3 IF PCTS_lio_listio THEN

TEST: An unsuccessful call to the *lio_listio()* function where, the *mode* argument has the value *LIO_NOWAIT*, returns the value -1 and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: Assertions in 6.7.4.4.

R_4 IF PCTS_lio_listio THEN

TEST: A successful call to the *lio_listio()* function, where the *mode* argument has the value *LIO_WAIT*, returns the value zero when all the indicated I/O operations have completed successfully.

ELSE NO_OPTION

SEE: Assertions in 6.7.4.2.

R_5 IF PCTS_lio_listio THEN

TEST: An unsuccessful call to the *lio_listio()* function, where the *mode* argument has the value *LIO_WAIT*, returns the value -1 and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: Assertions in 6.7.4.4.

15 IF PCTS_lio_listio THEN

TEST: A successful call to the *lio_listio()* function where some individual requests fail does not prevent completion of any other individual request and returns 0.

TR: Intersperse individual I/O operations that will fail with those that will succeed.

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_OPTION

R_6 IF PCTS_lio_listio THEN

TEST: The error statuses returned by a call to *lio_listio()*, with the *aio_lio_opcode* field of an *aio_cb* structure equal to *LIO_READ* or *LIO_WRITE*, are identical to those returned as the result of an *aio_read()* or *aio_write()* function, respectively.

ELSE NO_OPTION

SEE: Assertions starting with *lio_read* and *lio_write* in 6.7.4.4.

6.7.4.4 Errors

16 IF PCTS_lio_listio THEN

SETUP: Queue enough asynchronous I/O operations before calling *lio_listio()* to perform the test so that not all I/O requests in the call will have a resource to be queued.

TEST: A call to the *lio_listio()* function returns -1 and sets *errno* to [EAGAIN].

TR: Test with both *LIO_READ* and *LIO_WRITE* operations.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_TEST, NO_OPTION

17 IF PCTS_lio_listio THEN

IF {AIO_MAX} ≤ PCTS_AIO_MAX THEN

SETUP: Queue {AIO_MAX} or fewer asynchronous I/O operations before calling *lio_listio()* to perform the test.

TEST: A call to the *lio_listio()* function returns -1 and sets *errno* to [EAGAIN].

TR: Test with both {AIO_MAX} and fewer queued operations. When testing with less than {AIO_MAX} operations queued, make sure that some, but not all, of the I/O operations in the call can be queued. Test with both *LIO_READ* and *LIO_WRITE* operations.

NOTE: There is no known portable test method for this assertion.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for lio_listio: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION

18 IF PCTS_lio_listio THEN

IF {AIO_MAX} ≤ PCTS_AIO_MAX and PCTS_GTI_DEVICE THEN

SETUP: Queue {AIO_MAX} asynchronous I/O operations before calling *lio_listio()* for the test.

TEST: A call to the *lio_listio()* function returns -1 and sets *errno* to [EAGAIN].

TR: Test for a character special device. Test with both {AIO_MAX} and fewer queued operations. When testing with less than {AIO_MAX} operations queued, make sure that some, but not all, of the I/O operations in the call can be queued. Test with both LIO_READ and LIO_WRITE operations.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for lio_listio: PASS, NO_TEST_SUPPORT, NO_OPTION

19 IF PCTS_lio_listio THEN

IF {AIO_MAX} > PCTS_AIO_MAX and PCTS_GTI_DEVICE THEN

SETUP: Queue PCTS_AIO_MAX - *nent* asynchronous I/O operations before calling *lio_listio()*.

TEST: A call to the *lio_listio()* function with *nent* entries returns 0 and does not set *errno* to [EAGAIN].

TR: Test for a character special device. Test with both LIO_READ and LIO_WRITE operations.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for lio_listio: PASS, NO_TEST_SUPPORT, NO_OPTION

lio_read_ebadf1

IF PCTS_lio_listio THEN

IF PCTS_aio_error and PCTS_aio_return THEN

TEST: After a call to the *lio_listio()* function, where *list[]->aio_lio_opcode* is equal to LIO_READ and *list[]->aio_fildes* argument is not a valid file descriptor, the implementation either detects the condition synchronously, then the *lio_listio()* function returns -1 and sets *errno* to [EIO]; or it detects the condition asynchronously, then the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EIO].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for lio_listio: PASS, NO_TEST_SUPPORT, NO_OPTION

lio_read_ebadf2

IF PCTS_lio_listio THEN

IF PCTS_aio_error and PCTS_aio_return THEN

TEST: After a call to the *lio_listio()* function, where *list[]->aio_lio_opcode* is equal to LIO_READ and *list[]->aio_fildes* argument is not open for reading, the implementation either detects the condition synchronously, then the *lio_listio()* function returns -1 and sets *errno* to [EIO]; or it detects the condition asynchronously, then the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EIO].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for lio_listio: PASS, NO_TEST_SUPPORT, NO_OPTION

lio_read_einval1

IF PCTS_lio_listio THEN

IF PCTS_aio_error and PCTS_aio_return THEN

TEST: After a call to the *lio_listio()* function, where *list[]->aio_lio_opcode* is equal to *LIO_READ* and the file offset value implied by *list[]->aio_offset* would be invalid, or *list[]->aio_reqprio* is not a valid value, or *list[]->aio_nbytes* is an invalid value, the implementation either detects the condition synchronously, then the *lio_listio()* function returns -1 and sets *errno* to [EIO]; or it detects the condition asynchronously, then the return status of the asynchronous operation is set to -1 and the error status of the the asynchronous operation is set to [EIO].

TR: Test separately for each of the three conditions above.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_TEST_SUPPORT, NO_OPTION

20 IF PCTS_lio_listio and {_POSIX_JOB_CONTROL} THEN

IF PCTS_aio_error and PCTS_aio_return THEN

SETUP: Make the testing process part of the background process group and make the process group of the process orphaned. Call to the *lio_listio()* function with *list[]->aio_lio_opcode* equal to *LIO_READ*, so that it successfully queues the I/O operation to read from its controlling terminal.

TEST: The read operation will fail; the return status of the asynchronous operation returned by a call to the *aio_return()* function is -1 and the error status returned by a call to the *aio_error()* function is [EIO].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_TEST_SUPPORT, NO_OPTION

21 IF PCTS_lio_listio and {_POSIX_JOB_CONTROL} THEN

IF PCTS_aio_error and PCTS_aio_return THEN

SETUP: Make the testing process part of the background process group and have the process ignore or block the SIGTTIN signal. Call to the *lio_listio()* function with an *list[]->aio_lio_opcode* equal to *LIO_READ*, so that it successfully queues the I/O operation to read from its controlling terminal.

TEST: The read operation will fail; the return status of the asynchronous operation returned by a call to the *aio_return()* function is -1 and the error status returned by a call to the *aio_error()* function is [EIO].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_TEST_SUPPORT, NO_OPTION

R_7 IF PCTS_lio_listio THEN

IF PCTS_aio_error and PCTS_aio_return THEN

TEST: After a call to the *lio_listio()* function, where *list[]->aio_lio_opcode* is equal to *LIO_READ* and the *list[]->aio_fildes* argument is not a valid file descriptor, the implementation either detects the condition synchronously: the *lio_listio()* function returns -1 and sets *errno* to [EIO]; or it detects the condition asynchronously: the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EIO].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion *lio_read_ebadf1* in 6.7.4.4.

R_8 IF PCTS_lio_listio THEN

IF PCTS_aio_error THEN

TEST: After a call to the *lio_listio()* function, where *list[]->aio_lio_opcode* is equal to *LIO_READ* and the *list[]->aio_fildes* argument is not open for reading, the implementation either detects the condition synchronously, then the

lio_listio() function returns -1 and sets *errno* to [EBADF]; or it detects the condition asynchronously, then the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EBADF].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion *lio_read_ebadf2* in 6.7.4.4.

22 IF PCTS_lio_listio and PCTS_aio_cancel THEN

IF PCTS_aio_error and PCTS_aio_return THEN

SETUP: Call to the *lio_listio()* function with a *list[]->aio_lio_opcode* equal to LIO_READ and so that it successfully queues the I/O operation.

TEST: A read operation, that is canceled after a call to the *aio_cancel()* function and before the I/O completed, results in a return status from a call to the *aio_return()* function of -1 and the error status from a call to the *aio_error()* function of [ECANCELED].

TR: Test for both a pipe and a FIFO.

If *PCTS_GTI_DEVICE*, test for a character special file.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_TEST_SUPPORT, NO_OPTION

R_9 IF PCTS_lio_listio THEN

IF PCTS_aio_error and PCTS_aio_return THEN

SETUP: After a call to the *lio_listio()* function, where *list[]->aio_lio_opcode* is equal to LIO_READ and the file offset value implied by *list[]->aio_offset* would be invalid, the implementation detects the condition asynchronously, then the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EINVAL].

TEST: The read operation will fail and the return status of the asynchronous operation returned by a call to the *aio_return()* function is -1 and the error status returned by a call to the *aio_error()* function is [EIO].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion *lio_read_einval* in 6.7.4.4.

lio_write_ebadf1

IF PCTS_lio_listio THEN

IF PCTS_aio_error and PCTS_aio_return THEN

TEST: After a call to the *lio_listio()* function, where *list[]->aio_lio_opcode* is equal to LIO_WRITE and the *list[]->aio_fildes* argument is not a valid file descriptor, the implementation either detects the condition synchronously, then the *lio_listio()* function returns -1 and sets *errno* to [EIO]; or it detects the condition asynchronously, then the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EIO].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_TEST_SUPPORT, NO_OPTION

lio_write_ebadf2

IF PCTS_lio_listio THEN

IF PCTS_aio_error and PCTS_aio_return THEN

TEST: After a call to the *lio_listio()* function where *list[]->aio_lio_opcode* is equal to LIO_WRITE and the *list[]->aio_fildes* argument is not open for writing, the implementation either detects the condition synchronously, then the *lio_listio()* function returns -1 and sets *errno* to [EIO]; or it detects the condition asynchronously, then the return status of the asynchronous

operation is set to -1 and the error status of the asynchronous operation is set to [EIO] .

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_TEST_SUPPORT, NO_OPTION

lio_write_einval1

IF *PCTS_lio_listio* **THEN**

IF *PCTS_aio_error* and *PCTS_aio_return* **THEN**

TEST: After a call to the *lio_listio*() function, where *list[]->aio_lio_opcode* is equal to LIO_WRITE and file offset value implied by *list[]->aio_offset* would be invalid, or the *list[]->aio_reqprio* is not a valid value, or *list[]->aio_nbytes* is an invalid value, the implementation either detects the condition synchronously, then the *lio_listio*() function returns -1 and sets *errno* to [EIO]; or it detects the condition asynchronously, then the return status of the asynchronous operation is set to [EIO] .

TR: Test separately for each of the three conditions above.

If *PCTS_GTI_DEVICE*, test for a character special file.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_TEST_SUPPORT, NO_OPTION

23 IF PCTS_lio_listio THEN

IF *PCTS_aio_cancel* and *PCTS_aio_error* and *PCTS_aio_return* **THEN**

SETUP: Call to the *lio_listio*() function with an *list[]->aio_lio_opcode* equal to LIO_WRITE and so that it successfully queues the I/O operation.

TEST: After a write operation is canceled by a call to the *aio_cancel*() function and no data were transferred, the return status of the asynchronous operation returned by a call to the *aio_return*() function is -1 and the error status returned by a call to the *aio_error*() function is [EINTR] or [ECANCELED].

TR: Test for both a pipe and a FIFO.

If *PCTS_GTI_DEVICE*, test for a character special file.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_TEST_SUPPORT, NO_OPTION

24 IF PCTS_lio_listio THEN

IF the implementation supports a maximum file size **THEN**

TEST: An attempt to write a file that would exceed an implementation-defined maximum size by calling the *lio_listio*() function, where the write operation is successfully queued, causes the error status for the asynchronous operation to be [EFBIG].

NOTE: The assertion test would require an unreasonable amount of time or resources for most implementations.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION

25 IF PCTS_lio_listio and {_POSIX_JOB_CONTROL} THEN

IF *PCTS_aio_error* and *PCTS_aio_return* **THEN**

SETUP: Make the testing process part of the background process group; set TOSTOP; ignore or block SIGTTOU signals; and make the process group of the process orphaned. Call the *lio_listio*() function so that it successfully queues the I/O operation to write from its controlling terminal.

TEST: The write operation will fail; the return status of the asynchronous operation returned by a call to the *aio_return()* function is -1 and the error status returned by a call to the *aio_error()* function is [EIO].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_TEST_SUPPORT, NO_OPTION

26 **IF PCTS_lio_listio THEN**

IF PCTS_lio_error and PCTS_lio_return and PCTS_DETECT_ENOSPC THEN

SETUP: Fill a device so that there is no more space available on it for data. Call the *lio_listio()* function so that it successfully queues a write I/O operation.

TEST: After a call to the *lio_listio()* function the implementation either detects the condition synchronously, the *lio_listio()* function returns -1 and sets *errno* to [EIO]; or it detects the condition asynchronously, the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EIO].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_TEST_SUPPORT, NO_OPTION

27 **IF PCTS_lio_listio THEN**

IF PCTS_lio_error and PCTS_lio_return THEN

SETUP: Call the *lio_listio()* function so that it successfully queues a write I/O operation.

TEST: After a call to the *lio_listio()* function to write to a pipe or FIFO that is not open for reading by any process, the implementation either detects the condition synchronously, the *lio_listio()* function returns -1 and sets *errno* to [EIO]; or it detects the condition asynchronously, the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EIO].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_TEST_SUPPORT, NO_OPTION

R_10 **IF PCTS_lio_listio THEN**

IF PCTS_lio_error and PCTS_lio_return THEN

TEST: After a call to the *lio_listio()* function, where the *list[]-> aio_fildes* argument is not a valid file descriptor, the implementation detects the condition asynchronously, then the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EBADF].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion *lio_write_ebadf1* in 6.7.4.4.

R_11 **IF PCTS_lio_listio THEN**

IF PCTS_lio_error THEN

TEST: After a call to the *lio_listio()* function, where the *list[]-> aio_fildes* argument is not open for writing, the implementation either detects the condition synchronously, then the *lio_listio()* function returns -1 and sets *errno* to [EBADF]; or it detects the condition asynchronously, then the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EBADF].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion *lio_write_ebadf2* in 6.7.4.4.

28 **IF PCTS_lio_listio and PCTS_lio_cancel THEN**

IF PCTS_lio_error and PCTS_lio_return THEN

SETUP: Call the *lio_listio()* function so that it successfully queues a write I/O operation.

TEST: A write function, that is canceled after a call to the *aio_cancel()* function and before the I/O operation is completed, results in a return status returned by a call to the *aio_return()* function that is -1 and the error status returned by a call to the *aio_error()* function that is [ECANCELED].

TR: Test for both a pipe and a FIFO.

If *PCTS_GTI_DEVICE*, test for a character special file.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_TEST_SUPPORT, NO_OPTION

R_12 IF PCTS_lio_listio THEN

IF PCTS_aio_error and PCTS_aio_return THEN

TEST: After a call to the *lio_listio()* function for a write operation, where the file offset value implied by *list[]->aio_offset* would be invalid, the implementation detects the condition asynchronously, then the return status of the asynchronous operation is set to -1 and the error status of the asynchronous operation is set to [EINVAL].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion *lio_write_einval1* in 6.7.4.4.

29 IF PCTS_lio_listio THEN

TEST: A call to the *lio_listio()* where the *mode* argument is not a proper value returns -1 and sets *errno* to [EINVAL].

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_OPTION

30 IF PCTS_lio_listio THEN

TEST: A call to the *lio_listio()* where the value of *nent* is greater than {AIO_LISTIO_MAX}, returns -1 and sets *errno* to [EINVAL].

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_OPTION

31 IF PCTS_lio_listio THEN

SETUP: Call to *lio_listio()*, where the *mode* argument is LIO_WAIT and where there are at least two I/O operations, at least one of which will complete before the others and send a signal indicating its completion.

TEST: Such *lio_listio()* call will receive a signal while waiting for all I/O requests to complete during an operation, return -1, set *errno* to [EINTR], and outstanding I/O requests will not be canceled.

TR: Test for a signal also generated by another process.

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_OPTION

32 IF not PCTS_lio_listio THEN

TEST: A call to the *lio_listio()* function returns -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *lio_listio*: PASS, NO_OPTION

6.7.5 Retrieve Error Status of Asynchronous I/O Operation

Function: *aio_error()*.

6.7.5.1 Synopsis

1

*M_GA_stdC_proto_decl(int; aio_error; const struct aiocb * aiocbp; aio.h;;)*

SEE: Assertion *GA_stdC_proto_decl* in 2.7.3.

Conformance for *aio_error*: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(aio_error; aio.h;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for *aio_error*: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; aio_error; aio.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.

Conformance for *aio_error*: PASS, NO_OPTION

4

M_GA_macro_args (aio_error; aio.h;;)

SEE: Assertion GA_macro_args in 2.7.3.

Conformance for *aio_error*: PASS, NO_OPTION

6.7.5.2 Description

5

IF PCTS_aio_error THEN

TEST: A call to the *aio_error()* function returns the error status associated with the *aioch* structure referenced by the *aiochp* argument.

ELSE NO_OPTION

Conformance for *aio_error*: PASS, NO_OPTION

R_1 IF PCTS_aio_error THEN

TEST: The error status returned by a call to *aio_error()* is the *errno* value that would be set by the corresponding *read()*, *write()*, or *fsync()* operation.

ELSE NO_OPTION

SEE: Assertions for *aio_read()* in 6.7.2.4.

6

IF PCTS_aio_error THEN

TEST: A call to the *aio_error()* function where the *aioch* structure referenced by the *aiochp* argument refers to an operation that has not yet completed returns the value [EINPROGRESS].

ELSE NO_OPTION

Conformance for *aio_error*: PASS, NO_OPTION

6.7.5.3 Returns

7

IF PCTS_aio_error THEN

TEST: A call to the *aio_error()* function, where the *aioch* structure referenced by the *aiochp* argument refers to an asynchronous I/O operation that has completed successfully, returns 0.

ELSE NO_OPTION

Conformance for *aio_error*: PASS, NO_OPTION

R-2

TEST: The error status returned by a call to *aio_error()*, for an asynchronous I/O operation that has completed unsuccessfully, is the *errno* value that would be set by the corresponding *read()*, *write()*, or *fsync()* operation.

ELSE NO_OPTION

SEE: Assertions for *aio_read()* in 6.7.2.4.

8

IF PCTS_aio_error THEN

TEST: A call to the *aio_error()* function, where the *aiocb* structure referenced by the *aiocbp* argument refers to an asynchronous I/O operation that has not yet completed, returns [EINPROGRESS].

ELSE NO_OPTION

Conformance for *aio_error*: PASS, NO_OPTION

6.7.5.4 Errors

9 IF not PCTS_aio_error THEN

TEST: A call to the *aio_error()* returns -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *aio_error*: PASS, NO_OPTION

10 IF PCTS_aio_error THEN

IF PCTS_DETECT_AIO_ERROR_AIOCBP THEN

TEST: A call to the *aio_error()*, where the *aiocbp* argument refers to an asynchronous operation whose return status has previously been retrieved, returns -1 and sets *errno* to [EINVAL].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_error*: PASS, NO_TEST_SUPPORT, NO_OPTION

11 IF PCTS_aio_error THEN

IF PCTS_DETECT_AIO_ERROR_AIOCBP THEN

TEST: A call to the *aio_error()* function, where the *aiocbp* argument refers to an invalid *aiocb* structure, returns -1 and sets *errno* to [EINVAL].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_error*: PASS, NO_OPTION

6.7.6 Retrieve Return Status of Asynchronous I/O Operation

Function: *aio_return()*.

6.7.6.1 Synopsis

1

*M_GA_stdC_proto_decl(int; aio_return; struct aiocb * aiocbp; aio.h;;)*

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for *aio_return*: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(ssize_t; aio_return; aio.h;;)

SEE: Assertion GA_commonC_result_decl in 2.7.3.

Conformance for *aio_return*: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(ssize_t; aio_return; aio.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.

Conformance for *aio_return*: PASS, NO_OPTION

4

M_GA_macro_args (aio_return; aio.h;;)

SEE: Assertion GA_macro_args in 2.7.3.

Conformance for *aio_return*: PASS, NO_OPTION

6.7.6.2 Description**return_status****IF PCTS_aio_return THEN**

TEST: A call to the *aio_return()* function returns the return status associated with the *aio_cb* structure referenced by the *aio_cbp* argument.

ELSE NO_OPTION

Conformance for *aio_return*: PASS, NO_OPTION

R_1 IF PCTS_aio_return THEN

TEST: The return status for an asynchronous I/O operation is the value that would be returned by the corresponding *read()*, *write()*, or *fsync()* function call.

ELSE NO_OPTION

SEE: Assertions for *aio_read()* in 6.7.2.4.

D_1 IF PCTS_aio_return and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the return status for an operation returned by a call to *aio_return()*, when the error status is equal to [EINPROGRESS], does so in 6.7.6.2.

ELSE NO_OPTION

Conformance for *aio_return*: PASS, NO_OPTION

R_2 IF PCTS_aio_return THEN

SETUP: Initiate an asynchronous I/O operation and let it complete. Retrieve the return status by calling *aio_return()*.

TEST: A call to the *aio_return()* or the *aio_error()* function using the same *aio_cb* structure as used in a previously successful call to *aio_return()* returns -1 and sets *errno* to [EINVAL].

TR: Test for calling both *aio_return()* and *aio_error()*.

ELSE NO_OPTION

SEE: Assertion *EINVAL* in 6.7.6.4.

5 IF PCTS_aio_return THEN

SETUP: Initiate and complete an asynchronous I/O operation. Call the *aio_return()* function to retrieve its return status. Submit the same *aio_cb* structure referred to by *aio_cbp* in the *aio_return()* call to another asynchronous operation.

TEST: A call to the *aio_return()* function can reuse an *aio_cb* structure used in a previously successful *aio_return()* call after it has been used to initiate another asynchronous I/O operation.

ELSE NO_OPTION

Conformance for *aio_return*: PASS, NO_OPTION

6.7.6.3 Returns**R_3 IF PCTS_aio_return THEN**

SETUP: After an asynchronous I/O operation has completed, the return status, as described for *read()*, *write()*, and *fsync()*, is returned.

ELSE NO_OPTION

SEE: Assertion *return_status* in 6.7.6.4.

D_2 IF a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the results of a call to the *aio_return()* function, when the asynchronous I/O operation has not yet completed, does so in 6.7.6.4.

ELSE NO_OPTION

Conformance for *aio_return*: PASS, NO_OPTION

6.7.6.4 Errors**EINVAL**

IF *PCTS_aid_return* **THEN**

SETUP: Initiate an asynchronous I/O operation and let it complete. Retrieve the return status by calling *aid_return()*.

TEST: A call to the *aid_return()* or the *aid_error()* function, using the same *aiocb* structure as used in a previously successful call to *aid_return()*, returns -1 and sets *errno* to [EINVAL].

TR: Test for calling *aid_return()*. If *PCTS_DETECT_AIO_ERROR_AIOCBP* then test for *aid_error()*.

ELSE NO_OPTION

Conformance for *aid_return*: PASS, NO_OPTION

6 IF *PCTS_aid_return* **THEN**

TEST: A call to the *aid_return()* function, where the *aiocbp* argument refers to an invalid *aiocb* structure, returns -1 and sets *errno* to [EINVAL].

ELSE NO_OPTION

Conformance for *aid_return*: PASS, NO_OPTION

7 IF not *PCTS_aid_return* **THEN**

TEST: A call to the *aid_return()* function returns -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *aid_return*: PASS, NO_OPTION

6.7.7 Cancel Asynchronous I/O Request

Function: *aid_cancel()*.

6.7.7.1 Synopsis

1

*M_GA_stdC_proto_decl(int; aid_cancel; int fildes, struct aiocb * aiocbp; aio.h;;)*

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for *aid_cancel*: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(aid_cancel; aio.h;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for *aid_cancel*: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; aid_cancel; aio.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.

Conformance for *aid_cancel*: PASS, NO_OPTION

4

M_GA_macro_args (aid_cancel; aio.h;;)

SEE: Assertion GA_macro_args in 2.7.3.

Conformance for *aid_cancel*: PASS, NO_OPTION

6.7.7.2 Description

5 IF *PCTS_aid_cancel* **THEN**

IF *PCTS_AIO_CANCELABLE_OPS* and (*PCTS_aid_read* or *PCTS_aid_write* or *PCTS_lfo_listio*)

THEN

SETUP: Queue asynchronous I/O requests for one file descriptor that will not complete before calling the *aid_cancel()* function.

TEST: A call to the *aid_cancel()* function will cancel the asynchronous I/O request currently outstanding against file descriptor *fildes* specified by the *aiocbp* argument and return the value AIO_CANCELED.

TR: Test by queuing a single request. Then test by queueing multiple requests, each of which uses a different *aiocbp* against a single file descriptor. Then test by queueing multiple requests against multiple file descriptors.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_cancel*: PASS, NO_TEST_SUPPORT, NO_OPTION

6 IF PCTS_aio_cancel THEN

IF PCTS_AIO_CANCELABLE_OPS and (PCTS_aio_read or PCTS_aio_write or PCTS_lio_listio)

THEN

SETUP: Queue multiple asynchronous I/O requests for multiple file descriptors that will not complete signal notification before calling the *aio_cancel()* function.

TEST: A call to the *aio_cancel()* function, where the *aiocbp* argument is NULL, cancels the outstanding cancellable asynchronous I/O requests against the file descriptor *fildes*, returns the value AIO_CANCELED, and normal signal delivery occurs for the canceled operations.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_cancel*: PASS, NO_TEST_SUPPORT, NO_OPTION

7 IF PCTS_aio_cancel THEN

IF PCTS_AIO_CANCELABLE_OPS and (PCTS_aio_read or PCTS_aio_write or PCTS_lio_listio)

THEN

TEST: Any asynchronous I/O requests that cannot be canceled by a call to the *aio_cancel()* function complete following the normal asynchronous completion process.

NOTE: There is no known portable test method for this assertion.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_cancel*: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION

8 IF PCTS_aio_cancel THEN

IF PCTS_AIO_CANCELABLE_OPS and (PCTS_aio_read or PCTS_aio_write or PCTS_lio_listio)

THEN

TEST: After a call to the *aio_cancel()* function, for requested operations that are successfully canceled, the associated error status is set to [ECANCELED] and the return status is -1.

TR: Test for the *aiocbp* pointing to a valid *aiocb* and for it being NULL.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_cancel*: PASS, NO_TEST_SUPPORT, NO_OPTION

9 IF PCTS_aio_cancel THEN

IF PCTS_AIO_CANCELABLE_OPS and (PCTS_aio_read or PCTS_aio_write or PCTS_lio_listio)

THEN

TEST: After a call to the *aio_cancel()* function, for requested operations that are not successfully canceled, the *aiocbp* is not modified by *aio_cancel()*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_cancel*: PASS, NO_TEST_SUPPORT, NO_OPTION

D_1 IF PCTS_aio_cancel and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the results of calling *aio_cancel()*, where the *aiocbp* is not NULL and the *fildes* argument does not have the same value as the file descriptor with which the asynchronous operation was initiated, does so in 6.7.7.2.

ELSE NO_OPTION

Conformance for *aio_cancel*: PASS, NO_OPTION

D_2 IF PCTS_aio_cancel THEN

TEST: The PCD.1b that documents which asynchronous I/O operations are cancellable by calling the *aio_cancel()* function, does so in 6.7.7.2.

ELSE NO_OPTION

Conformance for *aio_cancel*: PASS, NO_OPTION

6.7.7.3 Returns**R_1 IF PCTS_aio_cancel THEN**

TEST: The *aio_cancel()* function returns the value AIO_CANCELED to the calling process if the requested operation(s) were canceled.

ELSE NO_OPTION

SEE: Assertions in 6.7.7.2.

10 IF PCTS_aio_cancel THEN

IF PCTS_AIO_CANCELABLE_OPS and (PCTS_aio_read or PCTS_aio_write or PCTS_lio_listio) THEN

TEST: After a call to the *aio_cancel()* function, the value AIO_NOTCANCELED is returned when at least one of the requested operation(s) cannot be canceled because it is in progress.

NOTE: There is no known portable test method for assertion.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_cancel*: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION

11 IF PCTS_aio_cancel THEN

IF PCTS_aio_read or PCTS_aio_write or PCTS_lio_listio THEN

TEST: The value AIO_ALLDONE is returned for a call to the *aio_cancel()* function when all of the operations have already completed before they could be canceled.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_cancel*: PASS, NO_TEST_SUPPORT, NO_OPTION

R_2 IF PCTS_aio_cancel THEN

TEST: When an error occurs in a call to the *aio_cancel()* function, it returns -1 and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: Assertions in 6.7.7.4.

6.7.7.4 Errors**12 IF PCTS_aio_cancel THEN**

IF PCTS_AIO_CANCELABLE_OPS and (PCTS_aio_read or PCTS_aio_write or PCTS_lio_listio) THEN

TEST: A call to the *aio_cancel()* function, where the *filides* argument is not a valid file descriptor, returns -1 and sets *errno* to [EBADF].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_cancel*: PASS, NO_OPTION

13 IF not PCTS_aio_cancel THEN

TEST: A call to the *aio_cancel()* function returns -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *aio_cancel*: PASS, NO_OPTION

6.7.8 Wait for Asynchronous I/O Request6.7.9.2 De: 11.2.3 *Initia Func***6.7.8.1 Synopsis**

1

*M_GA_stdC_proto_decl(int; aio_suspend; const struct aiocb * const list[], int nent, const struct timespec *timeout; aio.h;;)*

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for *aio_suspend*: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(aio_suspend; aio.h;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for *aio_suspend*: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; aio_suspend; aio.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.

Conformance for *aio_suspend*: PASS, NO_OPTION

4

M_GA_macro_args (aio_suspend; aio.h;;)

SEE: Assertion GA_macro_args in 2.7.3.

Conformance for *aio_suspend*: PASS, NO_OPTION

6.7.8.2 Description**completion**

IF *PCTS_aio_suspend* **THEN**

IF *PCTS_aio_read* or *PCTS_aio_write* or *PCTS_lio_listio* **THEN**

SETUP: Queue asynchronous I/O operations that will not send signals when they complete and that will not complete until after *aio_suspend()* has been called.

TEST: A call to the *aio_suspend()* function, with the *timeout* argument equal to **NULL**, suspends the calling process until at least one of the asynchronous I/O operations referenced by the *list* argument has completed and returns 0.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_suspend*: PASS, NO_TEST_SUPPORT, NO_OPTION

interrupt

IF *PCTS_aio_suspend* **THEN**

IF *PCTS_aio_read* or *PCTS_aio_write* or *PCTS_lio_listio* **THEN**

SETUP: Queue asynchronous I/O operations that will send signals when they complete and that will not complete until after *aio_suspend()* has been called.

TEST: A call to the *aio_suspend()* function, with the *timeout* argument equal to **NULL**, suspends the calling process until a signal interrupts the function and returns -1 and sets *errno* to [EINTR].

TR: Test for a signal coming from the completion of an asynchronous I/O operation and for a signal coming from another process.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_suspend*: PASS, NO_TEST_SUPPORT, NO_OPTION

timeout

IF *PCTS_aio_suspend* **THEN**
 IF *PCTS_aio_read* or *PCTS_aio_write* or *PCTS_lio_listio* **THEN**
 SETUP: Queue asynchronous I/O operations that will not complete; pass the list of the operations to the *aio_suspend()* function in the test.
 TEST: A call to the *aio_suspend()* function, with the *timeout* argument not equal to **NULL**, suspends the calling process until the time interval specified by *timeout* has elapsed, returns -1, and sets *errno* to [EAGAIN].
 ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
 Conformance for *aio_suspend*: PASS, NO_TEST_SUPPORT, NO_OPTION

already_completed

IF *PCTS_aio_suspend* **THEN**
 IF *PCTS_aio_read* or *PCTS_aio_write* or *PCTS_lio_listio* **THEN**
 SETUP: Queue asynchronous I/O operations so that at least one of them will complete before *aio_suspend()* is called.
 TEST: A call to the *aio_suspend()* function, where any of the *aiocb* structures in the *list* argument correspond to completed asynchronous I/O operations (i.e., the error status for the operation is not equal to [EINPROGRESS]) at the time of the call, returns without suspending the calling process and returns 0.
 ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
 Conformance for *aio_suspend*: PASS, NO_TEST_SUPPORT, NO_OPTION

5 **IF** *PCTS_aio_suspend* **THEN**
 IF *PCTS_aio_read* or *PCTS_aio_write* or *PCTS_lio_listio* **THEN**
 TEST: A call to the *aio_suspend()* function ignores any **NULL** pointers in the *list* argument.
 ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
 Conformance for *aio_suspend*: PASS, NO_TEST_SUPPORT, NO_OPTION

D_1 IF a PCD.1b documents the following **THEN**
 TEST: A PCD.1b that documents the effect of a call to the *aio_suspend()* function, where the *list* argument contains pointers that refer to *aiocb* structures that have not been used in submitting asynchronous I/O, does so in 6.7.8.2.
ELSE NO_OPTION
 Conformance for *aio_suspend*: PASS, NO_OPTION

R_1 IF *PCTS_aio_suspend* **THEN**
 IF *PCTS_aio_read* or *PCTS_aio_write* or *PCTS_lio_listio* **THEN**
 TEST: After a call to the *aio_suspend()* function, and after the time interval indicated in the *timespec* structure, pointed to by *timeout*, elapses before any of the I/O operations referenced by *list* are completed, the *aio_suspend()* returns with an error.
 ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
SEE: Assertion timeout in 6.7.8.2.

6.7.8.3 Returns

R_2 IF *PCTS_aio_suspend* **THEN**
 IF *PCTS_aio_read* or *PCTS_aio_write* or *PCTS_lio_listio* **THEN**
 TEST: A call to the *aio_suspend()* function, after one or more asynchronous I/O operations have completed, returns 0.
 ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
SEE: Assertions completion and already_completed in 6.7.8.2.

R_3 IF *PCTS_aio_suspend* THEN**IF *PCTS_aio_read* or *PCTS_aio_write* or *PCTS_lio_listio* THEN****TEST:** A call to the *aio_suspend()* function returns a value of -1 and sets *errno* to indicate the error, when an error condition is detected.**ELSE NO_TEST_SUPPORT****ELSE NO_OPTION****SEE:** Assertions timeout and interrupt in 6.7.8.2 and no_support in 6.7.8.4.**6.7.8.4 Errors****R_4 IF *PCTS_aio_suspend* THEN****IF *PCTS_aio_read* or *PCTS_aio_write* or *PCTS_lio_listio* THEN****TEST:** A call to the *aio_suspend()*, where no asynchronous I/O indicated in the list referenced by *list* completed in the time interval indicated by *timeout*, returns -1 and sets *errno* to [EAGAIN].**ELSE NO_TEST_SUPPORT****ELSE NO_OPTION****SEE:** Assertion timeout in 6.7.8.2.

6 TEST: A call to *aio_suspend()*, where a signal interrupts the *aio_suspend()* function, returns -1 and sets *errno* to [EINTR].

SEE: Assertion interrupt in 6.7.8.2.

Conformance for aio_suspend: PASS

no_support**IF not *PCTS_aio_suspend* THEN****TEST:** A call to the *aio_suspend()* function returns -1 and sets *errno* to [ENOSYS].**ELSE NO_OPTION***Conformance for aio_suspend: PASS, NO_OPTION***6.7.9 Asynchronous File Synchronization**Function: *aio_fsync()***6.7.9.1 Synopsis****1***M_GA_stdC_proto_decl(int; aio_fsync; int op, struct aiocb * aiocbp; aio.h;;)***SEE:** Assertion GA_stdC_proto_decl in 2.7.3.*Conformance for aio_fsync: PASS[1, 2], NO_OPTION***2***M_GA_commonC_int_result_decl(aio_fsync; aio.h;;)***SEE:** Assertion GA_commonC_int_result_decl in 2.7.3.*Conformance for aio_fsync: PASS[1, 2], NO_OPTION***3***M_GA_macro_result_decl(int; aio_fsync; aio.h;;)***SEE:** Assertion GA_macro_result_decl in 1.3.4.*Conformance for aio_fsync: PASS, NO_OPTION***4***M_GA_macro_args (aio_fsync; aio.h;;)***SEE:** Assertion GA_macro_args in 2.7.3.*Conformance for aio_fsync: PASS, NO_OPTION*

6.7.9.2 Description

5 IF PCTS_aio_fsync THEN

IF PCTS_aio_read or PCTS_lio_listio THEN

SETUP: Queue asynchronous read operations using as many of *PCTS_aio_read* and *PCTS_lio_listio* as are supported by the implementation against a file for which I/O data synchronization has not been set.

TEST: A call to the *aio_fsync()* function, with the *op* argument equal to *O_DSYNC*, asynchronously forces all read operations associated with the file indicated by the file descriptor *aio_fildes* member of the *aiocb* structure referenced by the *aiocbp* argument and queued at the time of the call to *aio_fsync()* to the synchronized I/O data completion state and returns 0 when the synchronization request has been initiated or queued to the file or device. That is, the read operation either completes by transferring an image of the data to the requesting process or, if unsuccessful, by diagnosing and returning an indicator of the error.

NOTE: There is no known portable test method for this assertion.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion GA_syncIODataIntegrityRead in 2.2.2.119.

Conformance for *aio_fsync*: PASS, NO_TEST_SUPPORT, NO_OPTION

6 IF PCTS_aio_fsync THEN

IF PCTS_aio_read or PCTS_lio_listio THEN

SETUP: Queue asynchronous read operations using as many of *PCTS_aio_read* and *PCTS_lio_listio* as are supported by the implementation against a file for which I/O data synchronization has not been set.

TEST: A call to the *aio_fsync()* function with the *op* argument equal to *O_DSYNC* asynchronously forces all read operations associated with the file indicated by the file descriptor *aio_fildes* member of the *aiocb* structure referenced by the *aiocbp* argument and queued at the time of the call to *aio_fsync()* to the synchronized I/O data completion state and returns 0 when the synchronization request has been initiated or queued to the file or device. That is, at the time that the synchronized read operation initiated by calling *aio_fsync()* any pending write requests affecting the data to be read are written to the physical medium containing the file prior to reading the data.

NOTE: There is no known portable test method for this assertion.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion GA_syncIODataIntegrityWbeforeR in 2.2.2.119.

Conformance for *aio_fsync*: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION

7 IF PCTS_aio_fsync THEN

IF PCTS_aio_write or PCTS_lio_listio THEN

SETUP: Queue asynchronous write operations using as many of *PCTS_aio_write* and *PCTS_lio_listio* as are supported by the implementation against a file for which I/O data synchronization has not been set.

TEST: A call to the *aio_fsync()* function with the *op* argument equal to *O_DSYNC* asynchronously forces all write operations associated with the file indicated by the file descriptor *aio_fildes* member of the *aiocb* structure referenced by the *aiocbp* argument and queued at the time of the call to *aio_fsync()* to the synchronized I/O data completion state and returns 0 when the synchronization request has been initiated or queued to the file or device. That is, a write operation initiated by calling *aio_fsync()* either completes by transferring an image of the data to the physical medium containing the file or, if unsuccessful, by diagnosing and returning an indicator of the error.

TR: Test for regular files and, if *PCTS_GTI_DEVICE*, terminals.

NOTE: There is no known portable test method for this assertion.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion GA_syncIODataIntegrityWrite in 2.2.2.119.

Conformance for *aio_fsync*: PASS, NO_TEST_SUPPORT, NO_OPTION

8 IF *PCTS_aio_fsync* THEN**IF *PCTS_aio_read* or *PCTS_lio_listio* THEN**

SETUP: Queue asynchronous read operations using as many of *PCTS_aio_read* and *PCTS_lio_listio* as are supported by the implementation against a file for which I/O data synchronization has not been set.

TEST: A call to the *aio_fsync()* function with the *op* argument equal to *O_SYNC* asynchronously forces all read operations associated with the file indicated by the file descriptor *aio_fildes* member of the *aiocb* structure referenced by the *aiocbp* argument and queued at the time of the call to *aio_fsync()* to the synchronized I/O data completion state and returns 0 when the synchronization request has been initiated or queued to the file or device. That is: At the time that the synchronized read operation initiated by calling *aio_fsync()* occurs, any pending write requests affecting the data to be read are written to the physical medium containing the file prior to reading the data and the following file attributes are also written to the physical medium containing the file prior to returning to the calling process:

1. File mode
2. File serial number
3. ID of device containing this file
4. Number of links
5. User ID of the owner of the file
6. Group ID of the group of the file
7. The file size in bytes
8. Time of last access
9. Time of last data modification
10. Time of last file status change.

NOTE: There is no known portable test method for this assertion.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion GA_syncIOFileIntegrityRead in 2.2.2.120.

Conformance for *aio_fsync*: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION

9 IF *PCTS_aio_fsync* THEN**IF *PCTS_aio_write* or *PCTS_lio_listio* THEN**

SETUP: Queue asynchronous write operations using as many of *PCTS_aio_write* and *PCTS_lio_listio* as are supported by the implementation against a file for which I/O data synchronization has not been set.

TEST: A call to the *aio_fsync()* function with the *op* argument equal to *O_SYNC* asynchronously forces all write operations associated with the file indicated by the file descriptor *aio_fildes* member of the *aiocb* structure referenced by the *aiocbp* argument and queued at the time of the call to *aio_fsync()* to the synchronized I/O file completion state and returns 0 when the synchronization request has been initiated or queued to the file or device. That is: At the time that the synchronized write operation initiated by calling *aio_fsync()* occurs, the data are written to the physical medium containing the file and the following file attributes are also written to the physical medium containing the file prior to returning to the calling process:

1. File mode

2. File serial number
3. ID of device containing this file
4. Number of links
5. User ID of the owner of the file
6. Group ID of the group of the file
7. The file size in bytes
8. Time of last access
9. Time of last data modification
10. Time of last file status change.

NOTE: There is no known portable test method for this assertion.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion GA_syncIOFileIntegrityWrite in 2.2.2.120.

Conformance for *aio_fsync*: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION

10 IF PCTS_aio_fsync THEN

IF PCTS_aio_read or PCTS_write or PCTS_lio_listio THEN

TEST: After a call to the *aio_fsync()* function and after the request is queued, the error status for all asynchronous I/O operations associated with the file indicated by the file descriptor *aio_fildes* member of the *aio_cb* structure referenced by the *aio_cbp* argument and queued at the time of the call will be [EINPROGRESS], and the *aio_fsync()* call returns 0.

TR: Test for as many of the *PCTS_aio_read*, *PCTS_aio_write*, and *PCTS_lio_listio* as are supported by the implementation.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_fsync*: PASS, NO_TEST_SUPPORT, NO_OPTION

11 IF PCTS_aio_fsync THEN

IF PCTS_aio_read or PCTS_write or PCTS_lio_listio THEN

TEST: After a call to the *aio_fsync()* function and after all data has been successfully transferred, the error status of each queued I/O operation is reset to reflect the success or failure of the operation.

TR: Test for as many of the *PCTS_aio_read*, *PCTS_aio_write*, and *PCTS_lio_listio* as are supported by the implementation. Test for operations that succeed and that fail.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_fsync*: PASS, NO_TEST_SUPPORT, NO_OPTION

12 IF PCTS_aio_fsync THEN

IF PCTS_aio_read or PCTS_write or PCTS_lio_listio THEN

SETUP: Queue asynchronous operations, including some write operations, using as many of *PCTS_aio_read*, *PCTS_aio_write*, and *PCTS_lio_listio* as are supported by the implementation against a file for which I/O synchronization has not been set.

TEST: After a call to the *aio_fsync()* function where the *aio_sigevent.sigev_signo* is nonzero, a signal is generated when all operations have achieved synchronized I/O completion, and the *aio_fsync()* call returns 0.

TR: Test for as many of the *PCTS_aio_read*, *PCTS_aio_write*, and *PCTS_lio_listio* as are supported by the implementation. Test for the *op* argument being *O_DSYNC* and *O_SYNC*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_fsync*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*

13 IF *PCTS_aio_fsync* THEN

IF *PCTS_aio_read* or *PCTS_write* or *PCTS_lio_listio* THEN

SETUP: Queue asynchronous operations, including some write operations using as many of *PCTS_aio_read*, *PCTS_aio_write*, and *PCTS_lio_listio* as are supported by the implementation against a file for which I/O synchronized has not been set.

TEST: During a call to the *aio_fsync()* function all members of the structure referenced by *aioctx* are ignored except for *aio_fildes* and *aio_sigevent*.

TR: Test for as many of the *PCTS_aio_read*, *PCTS_aio_write*, and *PCTS_lio_listio* as are supported by the implementation. Test for the *op* argument being *O_DSYNC* and *O_SYNC*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *aio_fsync*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*

D_1 IF *PCTS_aio_fsync* and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the behavior of an implementation when the control block referenced by *aioctx* in a call to the *aio_fsync()* function becomes an illegal address prior to asynchronous I/O completion does so in 6.7.9.2.

ELSE NO_OPTION

Conformance for *aio_fsync*: *PASS*, *NO_OPTION*

NOTE: The following statement in POSIX.1b {3} does not make sense since there is no file to synchronize:

If *aioctx* is *NULL*, then no status is returned in *aioctx*, and no signal is generated upon completion of the operation.

6.7.9.3 Returns

R_1 IF *PCTS_aio_fsync* THEN

TEST: The *aio_fsync()* function returns the value 0 to the calling process when the I/O operation is successfully queued.

ELSE NO_OPTION

SEE: Assertions in 6.7.9.2.

R_2 IF *PCTS_aio_fsync* THEN

TEST: The *aio_fsync()* function returns the value -1 and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: Assertions in 6.7.9.4.

6.7.9.4 Errors

14 IF *PCTS_aio_fsync* THEN

IF {*AIO_MAX*} ≤ *PCTS_AIO_MAX* and (*PCTS_aio_read* or *PCTS_aio_write* or *PCTS_lio_listio*) THEN

SETUP: Queue {*AIO_MAX*} asynchronous I/O operations that will not complete for a file that does not have its synchronized I/O attributes set.

- TEST:** A call to the *aio_fsync()* function, when the requested asynchronous operation was not queued due to temporary resource limitations, returns -1 and sets *errno* to [EAGAIN].
- TR:** Test for as many of the *PCTS_aio_read*, *PCTS_aio_write*, and *PCTS_lio_listio* as are supported by the implementation. Test for the *op* argument being O_DSYNC and O_SYNC.
- ELSE NO_TEST_SUPPORT**
ELSE NO_OPTION
Conformance for *aio_fsync*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 15 **IF** *PCTS_aio_fsync* **THEN**
 IF {*AIO_MAX*} ≤ *PCTS_AIO_MAX* and (*PCTS_aio_read* or *PCTS_aio_write* or *PCTS_lio_listio*) **THEN**
 SETUP: Queue *PCTS_AIO_MAX* asynchronous I/O operations that will not complete for a file that does not have its synchronized I/O attributes set.
 TEST: A call to the *aio_fsync()* returns 0 and does not set *errno* to [EAGAIN].
 TR: Test for as many of the *PCTS_aio_read*, *PCTS_aio_write*, and *PCTS_lio_listio* as are supported by the implementation. Test for the *op* argument being O_DSYNC and O_SYNC.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *aio_fsync*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 16 **IF** *PCTS_aio_fsync* **THEN**
 IF *PCTS_aio_read* or *PCTS_aio_write* or *PCTS_lio_listio* **THEN**
 TEST: A call to the *aio_fsync()*, where the *aio_fildes* member of the *aioctx* structure referenced by the *aioctx* argument is not a valid file descriptor open for writing, returns -1 and sets *errno* to [EBADF].
 TR: Test for as many of the *PCTS_aio_read*, *PCTS_aio_write*, and *PCTS_lio_listio* as are supported by the implementation. Test for the *op* argument being O_DSYNC and O_SYNC.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *aio_fsync*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 17 **IF** *PCTS_aio_fsync* **THEN**
 IF *PCTS_NO_SYNC_IO_FILE* and (*PCTS_aio_read* or *PCTS_aio_write* or *PCTS_lio_listio*) **THEN**
 SETUP: Queue asynchronous I/O operations for a file for which the implementation does not support synchronized I/O.
 TEST: A call to the *aio_fsync()* function, for a file for which the implementation does not support synchronized I/O, returns -1 and sets *errno* to [EINVAL].
 TR: Test for as many of the *PCTS_aio_read*, *PCTS_aio_write*, and *PCTS_lio_listio* as are supported by the implementation. Test for the *op* argument being O_DSYNC and O_SYNC.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *aio_fsync*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 18 **IF** *PCTS_aio_fsync* **THEN**
 TEST: A call to the *aio_fsync()* function, with a value of *op* other than O_DSYNC or O_SYNC, returns -1 and sets *errno* to [EINVAL].
 ELSE NO_OPTION
 Conformance for *aio_fsync*: PASS, NO_OPTION
- 19 **IF** not *PCTS_aio_fsync* **THEN**
 TEST: A call to the *aio_fsync()* function returns -1 and sets *errno* to [ENOSYS].
 ELSE NO_OPTION
 Conformance for *aio_fsync*: PASS, NO_OPTION

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Section 7: Device- and Class- Specific Functions

180 There are there are no POSIX.1b {3} assertions in Section 7.

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Section 8: Language-Specific Services for the C Programming Language

There are there are no POSIX.1b {3} assertions in Section 8 except for clause 8.2.2.2.

8.2.2 Open a Stream on a File Descriptor

Function: *fdopen()*.

8.2.2.1 Synopsis

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

8.2.2.2 Description

D_1 IF a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the result of the *fdopen()* function, when *filides* refers to a shared memory object, does so in 8.2.2.3.

ELSE NO_OPTION

Conformance for *fdopen*: *PASS, NO_OPTION*

8.2.2.3 Returns

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

8.2.2.4 Errors

There are only IEEE Std 2003.1-1992 {4} assertions in this clause; there are no POSIX.1b {3} assertions.

Section 9: System Databases

180 There are there are no POSIX.1b {3} assertions in Section 9.

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Section 10: Data Interchange Format

180 There are there are no POSIX.1b {3} assertions in Section 10.

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Section 11: Synchronization

11.1 Semaphore Characteristics

- 1 **SETUP:** Include <semaphore.h>.
 TEST: The type *sem_t* is defined.
 Conformance for *sem.hdr*: PASS

M_GA_semOpenMaxFD(PCTS_SEM_FILE_DESCRIPTORS; function; PCTS_function) =
IF *PCTS_SEM_FILE_DESCRIPTORS* THEN
 IF (*{OPEN_MAX}* <= *PCTS_OPEN_MAX*) and *PCTS_function* THEN
 TEST: A process calling *function()* can simultaneously open a combination of files and
 semaphores totaling at least *{OPEN_MAX}*.
 TR: Test for opening *{OPEN_MAX}* semaphores.
 Test for opening a semaphore after opening *{OPEN_MAX}* -1 files.
 Test for opening a file after opening *{OPEN_MAX}* -1 semaphores.
 ELSE NO_TEST_SUPPORT
ELSE NO_OPTION

GA_semOpenMaxFD
FOR: *sem_init()* and *sem_open()*
M_GA_semOpenMaxFD(PCTS_SEM_FILE_DESCRIPTORS; function; PCTS_function) =
NOTE: The assertion is to be tested once for each function specified in the FOR clause. The
 assertion is to be read by substituting *function()* with the current function specified in
 the FOR clause. The name of the function also is to be substituted for each occurrence in
 the construct *PCTS_function*.
 Conformance for *sem_hdr*: PASS, NO_TEST_SUPPORT, NO_OPTION

M_GA_semPCTSOpenMaxFD(PCTS_SEM_FILE_DESCRIPTORS; function; PCTS_function) =
IF *PCTS_SEM_FILE_DESCRIPTORS* THEN
 IF (*{OPEN_MAX}* <= *PCTS_OPEN_MAX*) and *PCTS_function* THEN
 TEST: A process calling *function()* can simultaneously open a combination of files and
 semaphores totaling at least *PCTS_OPEN_MAX*.
 TR: Test for opening *PCTS_OPEN_MAX*-1 files.
 Test for opening a file after opening *{OPEN_MAX}* -1 files.
 Test for opening a file after opening *PCTS_OPEN_MAX* -1 semaphores.
 ELSE NO_TEST_SUPPORT
ELSE NO_OPTION

GAsemPCTSOpenMaxFD
FOR: *sem_init()* and *sem_open()*
M_GA_semPCTSOpenMaxFD(PCTS_SEM_FILE_DESCRIPTORS; function; PCTS_function)
NOTE: The assertion is to be tested once for each function specified in the FOR clause. The
 assertion is to be read by substituting *function()* with the current function specified in
 the FOR clause. The name of the function also is to be substituted for each occurrence in
 the construct *PCTS_function*.
 Conformance for *sem_hdr*: PASS, NO_TEST_SUPPORT, NO_OPTION

11.2 Semaphore Functions

11.2.1 Initialize an Unnamed Semaphore

Function: *sem_init()*.

11.2.1.1 Synopsis

1

*M_GA_stdC_proto_decl(int; sem_init; sem_t *sem, int pshared, unsigned int value; semaphore.h;;)*

SEE: Assertion GA_stdC_proto_decl in 2.7.3.
Conformance for *sem_init*: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(sem_init; semaphore.h;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.
Conformance for *sem_init*: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; sem_init; semaphore.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.
Conformance for *sem_init*: PASS, NO_OPTION

4

M_GA_macro_args (sem_init; semaphore.h;;)

SEE: Assertion GA_macro_args in 2.7.3.
Conformance for *sem_init*: PASS, NO_OPTION

11.2.1.2 Description

M_GA_semOpenMaxFD(PCTS_SEM_INIT_FD; sem_init; PCTS_sem_init)

SEE: Assertion GA_semOpenMaxFD in 11.1.
Conformance for *sem_init*: PASS/OpenMaxSems, PCTSOpenMaxSems]

M_GA_semPCTSOpenMaxFD(PCTS_SEM_INIT_FD; sem_init; PCTS_sem_init)

SEE: Assertion GA_semPCTSOpenMaxFD in 11.1.
Conformance for *sem_init*: PASS/OpenMaxSems, PCTSopenMaxSems]

sem_init

IF PCTS_sem_init **THEN**

IF PCTS_GAP_sem_init **THEN**

TEST: A call *sem_init* (*sem*, *pshared*, *val*) initializes the unnamed semaphore *sem* to the value of *val*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_init*: PASS, NO_TEST_SUPPORT, NO_OPTION

5

FOR: *sem_wait()*, *sem_trywait()*, *sem_post()*, and *sem_destroy ()*

IF PCTS_sem_init **THEN**

IF PCTS_GAP_sem_init and PCTS_function **THEN**

TEST: The interface *function()* returns successfully when using a semaphore created by *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_init*: PASS, NO_TEST_SUPPORT, NO_OPTION

6

IF *PCTS_sem_init* **THEN**

IF *PCTS_GAP_sem_init* **THEN**

TEST: A semaphore created by *sem_init()* can be used until it is destroyed.

TR: Create a semaphore with a positive value, decrement to zero, then increment and re-decrement to zero.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_init*: PASS, NO_TEST_SUPPORT, NO_OPTION

7

FOR: *sem_wait()*, *sem_trywait()*, *sem_post()*, and *sem_destroy()*

IF *PCTS_sem_init* **THEN**

IF *PCTS_GAP_sem_init* and *PCTS_function* **THEN**

SETUP: Create a semaphore by calling *sem_init(sem, pshared, val)* with a non-zero value of *pshared*.

TEST: Any process that can access the semaphore *sem* can use it for performing *function()*.

TR: Test with values {INT_MAX} and {INT_MIN} for *pshared*.
Perform *function()* on the semaphore from the same process that created it and from a child process for each of these values of *pshared*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_init*: PASS, NO_TEST_SUPPORT, NO_OPTION

D_1 IF *PCTS_sem_init* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the result of referring to copies of *sem* in calls to *sem_wait()*, *sem_trywait()*, *sem_post()*, and *sem_destroy()*, does so in 11.2.1.2.

ELSE NO_OPTION

Conformance for *sem_init*: PASS, NO_OPTION

D_2 IF *PCTS_sem_init* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the result of a *pshared* argument of zero does so in 11.2.1.2.

ELSE NO_OPTION

Conformance for *sem_init*: PASS, NO_OPTION

D_3 IF *PCTS_sem_init* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not it supports the *sem_init()* function does so in 11.2.1.2.

ELSE NO_OPTION

Conformance for *sem_init*: PASS, NO_OPTION

11.2.1.3 Returns

R_1 IF *PCTS_sem_init* **THEN**

IF *PCTS_GAP_sem_init* **THEN**

TEST: When a call to *sem_init()* completes successfully, the semaphore *sem* is initialized.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion *sem_init* in 11.2.1.2

R_2 IF *PCTS_sem_init* **THEN**

IF *PCTS_GAP_sem_init* **THEN**
TEST: When a call to *sem_init()* completes unsuccessfully, the interface returns a value of -1, sets *errno* to indicate the error, and does not initialize the semaphore.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
SEE: All assertions in 11.2.1.4

11.2.1.4 Errors

- 8** **IF** *PCTS_sem_init* **THEN**
IF *PCTS_GAP_sem_init* and {SEM_VALUE_MAX} < {UINT_MAX} **THEN**
TEST: A call to *sem_init(sem, pshared, val)*, when *val* exceeds {SEM_VALUE_MAX}, returns a value of -1 and sets *errno* to [EINVAL].
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *sem_init*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 9** **IF** *PCTS_sem_init* **THEN**
IF *PCTS_GAP_sem_init* **THEN**
TEST: When a resource required to initialize the semaphore has been exhausted, a call to *sem_init()* returns a value of -1 and sets *errno* to [ENOSPC].
NOTE: The corresponding statement in IEEE Std 1003.1b-1993 is not specific enough to write a portable test.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *sem_init*: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION
- 10** **IF** *PCTS_sem_init* **THEN**
IF *PCTS_GAP_sem_init* and *PCTS_SEM_IS_FD* and ({OPEN_MAX} < *PCTS_OPEN_MAX*) **THEN**
SETUP: Open {OPEN_MAX} files. Try to open a semaphore.
TEST: When a resource required to initialize the semaphore has been exhausted, a call to *sem_init()* returns a value of -1 and sets *errno* to [ENOSPC].
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *sem_init*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 11** **IF** *PCTS_sem_init* **THEN**
IF *PCTS_GAP_sem_init* and *PCTS_SEM_IS_FD* and ({OPEN_MAX} >= *PCTS_OPEN_MAX*) **THEN**
SETUP: Open *PCTS_OPEN_MAX* files. Try to open a semaphore.
TEST: When a resource required to initialize the semaphore has been exhausted, a call to *sem_init()* returns a value of -1 and sets *errno* to [ENOSPC].
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *sem_init*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 12** **IF** *PCTS_sem_init* **THEN**
IF *PCTS_GAP_sem_init* and {SEM_NSEMS_MAX} < *PCTS_SEM_NSEMS_MAX* **THEN**
TEST: A call to *sem_init()*, after {SEM_NSEMS_MAX} semaphores have been created, returns a value of -1 and sets *errno* to [ENOSPC].
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *sem_init*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 13** **IF** *PCTS_sem_init* **THEN**
IF *PCTS_GAP_sem_init* and {SEM_NSEMS_MAX} >= *PCTS_SEM_NSEMS_MAX* **THEN**
TEST: A call to *sem_init()*, after {PCTS_SEM_NSEMS_MAX} semaphores have been created, returns a value of -1 and sets *errno* to [ENOSPC].

ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *sem_init*: PASS, NO_TEST_SUPPORT, NO_OPTION

- 14 IF not PCTS_sem_init THEN**
 IF PCTS_GAP_sem_init THEN
 TEST: A call to *sem_init()* returns a value of -1 and sets *errno* to [ENOSYS].
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *sem_init*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 15 IF PCTS_sem_init THEN**
 IF PCTS_RAP_sem_init THEN
 TEST: A call to *sem_init()*, when the process lacks the appropriate privileges to initialize a semaphore, returns a value of -1 and sets *errno* to [EPERM].
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *sem_init*: PASS, NO_TEST_SUPPORT, NO_OPTION

11.2.2 Destroy an Unnamed Semaphore

Function: *sem_destroy()*.

11.2.2.1 Synopsis

- 1**
*M_GA_stdC_proto_decl(int; sem_destroy; sem_t *sem, semaphore.h;;)*
SEE: Assertion GA_stdC_proto_decl in 2.7.3.
Conformance for *sem_destroy*: PASS[1, 2], NO_OPTION
- 2**
M_GA_commonC_int_result_decl(sem_destroy; semaphore.h;;)
SEE: Assertion GA_commonC_int_result_decl in 2.7.3.
Conformance for *sem_destroy*: PASS[1, 2], NO_OPTION
- 3**
M_GA_macro_result_decl(int; sem_destroy; semaphore.h;;)
SEE: Assertion GA_macro_result_decl in 1.3.4.
Conformance for *sem_destroy*: PASS, NO_OPTION
- 4**
M_GA_macro_args (sem_destroy; semaphore.h;;)
SEE: Assertion GA_macro_args in 2.7.3.
Conformance for *sem_destroy*: PASS, NO_OPTION

11.2.2.2 Description

sem_destroy
 IF PCTS_sem_destroy THEN
 TEST: A call *sem_destroy(sem)* destroys the unnamed semaphore *sem* and returns 0.
 ELSE NO_OPTION
 Conformance for *sem_destroy*: PASS, NO_OPTION

D_1 IF PCTS_sem_destroy and a PCD.1b documents the following THEN
 TEST: A PCD.1b that documents the effect of calling *sem_destroy()* with a named semaphore, does so in 11.2.2.2.
 ELSE NO_OPTION
 Conformance for *sem_destroy*: PASS, NO_OPTION

D_2 IF *PCTS_sem_destroy* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the effect of using the semaphore *sem* after it is destroyed by a call to *sem_destroy()*, does so in 11.2.2.2.

ELSE NO_OPTION

Conformance for *sem_destroy*: PASS, NO_OPTION

D_3 IF *PCTS_sem_destroy* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the effect of destroying a semaphore upon, which other processes are currently blocked, does so in 11.2.2.2.

ELSE NO_OPTION

Conformance for *sem_destroy*: PASS, NO_OPTION

D_4 IF *PCTS_sem_destroy* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not it supports the *sem_destroy()* function, does so in 11.2.2.2.

ELSE NO_OPTION

Conformance for *sem_destroy*: PASS, NO_OPTION

11.2.2.3 Returns

R_1 IF *PCTS_sem_destroy* **THEN**

TEST: When a call to *sem_destroy()* completes successfully, the interface returns a value of 0.

ELSE NO_OPTION

SEE: Assertion **sem_destroy** in 11.2.2.2.

R_2 IF *PCTS_sem_destroy* **THEN**

TEST: When a call to *sem_destroy()* completes unsuccessfully, interface returns a value of -1 and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: All assertions in 11.2.2.4.

11.2.2.4 Errors

5 IF *PCTS_sem_destroy* **THEN**

TEST: The call *sem_destroy(sem)*, when the argument *sem* is not a valid semaphore, returns a value of -1 and sets *errno* to [EINVAL].

NOTE: A subroutine is recommended that either returns an invalid semaphore, or indicates that there is no way to generate an invalid semaphore on the system.

ELSE NO_OPTION

Conformance for *sem_destroy*: PASS, NO_OPTION

6 IF not *PCTS_sem_destroy* **THEN**

TEST: A call to *sem_destroy()* returns a value of -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *sem_destroy*: PASS, NO_OPTION

7 IF *PCTS_sem_destroy* and *PCTS_SEM_EBUSY* **THEN**

TEST: A call to *sem_destroy(sem)*, when there are currently processes blocked on the semaphore, returns a value of -1 and sets *errno* to [EBUSY].

ELSE NO_OPTION

Conformance for *sem_destroy*: PASS, NO_OPTION

11.2.3 Initialize/Open a Named SemaphoreFunction: *sem_open()*.**11.2.3.1 Synopsis**

1

M_GA_stdC_proto_decl(sem_t; sem_open; const char *name, int oflag, ...; semaphore.h;;)***SEE:** Assertion GA_stdC_proto_decl in 2.7.3Conformance for *sem_open*: PASS[1, 2], NO_OPTION

2

M_GA_commonC_result_decl(sem_t; sem_open; semaphore.h;;)***SEE:** Assertion GA_commonC_int_result_decl in 2.7.3Conformance for *sem_open*: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(sem_t; sem_open; semaphore.h;;)***SEE:** Assertion GA_macro_result_decl in 1.3.4Conformance for *sem_open*: PASS, NO_OPTION

4

*M_GA_macro_args (sem_open; semaphore.h;;)***SEE:** Assertion GA_macro_args in 2.7.3Conformance for *sem_open*: PASS, NO_OPTION**11.2.3.2 Description***M_GA_semOpenMaxFD(PCTS_SEM_OPEN_FD; sem_open; PCTS_sem_open)***SEE:** Assertion GA_semOpenMaxFD in 11.1Conformance for *sem_open*: PASS/OpenMaxSems, PCTSOpenMaxSems]*M_GA_sempCTSOpenMaxFD(PCTS_SEM_OPEN_FD; sem_open; PCTS_sem_open)***SEE:** Assertion GA_sempCTSOpenMaxFD in 11.1Conformance for *sem_open*: PASS/OpenMaxSems, PCTSOpenMaxSems]**sem_open****FOR:** *sem_wait()*, *sem_trywait()*, *sem_post()*, and *sem_close()***IF** *PCTS_sem_open* **THEN****IF** *PCTS_function* **THEN****TEST:** A call *sem_open(name, oflag, ...)* establishes a connection between a named semaphore, *name*, and the calling process, and returns the address of the named semaphore that can be used in subsequent calls to *function()*.**NOTE:** The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.**ELSE** NO_TEST_SUPPORT**ELSE** NO_OPTIONConformance for *sem_open*: PASS, NO_TEST_SUPPORT, NO_OPTION

5

IF *PCTS_sem_open* **THEN****SETUP:** Include the header *<semaphore.h>*.**TEST:** The constants *O_CREAT* and *O_EXCL* are defined and are bitwise distinct.**ELSE** NO_OPTIONConformance for *sem_open*: PASS, NO_OPTION

6

FOR: *sem_close()*, *_exit()*, and *execl()*, *execv()*, *execle()*, *execve()*, *execlp()*, and *execvp()***IF** *PCTS_sem_open* **THEN****SETUP:** Create a semaphore using *sem_open()*.

TEST: The semaphore remains usable by the calling process until it is closed by a successful call to *function()*.

TR: Test using *sem_wait()*, *sem_trywait()*, and *sem_post()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_OPTION

Conformance for *sem_open*: PASS, NO_OPTION

7 **IF PCTS_sem_open THEN**

SETUP: Open a semaphore by calling *sem_open(name, oflag, ...)*, where the flag bit O_CREAT is set in *oflag* and the named semaphore *name* does not already exist.

TEST: The named semaphore is created.

ELSE NO_OPTION

Conformance for *sem_open*: PASS, NO_OPTION

8 **IF PCTS_sem_open THEN**

SETUP: The call *sem_open(name, oflag, mode, value)* creates a semaphore with an initial value of *value*.

ELSE NO_OPTION

Conformance for *sem_open*: PASS, NO_OPTION

9 **IF PCTS_sem_open THEN**

TEST: Valid initial values for semaphores are unsigned integers with values between 0 and {SEM_VALUE_MAX}, inclusive.

TR: Test values of 0, {SEM_VALUE_MAX}, and {SEM_VALUE_MAX} + 1, if it is less than {UINT_MAX}.

ELSE NO_OPTION

Conformance for *sem_open*: PASS, NO_OPTION

10 **IF PCTS_sem_open THEN**

TEST: The user ID of the semaphore created by *sem_open()* is the effective user ID of the process.

ELSE NO_OPTION

Conformance for *sem_open*: PASS, NO_OPTION

11 **IF PCTS_sem_open THEN**

TEST: The group ID of the semaphore created by *sem_open()* is a system default group ID, or the effective group ID, of the process.

ELSE NO_OPTION

Conformance for *sem_open*: PASS, NO_OPTION

12 **IF PCTS_sem_open THEN**

TEST: The permission bits of the semaphore created by *sem_open(name, oflag, mode, value)* are set to the value of the *mode* argument, except those set in the file mode creation mask, of the process.

ELSE NO_OPTION

Conformance for *sem_open*: PASS, NO_OPTION

D_1 IF PCTS_sem_open and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the effect of calling *sem_open (name, oflag, mode, value)* with bits specified in *mode*, other than the file permission bits, does so in 11.2.3.2.

ELSE NO_OPTION

Conformance for *sem_open*: PASS, NO_OPTION

13 **IF PCTS_sem_open THEN**

SETUP: Create a new named semaphore with the call *sem_open(name, oflag, ...)* and the *O_CREAT* flag set in *oflag*.
TEST: Other processes can connect to the semaphore by calling *sem_open()* with the same value of *name*.

ELSE NO_OPTION
 Conformance for *sem_open*: PASS, NO_OPTION

14 IF PCTS_sem_open THEN

TEST: When the semaphore *name* exists, the call *sem_open(name, oflag, ...)* with the *O_CREAT* and *O_EXCL* flags set in *oflag*, fails.

ELSE NO_OPTION
 Conformance for *sem_open*: PASS, NO_OPTION

15 IF PCTS_sem_open THEN

TEST: The check for the existence of the semaphore in a call to *sem_open()* with the *O_EXCL* and *O_CREAT* flags set, and the creation of the semaphore if it does not exist, are atomic with respect to other processes executing *sem_open()* with *O_EXCL* and *O_CREAT* set.

NOTE: There is no known reliable test method for this assertion.

ELSE NO_OPTION
 Conformance for *sem_open*: PASS, NO_TEST, NO_OPTION

D_2 IF PCTS_sem_open and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the effect of calling *sem_open()*, with *O_EXCL* set and *O_CREAT* not set, does so in 11.2.3.2.

ELSE NO_OPTION
 Conformance for *sem_open*: PASS, NO_OPTION

D_3 IF PCTS_sem_open and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the effect of calling *sem_open()* with *oflag* other than *O_EXCL* and *O_CREAT* specified in the *oflag* parameter, does so in 11.2.3.2.

ELSE NO_OPTION
 Conformance for *sem_open*: PASS, NO_OPTION

D_4 IF PCTS_sem_open and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents whether *name* appears in the filesystem does so in 11.2.3.2.

ELSE NO_OPTION
 Conformance for *sem_open*: PASS, NO_OPTION

D_5 IF PCTS_sem_open and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents whether *name* is visible to functions that take pathnames as arguments does so in 11.2.3.2.

ELSE NO_OPTION
 Conformance for *sem_open*: PASS, NO_OPTION

16 M_GA_portableFilenames(sem_open)

SEE: Assertion GA_portableFilenames in 2.2.2.40.
 Conformance for *sem_open*: PASS, NO_OPTION

17 M_GA_upperLowerNames(sem_open)

SEE: Assertion GA_upperLowerNames in 2.2.2.40.
 Conformance for *sem_open*: PASS, NO_OPTION

18 M_GA_PRNoTrunc(sem_open)

SEE: Assertion GA_PRNoTrunc in 2.3.6.
 Conformance for *sem_open*: PASS, NO_OPTION

19 M_GA_PRNoTruncError(sem_open)

SEE: Assertion GA_PRNoTruncError in 2.3.6
Conformance for sem_open: PASS, NO_OPTION

20 IF PCTS_sem_open THEN

SETUP: Call *sem_open(name, oflag, ...)* where *name* begins with the slash character.

TEST: Processes calling *sem_open()* with the same value of *name* refer to the same semaphore object, as long as that name has not been removed.

ELSE NO_OPTION

Conformance for sem_open: PASS, NO_OPTION

D_6 IF PCTS_sem_open THEN

TEST: A PCD.1b documents the effect of calling *sem_open(name, oflag, ...)*, when *name* does not begin with a slash character, in 11.2.3.2.

ELSE NO_OPTION

Conformance for sem_open: PASS, NO_OPTION

D_7 IF PCTS_sem_open THEN

TEST: A PCD.1b documents the interpretation of slash characters in 11.2.3.2.

ELSE NO_OPTION

Conformance for sem_open: PASS, NO_OPTION

21 IF PCTS_sem_open THEN

SETUP: Call *sem_open(name, oflag, ...)* with a single value for *name* and no intervening calls to *sem_unlink()*.

TEST: The same semaphore address is returned for each successful call.

ELSE NO_OPTION

Conformance for sem_open: PASS, NO_OPTION

D_8 IF PCTS_sem_open and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the effects of references to copies of semaphores created with *sem_open()* does so in 11.2.3.2.

ELSE NO_OPTION

Conformance for sem_open: PASS, NO_OPTION

D_9 IF PCTS_sem_open and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents whether or not it supports the *sem_open()* function does so in 11.2.3.2.

ELSE NO_OPTION

Conformance for sem_open: PASS, NO_OPTION

11.2.3.3 Returns

R_1 IF PCTS_sem_open THEN

TEST: When a call to *sem_open()* completes successfully, the address of the semaphore is returned.

ELSE NO_OPTION

SEE: Assertion *sem_open* in 11.2.3.2

11.2.3.4 Errors

22 IF PCTS_sem_open THEN

TEST: A call to *sem_open()* when the named semaphore exists and the permissions specified by *oflag* are denied, or the named semaphore does not exist and permission to create the named semaphore is denied, returns a value of -1 and sets *errno* to [EACCESS].

ELSE NO_OPTION

Conformance for sem_open: PASS, NO_OPTION

- 23** **IF** *PCTS_sem_open* **THEN**
 TEST: A call to *sem_open()* when *O_CREAT* and *O_EXCL* are set and the named semaphore already exists, returns a value of -1 and sets *errno* to [EEXIST].
 ELSE NO_OPTION
 Conformance for *sem_open*: PASS, NO_OPTION
- 24** **IF** *PCTS_sem_open* **THEN**
 TEST: A call to *sem_open()*, when the *sem_open()* operation is interrupted by a signal, returns a value of -1 and sets *errno* to [EINTR]
 ELSE NO_OPTION
 Conformance for *sem_open*: PASS, NO_OPTION
- 25** **IF** *PCTS_sem_open* **THEN**
 TEST: A call to *sem_open()*, when the *sem_open()* operation is not supported for the given name, returns a value of -1 and sets *errno* to [EINVAL]
 NOTE: A subroutine is recommended that either returns a name for which *sem_open()* is not supported, or indicates that there is no way to generate *sem_open()* on the system.
 ELSE NO_OPTION
 Conformance for *sem_open*: PASS, NO_OPTION
- D_10** **IF** *PCTS_sem_open* **THEN**
 TEST: The PCD.1b documents under what circumstances [EINVAL] may be returned in 11.2.3.4.
 ELSE NO_OPTION
 Conformance for *sem_open*: PASS, NO_OPTION
- 26** **IF** *PCTS_sem_open* **THEN**
 TEST: A call to *sem_open(name, oflag, ...)*, when *O_CREAT* is specified in *oflag* and value is greater than {SEM_VALUE_MAX}, returns a value of -1 and sets *errno* to [EINVAL].
 ELSE NO_OPTION
 Conformance for *sem_open*: PASS, NO_OPTION
- 27** **IF** *PCTS_sem_open* **THEN**
 TEST: A call to *sem_open()*, when too many semaphore descriptors are currently in use by this process, returns a value of -1 and sets *errno* to [EMFILE].
 ELSE NO_OPTION
 Conformance for *sem_open*: PASS, NO_OPTION
- 28** **IF** *PCTS_sem_open* **THEN**
 IF *PCTS_SEM_IS_FD* and ({OPEN_MAX} < *PCTS_OPEN_MAX*) **THEN**
 TEST: A call to *sem_open()*, when too many file descriptors are currently in use by this process, returns a value of -1 and sets *errno* to [EMFILE]
 TR: Open {OPEN_MAX} files. Try to open a semaphore.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *sem_open*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 29** **IF** *PCTS_sem_open* **THEN**
 IF {PATH_MAX} <= *PCTS_PATH_MAX* **THEN**
 TEST: A call to *sem_open()*, when the length of the *name* string exceeds {PATH_MAX}, returns a value of -1 and sets *errno* to [ENAMETOOLONG]
 TR: Open {OPEN_MAX} files. Try to open a semaphore.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *sem_open*: PASS, NO_TEST_SUPPORT, NO_OPTION

- 30** **IF** *PCTS_sem_open* **THEN**
 IF {NAME_MAX} <= *PCTS_NAME_MAX* and {_POSIX_NO_TRUNC} **THEN**
 TEST: A call to *sem_open*(), when a pathname component is longer than
 {NAME_MAX} while {_POSIX_NO_TRUNC} is in effect, returns a value of -1
 and sets *errno* to [ENAMETOOLONG].
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *sem_open*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 31** **IF** *PCTS_sem_open* **THEN**
 TEST: A call to *sem_open*(), when too many semaphores are currently open in the
 system, returns a value of -1 and sets *errno* to [ENFILE].
 ELSE *NO_OPTION*
 Conformance for *sem_open*: *PASS, NO_OPTION*
- 32** **IF** *PCTS_sem_open* **THEN**
 TEST: A call to *sem_open*(), when O_CREAT is not set and the named semaphore does not
 exist, returns a value of -1 and sets *errno* to [ENOENT].
 ELSE *NO_OPTION*
 Conformance for *sem_open*: *PASS, NO_OPTION*
- 33** **IF** *PCTS_sem_open* **THEN**
 TEST: A call to *sem_open*(), when there is insufficient space for the creation of the new
 named semaphore, returns a value of -1 and sets *errno* to [ENOSPC].
 NOTE: There is no known reliable test method for this assertion.
 ELSE *NO_OPTION*
 Conformance for *sem_open*: *PASS, NO_TEST, NO_OPTION*
- 34** **IF** not *PCTS_sem_open* **THEN**
 TEST: A call to *sem_open*() returns a value of -1 and sets *errno* to [ENOSYS].
 ELSE *NO_OPTION*
 Conformance for *sem_open*: *PASS, NO_OPTION*

11.2.4 Close a Named Semaphore

Function: *sem_close*().

11.2.4.1 Synopsis

- 1**
 *M_GA_stdC_proto_decl(int; sem_close; sem_t *sem; semaphore.h;;)*
 SEE: Assertion GA_stdC_proto_decl in 2.7.3.
 Conformance for *sem_close*: *PASS[1, 2], NO_OPTION*
- 2**
 M_GA_commonC_int_result_decl(sem_close; semaphore.h;;)
 SEE: Assertion GA_commonC_int_result_decl in 2.7.3.
 Conformance for *sem_close*: *PASS[1, 2], NO_OPTION*
- 3**
 M_GA_macro_result_decl(int; sem_close; semaphore.h;;)
 SEE: Assertion GA_macro_result_decl in 1.3.4.
 Conformance for *sem_close*: *PASS, NO_OPTION*
- 4**
 M_GA_macro_args (sem_close; semaphore.h;;)
 SEE: Assertion GA_macro_args in 2.7.3.
 Conformance for *sem_close*: *PASS, NO_OPTION*

11.2.4.2 Description

sem_close

IF *PCTS_sem_close* **THEN**

IF: *PCTS_sem_open* and {*SEM_NSEMS_MAX*} < *PCTS_SEM_NSEMS_MAX* **THEN**

TEST: The *sem_close()* function makes any system resources allocated by the system available for reuse by a subsequent *sem_open()* call in this process and returns 0.

TR: Open {*SEM_NSEMS_MAX*} semaphores, close one, then open another.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for *sem_close*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*

D_1 IF *PCTS_sem_close* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the effects of calling *sem_close()* for an unnamed semaphore, does so in 11.2.4.2.

ELSE *NO_OPTION*

Conformance for *sem_close*: *PASS*, *NO_OPTION*

D_2 IF *PCTS_sem_close* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the effects of subsequent use of the semaphore *sem*, does so in 11.2.4.2.

ELSE *NO_OPTION*

Conformance for *sem_close*: *PASS*, *NO_OPTION*

5 IF *PCTS_sem_close* **THEN**

TEST: The *sem_close()* has no effect on the state of the semaphore, if the semaphore has not been removed with a successful call to *sem_unlink()*.

ELSE *NO_OPTION*

Conformance for *sem_close*: *PASS*, *NO_OPTION*

6 IF *PCTS_sem_close* **THEN**

IF: *PCTS_sem_open* *PCTS_sem_unlink* **THEN**

SETUP: Call *sem_open()* with *O_CREAT*; then call *sem_unlink()* successfully on the same semaphore.

TEST: When all processes that have opened the semaphore then close it, the semaphore is no longer accessible.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for *sem_close*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*

D_3 IF *PCTS_sem_close* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not it supports the *sem_close()* function, does so in 11.2.4.2.

ELSE *NO_OPTION*

Conformance for *sem_close*: *PASS*, *NO_OPTION*

11.2.4.3 Returns

R_1 IF *PCTS_sem_close* **THEN**

TEST: When a call to *sem_close()* completes successfully, the interface returns a value of 0.

ELSE *NO_OPTION*

SEE: Assertion *sem_close* in 11.2.4.2.

R_2 IF *PCTS_sem_close* **THEN**

TEST: When a call to *sem_close()* completes unsuccessfully, the interface returns a value of -1 and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: Assertion `sem_close` in 11.2.4.4.

11.2.4.4 Errors

7 **IF** `PCTS_sem_close` **THEN**

TEST: A call to `sem_close()`, when the `sem` argument is not a valid semaphore descriptor, returns a value of -1 and sets `errno` to {EINVAL}.

NOTE: A subroutine is recommended that either returns an invalid semaphore descriptor, or indicates that there is no way to generate an invalid semaphore descriptor on the system.

ELSE NO_OPTION

Conformance for `sem_close`: PASS, NO_OPTION

8 **IF** not `PCTS_sem_close` **THEN**

TEST: A call to `sem_close()` returns a value of -1 and sets `errno` to [ENOSYS].

ELSE NO_OPTION

Conformance for `sem_close`: PASS, NO_OPTION

11.2.5 Remove a Named Semaphore

Function: `sem_unlink()`.

11.2.5.1 Synopsis

1

`M_GA_stdC_proto_decl(int; sem_unlink; const char *name; semaphore.h;;)`

SEE: Assertion `GA_stdC_proto_decl` in 2.7.3.

Conformance for `sem_unlink`: PASS[1, 2], NO_OPTION

2

`M_GA_commonC_int_result_decl(sem_unlink; semaphore.h;;)`

SEE: Assertion `GA_commonC_int_result_decl` in 2.7.3.

Conformance for `sem_unlink`: PASS[1, 2], NO_OPTION

3

`M_GA_macro_result_decl(int; sem_unlink; semaphore.h;;)`

SEE: Assertion `GA_macro_result_decl` in 1.3.4.

Conformance for `sem_unlink`: PASS, NO_OPTION

4

`M_GA_macro_args ( sem_unlink; semaphore.h;;)`

SEE: Assertion `GA_macro_args` in 2.7.3.

Conformance for `sem_unlink`: PASS, NO_OPTION

11.2.5.2 Description

sem_unlink

IF `PCTS_sem_unlink` **THEN**

TEST: The call `sem_unlink(name)` removes the semaphore named by the string `name` and returns the value zero.

ELSE NO_OPTION

Conformance for `sem_unlink`: PASS, NO_OPTION

- 5 **IF** *PCTS_sem_unlink* **THEN**
TEST: When the semaphore named by *name* is currently referenced by other processes, then *sem_unlink(name)* has no effect on the state of the semaphore.
ELSE NO_OPTION
Conformance for sem_unlink: PASS, NO_OPTION
- 6 **FOR:** *sem_close()*, *_exit()*, *execl()*, *execv()*, *execle()*, *execve()*, *execlp()*, and *execvp()*
IF *PCTS_sem_unlink* **THEN**
TEST: When one or more processes have the semaphore open when *sem_unlink()* is called, destruction of the semaphore is postponed until all references to the semaphore have been destroyed by a call to *function()*.
NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.
ELSE NO_OPTION
Conformance for sem_unlink: PASS, NO_OPTION
- 7 **IF** *PCTS_sem_unlink* **THEN**
IF *PCTS_sem_open*
TEST: Calls to *sem_open()* to recreate or reconnect to the semaphore refer to a new semaphore after *sem_unlink()* is called.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for sem_unlink: PASS, NO_TEST_SUPPORT, NO_OPTION
- 8 **IF** *PCTS_sem_unlink* **THEN**
TEST: When any process references *name*, the call *sem_unlink(name)* returns immediately.
ELSE NO_OPTION
Conformance for sem_unlink: PASS, NO_OPTION
- D_1 IF** *PCTS_sem_unlink* and a PCD.1b documents the following **THEN**
TEST: A PCD.1b that documents whether or not it supports the *sem_unlink()* function does so in 11.2.5.2.
ELSE NO_OPTION
Conformance for sem_unlink: PASS, NO_OPTION

11.2.5.3 Returns

- R_1 IF** *PCTS_sem_unlink* **THEN**
TEST: When a call to *sem_unlink()* completes successfully, the interface returns a value of 0.
ELSE NO_OPTION
SEE: Assertion *sem_unlink* in 11.2.5.2.
- R_2 IF** *PCTS_sem_unlink* **THEN**
TEST: When a call to *sem_unlink()* completes unsuccessfully, the interface returns a value of -1, sets *errno* to indicate the error, and does not change the semaphore.
ELSE NO_OPTION
SEE: All assertions in 11.2.5.4

11.2.5.4 Errors

- 9 **IF** *PCTS_sem_unlink* **THEN**
TEST: A call to *sem_unlink()*, when permission is denied to unlink the named semaphore, returns a value of -1 and sets *errno* to [EACCESS].
ELSE NO_OPTION
Conformance for sem_unlink: PASS, NO_OPTION

- 10** **IF** *PCTS_sem_unlink* **THEN**
 IF { *_posix_no_trunc* } AND { *name_max* } <= *PCTS_NAME_MAX* **THEN**
 TEST: A call to *sem_unlink*(), when the length of the *name* string exceeds { *NAME_MAX* } while { *_POSIX_NO_TRUNC* } is in effect, returns a value of -1 and sets *errno* to [ENAMETOOLONG].
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *sem_unlink*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 11** **IF** *PCTS_sem_unlink* **THEN**
 TEST: A calls to *sem_unlink*(), when the named semaphore does not exist, returns a value of -1 and sets *errno* to [ENOENT].
 NOTE: A subroutine is recommended that either returns the name of a semaphore that does not exist, or indicates that there is no way to generate the name of a semaphore that does not exist in the system.
 ELSE *NO_OPTION*
 Conformance for *sem_unlink*: *PASS, NO_OPTION*
- 12** **IF** not *PCTS_sem_unlink* **THEN**
 TEST: A calls to *sem_unlink*() returns a value of -1 and sets *errno* to [ENOSYS].
 ELSE *NO_OPTION*
 Conformance for *sem_unlink*: *PASS, NO_OPTION*

11.2.6 Lock a Semaphore

Functions: *sem_wait*(), *sem_trywait*().

11.2.6.1 Synopsis

- 1**
 *M_GA_stdC_proto_decl(int; sem_wait; sem_t *sem; semaphore.h;;)*
 SEE: Assertion *GA_stdC_proto_decl* in 2.7.3.
 Conformance for *sem_wait*: *PASS[1, 2], NO_OPTION*
- 2**
 M_GA_commonC_int_result_decl(sem_wait; semaphore.h;;)
 SEE: Assertion *GA_commonC_int_result_decl* in 2.7.3.
 Conformance for *sem_wait*: *PASS[1, 2], NO_OPTION*
- 3**
 M_GA_macro_result_decl(int; sem_wait; semaphore.h;;)
 SEE: Assertion *GA_macro_result_decl* in 1.3.4.
 Conformance for *sem_wait*: *PASS, NO_OPTION*
- 4**
 M_GA_macro_args (sem_wait; semaphore.h;;)
 SEE: Assertion *GA_macro_args* in 2.7.3.
 Conformance for *sem_wait*: *PASS, NO_OPTION*
- 5**
 *M_GA_stdC_proto_decl(int; sem_trywait; sem_t *sem; semaphore.h;;)*
 SEE: Assertion *GA_stdC_proto_decl* in 2.7.3.
 Conformance for *sem_trywait*: *PASS[5, 6], NO_OPTION*
- 6**
 *M_GA_commonC_int_result_decl(sem_trywait; sem_t *sem; semaphore.h;;)*
 SEE: Assertion *GA_commonC_int_result_decl* in 2.7.3.
 Conformance for *sem_trywait*: *PASS[5, 6], NO_OPTION*

7

M_GA_macro_result_decl(int; sem_trywait; semaphore.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.

Conformance for *sem_trywait*: PASS, NO_OPTION

8

M_GA_macro_args (sem_trywait; semaphore.h;;)

SEE: Assertion GA_macro_args in 2.7.3.

Conformance for *sem_trywait*: PASS, NO_OPTION

11.2.6.2 Description

sem_wait

FOR: *sem_init()* and *sem_open()*

IF *PCTS_sem_wait* **THEN**

IF *PCTS_function* **THEN**

SETUP: Create a semaphore using *function()*.

TEST: When the call *sem_wait(sem)* locks the semaphore *sem*, with the semaphore lock operation, it returns 0.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for *sem_wait*: PASS, *NO_TEST_SUPPORT*, *NO_OPTION*

sem_trywait

FOR: *sem_init()* and *sem_open()*

IF *PCTS_sem_trywait* **THEN**

IF *PCTS_function* **THEN**

SETUP: Create a semaphore using *function()*.

TEST: When the call *sem_trywait(sem)* locks the semaphore *sem*, with the semaphore lock operation, it returns the value zero.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for *sem_trywait*: PASS, *NO_TEST_SUPPORT*, *NO_OPTION*

9

FOR: *sem_init()* and *sem_open()*

IF *PCTS_sem_wait* **THEN**

IF *PCTS_function* **THEN**

SETUP: Create a semaphore using *function()*.

TEST: When the semaphore value is currently zero, and the call to *sem_wait(sem)* is not interrupted by a signal, the call returns when the semaphore referenced by *sem* is locked.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_wait*: PASS, NO_TEST_SUPPORT, NO_OPTION

10 FOR: *sem_init()* and *sem_open()*

IF *PCTS_sem_trywait* **THEN**

IF *PCTS_function* **THEN**

SETUP: Create a semaphore using *function()*.

TEST: When the semaphore value is currently positive, and the call to *sem_wait(sem)* is not interrupted by a signal, the call returns 0 when the semaphore referenced by *sem* is locked.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a NO_TEST_SUPPORT test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_trywait*: PASS, NO_TEST_SUPPORT, NO_OPTION

11 FOR: *sem_init()* and *sem_open()*

IF *PCTS_sem_trywait* **THEN**

IF *PCTS_function* **THEN**

SETUP: Create a semaphore using *function()*.

TEST: When the semaphore value is currently zero, the call to *sem_trywait()* does not lock the semaphore referenced by *sem*.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a NO_TEST_SUPPORT test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_trywait*: PASS, NO_TEST_SUPPORT, NO_OPTION

12 FOR: *sem_init()* and *sem_open()*

IF *PCTS_sem_wait* **THEN**

IF *PCTS_function* and *sem_post()* **THEN**

SETUP: Create a semaphore using *function()*.

TEST: After a successful *sem_wait()* call, the semaphore is locked, and remains locked, until the *sem_post()* function is executed and returns successfully.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a NO_TEST_SUPPORT test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_wait*: PASS, NO_TEST_SUPPORT, NO_OPTION

- 13** **FOR:** *sem_init()* and *sem_open()*
 IF *PCTS_sem_trywait* **THEN**
 IF *PCTS_function* and *sem_post()* **THEN**
 SETUP: Create a semaphore using *function()*.
 TEST: After a successful call to *sem_trywait()*, the semaphore is locked, and
 remains locked, until the *sem_post* function is executed and returns
 successfully.
 TR: When testing for *sem_init()*, perform the test consistent with the flag
 PCTS_GAP_sem_init; that is, generate a *NO_TEST_SUPPORT* test result code if there
 is no way to get appropriate privilege to call *sem_init()*.
 NOTE: The assertion is to be tested once for each function specified in the FOR
 clause. The assertion is to be read by substituting *function()* with the current
 function specified in the FOR clause. The name of the function also is to be
 substituted for each occurrence in the construct *PCTS_function*.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *sem_trywait*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*
- 14** **FOR:** *sem_init()* and *sem_open()*
 IF *PCTS_sem_wait* **THEN**
 IF *PCTS_function* **THEN**
 SETUP: Create a semaphore using *function()*.
 TEST: The *sem_wait()* function is interruptible by the delivery of a signal.
 TR: When testing for *sem_init()*, perform the test consistent with the flag
 PCTS_GAP_sem_init; that is, generate a *NO_TEST_SUPPORT* test result code if
 there is no way to get appropriate privilege to call *sem_init()*.
 NOTE: The assertion is to be tested once for each function specified in the FOR
 clause. The assertion is to be read by substituting *function()* with the current
 function specified in the FOR clause. The name of the function also is to be
 substituted for each occurrence in the construct *PCTS_function*.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *sem_wait*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*
- D_1** **IF** *PCTS_sem_wait* and a PCD.1b documents the following **THEN**
 TEST: A PCD.1b that documents whether or not it supports the *sem_wait()* function does
 so in 11.2.6.2.
 ELSE *NO_OPTION*
 Conformance for *sem_wait*: *PASS*, *NO_OPTION*
- D_2** **IF** *PCTS_sem_trywait* and a PCD.1b documents the following **THEN**
 TEST: A PCD.1b that documents whether or not it supports the *sem_trywait()* function
 does so in 11.2.6.2.
 ELSE *NO_OPTION*
 Conformance for *sem_trywait*: *PASS*, *NO_OPTION*

11.2.6.3 Returns

- 15** **FOR:** *sem_init()* and *sem_open()*
 IF *PCTS_sem_wait* **THEN**
 IF *PCTS_function* **THEN**
 SETUP: Create a semaphore using *function()*.
 TEST: The *sem_wait(sem)* function returns 0 if the calling process successfully
 performed the semaphore lock operation on the semaphore designated by
 sem.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_wait*: *PASS, NO_TEST_SUPPORT, NO_OPTION*

16 FOR: *sem_init()* and *sem_open()*

IF PCTS_sem_trywait THEN

IF PCTS_function THEN

SETUP: Create a semaphore using *function()*.

TEST: The *sem_trywait(sem)* function returns 0 if the calling process successfully performed the semaphore lock operation on the semaphore designated by *sem*.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_trywait*: *PASS, NO_TEST_SUPPORT, NO_OPTION*

R_1 FOR: *sem_init()* and *sem_open()*

IF PCTS_sem_wait THEN

IF PCTS_function THEN

SETUP: Create a semaphore using *function()*.

TEST: When a call to *sem_wait(sem)* completes successfully, the interface returns a value of 0 and the semaphore designated by *sem* is locked by the semaphore lock operation.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion *sem_wait* in 11.2.6.2.

R_2 FOR: *sem_init()* and *sem_open()*

IF PCTS_sem_trywait THEN

IF PCTS_function THEN

SETUP: Create a semaphore using *function()*.

TEST: When a call to *sem_trywait(sem)* completes successfully, the interface returns a value of 0 and the semaphore designated by *sem* is locked by the semaphore lock operation.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current

function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion *sem_trywait* in 11.2.6.2.

R_3 FOR: *sem_init()* and *sem_open()*

IF *PCTS_sem_wait* **THEN**

IF *PCTS_function* **THEN**

SETUP: Create a semaphore using *function()*.

TEST: When a call to *sem_wait(sem)* completes unsuccessfully, the interface returns a value of -1, sets *errno* to indicate the error, and does not change the state of the semaphore.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: All assertions in 11.2.6.4 controlled by *PCTS_sem_wait*.

R_4 FOR: *sem_init()* and *sem_open()*

IF *PCTS_sem_trywait* **THEN**

IF *PCTS_function* **THEN**

SETUP: Create a semaphore using *function()*.

TEST: When a call to *sem_trywait()* completes unsuccessfully, the interface returns a value of -1, sets *errno* to indicate the error, and does not change the state of the semaphore.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: All assertions in 11.2.6.4 controlled by *PCTS_sem_trywait*.

11.2.6.4 Errors

17 FOR: *sem_init()* and *sem_open()*

IF *PCTS_sem_wait* **THEN**

IF *PCTS_function* **THEN**

TEST: A call to *sem_wait()*, when the semaphore is already locked, so that it cannot be immediately locked by the *sem_trywait()* operation, returns a value of -1 and sets *errno* to [EAGAIN].

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_trywait*: *PASS, NO_TEST_SUPPORT, NO_OPTION*

18 **FOR:** *sem_init()* and *sem_open()*
 IF *PCTS_sem_trywait* **THEN**
 IF *PCTS_function* **THEN**
 SETUP: Create a semaphore using *function()*.
 TEST: A call to *sem_trywait()*, when the semaphore is already locked, so that it cannot be immediately locked by the *sem_trywait()* operation, returns a value of -1 and sets *errno* to [EAGAIN].
 TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.
 NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *sem_trywait*: *PASS, NO_TEST_SUPPORT, NO_OPTION*

19 **FOR:** *sem_init()* and *sem_open()*
 IF *PCTS_sem_wait* **THEN**
 IF *PCTS_function* **THEN**
 SETUP: Create a semaphore using *function()*.
 TEST: A call to *sem_wait()*, when the *sem* argument does not refer to a valid semaphore, returns a value of -1 and sets *errno* to [EINVAL].
 TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.
 NOTE: A subroutine is recommended that either returns an invalid semaphore, or indicates that there is no way to generate an invalid semaphore on the system.
 The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *sem_wait*: *PASS, NO_TEST_SUPPORT, NO_OPTION*

20 **FOR:** *sem_init()* and *sem_open()*
 IF *PCTS_sem_trywait* **THEN**
 IF *PCTS_function* **THEN**
 SETUP: Create a semaphore using *function()*.
 TEST: A call to *sem_trywait(sem)*, when the *sem* argument does not refer to a valid semaphore, returns a value of -1 and sets *errno* to [EINVAL].
 TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.
 NOTE: A subroutine is recommended that either returns an invalid semaphore, or indicates that there is no way to generate an invalid semaphore on the system.
 The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*

Conformance for *sem_trywait*: PASS, NO_TEST_SUPPORT, NO_OPTION

- 21 **FOR:** *sem_init()* and *sem_open()*
 IF *PCTS_sem_wait* **THEN**
 IF *PCTS_function* **THEN**
 SETUP: Create a semaphore using *function()*.
 TEST: A call to *sem_wait()*, interrupted by a signal, returns a value of -1 and sets *errno* to [EINTR].
 TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a NO_TEST_SUPPORT test result code if there is no way to get appropriate privilege to call *sem_init()*.
 NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *sem_trywait*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 22 **FOR:** *sem_init()* and *sem_open()*
 IF *PCTS_sem_trywait* **THEN**
 IF *PCTS_function* **THEN**
 SETUP: Create a semaphore using *function()*.
 TEST: A call to *sem_trywait()*, when interrupted by a signal, returns a value of -1 and sets *errno* to [EINVAL].
 TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a NO_TEST_SUPPORT test result code if there is no way to get appropriate privilege to call *sem_init()*.
 NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *sem_trywait*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 23 **IF** not *PCTS_sem_wait* **THEN**
 TEST: A call to *sem_wait()* returns a value of -1 and sets *errno* to [ENOSYS].
 ELSE NO_OPTION
 Conformance for *sem_wait*: PASS, NO_OPTION
- 24 **IF** not *PCTS_sem_trywait* **THEN**
 TEST: A call to *sem_trywait()* returns a value of -1 and sets *errno* to [ENOSYS].
 ELSE NO_OPTION
 Conformance for *sem_trywait*: PASS, NO_OPTION
- 25 **FOR:** *sem_init()* and *sem_open()*
 IF *PCTS_sem_wait* **THEN**
 IF *PCTS_function* **THEN**
 SETUP: Create a semaphore using *function()*.
 TEST: A call to *sem_wait()*, when a deadlock condition is detected, returns a value of -1 and sets *errno* to [EDEADLK].
 TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a NO_TEST_SUPPORT test result code if there is no way to get appropriate privilege to call *sem_init()*.
 NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current

function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_wait*: PASS, NO_TEST_SUPPORT, NO_OPTION

26 FOR: *sem_init()* and *sem_open()*

IF *PCTS_sem_trywait* **THEN**

IF *PCTS_function* **THEN**

SETUP: Create a semaphore using *function()*.

TEST: A call to *sem_trywait()*, when a deadlock condition is detected, returns a value of -1 and sets *errno* to [EDEADLK].

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a NO_TEST_SUPPORT test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_trywait*: PASS, NO_TEST_SUPPORT, NO_OPTION

11.2.7 Unlock a Semaphore

Function: *sem_post()*.

11.2.7.1 Synopsis

1

*M_GA_stdC_proto_decl(int; sem_post; sem_t *sem, semaphore.h;;)*

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for *sem_post*: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(sem_post; semaphore.h;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for *sem_post*: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; sem_post; semaphore.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.

Conformance for *sem_post*: PASS, NO_OPTION

4

M_GA_macro_args (sem_post; semaphore.h;;)

SEE: Assertion GA_macro_args in 2.7.3.

Conformance for *sem_post*: PASS, NO_OPTION

11.2.7.2 Description

sem_post

FOR: *sem_init()* and *sem_open()*

IF *PCTS_sem_post* **THEN**

IF *PCTS_function* **THEN**

SETUP: Create a semaphore using *function()*.

- TEST:** A successful call to *sem_post()* unlocks the semaphore referenced by *sem* by performing the semaphore unlock operation on that semaphore, and returns the value 0.
- TR:** When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.
- NOTE:** The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_post*: PASS, NO_TEST_SUPPORT, NO_OPTION

5 **FOR:** *sem_init()* and *sem_open()*

IF *PCTS_sem_post* **THEN**

IF *PCTS_function* **THEN**

SETUP: Create a semaphore using *function()*.

TEST: When the semaphore value resulting from *sem_post()* is positive, then the semaphore value is incremented.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_post*: PASS, NO_TEST_SUPPORT, NO_OPTION

6 **FOR:** *sem_init()* and *sem_open()*

IF *PCTS_sem_post* **THEN**

IF *PCTS_sem_wait* **THEN**

SETUP: Create a semaphore using *function()*. Also, create multiple processes and have them block waiting on the semaphore.

TEST: When the value of the semaphore resulting from *sem_post()* is 0, then one of the processes blocked waiting for the semaphore returns successfully from its call to *sem_wait()*.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_post*: PASS, NO_TEST_SUPPORT, NO_OPTION

R_1 FOR: *sem_init()* and *sem_open()*

IF *PCTS_sem_post* **THEN**

IF *PCTS_function* and {_POSIX_PRIORITY_SCHEDULING} **THEN**

SETUP: Create a semaphore using *function()*.

TEST: When the value of the semaphore resulting from *sem_post()* is 0, the process to be unblocked is chosen in a manner appropriate to the scheduling policies and parameters in effect for the blocked processes.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion 8 in 11.2.7.2.

- 7 **FOR:** *sem_init()* and *sem_open()*
IF *PCTS_sem_post* **THEN**
 IF *PCTS_function* and *{_POSIX_PRIORITY_SCHEDULING}* **THEN**
 SETUP: Create a semaphore using *function()*.
 TEST: When the value of the semaphore resulting from *sem_post()* is 0, and the scheduler is *SCHED_FIFO* or *SCHED_RR*, the highest priority waiting process is unblocked.
 TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

 Test for each of *SCHED_FIFO* and *SCHED_RR*.
 NOTE: The assertion is to be tested once for each function specified in the *FOR* clause. The assertion is to be read by substituting *function()* with the current function specified in the *FOR* clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *sem_post*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*
- 8 **FOR:** *sem_init()* and *sem_open()*
IF *PCTS_sem_post* **THEN**
 IF *PCTS_function* and *{_POSIX_PRIORITY_SCHEDULING}* **THEN**
 SETUP: Create a semaphore using *function()*.
 TEST: When the value of the semaphore resulting from *sem_post()* is 0, and the scheduler is *SCHED_FIFO* or *SCHED_RR*, and there is more than one highest priority process blocked waiting for the semaphore, then the highest priority process that has been waiting the longest is unblocked.
 TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

 Test for each of *SCHED_FIFO* and *SCHED_RR*.
 NOTE: The assertion is to be tested once for each function specified in the *FOR* clause. The assertion is to be read by substituting *function()* with the current function specified in the *FOR* clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *sem_post*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*
- D_1** **IF** *PCTS_sem_post* and a PCD.1b documents the following **THEN**
 TEST: A PCD.1b that documents the choice of a process to unblock if *{_POSIX_PRIORITY_SCHEDULING}* is defined does so in 11.2.7.2.
 ELSE *NO_OPTION*
 Conformance for *sem_post*: *PASS*, *NO_OPTION*
- 9 **FOR:** *sem_init()* and *sem_open()*
IF *PCTS_sem_post* **THEN**
 IF *PCTS_function* **THEN**
 SETUP: Create a semaphore using *function()*.
 TEST: The *sem_post()* function is reentrant with respect to signals and may be invoked from a signal-catching function.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_post*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*

D_2 IF *PCTS_sem_post* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not it supports the *sem_post()* function does so in 11.2.7.2.

ELSE NO_OPTION

Conformance for *sem_post*: *PASS*, *NO_OPTION*

11.2.7.3 Returns

R_2 FOR: *sem_init()* and *sem_open()*

IF *PCTS_sem_post* **THEN**

IF *PCTS_function* **THEN**

SETUP: Create a semaphore using *function()*.

TEST: When a call to *sem_post()* completes successfully, the interface returns a value of 0.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion *sem_post* in 11.2.7.2.

R_3 FOR: *sem_init()* and *sem_open()*

IF *PCTS_sem_post* **THEN**

IF *PCTS_function* **THEN**

SETUP: Create a semaphore using *function()*.

TEST: When a call to *sem_post()* completes unsuccessfully, the interface returns a value of -1 and sets *errno* to indicate the error.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: All assertions in 11.2.7.4.

11.2.7.4 Errors

10 FOR: *sem_init()* and *sem_open()*

IF *PCTS_sem_post* **THEN**

IF *PCTS_function* **THEN**

- SETUP:** Create a semaphore using *function()*.
- TEST:** A call to *sem_post()*, when the *sem* does not refer to a valid semaphore, returns a value of -1 and sets *errno* to [EINVAL].
- TR:** When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.
- NOTE:** A subroutine is recommended that either returns an invalid semaphore, or indicates that there is no way to generate an invalid semaphore on the system.

The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_post*: PASS, NO_TEST_SUPPORT, NO_OPTION

- 11 IF not PCTS_sem_post THEN**
- TEST:** A call to *sem_post()* returns a value of -1 and sets *errno* to [ENOSYS].
- ELSE NO_OPTION**
- Conformance for *sem_post*: PASS, NO_OPTION

11.2.8 Get the Value of a Semaphore

Function: *sem_getvalue()*.

11.2.8.1 Synopsis

- 1**
- M_GA_stdC_proto_decl(int; sem_getvalue; sem_t *sem, int *sval; semaphore.h;;;)*
- SEE:** Assertion GA_stdC_proto_decl in 2.7.3.
- Conformance for *sem_getvalue*: PASS[1, 2], NO_OPTION
- 2**
- M_GA_commonC_int_result_decl(sem_getvalue; semaphore.h;;;)*
- SEE:** Assertion GA_commonC_int_result_decl in 2.7.3.
- Conformance for *sem_getvalue*: PASS[1, 2], NO_OPTION
- 3**
- M_GA_macro_result_decl(int; sem_getvalue; semaphore.h;;;)*
- SEE:** Assertion GA_macro_result_decl in 1.3.4.
- Conformance for *sem_getvalue*: PASS, NO_OPTION
- 4**
- M_GA_macro_args (sem_getvalue; semaphore.h;;;)*
- SEE:** Assertion GA_macro_args in 2.7.3.
- Conformance for *sem_getvalue*: PASS, NO_OPTION

11.2.8.2 Description

sem_getvalue

- FOR:** *sem_init()* and *sem_open()*
- IF PCTS_sem_getvalue THEN**
- IF PCTS_function THEN**
- SETUP:** Create a semaphore using *function()*.

TEST: A successful call of *sem_getvalue(sem, sval)* updates the location referenced by the *sval* argument to have the value of the semaphore referenced by *sem* at some unspecified time during the call, and returns the value of 0.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_getvalue*: PASS, NO_TEST_SUPPORT, NO_OPTION

5 **FOR:** *sem_init()* and *sem_open()*

IF PCTS_sem_getvalue THEN

IF PCTS_function THEN

SETUP: Create a semaphore using *function()*.

TEST: The *sem_getvalue()* function does not affect the state of the semaphore referenced by *sem*.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_getvalue*: PASS, NO_TEST_SUPPORT, NO_OPTION

6 **FOR:** *sem_init()* and *sem_open()*

IF PCTS_sem_getvalue THEN

IF PCTS_function THEN

SETUP: Create a semaphore using *function()*.

TEST: When *sem* is locked, then the value returned by *sem_getvalue()* is either 0 or a negative number whose absolute value represents the number of processes waiting for the semaphore at some unspecified time during the call.

TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sem_getvalue*: PASS, NO_TEST_SUPPORT, NO_OPTION

D_1 IF PCTS_sem_getvalue and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents whether or not it supports the *sem_getvalue()* function does so in 11.2.8.2.

ELSE NO_OPTION

Conformance for *sem_getvalue*: PASS, NO_OPTION

11.2.8.3 Returns

R_1 FOR: *sem_init()* and *sem_open()*

IF *PCTS_sem_getvalue* **THEN**
 IF *PCTS_function* **THEN**
 SETUP: Create a semaphore using *function()*.
 TEST: When a call to *sem_getvalue()* completes successfully, the interface returns a value of 0.
 TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.
 NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.
 ELSE *NO_TEST_SUPPORT*
ELSE *NO_OPTION*
SEE: Assertion *sem_getvalue* in 11.2.8.2.

R_2 FOR: *sem_init()* and *sem_open()*
 IF *PCTS_sem_getvalue* **THEN**
 IF *PCTS_function* **THEN**
 SETUP: Create a semaphore using *function()*.
 TEST: When a call to *sem_getvalue()* completes unsuccessfully, the interface returns a value of -1 and sets *errno* to indicate the error.
 TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.
 NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
SEE: All assertions in 11.2.8.4

7 FOR: *sem_init()* and *sem_open()*
 IF *PCTS_sem_getvalue* **THEN**
 IF *PCTS_function* and *PCTS_SEM_INVALID* **THEN**
 SETUP: Create a semaphore using *function()*.
 TEST: A call to *sem_getvalue()*, when the *sem* argument does not refer to a valid semaphore, returns a value of -1 and sets *errno* to [EINVAL]
 TR: When testing for *sem_init()*, perform the test consistent with the flag *PCTS_GAP_sem_init*; that is, generate a *NO_TEST_SUPPORT* test result code if there is no way to get appropriate privilege to call *sem_init()*.
 NOTE: A subroutine is recommended that either returns an invalid semaphore or indicates that there is no way to generate an invalid semaphore on the system.

The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE *NO_TEST_SUPPORT*
ELSE *NO_OPTION*
Conformance for sem_getvalue: PASS, NO_TEST_SUPPORT, NO_OPTION

8 IF not *PCTS_sem_getvalue* **THEN**
 TEST: A call to *sem_getvalue()* returns a value of -1 and sets *errno* to [ENOSYS].
ELSE *NO_OPTION*
Conformance for sem_getvalue: PASS, NO_OPTION

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Section 12: Memory Management

- 1 TEST:** The page size, in bytes, is the value of the configurable system variable [PAGESIZE].
Conformance for mem_intro: PASS
- D_1 IF** a PCD.1b documents the following **THEN**
TEST: A PCD.1b that documents the restriction of the size and alignment of range lockings and mappings to be on page-size boundaries, does so in 12.
ELSE NO_OPTION
Conformance for mem_intro: PASS, NO_OPTION
- D_2 IF** a PCD.1b documents the following **THEN**
TEST: A PCD.1b that documents 1B page size, meaning no restrictions on the size or alignment of range lockings and mappings, does so in 12.
ELSE NO_OPTION
Conformance for mem_intro: PASS, NO_OPTION
- D_3 IF** a PCD.1b documents the following **THEN**
TEST: A PCD.1b that documents whether locking memory guarantees fixed translation between virtual addresses (as seen by the process) and physical addresses, does so in 12.
ELSE NO_OPTION
Conformance for mem_intro: PASS, NO_OPTION
- R_1 IF** *PCTS_mlockall* or *PCTS_mlock* **THEN**
TEST: Per-process memory locks are not inherited across a *fork()*.
ELSE NO_TEST_SUPPORT
SEE: Assertion 2 in 3.1.1.2.
- R_2 IF** *PCTS_mlockall* or *PCTS_mlock* **THEN**
TEST: All memory locks owned by a process are unlocked upon *exec* or process termination.
ELSE NO_TEST_SUPPORT
SEE: Assertion *mlock* in 12.1.2.2.
- R_3 IF** *PCTS_munlock* **THEN**
TEST: Unmapping of an address range removes any memory locks established on that address range by this process.
ELSE NO_TEST_SUPPORT
SEE: Assertion *munlock_remove_maps* in 12.2.2.2.
- 2 IF** *PCTS_mmap* **THEN**
TEST: Once a file is "mapped" into a process address space, the data can be manipulated as memory.
ELSE NO_TEST_SUPPORT
Conformance for mem_intro: PASS, NO_TEST_SUPPORT

- 3 IF PCTS_mmap THEN**
TEST: When more than one process maps a file, its contents are shared among them.
ELSE NO_TEST_SUPPORT
Conformance for mem_intro: PASS, NO_TEST_SUPPORT
- 4 IF PCTS_mmap THEN**
TEST: When the mappings allow shared write access, then data written into the memory object through the address space of one process appear in the address spaces of all processes that similarly map the same portion of the memory object.
ELSE NO_TEST_SUPPORT
Conformance for mem_intro: PASS, NO_TEST_SUPPORT
- R_4 IF PCTS_shm_unlink THEN**
TEST: *unlink ()* of a mapped file or *shm-unlink ()* of a shared memory object, while causing the removal of the name, does not unmap any mappings while causing the removal of the name, and does not unmap any mappings established for the object. Once the name has been removed, the contents of the memory object are preserved as long as a process has the memory object open, or has some area of the memory object mapped.
ELSE NO_TEST_SUPPORT
SEE: All assertions in 12.3.2.2.
- R_5 IF {_POSIX_MEMORY_PROTECTION} THEN**
IF PCTS_mmap THEN
TEST: References to whole pages within the mapping but beyond the current length of an object result in a SIGBUS signal.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
SEE: Assertion mmap_ SIGBUS in 12.1.2.2.
- D_4 IF {_POSIX_MEMORY_PROTECTION} and a PCD.1b documents the following THEN**
TEST: A PCD.1b that documents the result of references to memory within the mapping but beyond the current length of an object, does so in 12.
ELSE NO_OPTION
Conformance for mem_intro: PASS, NO_OPTION
- 5 IF {_POSIX_MEMORY_PROTECTION} THEN**
IF PCTS_mmap THEN
SETUP: Create a mapped memory object using *mmap ()*.
TEST: The size of a memory object is unaffected by access beyond the end of the object.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for mem_intro: PASS, NO_TEST_SUPPORT, NO_OPTION
- 6 IF {_POSIX_MEMORY_PROTECTION} THEN**
IF PCTS_mmap THEN
SETUP: Create a mapped memory object without write access using *mmap ()*.
TEST: Write attempts to memory mapped without write access result in a SIGSEGV signal.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for mem_intro: PASS, NO_TEST_SUPPORT, NO_OPTION
- 7 IF {_POSIX_MEMORY_PROTECTION} THEN**
IF PCTS_mmap THEN
SETUP: Create a mapped memory object with PROT_NONE using *mmap ()*.
TEST: Any access to memory mapped PROT_NONE results in a SIGSEGV signal.
ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for mem_intro: PASS, NO_TEST_SUPPORT, NO_OPTION

R_6 IF {_POSIX_MEMORY_PROTECTION} **THEN**

TEST: References to unmapped addresses result in a SIGSEGV signal.

ELSE NO_OPTION

SEE: Assertion munmap_ SIGSEV in 12.2.2.2.

D_5 IF not {_POSIX_MEMORY_PROTECTION} and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the effect of references to unmapped addresses, does so in 12.

ELSE NO_OPTION

Conformance for mem_intro: PASS, NO_OPTION

12.1 Memory Locking Functions

12.1.1 Lock/Unlock the Address Space of a Process

Functions: *mlockall()*, *munlockall()*.

12.1.1.1 Synopsis

1

M_GA_stdC_proto_decl(int; mlockall; int; int flags; sys/mman.h;;)

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for mlockall: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(mlockall; sys/mman.h;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for mlockall: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; mlockall; sys/mman.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.

Conformance for mlockall: PASS, NO_OPTION

4

M_GA_macro_args (mlockall; sys/mman.h;;)

SEE: Assertion GA_macro_args in 2.7.3.

Conformance for mlockall: PASS, NO_OPTION

5

M_GA_stdC_proto_decl(int; munlockall; sys/mman.h;;)

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for munlockall: PASS[5, 6], NO_OPTION

6

M_GA_commonC_int_result_decl(munlockall; sys/mman.h;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for munlockall: PASS[5, 6], NO_OPTION

7

M_GA_macro_result_decl(int; munlockall; sys/mman.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.

Conformance for munlockall: PASS, NO_OPTION

8

M_GA_macro_args (munlockall; sys/mman.h;;;)
SEE: Assertion GA_macro_args in 2.7.3.
Conformance for munlockall: PASS, NO_OPTION

12.1.1.2 Description

mlockall

FOR: *execl(), execv(), execl(), execve(), execl(), and execve()*

IF *PCTS_mlockall* **THEN**

IF: *PCTS_GAP_mlockall* **THEN**

TEST: A successful call to the function *mlockall()* returns 0 and makes all of the pages mapped by the address space of a process memory resident until unlocked, or until the process exits or executes a successful call to *function()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*

TR: Try both *exec* and *exit()*.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for sem_unlink: PASS, NO_TEST_SUPPORT, NO_OPTION

9

IF *PCTS_mlockall* **THEN**

SETUP: Include the header *<sys/mman.h>*

TEST: The constants *MCL_CURRENT* and *MCL_FUTURE* are defined and are bitwise distinct.

ELSE *NO_OPTION*

Conformance for mlockall: PASS, NO_OPTION

10

IF *PCTS_mlockall* **THEN**

IF: *PCTS_GAP_mlockall* **THEN**

TEST: When the flag *MCL_CURRENT* is set, the call *mlockall (flags)* locks all of the pages currently mapped into the address space of the process.

TR: Test for at least two disjoint sets of pages.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for mlockall: PASS, NO_TEST_SUPPORT, NO_OPTION

11

IF *PCTS_mlockall* **THEN**

IF: *PCTS_GAP_mlockall* **THEN**

TEST: When the flag *MCL_FUTURE* is set, the call *mlockall (flags)* locks all of the pages that become mapped into the address space of the process in the future, when those mappings are established.

TR: Test for at least two disjoint sets of pages.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for mlockall: PASS, NO_TEST_SUPPORT, NO_OPTION

D_1 IF *PCTS_mlockall* **THEN**

TEST: The PCD.1b that documents the behavior if *MCL_FUTURE* is specified in 12.1.1.2, as well as

1. The automatic locking of future mappings eventually causes the amounts of locked memory to exceed the amount of available physical memory
2. the automatic locking of future mappings eventually causes the amount of locked memory to exceed any other implementation-defined limit,
3. the manner in which the implementation informs the application of these situations.

ELSE *NO_OPTION*

Conformance for mlockall: PASS, NO_OPTION

munlockall

IF *PCTS_munlockall* **THEN**

TEST: A successful call to *munlockall()* unlocks all currently mapped pages of the address space of the process, with respect to the process's address space, and returns 0.

TR: Test for at least two disjoint sets of pages.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for munlockall: PASS, NO_OPTION

12 IF *PCTS_munlockall* **THEN**

IF: *PCTS_GAP_mlockall* **THEN**

TEST: Any pages that become mapped into the address space of the process after a call to *munlockall()* are not locked, unless there is an intervening call to *mlockall()* specifying *MCL_FUTURE*, or a subsequent call to *mlockall()* specifying *MCL_CURRENT*.

TR: Test for both *MCL_FUTURE* and *MCL_CURRENT*.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for mlockall: PASS, NO_TEST_SUPPORT, NO_OPTION

13 IF *PCTS_munlockall* **THEN**

TEST: When pages mapped into the address space of the process are also mapped into the address spaces of other processes, and are locked by those processes, the locks established by the other processes are unaffected by a call by this process to *munlockall()*.

TR: Test for at least two other processes.

ELSE *NO_OPTION*

Conformance for mlockall: PASS, NO_OPTION

14 IF *PCTS_mlockall* **THEN**

IF: *PCTS_GAP_munlockall* **THEN**

TEST: After a successful call to *mlockall()* that specifies *MCL_CURRENT*, all currently mapped pages of the process's address space are memory resident and locked.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for mlockall: PASS, NO_TEST_SUPPORT, NO_OPTION

D_2 IF *PCTS_mlockall* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the memory residency of unlocked pages, does so in 12.1.1.2.

ELSE *NO_OPTION*

Conformance for mlockall: PASS, NO_OPTION

15 IF *PCTS_mlockall* **THEN**

IF: *PCTS_RAP_mlockall* **THEN**

TEST: Appropriate privilege is required to lock process memory with *mlockall()*.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for mlockall: PASS, NO_TEST_SUPPORT, NO_OPTION

D_3 IF *PCTS_mlockall* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not it supports the *mlockall()* function, does so in 12.1.1.2.

ELSE *NO_OPTION*

Conformance for mlockall: PASS, NO_OPTION

D_4 IF *PCTS_munlockall* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not it supports the *munlockall*() function, does so in 12.1.1.2.

ELSE NO_OPTION

Conformance for *mlockall*: PASS, NO_OPTION

12.1.1.3 Returns

R_1 IF *PCTS_mlockall* **THEN**

TEST: When a call to *mlockall*() completes successfully, the interface returns a value of 0.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion *mlockall* in 12.1.1.2

R_2 IF *PCTS_mlockall* **THEN**

TEST: When a call to *mlockall*() completes unsuccessfully, the interface returns a value of -1, sets *errno* to indicate the error, and no additional memory is locked.

ELSE NO_OPTION

SEE: All assertions in 12.1.1.4 controlled by a *PCTS_mlockall*

D_5 IF *PCTS_mlockall* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the effect of failure of *mlockall*() on previously existing locks in the address space does so in 12.1.1.3.

R_3 IF *PCTS_mlockall* and a PCD.1b documents the following *PCTS_munlockall* **THEN**

TEST: The interface *munlockall*() returns a value of 0

ELSE NO_OPTION

SEE: Assertion *munlockall* in 12.1.1.2

12.1.1.4 Errors

16 IF not *PCTS_mlockall* **THEN:**

TEST: A call to *mlockall*() returns a value of -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *mlockall*: PASS, NO_OPTION

17 IF not *PCTS_munlockall* **THEN:**

TEST: A call to *munlockall*() returns a value of -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *munlockall*: PASS, NO_OPTION

18 IF *PCTS_mlockall* **THEN:**

IF *PCTS_GAP_mlockall* **THEN:**

TEST: A call to *mlockall*(), when some or all of the memory identified by the operation could not be locked, returns a value of -1 and sets *errno* to [EAGAIN].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *mlockall*: PASS, NO_TEST_SUPPORT, NO_OPTION

19 IF *PCTS_mlockall* **THEN:**

IF *PCTS_GAP_mlockall* **THEN:**

TEST: A call to *mlockall*(), when the *flags* argument is 0, returns a value of -1 and sets *errno* to [EINVAL].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *mlockall*: PASS, NO_TEST_SUPPORT, NO_OPTION

- 20 IF PCTS_mlockall THEN**
IF: PCTS_GAP_mlockall THEN:
TEST: A call to *mlockall()*, when *flags* includes unimplemented flags, returns a value of -1 and sets *errno* to [EINVAL].
NOTE: A subroutine is recommended that either returns a *flags* argument that includes unimplemented flags, or indicates that there is no way to generate a *flags* argument that includes unimplemented flags on the system.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *mlockall*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 21 IF PCTS_mlockall THEN**
IF: PCTS_GAP_mlockall
PCTS_DETECT_LOCKABLE_MEMORY_LIMITS_mlockall THEN:
TEST: A call to *mlockall()*, when locking all of the pages currently mapped into the address space of the process would exceed an implementation-defined limit on the amount of memory that the process may lock, returns a value of -1 and sets *errno* to [ENOMEM].
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *mlockall*: PASS, NO_TEST_SUPPORT, NO_OPTION
- D_6 IF PCTS_mlockall THEN**
TEST: The PCD.1b documents the maximum amount of memory that process may lock in 12.1.1.4.
ELSE NO_OPTION
Conformance for *mlockall*: PASS, NO_OPTION
- 22 IF PCTS_mlockall THEN**
IF: PCTS_RAP_mlockall PCTS_DETECT_NO_AP THEN:
TEST: A call to *mlockall()*, when the calling process does not have the appropriate privilege to perform the requested operation, returns a value of -1 and sets *errno* to [EPERM].
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *mlockall*: PASS, NO_TEST_SUPPORT, NO_OPTION

12.1.2 Lock/Unlock a Range of Process Address Space

Functions: *mlock()*, *munlock()*.

12.1.2.1 Synopsis

- 1**
M_GA_stdC_proto_decl(int; mlock; const void *addr, size_tlen; sys/mman.h;;)
SEE: Assertion GA_stdC_proto_decl in 2.7.3.
Conformance for *mlock*: PASS[1, 2], NO_OPTION
- 2**
M_GA_commonC_int_result_decl(mlock; sys/mman.h;;)
SEE: Assertion GA_commonC_int_result_decl in 2.7.3.
Conformance for *mlock*: PASS[1, 2], NO_OPTION
- 3**
M_GA_macro_result_decl(int; mlock; sys/mman.h;;)
SEE: Assertion GA_macro_result_decl in 1.3.4.
Conformance for *sem_init*: PASS, NO_OPTION
- 4**
M_GA_macro_args (mlock; sys/mman.h;;)

SEE: Assertion GA_macro_args in 2.7.3.
Conformance for mlock: PASS, NO_OPTION

5

M_GA_stdC_proto_decl(int; munlock; const void *addr, size_tlen; sys/mman.h;;)

SEE: Assertion GA_stdC_proto_decl in 2.7.3.
Conformance for munlock: PASS[5, 6], NO_OPTION

6

M_GA_commonC_int_result_decl(munlock; const void *addr, size_tlen; sys/mman.h;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.
Conformance for munlock: PASS[5, 6], NO_OPTION

7

M_GA_macro_result_decl(int; munlock; sys/mman.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.
Conformance for munlock: PASS, NO_OPTION

8

M_GA_macro_args (munlock; sys/mman.h;;)

SEE: Assertion GA_macro_args in 2.7.3.
Conformance for munlock: PASS, NO_OPTION

12.1.2.2 Description

mlock **FOR:** *execl()*, *execv()*, *execle()*, *execve()*, *execvp()* and *execvp()*

IF PCTS_MLOCK **THEN**

IF PCTS_GAP_mlock **THEN**

TEST: A successful call to the function *mlock* (*addr*, *len*) returns a value of 0 and causes those whole pages containing any part of the address space of the process, starting at address *addr* and continuing for *len* bytes, to be memory resident until unlocked, or until the process exits, or executes a successful call to *function()*.

TR: Test for each of the three conditions.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for mlock: PASS, NO_TEST_SUPPORT, NO_OPTION

D_1 **IF** a PCTS_mlock and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the argument *addr*, in a call to *mlock* (*addr*, *len*), must be a multiple of the page size {PAGESIZE}, does so in 12.1.2.2.

ELSE NO_OPTION

Conformance for mlock: PASS, NO_OPTION

munlock

IF PCTS_munlock **THEN**

IF PCTS_mlock and PCTS_GAP_mlock **THEN**

TEST: The call *munlock* (*addr*, *len*) unlocks those whole pages containing any part of the address space of the process, with respect to the address space of the process, starting at address *addr* and continuing by *len* bytes, regardless of how many times *mlock()* has been called by the process for any of the pages in the specified ranges, and returns 0.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for munlock: PASS, NO_TEST_SUPPORT, NO_OPTION

D_2 IF *PCTS_munlock* documents the following **THEN**

TEST: A PCD.1b that documents the argument *addr*, in a call to *munlock(addr, len)*, must be a multiple of the page size {PAGESIZE}, does so in 12.1.2.2.

ELSE *NO_OPTION*

Conformance for munlock: PASS, NO_OPTION

9 IF *PCTS_munlock* **THEN**

TEST: When any of the pages in the range specified by a call to *munlock()* are also mapped into the address spaces of other processes, any locks established on those pages by another process are unaffected by the call of this process to *munlock()*.

ELSE *NO_OPTION*

Conformance for munlock: PASS, NO_OPTION

10 IF *PCTS_munlock* **THEN**

TEST: When any of the pages in the range specified by a call to *munlock()* are also mapped into the address spaces of other processes, any locks established on those pages via the other mappings are unaffected by this call.

ELSE *NO_OPTION*

Conformance for munlock: PASS, NO_OPTION

D_3 IF *PCTS_mlock* and PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents memory residency of unlocked pages does so in 12.1.2.2.

ELSE *NO_OPTION*

Conformance for mlock: PASS, NO_OPTION

11 IF *PCTS_mlock* **THEN**

IF *PCTS_RAP_mlock* **THEN**

TEST: Appropriate privilege is required to lock process memory with *mlock()*.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for mlock: PASS, NO_TEST_SUPPORT, NO_OPTION

D_4 IF *PCTS_mlock* and PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not it supports the *mlock()* function does so in 12.1.2.2.

ELSE *NO_OPTION*

Conformance for mlock: PASS, NO_OPTION

D_5 IF *PCTS_munlock* and PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not it supports *munlock()* does so in 12.1.2.2.

ELSE *NO_OPTION*

Conformance for mlock: PASS, NO_OPTION

12.1.2.3 Returns

R_1 IF *PCTS_mlock* **THEN**

TEST: When a call to *mlock()* completes successfully, the interface returns a value of 0.

ELSE *NO_OPTION*

SEE: Assertion *mlock* in 12.1.2.2.

R_2 IF *PCTS_mlock* **THEN**

TEST: When a call to *mlock()* completes successfully, the interface returns a value of -1, sets *errno* to indicate the error, and no change is made to any locks in the address space.

PCTS_mlock
ELSE NO_OPTION
SEE: All assertions in 12.1.2.4 controlled by *PCTS_mlock*.

R_3 IF *PCTS_munlock* THEN
 TEST: When a call to *munlock()* completes successfully, the interface returns a value of 0.
 ELSE NO_OPTION
 SEE: Assertion *munlock* in 12.1.2.2.

R_4 IF *PCTS_munlock* THEN
 TEST: When a call to *munlock()* completes unsuccessfully, the interface returns a value of -1, sets *errno* to indicate the error, and no change is made to any locks in the address space.
 PCTS_munlock
 ELSE NO_OPTION
 SEE: All assertions in 12.1.2.4 controlled by *PCTS_munlock*.

12.1.2.4 Errors

12 IF *PCTS_mlock* THEN
 IF: *PCTS_GAP_mlock* THEN
 TEST: A call to *mlock()*, when some or all of the address range specified by the *addr* and *len* arguments does not correspond to valid mapped pages in the address space of the process, returns a value of -1 and sets *errno* to [ENOMEN].
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *mlock*: PASS, NO_TEST_SUPPORT, NO_OPTION

13 IF *PCTS_munlock* THEN
 TEST: A call to *munlock()*, when some or all of the address range specified by the *addr* and *len* arguments does not correspond to valid mapped pages in the address space of the process, returns a value of -1 and sets *errno* to [ENOMEN].
 ELSE NO_OPTION
 Conformance for *munlock*: PASS, NO_OPTION

14 IF not *PCTS_mlock* THEN
 TEST: A call to *mlock()*, returns a value of -1 and sets *errno* to [ENOSYS].
 ELSE NO_OPTION
 Conformance for *mlock*: PASS, NO_OPTION

15 IF not *PCTS_munlock* THEN
 TEST: A call to *munlock()*, returns a value of -1 and sets *errno* to [ENOSYS].
 ELSE NO_OPTION
 Conformance for *mlock*: PASS, NO_OPTION

16 IF *PCTS_mlock* THEN
 IF: *PCTS_GAP_mlock* THEN
 TEST: A call to *mlock()*, when some or all of the memory identified by the operation could not be locked, returns a value of -1 and sets *errno* to [EAGAIN].
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *mlock*: PASS, NO_TEST_SUPPORT, NO_OPTION

D_6 IF *PCTS_mlock* or *PCTS_munlock* and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the implementation requires memory locking only in multiples of {PAGESIZE}, does so in 12.1.2.4.

ELSE NO_OPTION

Conformance for mlock: PASS, NO_OPTION

17 IF PCTS_mlock and PCTS_MULTIPLE_OF_PAGESIZE and PCTS_DETECT_NOT_MULTIPLE_OF_PAGESIZE THEN

IF PCTS_GAP_mlock THEN

TEST: A call to *mlock()*, when the *addr* argument is not a multiple of the page size {PAGESIZE}, returns a value of -1 and sets *errno* to [EINVAL].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for mlock: PASS, NO_TEST_SUPPORT, NO_OPTION

18 IF PCTS_MULTIPLE_OF_PAGESIZE and PCTS_DETECT_NOT_MULTIPLE_OF_PAGESIZE and PCTS_munlock THEN

TEST: A call to *munlock()*, when the *addr* argument is not a multiple of the page size {PAGESIZE}, returns a value of -1 and sets *errno* to [EINVAL].

ELSE NO_OPTION

Conformance for mlock: PASS, NO_OPTION

D_7 IF PCTS_mlock and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the implementation-defined limit on an amount of memory that a process may lock, does so in 12.1.2.4.

ELSE NO_OPTION

Conformance for mlock: PASS, NO_OPTION

19 IF PCTS_mlock and PCTS_DETECT_LOCKABLE_MEMORY_LIMIT_mlock THEN

IF PCTS_GAP_mlock THEN

TEST: A call to *mlock()*, when locking the pages mapped by the specified range would exceed an implementation-defined limit on the amount of memory that the process may lock, returns a value of -1 and sets *errno* to [ENOMEM].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for mlock: PASS, NO_TEST_SUPPORT, NO_OPTION

D_8 IF PCTS_mlock and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the implementation detects whether or not a process has appropriate privileges to lock pages, does so in 12.1.2.4.

ELSE NO_OPTION

Conformance for mlock: PASS, NO_OPTION

20 IF PCTS_mlock and PCTS_DETECT_NO_AP THEN

IF PCTS_RAP_mlock THEN

TEST: A call to *mlock()*, when the calling process does not have the appropriate privilege to perform the requested operation, returns a value of -1 and sets *errno* to [EPERM].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for mlock: PASS, NO_TEST_SUPPORT, NO_OPTION

12.2 Memory Mapping Functions

12.2.1 Map Process Address to a Memory Object

Function: *mmap()*.

1

M_GA_stdC_proto_decl(void *; mmap; void*addr, size_tlen; int prot, int flags, int fildes, off_t off; sys/mman.h;;)

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for mlock: PASS[1, 2], NO_OPTION

2

M_GA_commonC_result_decl (void*; mmap; sys/mman.h;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for mlock: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; mlock; sys/mman.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.

Conformance for sem_init: PASS, NO_OPTION

4

M_GA_macro_args (mmap; sys/mman.h;;)

SEE: Assertion GA_macro_args in 2.7.3.

Conformance for mlock: PASS, NO_OPTION

mmap

IF PCTS_mmap THEN

TEST: A successful call to the function *mmap()* establishes a mapping between the address space of the process for *len* bytes to the memory object represented by the file descriptor *fildes* at offset *off* for *len* bytes, and returns the address at which the mapping was placed.

ELSE NO_OPTION

Conformance for mmap: PASS, NO_OPTION

D_1 IF PCTS_mmap and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the implementation-dependent function of the parameter *addr* and the values of *flags*, which determines the address at which the mapping is placed, does so in 12.1.2.2.

ELSE NO_OPTION

Conformance for mmap: PASS, NO_OPTION

5

IF PCTS_mmap THEN

TEST: The address range starting at the address returned by *mmap(addr, len, prot, flags, fildes, off)*, and continuing for *len* bytes, is legitimate for the possible (not necessarily current) address space of the process.

ELSE NO_OPTION

Conformance for mmap: PASS, NO_OPTION

6

IF PCTS_mmap THEN

TEST: In a call to *mmap(addr, len, prot, flags, fildes, off)*, the range of bytes starting at *off* and continuing for *len* bytes is legitimate for the possible (not necessarily current) offsets in the file or, for the shared memory object represented by *fildes*.

ELSE NO_OPTION

Conformance for mmap: PASS, NO_OPTION

7

IF PCTS_mmap THEN

TEST: The mapping established by *mmap(addr, len, prot, flags, fildes, off)* replaces any previous mappings for those whole pages containing any part of the address space of the process, starting at the address returned by *mmap()* and continuing for *len* bytes.

ELSE NO_OPTION

Conformance for mmap: PASS, NO_OPTION

8 IF PCTS_mmap THEN
TEST: In a call to *mmap(addr, len, prot, flags, fildes, off)*, the parameter *prot* determines whether read, write, execute, or some combination of accesses are permitted to the data being mapped.
ELSE NO_OPTION
 Conformance for *mmap*: PASS, NO_OPTION

prot_values

IF PCTS_mmap THEN
SETUP: Include the header `<sys/mman.h>`.
TEST: The constants `PROT_NONE`, `PROT_READ`, `PROT_WRITE`, and `PROT_EXEC` are defined and are bitwise distinct.
ELSE NO_OPTION
 Conformance for *mmap*: PASS, NO_OPTION

9 IF PCTS_mmap THEN
TEST: In the call *mmap(addr, len, prot, flags, fildes, off)*, *prot* may be either `PROT_NONE`, or the bitwise inclusive OR of one or more of the flags `PROT_READ`, `PROT_WRITE`, `PROT_EXEC`, and `PROT_NONE`.
TR: Try `PROT_NONE` and all eight bitwise combinations of the other three values.
ELSE NO_OPTION
 Conformance for *mmap*: PASS, NO_OPTION

R_1 IF PCTS_mmap THEN
TEST: When the combination of access types specified by *prot* is not supported, the call *mmap(addr, len, prot, flags, fildes, off)* fails.
ELSE NO_OPTION
SEE: Assertion `mmap_ENOTSUP` in 12.1.2.2.

10 IF PCTS_mmap THEN
IF {POSIX_MEMORY_PROTECTION} THEN
TEST: When `PROT_WRITE` is unset, writes to the region mapped by *mmap()* fail.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
 Conformance for *mmap*: PASS, NO_TEST_SUPPORT, NO_OPTION

mem_protect_flags

11 IF PCTS_mmap THEN
IF {POSIX_MEMORY_PROTECTION} THEN
TEST: When `PROT_NONE` alone has been set, writes to the region mapped by *mmap(addr, len, prot, flags, fildes, off)* fail.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
 Conformance for *mmap*: PASS, NO_TEST_SUPPORT, NO_OPTION

mem_protect_flags

IF PCTS_mmap THEN
IF {POSIX_MEMORY_PROTECTION} THEN
TEST: The implementation supports the following values of *prot*: `PROT_NONE`, `PROT_READ`, `PROT_WRITE`, and the inclusive OR of `PROT_READ` and `PROT_WRITE`.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
 Conformance for *mmap*: PASS, NO_TEST_SUPPORT, NO_OPTION

12 IF PCTS_mmap THEN

TEST: After a call to *mmap(addr, len, prot, flags, fildes, off)*, with the flag *MAP_SHARED* SET, write references change the underlying object.

ELSE NO_OPTION

Conformance for mmap: PASS, NO_TEST_SUPPORT, NO_OPTION

13 IF PCTS_mmap THEN

IF PCTS_MAP_PRIVATE THEN

TEST: After a call to *mmap(addr, len, prot, flags, fildes, off)*, with the flag *MAP_PRIVATE* set, modifications to the mapped data by the calling process are visible only to the calling process and do not change the underlying object.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for mmap: PASS, NO_TEST_SUPPORT, NO_OPTION

D_2 IF PCTS_mmap and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents whether modifications to the underlying object, done after the *MAP_PRIVATE* mapping is established, are visible through the *MAP_PRIVATE* mapping, does so in 12.1.2.2.

ELSE NO_OPTION

Conformance for mmap: PASS, NO_OPTION

14 IF PCTS_mmap THEN

IF PCTS_MAP_PRIVATE THEN

TEST: *MAP_SHARED* must be specified in a call to the *mmap()* function.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for mmap: PASS, NO_TEST_SUPPORT, NO_OPTION

15 IF PCTS_mmap THEN

TEST: When *mmap()* is called, the mapping type is retained across *fork()*.

ELSE NO_OPTION

Conformance for mmap: PASS, NO_OPTION

16 IF PCTS_mmap THEN

IF PCTS_MAP_FIXED THEN

TEST: When *MAP_FIXED* is set, the address returned by *mmap(addr, len, prot, flags, fildes, off)* is *addr* exactly.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for mmap: PASS, NO_TEST_SUPPORT, NO_OPTION

D_3 IF PCTS_mmap and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents whether *MAP_FIXED* is supported, does so in 12.1.2.2.

ELSE NO_OPTION

Conformance for mmap: PASS, NO_OPTION

D_4 IF PCTS_mmap THEN

TEST: A PCD.1b documents how the system uses *addr* to arrive at *pa*, when *MAP_FIXED* is not set, in 12.1.2.2.

ELSE NO_OPTION

Conformance for mmap: PASS, NO_OPTION

17 IF PCTS_mmap THEN

TEST: When *MAP_FIXED* is not set, a call to *mmap()* never places a mapping at address 0.

ELSE NO_OPTION

Conformance for mmap: PASS, NO_OPTION

- 18 IF PCTS_mmap THEN**
TEST: When MAP_FIXED is not set, a call to *mmap()* never replaces an extant mapping.
ELSE NO_OPTION
Conformance for mmap: PASS, NO_OPTION
- 19 IF PCTS_mmap THEN**
IF PCTS_MAP_FIXED THEN
TEST: When MAP_FIXED is specified and *addr* is non0, the address returned by *mmap(addr, len, prot, flags, fildes, off)* has the same remainder as the *off* parameter, modulo the page size {PAGESIZE}.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for mmap: PASS, NO_TEST_SUPPORT, NO_OPTION
- 20 IF PCTS_mmap THEN**
IF PCTS_MULTIPLE_OF_PAGESIZE THEN
TEST: The argument *off* must be a multiple of the page size.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for mmap: PASS, NO_TEST_SUPPORT, NO_OPTION
- D_5 IF PCTS_mmap and a PCD.1b documents the following THEN**
TEST: A PCD.1b that documents that the argument *off*, in a call to *mmap(addr, len, prot, flags, fildes, off)*, must be a multiple of the page size, does so in 12.1.2.2.
ELSE NO_OPTION
Conformance for mmap: PASS, NO_OPTION
- 21 IF PCTS_mmap THEN**
IF PCTS_MULTIPLE_OF_PAGESIZE and PCTS_MAP_FIXED THEN
TEST: When MAP_FIXED is specified, the argument *addr* must be a multiple of the page size.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for mmap: PASS, NO_TEST_SUPPORT, NO_OPTION
- D_6 IF PCTS_mmap and a PCD.1b documents the following THEN**
TEST: A PCD.1b that documents that the argument *addr*, in a call to *mmap(addr, len, prot, flags, fildes, off)* with MAP_FIXED specified, must be a multiple of the page size, does so in 12.1.2.2.
ELSE NO_OPTION
Conformance for mmap: PASS, NO_OPTION
- 22 IF PCTS_mmap THEN**
IF PCTS_MAP_FIXED THEN
TEST: When MAP_FIXED is specified, the parameter *len* need not meet a size or alignment constraint.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for mmap: PASS, NO_TEST_SUPPORT, NO_OPTION
- 23 IF PCTS_mmap THEN**
IF PCTS_MAP_FIXED THEN
TEST: When MAP_FIXED is specified, after a call to *mmap(addr, len, prot, flags, fildes, off)*, any partial page specified by the address range starting at the returned address and continuing for *len* bytes, is included in the object.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for mmap: PASS, NO_TEST_SUPPORT, NO_OPTION

24 IF PCTS_mmap THEN
TEST: Any partial page at the end of an object is zero-filled.
ELSE NO_OPTION
Conformance for mmap: PASS, NO_OPTION

25 IF PCTS_mmap THEN
TEST: Modified portions of the last page of an object that are beyond its end are not written out.
ELSE NO_OPTION
Conformance for mmap: PASS, NO_OPTION

mmap_SIGBUS

IF PCTS_mmap THEN
IF {POSIX_MEMORY_PROTECTION} THEN
TEST: Following a call to *mmap(addr, len, prot, flags, fildes, off)*, references within the address range starting at the returned address and continuing for *len* bytes to whole pages following the end of an object, result in delivery of a SIGBUS signal.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for mmap: PASS, NO_TEST_SUPPORT, NO_OPTION

D_7 IF PCTS_mmap and a PCD.1b documents the following THEN
TEST: A PCD.1b that documents the result of references within the address range starting at *pa* and continuing for *len* bytes, to whole pages following the end of an object, when the {POSIX_MEMORY_PROTECTION} option is not supported, does so in 12.1.2.2.
ELSE NO_OPTION
Conformance for mmap: PASS, NO_OPTION

D_8 IF PCTS_mmap and a PCD.1b documents the following THEN
TEST: A PCD.1b that documents whether or not it supports the *mmap()* function, does so in 12.1.2.2.
ELSE NO_OPTION
Conformance for mmap: PASS, NO_OPTION

12.2.1.3 Returns

R_2 IF PCTS_mmap THEN
TEST: When a call to *mmap()* completes successfully, the interface returns the address at which the mapping was placed.
ELSE NO_OPTION
SEE: Assertion mmap in 12.2.1.2.

R_3 IF PCTS_mmap THEN
TEST: When a call to *mmap()* completes unsuccessfully, the interface returns a value of MAP_FAILED and sets *errno* to indicate the error.
ELSE NO_OPTION
SEE: Assertion mmap in 12.2.1.4.

26 IF PCTS_mmap THEN
SETUP: Include the header `<sys/mman.h>`.
TEST: The symbol MAP_FAILED is defined.
ELSE NO_OPTION
Conformance for mmap: PASS, NO_OPTION

R_4 IF PCTS_mmap THEN
TEST: No successful return from *mmap()* returns the value of MAP_FAILED.
ELSE NO_OPTION

SEE: Assertion mmap in 12.2.1.4.

12.2.1.4 Errors

- 27 **IF** *PCTS_mmap* **THEN**
TEST: A call to *mmap*(*addr*, *len*, *prot*, *flags*, *fildes*, *off*), when the file descriptor *fildes* is not open for read, returns a value of *MAP_FAILED* and sets *errno* to [EACCESS].
TR: Specify each possible protection.
ELSE NO_OPTION
Conformance for mmap: PASS, NO_OPTION
- 28 **IF** *PCTS_mmap* **THEN**
TEST: A call to *mmap*(*addr*, *len*, *prot*, *flags*, *fildes*, *off*), when the file descriptor *fildes* is not open for write and *PROT_WRITE* is specified for a *MAP_SHARED* type mapping, returns a value of *MAP_FAILED* and sets *errno* to [EACCESS].
ELSE NO_OPTION
Conformance for mmap: PASS, NO_OPTION
- 29 **IF** *PCTS_mmap* **THEN**
TEST: A call to *mmap*(), when the mapping could not be locked in memory, if required by *mlockall*(), due to a lack of resources, returns a value of *MAP_FAILED* and sets *errno* to [EAGAIN].
ELSE NO_OPTION
Conformance for mmap: PASS, NO_TEST_SUPPORT, NO_OPTION
- 30 **IF** *PCTS_mmap* **THEN**
TEST: A call to *mmap*(*addr*, *len*, *prot*, *flags*, *fildes*, *off*), when the *fildes* argument is not a valid open file descriptor, returns a value of *MAP_FAILED* and sets *errno* to [EBADF].
ELSE NO_OPTION
Conformance for mmap: PASS, NO_OPTION
- 31 **IF** *PCTS_mmap* **THEN**
IF *PCTS_DETECT_INVALID_FLAGS_mmap* **THEN**
TEST: A call to *mmap*(*addr*, *len*, *prot*, *flags*, *fildes*, *off*), when the value in *flags* is invalid (e.g., neither *MAP_PRIVATE* or *MAP_SHARED* is set), returns the value of *MAP_FAILED* and sets *errno* to [EINVAL].
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for mmap: PASS, NO_TEST_SUPPORT, NO_OPTION
- 32 **IF** *PCTS_mmap* **THEN**
TEST: A call to *mmap*(*addr*, *len*, *prot*, *flags*, *fildes*, *off*), when the *fildes* argument refers to an object for which *mmap*() is meaningless, such as a terminal, returns a value of *MAP_FAILED* and sets *errno* to [ENODEV].
ELSE NO_OPTION
Conformance for mmap: PASS, NO_OPTION
- 33 **IF** *PCTS_mmap* **THEN**
IF *PCTS_MAP_FIXED* **THEN**
TEST: A call to *mmap*(*addr*, *len*, *prot*, *flags*, *fildes*, *off*), when *MAP_FIXED* is specified, and the address range starting at *addr* and continuing for *len* bytes exceeds that allowed for the address space of a process, or *MAP_FIXED* is not specified, and there is insufficient room in the address space to effect the mapping; returns a value of *MAP_FAILED* and sets *errno* to [ENOMEM].
There is no known reliable test method for this assertion.

ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for mmap: PASS, NO_TEST_SUPPORT, NO_OPTION

- 34 IF PCTS_mmap THEN**
 IF PCTS_mlockall PCTS_GAP_mlockall THEN
 TEST: A call to *mmap()*, when the mapping could not be locked in memory, if required by *mlockall()*, because it would require more space than the system is able to supply, returns a value of *MAP_FAILED* and sets *errno* to *[ENOMEM]*.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for mmap: PASS, NO_TEST_SUPPORT, NO_OPTION
- 35 IF not PCTS_mmap THEN**
 TEST: A call to *mmap()*, returns a value of *MAP_FAILED* and sets *errno* to *[ENOSYS]*.
 ELSE NO_OPTION
 Conformance for mmap: PASS, NO_OPTION
- 36 IF PCTS_mmap THEN**
 IF not PCTS_MAP_FIXED THEN
 TEST: A call to *mmap(addr, len, prot, flags, fildes, off)*, when *MAP_FIXED* is specified in the *flags* argument, returns a value of *MAP_FAILED* and sets *errno* to *[ENOTSUP]*.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for mmap: PASS, NO_TEST_SUPPORT, NO_OPTION
- 37 IF PCTS_mmap THEN**
 IF not PCTS_MAP_PRIVATE THEN
 TEST: A call to *mmap(addr, len, prot, flags, fildes, off)*, when *MAP_PRIVATE* is specified in the *flags* argument, returns a value of *MAP_FAILED* and sets *errno* to *[ENOTSUP]*.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for mmap: PASS, NO_TEST_SUPPORT, NO_OPTION

mmap_ENOTSUP

IF PCTS_mmap THEN
 TEST: A call to *mmap()*, when the implementation does not support the combination of accesses requested in the *prot* argument, returns a value of *MAP_FAILED* and sets *errno* to *[ENOTSUP]*.
 TR: Test with *MAP_SHARED* and *MAP_PRIVATE* both in the *prot* argument.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for mmap: PASS, NO_OPTION

- 38 IF PCTS_mmap THEN**
 TEST: A call to *mmap(addr, len, prot, flags, fildes, off)*, when the addresses in the range starting at *off* and continuing for *len* bytes are invalid for the object specified by *fildes*, returns a value of *MAP_FAILED* and sets *errno* to *[ENXIO]*.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for mmap: PASS, NO_OPTION

- 39 IF PCTS_mmap THEN**
 IF PCTS_MAP_FIXED THEN

TEST: A call to `mmap(addr, len, prot, flags, fildes, off)`, when `MAP_FIXED` is specified in `flags` and the combination of `addr`, `len`, and `off` is invalid for the object specified by `fildes`, returns a value of `MAP_FAILED` and sets `errno` to `[ENXIO]`.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for `mmap`: `PASS`, `NO_TEST_SUPPORT`, `NO_OPTION`

40 IF PCTS_mmap THEN

IF PCTS_MULTIPLE_OF_PAGESIZE THEN

TEST: A call to `mmap(addr, len, prot, flags, fildes, off)`, when the argument `off` is not a multiple of the page size `{PAGESIZE}`, returns a value of `MAP_FAILED` and sets `errno` to `[EINVAL]`.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for `mmap`: `PASS`, `NO_TEST_SUPPORT`, `NO_OPTION`

41 IF PCTS_mmap THEN

IF PCTS_MULTIPLE_OF_PAGESIZE and PCTS_MAP_FIXED THEN

TEST: A call to `mmap(addr, len, prot, flags, fildes, off)`, when `MAP_FIXED` is specified and the argument `addr` is not a multiple of the page size `{PAGESIZE}`, returns a value of `MAP_FAILED` and sets `errno` to `[EINVAL]`.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for `mmap`: `PASS`, `NO_TEST_SUPPORT`, `NO_OPTION`

12.2.2.2 Unmap Previously Mapped Addresses

function: `munmap()`.

12.2.2.1 Synopsis

1

`M_GA_stdC_proto_decl( int;; munmap; void*addr, size_t len; sys/mman.h;;)`

SEE: Assertion `GA_stdC_proto_decl` in 2.7.3.

Conformance for `munmap`: `PASS[1, 2]`, `NO_OPTION`

2

`M_GA_commonC_result_decl ( munmap; sys/mman.h;;)`

SEE: Assertion `GA_commonC_int_result_decl` in 2.7.3.

Conformance for `munmap`: `PASS[1, 2]`, `NO_OPTION`

3

`M_GA_macro_result_decl(int; munmap; sys/mman.h;;)`

SEE: Assertion `GA_macro_result_decl` in 1.3.4.

Conformance for `munmap`: `PASS`, `NO_OPTION`

4

`M_GA_macro_args ( munmap; sys/mman.h;;)`

SEE: Assertion `GA_macro_args` in 2.7.3.

Conformance for `munmap`: `PASS`, `NO_OPTION`

12.2.2.2 Description

munmap

IF PCTS_munmap THEN

TEST: A successful call to the function `munmap(addr, len)` removes any mappings for those entire pages containing any part of the address space of the process, starting at `addr` and continuing for `len` bytes, and returns the value 0.

ELSE NO_OPTION

Conformance for munmap: PASS, NO_OPTION

munmap_SIGSEV

IF *PCTS_munmap* **THEN**

TEST: Following a successful call to *munmap()*, references to the unmapped pages result in the delivery of a SIGSEV signal to the process.

ELSE *NO_OPTION*

Conformance for munmap: PASS, NO_OPTION

5 IF *PCTS_munmap* **THEN**

TEST: When there are no mappings in the specified address range, then *munmap()* has no effect.

ELSE *NO_OPTION*

Conformance for munmap: PASS, NO_OPTION

6 IF *PCTS_munmap* **THEN**

IF *PCTS_MULTIPLE_OF_PAGESIZE* **THEN**

TEST: In a call to *munmap(addr, len)*, the argument *addr* must be a multiple of the page size {PAGESIZE}.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for munmap: PASS, NO_TEST_SUPPORT, NO_OPTION

D_1 IF *PCTS_munmap* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents that the argument *addr*, in a call to *munmap(addr, len)*, must be a multiple of the page size {PAGESIZE}, does so in 12.2.2.2.

ELSE *NO_OPTION*

Conformance for munmap: PASS, NO_OPTION

7 IF *PCTS_munmap* **THEN**

IF *PCTS_munmap* and *PCTS_MAP_PRIVATE* **THEN**

TEST: When a mapping to be removed is private, any modifications made in this address range are discarded.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for munmap: PASS, NO_TEST_SUPPORT, NO_OPTION

munlock_remove_maps

IF *PCTS_munmap* **THEN**

IF *PCTS_mlock* and *PCTS_GAP_MLOCK* and *PCTS_mlockall* and *PCTS_GAP_MLOCKALL* and *PCTS_munlock* **THEN**

TEST: Following a call to *munmap(addr, len)*, any memory locks (see POSIX.1b {3} 12.1 2 and POSIX.1b {3} 12.1 1) associated with this address range are removed, as if by an appropriate call to *munlock()*.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for munmap: PASS, NO_TEST_SUPPORT, NO_OPTION

D_2 IF *PCTS_munmap* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the behavior of this function if the mapping was not established by a call to *munmap()*, does so in 12.2.2.2.

ELSE *NO_OPTION*

Conformance for munmap: PASS, NO_OPTION

D_3 IF *PCTS_munmap* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not it supports the *munmap()* function does so in 12.2.2.2.

ELSE *NO_OPTION*

Conformance for munmap: PASS, NO_OPTION

12.2.2.3 Returns**R_1 IF PCTS_munmap THEN**

TEST: When a call to *munmap()* completes successfully, the interface returns to a value of 0.

ELSE NO_OPTION

SEE: Assertion *munmap* in 12.2.2.2.

R_2 IF PCTS_munmap THEN

TEST: When a call to *munmap()* completes unsuccessfully, the interface returns a value of -1 and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: All assertions in 12.2.2.4.

12.2.2.4 Errors**8 IF PCTS_munmap THEN**

TEST: A call to *munmap()*, when some of the addresses in the range starting at *addr* and continuing for *len* bytes are outside the range allowed for the address space of a process, returns a value of -1 and sets *errno* to [EINVAL].

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

Conformance for *munmap*: PASS, NO_TEST, NO_OPTION

9 IF not PCTS_munmap THEN

TEST: A call to *munmap()* returns a value of -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *munmap*: PASS, NO_OPTION

10 IF PCTS_munmap THEN

IF PCTS_MULTIPLE_OF_PAGESIZE
and **PCTS_DETECT_NOT_MULTIPLE_OF_PAGESIZE THEN**

TEST: A call to *munmap(addr, len,)*, when the value of *addr* is not a multiple of the page size {PAGESIZE}, returns a value of -1 and sets *errno* to [EINVAL].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *munmap*: PASS, NO_TEST_SUPPORT, NO_OPTION

12.2.3 Change Memory Protection

Function: *mprotect()*.

12.2.3.1 Synopsis

1

*M_GA_stdC_proto_decl(int; mprotect; const void*addr, size_t len; int_prot; sys/mman.h;;;)*

SEE: Assertion *GA_stdC_proto_decl* in 2.7.3.

Conformance for *mprotect*: PASS[1, 2], NO_OPTION

2

M_GA_commonC_result_decl (mprotect; sys/mman.h;;;)

SEE: Assertion *GA_commonC_int_result_decl* in 2.7.3.

Conformance for *munmap*: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; mprotect; sys/mman.h;;;)

SEE: Assertion *GA_macro_result_decl* in 1.3.4.

Conformance for *mprotect*: PASS, NO_OPTION

- 4 ***M_GA_macro_args (mprotect; sys/mman.h;;)***
SEE: Assertion GA_macro_args in 2.7.3.
Conformance for mprotect: PASS, NO_OPTION

12.2.3.2 Description

mprotect

- IF** *PCTS_mprotect* and *PCTS_mmap* **THEN**
SETUP: Map memory pages using the function *mmap()*.
TEST: A successful call to the function *mprotect(addr, len, prot)* changes the access protections to those specified by *prot* for whole pages containing any part of the address space of the process, starting at address *addr* and continuing for *len* bytes, and returns the value 0.
TR: Test for PROT_READ, PROT_WRITE, and PROT_NONE individually.
ELSE *NO_OPTION*
Conformance for mprotect: PASS, NO_OPTION
- R-1** **IF** *PCTS_mprotect* and *PCTS_mmap* **THEN**
SETUP: Map memory pages using the function *mmap()*. Include the header *<sys/mman.h>*.
TEST: The constants PROT_NONE, PROT_READ, PROT_WRITE, and PROT_EXEC are defined and are bitwise distinct.
ELSE *NO_OPTION*
SEE: Assertion prot_values in 12.2.1.2
Conformance for mprotect: PASS, NO_OPTION
- 5 **IF** *PCTS_mprotect* and *PCTS_mmap* **THEN**
SETUP: Map memory pages using the function *mmap()*.
TEST: In the call *mprotect(addr, len, prot)*, the only permitted values for *prot* are PROT_NONE or the bitwise inclusive OR of one or more of the values PROT_READ, PROT_WRITE..
ELSE *NO_OPTION*
Conformance for mprotect: PASS, NO_OPTION
- R-2** **IF** *PCTS_mprotect* and *PCTS_mmap* **THEN**
SETUP: Map memory pages using the function *mmap()*.
TEST: When an implementation cannot support the combination of access types specified by *prot*, the call to *mprotect()* fails.
ELSE *NO_OPTION*
SEE: Assertion mprotect_ENOTSUP in 12.2.3.4.
- D_1** **IF** *PCTS_mprotect* and a PCD.1b documents the following **THEN**
TEST: A PCD.1b that documents whether accesses other than those specified by *prot* are permitted, does so in 12.2.3.2.
ELSE *NO_OPTION*
Conformance for mprotect: PASS, NO_OPTION
- 6 **IF** *PCTS_mprotect* and *PCTS_mmap* **THEN**
SETUP: Map memory pages using the function *mmap()*.
TEST: All accesses fail where PROT_WRITE alone has been set.
ELSE *NO_OPTION*
Conformance for mprotect: PASS, NO_OPTION
- 7 **IF** *PCTS_mprotect* and *PCTS_mmap* **THEN**
SETUP: Map memory pages using the function *mmap()*.
TEST: All accesses fail where PROT_NONE alone has been set.
ELSE *NO_OPTION*
Conformance for mprotect: PASS, NO_OPTION

- 8 IF** *PCTS_mprotect* and *PCTS_mmap* **THEN**
SETUP: Map memory pages using the function *mmap()*.
TEST: The implementation supports at least the following values of *prot*: *PROT_NONE*, *PROT_READ*, *PROT_WRITE*, and the inclusive OR of *PROT_READ* and *PROT_WRITE*.
ELSE NO_OPTION
Conformance for *mprotect*: *PASS, NO_OPTION*
- 9 IF** *PCTS_mprotect* and *PCTS_mmap* **THEN**
SETUP: Map memory pages using the function *mmap()*.
TEST: When *MAP_PRIVATE* is not specified in the original mapping, and *PROT_WRITE* is specified, mapped objects are opened in the specified address range with write permission.
TR: Try with and without closing the file descriptors used to map the objects after performing the original mapping.
ELSE NO_OPTION
Conformance for *mprotect*: *PASS, NO_OPTION*
- D_2 IF** *PCTS_mprotect* and a PCD.1b documents the following **THEN**
TEST: A PCD.1b that documents that the argument *addr* in a call to *mprotect(addr, len, prot)* must be a multiple of the page size {*PAGESIZE*}, does so in 12.2.3.2.
ELSE NO_OPTION
Conformance for *mprotect*: *PASS, NO_OPTION*
- D_3 IF** *PCTS_mprotect* and a PCD.1b documents the following **THEN**
TEST: A PCD.1b that documents the behavior of *mprotect()*, if the mapping was not established by a call to *mmap()*, does so in 12.2.3.2.
ELSE NO_OPTION
Conformance for *mprotect*: *PASS, NO_OPTION*
- D_4 IF** *PCTS_mprotect* and a PCD.1b documents the following **THEN**
TEST: A PCD.1b that documents whether or not it supports the *mprotect()* function does so in 12.2.3.2.
ELSE NO_OPTION
Conformance for *mprotect*: *PASS, NO_OPTION*
- 12.2.3.3 Returns**
- R_3 IF** *PCTS_mprotect* and *PCTS_mmap* **THEN**
SETUP: Map memory pages using the function *mmap()*.
TEST: When a call to *mprotect()* completes successfully, the interface returns a value of 0.
ELSE NO_OPTION
SEE: Assertion *mprotect* in 12.2.3.2.
- R_4 IF** *PCTS_mprotect* and *PCTS_mmap* **THEN**
SETUP: Map memory pages using the function *mmap()*.
TEST: When a call to *mprotect()* completes unsuccessfully, the interface returns a value of -1 and sets *errno* to indicate the error.
ELSE NO_OPTION
SEE: All assertions in 12.2.3.4.
- 10 IF** *PCTS_mprotect* and *PCTS_mmap* **THEN**
SETUP: Map memory pages using the function *mmap()*.
TEST: When *mprotect()* fails and returns [*EINVAL*], the protections in the pages in the address range starting at *addr* and continuing for *len* bytes are unchanged.
ELSE NO_OPTION
Conformance for *mprotect*: *PASS, NO_OPTION*

12.2.3.4 Errors

- 11 **IF** *PCTS_mprotect* and *PCTS_mmap* **THEN**
 SETUP: Map memory pages using the function *mmap()*.
 TEST: A call to *mprotect()*, when the memory object was not opened for read, regardless of the protection specified, returns a value of -1 and sets *errno* to [EACCESS].
 ELSE NO_OPTION
 Conformance for *mprotect*: PASS, NO_OPTION
- 12 **IF** *PCTS_mprotect* and *PCTS_mmap* **THEN**
 SETUP: Map memory pages using the function *mmap()*.
 TEST: A call to *mprotect(addr, len, prot)*, when the memory object was not opened for write, and PROT_WRITE is specified for a MAP_SHARED type mapping, returns a value of -1 and sets *errno* to [EACCESS].
 ELSE NO_OPTION
 Conformance for *mprotect*: PASS, NO_OPTION
- 13 **IF** *PCTS_mprotect* and *PCTS_mmap* **THEN**
 IF *PCTS_MAP_PRIVATE* **THEN**
 SETUP: Map memory pages using the function *mmap()*.
 TEST: A call to *mprotect(addr, len, prot)*, when the *prot* argument specifies PROT_WRITE on a MAP_PRIVATE mapping, and there are insufficient memory resources to reserve for locking the private pages, if required, returns a value of -1 and sets *errno* to [EAGAIN].
 NOTE: There is no known reliable test method for this assertion.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *mprotect*: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION
- 14 **IF** *PCTS_mprotect* and *PCTS_mmap* **THEN**
 SETUP: Map memory pages using the function *mmap()*.
 TEST: A call to *mprotect(addr, len, prot)*, when the addresses in the range starting at *addr* and continuing for *len* bytes are outside the range allowed for the address space of a process, returns a value of -1 and sets *errno* to [ENOMEM].
 ELSE NO_OPTION
 Conformance for *mprotect*: PASS, NO_OPTION
- 15 **IF** *PCTS_mprotect* and *PCTS_mmap* **THEN**
 SETUP: Map memory pages using the function *mmap()*.
 TEST: A call to *mprotect(addr, len, prot)*, when the addresses in the range starting at *addr* and continuing for *len* bytes specify one or more pages that are not mapped, returns a value of -1 and sets *errno* to [ENOMEM].
 ELSE NO_OPTION
 Conformance for *mprotect*: PASS, NO_OPTION
- 16 **IF** *PCTS_mprotect* and *PCTS_mmap* **THEN**
 IF *PCTS_MAP_PRIVATE* **THEN**
 SETUP: Map memory pages using the function *mmap()*.
 TEST: A call to *mprotect(addr, len, prot)*, when the *prot* argument specifies PROT_WRITE on a MAP_PRIVATE mapping, and it would require more space than the system is able to supply for locking the private pages, if required, returns a value of -1 and sets *errno* to [ENOMEM].
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *mprotect*: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION
- 17 **IF** not *PCTS_mprotect* **THEN**
 TEST: A call to *mprotect()* returns a value of -1 and sets *errno* to [ENOSYS].
 ELSE NO_OPTION
 Conformance for *mprotect*: PASS, NO_OPTION

mprotect_ENOTSUP

IF *PCTS_mprotect* and *PCTS_mmap* **THEN**

SETUP: Map memory pages using the function *mmap()*.

TEST: A call to *mprotect()*, when the implementation does not support the combination of accesses requested in the *prot* argument, returns a value of -1 and sets *errno* to [ENOTSUP].

ELSE *NO_OPTION*

Conformance for *mprotect*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*

18 IF PCTS_mprotect and PCTS_mmap THEN

IF *PCTS_MULTIPLE_OF_PAGESIZE*

and *PCTS_DETECT_NOT_MULTIPLE_OF_PAGESIZE* **THEN**

SETUP: Map memory pages using the function *mmap()*.

TEST: A call to *mprotect(addr, len, prot)*, when the value of *addr* is not a multiple of the page size {PAGESIZE}, returns a value of -1 and sets *errno* to [EINVAL].

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for *mprotect*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*

12.2.4 Memory Object Synchronization

Function: *msync()*.

12.2.4.1 Synopsis

1

*M_GA_stdC_proto_decl(int; msync; void*addr, size_t len; int_flags; sys/mman.h;;)*

SEE: Assertion *GA_stdC_proto_decl* in 2.7.3.

Conformance for *msync*: *PASS*[1, 2], *NO_OPTION*

2

M_GA_commonC_result_decl (msync; sys/mman.h;;)

SEE: Assertion *GA_commonC_int_result_decl* in 2.7.3.

Conformance for *msync*: *PASS*[1, 2], *NO_OPTION*

3

M_GA_macro_result_decl(int; msync; sys/mman.h;;)

SEE: Assertion *GA_macro_result_decl* in 1.3.4.

Conformance for *msync*: *PASS*, *NO_OPTION*

4

M_GA_macro_args (msync; sys/mman.h;;)

SEE: Assertion *GA_macro_args* in 2.7.3.

Conformance for *msync*: *PASS*, *NO_OPTION*

12.2.4.2 Description

msync IF PCTS_msync and PCTS_munmap THEN

IF: *PCTS_msync_storage* **THEN**

SETUP: Map memory pages using the function *mmap()*

TEST: A successful call to the function *msync()* writes all modified data to permanent storage locations in those whole pages containing any part of the address space of the process, starting at address *addr* and continuing for *len* bytes, and returns the value 0.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for *msync*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*

- 5 **IF** *PCTS_msync* and *PCTS_munmap* **THEN**
SETUP: Map memory pages using the function *mmap()*.
TEST: A successful call to the function *msync(addr, len, flags)*, where the *flags* argument contains the value *MS_INVALIDATE*, invalidates cached copies of the data.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for msync: PASS, NO_TEST, NO_OPTION
- D_1 IF** *PCTS_msync* and a PCD.1b documents the following **THEN**
TEST: A PCD.1b that documents a call to *msync(addr, len, flags)*, when there are no permanent storage locations to write the modified data, does so in 12.2.4.2.
ELSE NO_OPTION
Conformance for msync: PASS, NO_OPTION
- D_2 IF** *PCTS_msync* and a PCD.1b documents the following **THEN**
TEST: A PCD.1b that documents that the argument *addr*, in a call to *msync(addr, len, flags)*, must be a multiple of the page size {*PAGESIZE*}, does so in 12.2.4.2.
ELSE NO_OPTION
Conformance for msync: PASS, NO_OPTION
- D_3 IF** *PCTS_msync* and a PCD.1b documents the following **THEN**
TEST: A PCD.1b that documents whether the implementation also writes out other file attributes, does so in 12.2.4.2.
ELSE NO_OPTION
Conformance for msync: PASS, NO_OPTION
- 6 **IF** *PCTS_msync* and *PCTS_munmap* **THEN**
IF *PCTS_msync_storage* and *PCTS_MAP_PRIVATE* **THEN**
SETUP: Map memory pages using the function *mmap()*
TEST: When the *msync()* function is called on *MAP_PRIVATE* mapping, any modified data is not written to the underlying object, nor is such data made visible to other processes.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for msync: PASS, NO_TEST, NO_OPTION
- D_4 IF** *PCTS_msync* and a PCD.1b documents the following **THEN**
TEST: A PCD.1b that documents whether data in *MAP_PRIVATE* mappings has any permanent storage locations, does so in 12.2.4.2.
ELSE NO_OPTION
Conformance for msync: PASS, NO_OPTION
- D_5 IF** *PCTS_msync* and a PCD.1b documents the following **THEN**
TEST: A PCD.1b that documents the effect of *msync()* on shared memory objects, does so in 12.2.4.2.
ELSE NO_OPTION
Conformance for msync: PASS, NO_OPTION
- 7 **IF** *PCTS_msync* **THEN**
SETUP: Include the header *<sys/msync.h>*.
TEST: The constants *MS_ASYNC*, *MS_SYNC*, and *MS_INVALIDATE* are defined and are bitwise distinct.
ELSE NO_OPTION
Conformance for msync: PASS, NO_OPTION
- 8 **IF** *PCTS_msync* and *PCTS_mmap* **THEN**

IF *PCTS_msync_storage* **THEN**

SETUP: Map memory pages using the function *mmap()*.

TEST: When *MS_ASYNC* is specified, *msync()* returns immediately once all the write operations are initiated or queued for servicing.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for *msync*: *PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION*

9 IF *PCTS_msync* and *PCTS_mmap* **THEN**

IF *PCTS_msync_storage* **THEN**

SETUP: Map memory pages using the function *mmap()*.

TEST: When *MS_SYNC* is specified, *msync()* does not return until all write operations are completed as defined for synchronized I/O data integrity completion.

NOTE: There is no known portable test method for this assertion.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

SEE: Assertion *GA_syncIODataIntegrityWrite* in 2.2.119.

Conformance for *msync*: *PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION*

10 IF *PCTS_msync* and *PCTS_mmap* **THEN**

IF *PCTS_msync_storage* **THEN**

SETUP: Map memory pages using the function *mmap()*.

TEST: When *msync()* is called, with *MS_ASYNC* specified, all write operations are completed as defined for synchronized I/O data integrity completion.

NOTE: There is no known portable test method for this assertion.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

SEE: Assertion *GA_syncIODataIntegrityWrite* in 2.2.119.

Conformance for *msync*: *PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION*

R_1 IF *PCTS_msync* **THEN**

TEST: A call to *msync()* cannot specify both *MS_ASYNC* and *MS_SYNC*.

ELSE *NO_OPTION*

SEE: Assertions *msync_einval* in 12.2.4.4 .

11 IF *PCTS_msync* and *PCTS_mmap* **THEN**

IF *PCTS_msync_storage* **THEN**

SETUP: Map memory pages using the function *mmap()*.

TEST: Following a call to *msync(addr, len, flags)* with *MS_INVALIDATE* set, references to the object obtain data that was consistent with the permanent storage locations sometime between the call to *msync()* and the first subsequent memory reference to the data.

NOTE: The corresponding statement in IEEE Std 1003.1b-1993 is not specific enough to write a portable test.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for *msync*: *PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION*

D_6 IF *PCTS_msync* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the behavior of this function, if the mapping was not established by a call to *mmap()*, does so in 12.2.4.2.

ELSE *NO_OPTION*

Conformance for *msync*: *PASS, NO_OPTION*

D_7 IF *PCTS_msync* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not it supports the *msync()* function, does so in 12.2.4.2.

ELSE *NO_OPTION*

Conformance for msync: PASS, NO_OPTION

12.2.4.3 Returns

R_2 IF *PCTS_msync* and *PCTS_mmap* **THEN**

IF *PCTS_msync_storage* **THEN**

SETUP: Map memory pages using the function *mmap()*

TEST: When a call to *msync()* completes successfully, the interface returns a value of 0.

NOTE: There is no known portable test method for this assertion.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

SEE: Assertion *msync* in 12.2.4.2.

R_3 IF *PCTS_msync* and *PCTS_mmap* **THEN**

IF *PCTS_msync_storage* **THEN**

SETUP: Map memory pages using the function *mmap()*

TEST: When a call to *msync()* completes unsuccessfully, the interface returns a value of -1, and sets *errno* to indicate the error.

NOTE: There is no known portable test method for this assertion.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

SEE: Assertion *msync* in 12.2.4.4

12.2.4.4 Errors

12 IF *PCTS_msync* and *PCTS_mmap* **THEN**

IF *PCTS_msync_storage* **THEN**

SETUP: Map memory pages using the function *mmap()*.

TEST: A call to *msync(addr, len, flags)*, when some or all of the addresses in the range starting at *addr* and continuing for *len* bytes are locked, and *MS_INVALIDATE* is specified, returns a value of -1 and sets *errno* to [EBUSY].

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for msync: PASS, NO_TEST_SUPPORT, NO_OPTION

msync_einval

IF *PCTS_msync* and *PCTS_mmap* **THEN**

IF *PCTS_msync_storage* **THEN**

SETUP: Map memory pages using the function *mmap()*.

TEST: A call to *msync(addr, len, flags)*, when the value in *flags* is invalid, returns a value of -1 and sets *errno* to [EINVAL].

TR: Test with *flags* having both *MS_ASYNC* and *MS_SYNC*.

NOTE: A subroutine is recommended that either returns a *flags* argument that includes unimplemented flags, or indicates that there is no way to generate a *flags* argument that includes unimplemented flags on the system.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for msync: PASS, NO_TEST_SUPPORT, NO_OPTION

13 IF *PCTS_msync* and *PCTS_mmap* **THEN**

IF *PCTS_msync_storage* **THEN**

SETUP: Map memory pages using the function *mmap()*.

TEST: A call to *msync(addr, len, flags)*, when the addresses in the range starting at *addr* and continuing for *len* bytes are outside the range allowed for the address space of a process, returns a value of -1 and sets *errno* to [ENOMEM].

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for *msync*: *PASS, NO_TEST_SUPPORT, NO_OPTION*

- 14** IF *PCTS_msync* and *PCTS_mmap* THEN
 IF *PCTS_msync_storage* THEN
 SETUP: Map memory pages using the function *mmap()*.
 TEST: A call to *msync(addr, len, flags)*, when the addresses in the range starting at *addr* and continuing for *len* specify one of more pages that are not mapped, returns a value of -1 and sets *errno* to [ENOMEM].
 TR: Test for one page not mapped and for more than one page not mapped.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *msync*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 15** IF not *PCTS_msync* THEN
 TEST: A call to *msync()*, returns a value of -1 and sets *errno* to [ENOSYS].
 ELSE *NO_OPTION*
 Conformance for *msync*: *PASS, NO_OPTION*
- 16** IF *PCTS_msync* and *PCTS_mmap* THEN
 IF *PCTS_msync_storage* and *PCTS_MULTIPLE_OF_PAGESIZE* and *PCTS_DETECT_NOT_MULTIPLE_OF_PAGESIZE* THEN
 SETUP: Map memory pages using the function *mmap()*.
 TEST: A call to *msync(addr, len, flags)*, when the value of *addr* is not a multiple of the page size {*PAGESIZE*}, returns a value of -1 and sets *errno* to [EINVAL].
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *msync*: *PASS, NO_TEST_SUPPORT, NO_OPTION*

12.3 Shared Memory Functions

12.3.1 Open a Shared Memory Object

Function: *shm_open()*.

12.3.1.1 Synopsis

- 1**
*M_GA_stdC_proto_decl(int; shm_open; const char*name, int oflag, mod_t mode; sys/mman.h;;;)*
SEE: Assertion *GA_stdC_proto_decl* in 2.7.3.
 Conformance for *shm_open*: *PASS[1, 2], NO_OPTION*
- 2**
M_GA_commonC_result_decl (shm_open; sys/mman.h;;;)
SEE: Assertion *GA_commonC_int_result_decl* in 2.7.3.
 Conformance for *shm_open*: *PASS[1, 2], NO_OPTION*
- 3**
M_GA_macro_result_decl(int; shm_open; sys/mman.h;;;)
SEE: Assertion *GA_macro_result_decl* in 1.3.4.
 Conformance for *shm_open*: *PASS, NO_OPTION*
- 4**
M_GA_macro_args (shm_open; sys/mman.h;;;)
SEE: Assertion *GA_macro_args* in 2.7.3.
 Conformance for *shm_open*: *PASS, NO_OPTION*

12.3.1.2 Description

shm_open

IF *PCTS_shm_open* **THEN**

TEST: A successful call to the *shm_open()* function creates an open file description that refers to the shared memory object, and returns a valid file descriptor that refers to that open file description.

ELSE *NO_OPTION*

Conformance for *shm_open*: *PASS, NO_OPTION*

5 **IF** *PCTS_shm_open* **THEN**

TEST: The file descriptor returned by *shm_open()* is a nonnegative integer.

ELSE *NO_OPTION*

Conformance for *shm_open*: *PASS, NO_OPTION*

D_1 IF *PCTS_shm_open* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether the shared memory object *name* appears in the file system, and is visible to other functions that take pathnames as arguments, does so in 12.3.1.2.

ELSE *NO_OPTION*

Conformance for *shm_open*: *PASS, NO_OPTION*

6 *M_GA_portableFilenames(shm_open)*

SEE: Assertion *GA_portableFilenames* in 2.2.4.0.

Conformance for *shm_open*: *PASS, NO_OPTION*

7 *M_GA_upperLowerNames (shm_open)*

SEE: Assertion *GA_upperLowerNames* in 2.2.2.40.

Conformance for *shm_open*:: *PASS, NO_OPTION*

8 *M_GA_PRNoTRUNC(shm_open)*

SEE: Assertion *GA_PRNoTrunc* in 2.3.6.

Conformance for *shm_open*: *PASS, NO_OPTION*

9 *M_GA_PRNoTruncError (shm_open)*

SEE: Assertion *GA_macro_args* in 2.7.3.

Conformance for *shm_open*: *PASS, NO_OPTION*

10 **IF** *PCTS_shm_open* **THEN**

TEST: When *name* begins with the slash character, then processes calling *shm_open(name, oflag, mode)* with the same value of *name* refer to the same shared memory object, as long as that name has not been removed.

TR: Test using two different processes.

ELSE *NO_OPTION*

Conformance for *shm_open*: *PASS, NO_OPTION*

D_2 IF *PCTS_shm_open* **THEN**

TEST: A PCD.1b that documents the effect if the *name* to *shm_open(name, oflag, mode)* does not begin with the slash character, does so in 12.3.1.2.is specified

ELSE *NO_OPTION*

Conformance for *shm_open*: *PASS, NO_OPTION*

D_3 IF *PCTS_shm_open* **THEN**

TEST: A PCD.1b that documents the interpretation of slash characters other than the leading slash character in the *name* argument to *shm_open(name, oflag, mode)*, does so in 12.3.1.2.

ELSE NO_OPTION

Conformance for *shm_open*: PASS, NO_OPTION

11 IF PCTS_shm_open THEN

TEST: A successful call to *shm_open()* returns a file descriptor for the shared memory object that is the lowest-numbered file descriptor not currently open for that process.

ELSE NO_OPTION

Conformance for *shm_open*: PASS, NO_OPTION

12 IF PCTS_shm_open THEN

TEST: The process does not share the open file description created by *shm_open()* with any other processes.

ELSE NO_OPTION

Conformance for *shm_open*: PASS, NO_OPTION

D_4 IF PCTS_shm_open and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents whether the file offset is set by *shm_open()*, does so in 12.3.1.2.

ELSE NO_OPTION

Conformance for *shm_open*: PASS, NO_OPTION

13 IF PCTS_shm_open THEN

TEST: The FD_CLOEXEC file descriptor flag associated with the new file descriptor is set by *shm_open()*.

ELSE NO_OPTION

Conformance for *shm_open*: PASS, NO_OPTION

14 IF PCTS_shm_open THEN

TEST: Following a call to *shm_open(name, oflag, mode)*, the file status flags and file access modes of the open file description are set according to the value of *oflag*.

ELSE NO_OPTION

Conformance for *shm_open*: PASS, NO_OPTION

15 IF PCTS_shm_open THEN

SETUP: Include the header `<sys/mman.h>`.

TEST: The constants O_RDONLY, O_RDWR, O_CREAT, O_EXCL and O_TRUNC are defined and have the same values as defined in the header `<fcntl.h>`.

ELSE NO_OPTION

Conformance for *shm_open*: PASS, NO_OPTION

16 IF PCTS_shm_open THEN

SETUP: Include the header `<sys/mman.h>`.

TEST In a call to *shm_open(name, oflag, mode)*, the *oflag* argument must be the bitwise inclusive OR of one or more of the following flags: O_RDONLY, O_RDWR, O_CREAT, O_EXCL, or O_TRUNC.

ELSE NO_OPTION

Conformance for *shm_open*: PASS, NO_OPTION

17 IF PCTS_shm_open THEN

TEST: In the call to *shm_open(name, oflag, mode)*, *oflag* must have either O_RDONLY or O_RDWR set.

ELSE NO_OPTION

Conformance for *shm_open*: PASS, NO_OPTION

- 18 IF PCTS_shm_open THEN**
TEST: In the call to *shm_open(name, oflag, mode)*, *oflag* must have both O_RDONLY, or O_RDWR set.
ELSE NO_OPTION
Conformance for shm_open: PASS, NO_OPTION
- 19 IF PCTS_shm_open THEN**
TEST: In the call to *shm_open(name, oflag, mode)*, any combination of the following flags: O_CREAT, O_EXCL, and O_TRUNC, may be specified in *oflag*.
ELSE NO_OPTION
Conformance for shm_open: PASS, NO_OPTION
- 20 IF PCTS_shm_open THEN**
TEST: In a call to *shm_open(name, oflag, mode)*, the flag O_CREAT has no effect when it refers to a shared memory object that was previously created with the O_EXCL flag unset.
ELSE NO_OPTION
Conformance for shm_open: PASS, NO_OPTION
- 21 IF PCTS_shm_open THEN**
TEST: A call to *shm_open(name, oflag, mode)* creates a shared memory object when the flag O_CREAT is set, and the shared memory object did not exist previously.
ELSE NO_OPTION
Conformance for shm_open: PASS, NO_OPTION
- 22 IF PCTS_shm_open THEN**
SETUP: Create a shared memory object by calling *shm_open (name, oflag, mode)* with the *oflag* argument set to O_CREAT.
TEST: The user ID of a newly created, shared memory object is set to the effective user ID of the process.
ELSE NO_OPTION
Conformance for shm_open: PASS, NO_OPTION
- 23 IF PCTS_shm_open THEN**
SETUP: Create a shared memory object by calling *shm_open (name, oflag, mode)* with the *oflag* argument set to O_CREAT.
TEST: The group ID of a newly created, shared memory object is set to the effective user ID of the process.
ELSE NO_OPTION
Conformance for shm_open: PASS, NO_OPTION
- 24 IF PCTS_shm_open THEN**
TEST: When a shared memory object is created by calling *shm_open(name, oflag, mode)*, with the *oflag* argument set to O_CREAT, the permission bits are set to the value of the *mode* argument, except for those set in the file mode creation mask of the process.
ELSE NO_OPTION
Conformance for shm_open: PASS, NO_OPTION
- D_5 IF PCTS_shm_open and a PCD.1b documents the following THEN**
TEST: A PCD.1b that documents the effect when bits in *mode*, other than the file permission bits, are set during creation of a shared memory object by a call to *shm_open(name, oflag, mode)* does so in 12.3.1.2.
ELSE NO_OPTION
Conformance for shm_open: PASS, NO_OPTION
- 25 IF PCTS_shm_open THEN**
TEST: In the call *shm_open(name, oflag, mode)*, the *mode* argument does not affect whether the shared memory object is opened for reading, or writing, or both.

TR: Try all three, with all possibly mode bit combinations.

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

26 IF PCTS_shm_open THEN

TEST: A newly created shared memory object has a size of 0

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

R_1 IF PCTS_shm_open THEN

TEST: When O_EXCL and O_CREAT are set, and the shared memory object already exists, *shm_open()* fails.

ELSE NO_OPTION

SEE: Assertion shm_exist_err in 12.3.1.4.

27 IF PCTS_shm_open THEN

TEST: The check by *shm_open()* for the existence of the shared memory object, and the creation of the object if it does not exist, are atomic with respect to other processes executing *shm_open()* with O_EXCL and O_CREAT set, and naming the same shared memory object.

NOTE: There is no known reliable test method for this assertion.

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_TEST, NO_OPTION

D_6 IF PCTS_shm_open and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the result of a call to *shm-open(name, oflag, mode)*, if O_EXCL is set and O_CREAT is not set, does so in 12.3.1.2.

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

28 IF PCTS_shm_open THEN

TEST: When a shared memory object exists, a successful call to *shm_open(name, oflag, mode)*, specifying both O_RDWR and O_TRUNC, truncates the object to zero length.

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

29 IF PCTS_shm_open THEN

TEST: When a shared memory object exists, a successful call to *shm_open(name, oflag, mode)*, specifying both O_RDWR and O_TRUNC, leaves the mode and owner unchanged.

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

D_7 IF PCTS_shm_open and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the result of specifying both O_TRUNC and O_RDONLY when calling *shm-open(name, oflag, mode)*, does so in 12.3.1.2.

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

30 IF PCTS_shm_open THEN

TEST: When a shared memory object is created by *shm_open()*, the state of the shared memory object, including all data associated with the shared memory object, persists until the shared memory object is unlinked and all other references are gone.

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

D_8 IF *PCTS_shm_open* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether the name and state of a shared memory object remain valid after a system reboot does so in 12.3.1.2.

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

D_9 IF *PCTS_shm_open* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not it supports the *shm_open()* function, does so in 12.3.1.2.

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

12.3.1.3 Returns

R_2 IF *PCTS_shm_open* **THEN**

TEST: When a call to *shm_open()* completes successfully, it returns a nonnegative integer representing the lowest numbered unused file descriptor.

ELSE NO_OPTION

SEE: Assertion *shm_open* in 12.3.1.2.

R_3 IF *PCTS_shm_open* **THEN**

TEST: When a call to *shm_open()* completes unsuccessfully, it returns a value of -1 and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: All assertions in 12.3.1.4.

12.3.1.4 Errors

31 IF *PCTS_shm_open* **THEN**

TEST: A call to *shm_open()*, when the shared memory object exists and the permission specified by *oflag* is denied, returns a value of -1 and sets *errno* to [EACCESS].

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

32 IF *PCTS_shm_open* **THEN**

TEST: A call to *shm_open()*, when the shared memory object does not exist and permission to create the shared memory object is denied, returns a value of -1 and sets *errno* to [EACCESS].

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

33 IF *PCTS_shm_open* **THEN**

TEST: A call to *shm_open()*, when O_TRUNC is specified and write permission is denied, returns a value of -1 and sets *errno* to [EACCESS].

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

shm_exist_err

IF *PCTS_shm_open* **THEN**

TEST: A call to *shm_open()*, when O_CREAT and O_EXCL are set and the named shared memory object already exists, returns a value of -1 and sets *errno* to [EEXIST].

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

34 IF *PCTS_shm_open* **THEN**

TEST: A call to *shm_open()*, when the *shm_open()* operation is interrupted by a signal, returns a value of -1 and sets *errno* to [EINTR].

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

35 IF PCTS_shm_open THEN

TEST: A call to *shm_open*(), when the *shm_open*() operation is not supported for the given name, returns a value of -1 and sets *errno* to [EINVAL].

NOTE: A subroutine is recommended that either returns a name for which *shm_open* is not supported, or indicates that there is no way to generate a name for which *shm_open*() is not supported on the system.

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

D_10 IF PCTS_shm_open THEN

TEST: A PCD.1b that documents under what circumstances [EINVAL] may be returned, does so in 12.3.1.2.

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

36 IF PCTS_shm_open THEN

TEST: A call to *shm_open*(), when too many file descriptors are currently in use by this process, returns a value of -1 and sets *errno* to [EMFILE].

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

37 IF PCTS_shm_open THEN

IF {PATH_MAX} <= PCTS_PATH_MAX THEN

TEST: A call to *shm_open*(), when the length of the *name* string exceeds {PATH_MAX}, returns a value of -1 and sets *errno* to [ENAMETOOLONG].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_TEST_SUPPORT, NO_OPTION

38 IF PCTS_shm_open and { _POSIX_NO_TRUNC } THEN

IF {NAME_MAX} <= PCTS_NAME_MAX THEN

TEST: A call to *shm_open*(), when a pathname component is longer than {NAME_MAX}, returns a value of -1 and sets *errno* to [ENAMETOOLONG].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_TEST_SUPPORT, NO_OPTION

39 IF PCTS_shm_open THEN

TEST: A call to *shm_open*(), when too many shared memory objects are currently open in the system, returns a value of -1 and sets *errno* to [EINFILE].

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

40 IF PCTS_shm_open THEN

TEST: A call to *shm_open*(), when O_CREAT is not set and the named shared memory object does not exist, returns a value of -1 and sets *errno* to [ENOENT].

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

41 IF PCTS_shm_open THEN

TEST: A call to *shm_open*(), when there is insufficient space for the creation of the new shared memory object, returns a value of -1 and sets *errno* to [ENOSPC].

NOTE: There is no known reliable test method for this assertion.

ELSE NO_OPTION

Conformance for shm_open: PASS, NO_OPTION

42 IF not *PCTS_shm_open* **THEN**
TEST: A call to *shm_open*(), returns a value of -1 and sets *errno* to [ENOSYS].
ELSE NO_OPTION
Conformance for shm_open: PASS, NO_OPTION

12.3.2 Remove a Shared Memory Object

Function: *shm_unlink*().

12.3.2.1 Synopsis

1
M_GA_stdC_proto_decl(*int*; *shm_unlink*; *const char*name*;;;)
SEE: Assertion *GA_stdC_proto_decl* in 2.7.3.
Conformance for shm_unlink: PASS[1, 2], NO_OPTION

2
M_GA_commonC_result_decl (*shm_unlink*;;;)
SEE: Assertion *GA_commonC_int_result_decl* in 2.7.3.
Conformance for shm_unlink:: PASS[1, 2], NO_OPTION

3
M_GA_macro_result_decl(*int*; *shm_unlink*;;;)
SEE: Assertion *GA_macro_result_decl* in 1.3.4.
Conformance for shm_open: PASS, NO_OPTION

4
M_GA_macro_args (*shm_unlink*;;;)
SEE: Assertion *GA_macro_args* in 2.7.3.
Conformance for shm_open: PASS, NO_OPTION

12.3.2.2 Description

shm_unlink

IF *PCTS_shm_unlink* **THEN**
TEST: A successful call to the function *shm_unlink*() removes the name of the shared memory object named by the string pointed to by *name*, and returns 0.
ELSE NO_OPTION
Conformance for shm_unlink: PASS, NO_OPTION

5 IF *PCTS_shm_unlink* **THEN**
IF *PCTS_shm_open* **THEN**
TEST: When one or more references to the shared memory object exist when the object is unlinked, the removal of the memory object contents is postponed until all open references to the shared memory object have been removed.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for shm_unlink: PASS, NO_TEST_SUPPORT, NO_OPTION

6 IF *PCTS_shm_unlink* **THEN**
IF *PCTS_shm_open* and *PCTS_mmap* **THEN**
TEST: When one or more references to the shared memory object exist when the object is unlinked, the removal of the memory object contents is postponed until all map references to the shared memory object have been removed.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for shm_unlink: PASS, NO_TEST_SUPPORT, NO_OPTION

D_1 IF *PCTS_shm_unlink* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not it supports the *shm_unlink()* function does so in 12.3.2.2.

ELSE NO_OPTION

Conformance for shm_unlink: PASS, NO_OPTION

R_1 IF *PCTS_shm_unlink* **THEN**

TEST: When a call to *shm_unlink()* completes successfully, the interface returns a value of 0.

ELSE NO_OPTION

SEE: All assertions in 12.3.2.2

R_2 IF *PCTS_shm_unlink* **THEN**

TEST: When a call to *shm_unlink()* completes unsuccessfully, the interface returns a value of -1 and sets *errno* to indicate the error; the named shared memory object is unchanged.

ELSE NO_OPTION

SEE: All assertions in 12.3.2.4.

12.3.2.4 Errors

7 IF *PCTS_shm_unlink* and {_POSIX_NO_TRUNC} **THEN**

TEST: A call to *shm_unlink()*, when permission is denied to unlink the named shared memory object, returns a value of -1 and sets *errno* to [EACCESS].

ELSE NO_OPTION

Conformance for shm_unlink: PASS, NO_OPTION

8 IF *PCTS_shm_unlink* **THEN**

IF {_POSIX_NO_TRUNC} and {NAME_MAX} $\neq$ *PCTS_NAME_MAX* **THEN**

TEST: A call to *shm_unlink()*, when the length of the *name* string exceeds {NAME_MAX}, returns a value of -1 and sets *errno* to [ENAMETOOLONG].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for shm_unlink: PASS, NO_TEST_SUPPORT, NO_OPTION

9 IF *PCTS_shm_unlink* **THEN**

TEST: A call to *shm_unlink(name)*, when the named shared memory object does not exist, returns a value of -1 and sets *errno* to [ENOENT].

ELSE NO_OPTION

Conformance for shm_unlink: PASS, NO_OPTION

10 IF not *PCTS_shm_unlink* **THEN**

TEST: A call to *shm_unlink()* returns a value of -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for shm_unlink: PASS, NO_OPTION

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Section 13: Execution Scheduling

13.1 Scheduling Parameters

- 1** **SETUP:** Include the header `<sched.h>`.
TEST: The structure `sched_param` is defined and has the member

Member Type	Member Name	Description
<i>int</i>	<i>sched_priority</i>	Process execution scheduling priority

Conformance for sched_param: PASS

D_1 IF a PCD.1b documents the following THEN

TEST: A PCD.1b that documents extensions to `sched_param`, as permitted in POSIX.1b{3}, 1.3.1.1 Item (2), does so in 13.1.

ELSE NO_OPTION

Conformance for sched_param: PASS, NO_OPTION

- 2** **SETUP:** Include the header `<sched.h>`.
TEST: Extensions to `sched_param` that may change the behavior of the application with respect to this standard when those fields in the structure are uninitialized, are enabled as required by POSIX.1b {3} 1.3.1.1.
NOTE: The corresponding statement in IEEE Std 1003.1b-1993 is not specific enough to write a portable test.

Conformance for sched_param: PASS, NO_TEST

- 3** **SETUP:** Include the header `<sched.h>`.
TEST: The symbols allowed by this standard to be in the header `<time.h>` are visible.
Conformance for sched_param: PASS

13.2 Scheduling Policies

- 1** **TEST:** The implementation makes the process at the head of the highest priority nonempty process list a running process, regardless of its associated policy.

Conformance for sched_policy: PASS

- 2** **TEST:** A running process is then removed from its process list.
NOTE: There is no known portable test method for this assertion.

Conformance for sched_policy: PASS, NO_TEST

D_1 IF a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the implementation of scheduling policies other
SCHED_FIFO, SCHED_RR, and SCHED_OTHER, does so in 13.2.

ELSE NO_OPTION

Conformance for sched_policy: PASS, NO_OPTION

3 **SETUP:** Include the header `<sched.h>`.

TEST: The constants SCHED_FIFO, SCHED_RR, and SCHED_OTHER are defined and are bitwise
distinct.

Conformance for sched_policy: PASS

13.2.1 SCHED_FIFO

sched_fifo1

IF PCTS_sched_setscheduler **THEN**

IF PCTS_GAP_sched_setscheduler **THEN**

TEST: Processes scheduled under the FIFO scheduling policy are chosen from a
process list that is ordered by the time its processes have been on the list
without being executed.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for sched_policy: PASS, NO_TEST_SUPPORT, NO_OPTION

sched_fifo2

IF PCTS_sched_setscheduler **THEN**

IF PCTS_GAP_sched_setscheduler **THEN**

TEST: Under the FIFO scheduling policy, when a running process becomes a
preempted process, it becomes the head of the process list for its priority.

NOTE: There is no known portable test method for this assertion.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for sched_policy: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION

sched_fifo3

IF PCTS_sched_setscheduler **THEN**

IF PCTS_GAP_sched_setscheduler **THEN**

TEST: Under the SCHED_FIFO policy, when a blocked process becomes a runnable
process, it becomes the tail of the process list for its priority.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for sched_policy: PASS, NO_TEST_SUPPORT, NO_OPTION

sched_fifo4

IF PCTS_sched_setscheduler **THEN**

IF PCTS_GAP_sched_setscheduler **THEN**

TEST: Under the SCHED_FIFO policy, when a running process calls the
sched_setscheduler() function, the process specified in the function call is
modified to the specified policy and the priority specified by the *param*
argument.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for sched_policy: PASS, NO_TEST_SUPPORT, NO_OPTION

sched_fifo5

IF PCTS_sched_setscheduler **THEN**

IF PCTS_GAP_sched_setscheduler **THEN**

TEST: Under the SCHED_FIFO policy, if the process whose policy and priority has
been modified is a running process or is runnable, it then becomes the tail of
the process list for its new priority.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for sched_policy: PASS, NO_TEST_SUPPORT, NO_OPTION

sched_fifo6

IF PCTS_sched_setscheduler and PCTS_sched_setparam THEN

IF PCTS_GAP_sched_setscheduler and PCTS_GAP_sched_setparam THEN

TEST: Under the SCHED_FIFO policy, when a running process calls the *sched_setparam()* function, the priority of the process specified in the function call is modified to the priority specified by the *param* argument.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for sched_policy: PASS, NO_TEST_SUPPORT, NO_OPTION

sched_fifo7

IF PCTS_sched_setscheduler and PCTS_sched_setparam THEN

IF PCTS_GAP_sched_setscheduler and PCTS_GAP_sched_setparam THEN

TEST: Under the SCHED_FIFO policy, if a process whose priority has been modified is a running process or is runnable, it then becomes the tail of the process list for its new priority.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for sched_policy: PASS, NO_TEST_SUPPORT, NO_OPTION

sched_fifo8

IF PCTS_sched_setscheduler and PCTS_sched_yield THEN

IF PCTS_GAP_sched_setscheduler THEN

TEST: Under the SCHED_FIFO policy, when a running process issues the *sched_yield()* function, the process becomes the tail of the process list for its priority.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for sched_policy: PASS, NO_TEST_SUPPORT, NO_OPTION

R_1 TEST: Under the SCHED_FIFO policy, the position of a process within the process lists is affected only by process scheduling events.

NOTE: There is no known portable test method for this assertion.

SEE: Assertions *sched_fifo1*, *sched_fifo2*, *sched_fifo3*, *sched_fifo4*, *sched_fifo5*, *sched_fifo6*, *sched_fifo7*, *sched_fifo8* in 13.2.1.

4

IF PCTS_sched_setscheduler and PCTS_sched_get_priority_max and PCTS_sched_get_priority_min THEN

IF PCTS_GAP_sched_setscheduler THEN

TEST: Valid priorities under the SCHED_FIFO policy are within the range returned by the function *sched_get_priority_max()* and *sched_get_priority_min()* when SCHED_FIFO is provided as the parameter.

TR: Try the return values of *sched_get_priority_max()* and *sched_get_priority_min()*. If *sched_get_priority_max()* returns a value less than INT_MAX, try *sched_get_priority_max()+1*. If *sched_get_priority_min()* returns a value greater than INT_MIN, try *sched_get_priority_min()-1*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for sched_policy: PASS, NO_TEST_SUPPORT, NO_OPTION

5

IF PCTS_sched_setscheduler THEN

IF PCTS_GAP_sched_setscheduler THEN

TEST: The SCHED_FIFO policy has a priority range of at least 32 priorities.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for sched_policy: PASS, NO_TEST_SUPPORT, NO_OPTION

13.2.2 SCHED_RR

- 6 **IF** *PCTS_sched_setscheduler* and *PCTS_sched_rr_get_interval* **THEN**
 IF *PCTS_GAP_sched_setscheduler* **THEN**
 TEST: The SCHED_RR policy is identical to the SCHED_FIFO policy, with the additional condition that when the implementation detects that a running process has been executing as a running process for a time period of the length returned by the function *sched_rr_get_interval()* or longer, the process becomes the tail of its process list, and the head of that process list is removed and made a running process.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for sched_policy: PASS, NO_TEST_SUPPORT, NO_OPTION
- 7 **IF** *PCTS_sched_setscheduler* **THEN**
 IF *PCTS_GAP_sched_setscheduler* **THEN**
 TEST: A process under the SCHED_RR policy that is preempted, and subsequently resumes execution as a running process, completes the unexpired portion of its round-robin-interval time period.
 NOTE: There is no known portable test method for this assertion.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for sched_policy: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION
- 8 **IF** *PCTS_sched_setscheduler* and *PCTS_sched_get_priority_max* and *PCTS_sched_get_priority_min* **THEN**
 IF *PCTS_GAP_sched_setscheduler* **THEN**
 TEST: For the SCHED_RR policy, valid priorities are within the range returned by the functions *sched_get_priority_max()* and *sched_get_priority_min()* when SCHED_RR is provided as the parameter.
 TR: Try the return values of *sched_get_priority_max()* and *sched_get_priority_min()*. If *sched_get_priority_max()* returns a value less than INT_MAX, try *sched_get_priority_max()+1*. If *sched_get_priority_min()* returns a value greater than INT_MIN, try *sched_get_priority_min()-1*.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for sched_policy: PASS, NO_TEST_SUPPORT, NO_OPTION
- 9 **IF** *PCTS_sched_setscheduler* **THEN**
 IF *PCTS_GAP_sched_setscheduler* **THEN**
 TEST: The SCHED_RR has a priority range of at least 32 priorities.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for sched_policy: PASS, NO_TEST_SUPPORT, NO_OPTION

13.2.3 SCHED_OTHER

- D_2 TEST:** A PCD.1b documents the behavior of the SCHED_OTHER policy, as described in the definition of scheduling policy, in 13.2.3.
 Conformance for sched_policy: PASS
- D_3 TEST:** The PCD.1b documents the effect of scheduling processes with the SCHED_OTHER policy, as described in a system in which other processes are executing under SCHED_FIFO or SCHED_RR, in 13.2.3.
 Conformance for sched_policy: PASS

10 IF *PCTS_sched_setscheduler* and *PCTS_sched_get_priority_max* and *PCTS_sched_get_priority_min*
THEN
 IF *PCTS_GAP_sched_setscheduler* **THEN**
 TEST: Priorities of processes executing under the SCHED_OTHER policy are
 restricted to the range returned by the functions *sched_get_priority_max()*
 and *sched_get_priority_min()* when SCHED_OTHER is provided as the
 parameter.
 TR: Try the return values of *sched_get_priority_max()* and *sched_get_priority_min()*. If
 sched_get_priority_max() returns a value less than INT_MAX, try
 sched_get_priority_max()+1. If *sched_get_priority_min()* returns a value greater
 than INT_MIN, try *sched_get_priority_min()-1*.
 ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *sched_policy*: PASS, NO_TEST_SUPPORT, NO_OPTION

13.3 Process Scheduling Functions

13.3.1 Set Scheduling Parameters

Function: *sched_setparam()*.

13.3.1.1 Synopsis

1
*M_GA_stdC_proto_decl(int; sched_setparam; pid_t pid, const struct sched_param *param;
sched.h;;;)*
SEE: Assertion GA_stdC_proto_decl in 2.7.3.
Conformance for *sched_setparam*: PASS[1, 2], NO_OPTION

2
M_GA_commonC_int_result_decl(sched_setparam; sched.h;;;)
SEE: Assertion GA_commonC_int_result_decl in 2.7.3.
Conformance for *sched_setparam*: PASS[1, 2], NO_OPTION

3
M_GA_macro_result_decl(int; sched_setparam; sched.h;;;)
SEE: Assertion GA_macro_result_decl in 1.3.4.
Conformance for *sched_setparam*: PASS, NO_OPTION

4
M_GA_macro_args (sched_setparam; sched.h;;;)
SEE: Assertion GA_macro_args in 2.7.3.
Conformance for *sched_setparam*: PASS, NO_OPTION

13.3.1.2 Description

sched_setparam

IF *PCTS_sched_setparam* **THEN**
 IF *PCTS_GAP_sched_setparam* **THEN**
 TEST: A successful call to *sched_setparam()* sets the scheduling parameters of the
 process specified by *pid* to the values specified by the *sched_param* structure
 pointed to by *param*, and returns the value 0.
 ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *sched_setparam*: PASS, NO_TEST_SUPPORT, NO_OPTION

- 5** **IF** *PCTS_sched_setparam* **THEN**
 IF *PCTS_GAP_sched_setparam* **THEN**
 TEST: Any integer within the inclusive priority range for the current scheduling policy of the process specified by *pid* is a valid value of the *sched_priority* member in the *param* structure.
 TR: Try the return values of *sched_get_priority_max()* and *sched_get_priority_min()*. If *sched_get_priority_max()* returns a value less than *INT_MAX*, try *sched_get_priority_max()+1*. If *sched_get_priority_min()* returns a value greater than *INT_MIN*, try *sched_get_priority_min()-1*.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *sched_setparam*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 6** **IF** *PCTS_sched_setparam* **THEN**
 IF *PCTS_GAP_sched_setparam* **THEN**
 TEST: Higher numerical values for the priority represent higher priorities.
 NOTE: There is no known portable test method for this assertion.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *sched_setparam*: *PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION*
- D_1** **IF** *PCTS_sched_setparam* a PCD.1b documents the following **THEN**
 TEST: A PCD.1b that documents the behavior of *sched_setparam()*, if the value of *pid* is negative, does so in 13.3.1.2.
 ELSE *NO_OPTION*
 Conformance for *sched_setparam*: *PASS, NO_OPTION*
- 7** **IF** *PCTS_sched_setparam* **THEN**
 IF *PCTS_GAP_sched_setparam* **THEN**
 TEST: When a process specified by *pid* exists, and if the calling process has permission, the scheduling parameters are set for the process whose process ID is equal to *pid*.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *sched_setparam*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 8** **IF** *PCTS_sched_setparam* **THEN**
 IF *PCTS_GAP_sched_setparam* **THEN**
 TEST: When *pid* is zero, the scheduling parameters are set for the calling process.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *sched_setparam*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- D_2** **IF** *PCTS_sched_setparam* **THEN**
 TEST: A PCD.1b documents the conditions under which one process has permission to change the scheduling parameters of another process in 13.3.1.2.
 ELSE *NO_OPTION*
 Conformance for *sched_setparam*: *PASS, NO_OPTION*
- 9** **IF** *PCTS_sched_setparam* **THEN**
 IF *PCTS_RAP_sched_setparam* **THEN**
 TEST: The requesting process must have the appropriate privilege to set its own scheduling parameters, or those of another process.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *sched_setparam*: *PASS, NO_TEST_SUPPORT, NO_OPTION*

D_3 IF *PCTS_sched_setparam* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether the requesting process must have appropriate privilege to set its own scheduling parameters, or those of another process, does so in 13.3.1.2.

ELSE NO_OPTION

Conformance for sched_setparam: PASS, NO_OPTION

10 IF *PCTS_sched_setparam* **THEN**

TEST: The target process, whether it is running or not running, resumes execution after all other runnable processes of equal or greater priority have been scheduled to run.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

Conformance for sched_setparam: PASS, NO_TEST, NO_OPTION

11 IF *PCTS_sched_setparam* **THEN**

IF *PCTS_GAP_sched_setparam* **THEN**

TEST: When the priority of the process specified by the *pid* argument is set higher than that of the lowest-priority running process, and if the specified process is ready to run, the process specified by the *pid* argument preempts a lowest priority running process.

NOTE: There is no known portable test method for this assertion.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for sched_setparam: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION

12 IF *PCTS_sched_setparam* **THEN**

IF *PCTS_GAP_sched_setparam* **THEN**

TEST: When the process calling *sched_setparam()* sets its own priority lower than that of one or more other nonempty process lists, then the process that is the head of the highest priority list preempts the calling process.

NOTE: There is no known portable test method for this assertion.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for sched_setparam: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION

D_4 IF *PCTS_sched_setparam* **THEN**

IF *PCTS_GAP_sched_setparam* **THEN**

TEST: A PCD.1b documents the result of the current scheduling policy for the process specified by *pid* if it is not SCHED_FIFO, or SCHED_RR, or SCHED_OTHER, in 13.3.1.2.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for sched_setparam: PASS, NO_TEST_SUPPORT, NO_OPTION

D_5 IF *PCTS_sched_setparam* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not the implementation supports the *sched_setparam()* function, does so in 13.3.1.2.

ELSE NO_OPTION

Conformance for sched_setparam: PASS, NO_OPTION

13.3.1.4 Errors

13 IF *PCTS_sched_setparam* **THEN**

IF *PCTS_GAP_sched_setparam* **THEN**

TEST: A call to *sched_setparam()*, when one or more of the requested scheduling parameters is outside the range defined for the scheduling policy of the specified *pid*, returns a value of -1 and sets *errno* to [EINVAL].

TR: Try the return values of `sched_get_priority_max()` and `sched_get_priority_min()`. If `sched_get_priority_max()` returns a value less than `INT_MAX`, try `sched_get_priority_max()+1`. If `sched_get_priority_min()` returns a value greater than `INT_MIN`, try `sched_get_priority_min()-1`.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for `sched_setparam`: PASS, NO_TEST_SUPPORT, NO_OPTION

14 IF not PCTS_sched_setparam THEN

TEST: A call to `sched_setparam()` returns a value of -1 and sets `errno` to [ENOSYS].

ELSE NO_OPTION

Conformance for `sched_setparam`: PASS, NO_OPTION

15 IF PCTS_sched_setparam THEN

IF PCTS_GAP_sched_setparam THEN

TEST: A call to `sched_setparam()`, when the requesting process does not have permission to set the scheduling parameters for the specified process, returns a value of -1 and sets `errno` to [EPERM].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for `sched_setparam`: PASS, NO_TEST_SUPPORT, NO_OPTION

16 IF PCTS_sched_setparam THEN

IF PCTS_RAP_sched_setparam THEN

TEST: A call to `sched_setparam()`, when the requesting process does not have the appropriate privilege to invoke `sched_setparam()`, returns a value of -1 and sets `errno` to [EPERM].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for `sched_setparam`: PASS, NO_TEST_SUPPORT, NO_OPTION

17 IF PCTS_sched_setparam THEN

IF PCTS_GAP_sched_setparam THEN

TEST: A call to `sched_setparam()`, when no process can be found corresponding to that specified by `pid`, returns a value of -1 and sets `errno` to [ESRCH].

NOTE: A subroutine is recommended that returns a `pid` that doesn't correspond to any existing process.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for `sched_setparam`: PASS, NO_TEST_SUPPORT, NO_OPTION

13.3.2 Get Scheduling Parameters

Function: `sched_getparam()`.

13.3.2.1 Synopsis

1

`M_GA_stdC_proto_decl(int; sched_getparam; pid_t pid, struct sched_param *param; sched.h;;)`

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for `sched_getparam`: PASS[1, 2], NO_OPTION

2

`M_GA_commonC_int_result_decl(sched_getparam; sched.h;;)`

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for `sched_getparam`: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; sched_getparam; sched.h;;)**SEE:** Assertion GA_macro_result_decl in 1.3.4.*Conformance for sched_getparam: PASS, NO_OPTION*

4

M_GA_macro_args (sched_getparam; sched.h;;)**SEE:** Assertion GA_macro_args in 2.7.3.*Conformance for sched_getparam: PASS, NO_OPTION***sched_getparam****IF** *PCTS_sched_getparam* **THEN****TEST:** A successful call to *sched_getparam()* returns the scheduling parameters of a process specified by *pid* in the *sched_param* structure pointed to by *param*, and returns the value zero.**ELSE** *NO_OPTION**Conformance for sched_getparam: PASS, NO_OPTION*

5

IF *PCTS_sched_getparam* **THEN****TEST:** When a process specified by *pid* exists, and if the calling process has permission, the scheduling parameters for the process whose process ID is equal to *pid* are returned.**ELSE** *NO_OPTION**Conformance for sched_getparam: PASS, NO_OPTION*

6

IF *PCTS_sched_getparam* **THEN****TEST:** When *pid* is zero, the scheduling parameters for the calling process are returned.**ELSE** *NO_OPTION**Conformance for sched_getparam: PASS, NO_OPTION***D_1 IF** *PCTS_sched_getparam* and PCD.1b documents the following **THEN****TEST:** A PCD.1b that documents the behavior of *sched_getparam()*, if the value of *pid* is negative, does so in 13.3.2.2.**ELSE** *NO_OPTION**Conformance for sched_getparam: PASS, NO_OPTION***D_2 IF** *PCTS_sched_getparam* and PCD.1b documents the following **THEN****TEST:** A PCD.1b that documents whether or not it supports the *sched_getparam()* function does so in 13.3.2.2.**ELSE** *NO_OPTION**Conformance for sched_getparam: PASS, NO_OPTION***R_1 IF** *PCTS_sched_getparam* **THEN****TEST:** When a call to *sched_getparam()* completes successfully, the interface returns 0.**ELSE** *NO_OPTION***SEE:** Assertion *sched_getparam* in 13.3.2.2.**R_2 IF** *PCTS_sched_getparam* **THEN****TEST:** When a call to *sched_getparam()* completes unsuccessfully, the interface returns a value of -1, and sets *errno* to indicate the error.**ELSE** *NO_OPTION***SEE:** All assertions in 13.3.2.4.**13.3.2.4 Errors**

7

IF not *PCTS_sched_getparam* **THEN****TEST:** A call to *sched_getparam()* returns a value of -1 and sets *errno* to [ENOSYS].**ELSE** *NO_OPTION**Conformance for sched_getparam: PASS, NO_OPTION*

8 **IF** *PCTS_sched_getparam* **THEN**
 TEST: A call to *sched_getparam()*, when the requesting process does not have permission to obtain the scheduling parameters of the specified process, returns a value of -1 and sets *errno* to [EPERM].
 ELSE *NO_OPTION*
 Conformance for *sched_getparam*: *PASS, NO_OPTION*

9 **IF** *PCTS_sched_getparam* **THEN**
 TEST: A call to *sched_getparam()*, when no process can be found corresponding to that specified by *pid*, returns a value of -1 and sets *errno* to [ESRCH].
 NOTE: A subroutine is recommended that returns a *pid* that doesn't correspond to any existing process.
 ELSE *NO_OPTION*
 Conformance for *sched_getparam*: *PASS, NO_OPTION*

13.3.3 Set Scheduling Policy and Scheduling Parameters

Function: *sched_setscheduler()*.

1
 *M_GA_stdC_proto_decl(int; sched_setscheduler; pid_t pid, int policy, const struct sched_param *param; sched.h;;)*
 SEE: Assertion *GA_stdC_proto_decl* in 2.7.3.
 Conformance for *sched_setscheduler*: *PASS[1, 2], NO_OPTION*

2
 M_GA_commonC_int_result_decl(sched_setscheduler; sched.h;;)
 SEE: Assertion *GA_commonC_int_result_decl* in 2.7.3.
 Conformance for *sched_setscheduler*: *PASS[1, 2], NO_OPTION*

3
 M_GA_macro_result_decl(int; sched_setscheduler; sched.h;;)
 SEE: Assertion *GA_macro_result_decl* in 1.3.4.
 Conformance for *sched_setscheduler*: *PASS, NO_OPTION*

4
 M_GA_macro_args (sched_setscheduler; sched.h;;)
 SEE: Assertion *GA_macro_args* in 2.7.3.
 Conformance for *sched_setscheduler*: *PASS, NO_OPTION*

13.3.3.2 Description

sched_setscheduler

IF *PCTS_sched_setscheduler* **THEN**
 IF *PCTS_GAP_sched_setscheduler* **THEN**
 TEST: A successful call to *sched_setscheduler()* sets the scheduling policy of the process specified by *pid* to *policy*, and its scheduling parameters to and the parameters specified in the *sched_param* structure pointed to by *param*, and returns the former scheduling policy of the specified process.
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *sched_setscheduler*: *PASS, NO_TEST_SUPPORT, NO_OPTION*

5 **IF** *PCTS_sched_setscheduler* **THEN**
 IF *PCTS_GAP_sched_setscheduler* **THEN**

TEST: The *sched_priority* member in the *param* structure can take on any integer value within the inclusive priority range for the scheduling policy specified by *policy*.

TR: Try to return values of *sched_get_priority_max()* and *sched_get_priority_min()*. If *sched_get_priority_max()* returns a value less than *INT_MAX*, try *sched_get_priority_max()+1*. If *sched_get_priority_min()* returns a value greater than *INT_MIN*, try *sched_get_priority_min()-1*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sched_setscheduler*: PASS, NO_TEST_SUPPORT, NO_OPTION

D_1 IF *PCTS_sched_setscheduler* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the behavior of *sched_setscheduler(pid, policy, param)*, if the value of *pid* is negative, does so in 13.3.3.2.

ELSE NO_OPTION

Conformance for *sched_setscheduler*: PASS, NO_OPTION

6 IF *PCTS_sched_setscheduler* **THEN**

IF *PCTS_GAP_sched_setscheduler* **THEN**

SETUP: Include the header `<sched.h>`.

TEST: The possible values for the *policy* parameter, in the call *sched_setscheduler(pid, policy, param)*, are defined.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sched_setscheduler*: PASS, NO_TEST_SUPPORT, NO_OPTION

7 IF *PCTS_sched_setscheduler* **THEN**

IF *PCTS_GAP_sched_setscheduler* **THEN**

TEST: When a process specified by *pid* exists, and if the calling process has permission, *sched_setscheduler(pid, policy, param)* sets the scheduling policy for the process whose process ID is equal to *pid*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sched_setscheduler*: PASS, NO_TEST_SUPPORT, NO_OPTION

8 IF *PCTS_sched_setscheduler* **THEN**

IF *PCTS_GAP_sched_setscheduler* **THEN**

TEST: When a process specified by *pid* exists, and if the calling process has permission, *sched_setscheduler(pid, policy, param)* sets the scheduling parameters for the process whose process ID is equal to *pid*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sched_setscheduler*: PASS, NO_TEST_SUPPORT, NO_OPTION

9 IF *PCTS_sched_setscheduler* **THEN**

IF *PCTS_GAP_sched_setscheduler* **THEN**

TEST: When *pid* is zero, *sched_setscheduler(pid, policy, param)* sets the scheduling policy for the calling process.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sched_setscheduler*: PASS, NO_TEST_SUPPORT, NO_OPTION

10 IF *PCTS_sched_setscheduler* **THEN**

IF *PCTS_GAP_sched_setscheduler* **THEN**

TEST: When *pid* is zero, *sched_setscheduler(pid, policy, param)* sets the scheduling parameters for the calling process.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *sched_setscheduler*: PASS, NO_TEST_SUPPORT, NO_OPTION

D_1 IF *PCTS_sched_setscheduler* **THEN**

TEST: The PCD.1b documents the conditions under which one process has the appropriate privilege to change the scheduling parameters of another process in 13.3.3.2.

ELSE NO_OPTION

Conformance for sched_setscheduler: PASS, NO_OPTION

D_2 IF *PCTS_sched_setscheduler* **THEN**

TEST: The PCD.1b documents the conditions under which one process has the appropriate privilege to change the scheduling parameters of another process in 13.3.3.2.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for sched_setscheduler: PASS, NO_TEST_SUPPORT, NO_OPTION

D_3 IF *PCTS_sched_setscheduler* and a PCD.1b documents the following **THEN**

IF *PCTS_GAP_sched_setscheduler* **THEN**

TEST: A PCD.1 that documents whether the requesting process has permission to set its own scheduling parameters, or those of another process, does so in 13.3.3.2.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for sched_setscheduler: PASS, NO_TEST_SUPPORT, NO_OPTION

D_4 IF *PCTS_sched_setscheduler* and a PCD.1b documents the following **THEN**

TEST: A PCD.1 that documents restrictions that apply to the appropriate privileges required to set a process's own scheduling policy, or another process's scheduling policy, to a particular value, does so in 13.3.3.2.

ELSE NO_OPTION

Conformance for sched_setscheduler: PASS, NO_OPTION

R_1 IF *PCTS_sched_setscheduler* **THEN**

IF *PCTS_GAP_sched_setscheduler* **THEN**

TEST: The *sched_setscheduler()* function is considered successful if it succeeds in setting the scheduling policy, and the scheduling parameters of the process specified by *pid*, to the values specified by *policy* and the structure *param*, respectively.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion *sched_setscheduler* in 13.3.3.2.

D_5 IF *PCTS_sched_setscheduler* and a PCD.1b documents the following **THEN**

TEST: A PCD.1 that documents whether or not it supports the *sched_setscheduler()* function, does so in 13.3.3.2.

ELSE NO_OPTION

Conformance for sched_setscheduler: PASS, NO_OPTION

13.3.3.3 Returns

R_2 IF *PCTS_sched_setscheduler* **THEN**

IF *PCTS_GAP_sched_setscheduler* **THEN**

TEST: When a call to *sched_setscheduler()* completes successfully, the interface returns the former scheduling policy of the specified process.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion *sched_setscheduler* in 13.3.3.2.

R_3 IF *PCTS_sched_setscheduler* **THEN**

IF *PCTS_GAP_sched_setscheduler* **THEN**

TEST: When a call to *sched_setscheduler()* completes unsuccessfully, the policy and scheduling parameters remain unchanged, and the interface returns a value of -1 and sets *errno* to indicate the error.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: All assertions in 13.3.3.4.

13.3.3.4 Errors

- 11** **IF** *PCTS_sched_setscheduler* **THEN**
 IF *PCTS_GAP_sched_setscheduler* **THEN**
 TEST: A call to *sched_setscheduler()*, when the value of the *policy* parameter is invalid, returns a value of -1 and sets *errno* to [EINVAL].
 NOTE: A subroutine is recommended that indicates either an invalid value for *policy*, or that there is no way to generate an invalid value for *policy* on the system.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *sched_setscheduler*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 12** **IF** *PCTS_sched_setscheduler* **THEN**
 IF *PCTS_GAP_sched_setscheduler* **THEN**
 TEST: A call to *sched_setscheduler()*, when one or more of the parameters contained in *param* is outside the valid range for the specified scheduling policy, returns a value of -1 and sets *errno* to [EINVAL].
 TR: Try the return values of *sched_get_priority_max()* and *sched_get_priority_min()*. If *sched_get_priority_max()* returns a value less than INT_MAX, try *sched_get_priority_max()+1*. If *sched_get_priority_min()* returns a value greater than INT_MIN, try *sched_get_priority_min()-1*.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *sched_setscheduler*: PASS, NO_OPTION
- 13** **IF** not *PCTS_sched_setscheduler* **THEN**
 TEST: A call to *sched_setscheduler()* returns a value of -1 and sets *errno* to [ENOSYS].
 ELSE NO_OPTION
 Conformance for *sched_setscheduler*: PASS, NO_OPTION
- 14** **IF** *PCTS_sched_setscheduler* **THEN**
 IF *PCTS_GAP_sched_setscheduler* **THEN**
 TEST: A call to *sched_setscheduler()*, when the requesting process does not have permission to set the scheduling parameters of the specified process, returns a value of -1 and sets *errno* to [EPERM].
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *sched_setscheduler*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 15** **IF** *PCTS_sched_setscheduler* **THEN**
 IF *PCTS_GAP_sched_setscheduler* **THEN**
 TEST: A call to *sched_setscheduler()*, when the requesting process does not have permission to set the scheduling policy of the specified process, returns a value of -1 and sets *errno* to [EPERM].
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION

Conformance for `sched_setscheduler`: *PASS, NO_TEST_SUPPORT, NO_OPTION*

- 16 **IF** *PCTS_sched_setscheduler* **THEN**
 IF *PCTS_GAP_sched_setscheduler* **THEN**
 TEST: A call to `sched_setscheduler()`, when no process can be found corresponding to that specified by *pid*, returns a value of -1 and sets *errno* to [ESRCH].
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for `sched_setscheduler`: *PASS, NO_TEST_SUPPORT, NO_OPTION*

13.3.4 Get Scheduling Policy

Function: `sched_getscheduler()`.

13.3.4.1 Synopsis

- 1 *M_GA_stdC_proto_decl(int; sched_getscheduler; pid_t pid; sched.h;;)*
 SEE: Assertion *GA_stdC_proto_decl* in 2.7.3.
 Conformance for `sched_getscheduler`: *PASS[1, 2], NO_OPTION*
- 2 *M_GA_commonC_int_result_decl(sched_getscheduler; sched.h;;)*
 SEE: Assertion *GA_commonC_int_result_decl* in 2.7.3.
 Conformance for `sched_getscheduler`: *PASS[1, 2], NO_OPTION*
- 3 *M_GA_macro_result_decl(int; sched_getscheduler; sched.h;;)*
 SEE: Assertion *GA_macro_result_decl* in 1.3.4.
 Conformance for `sched_getscheduler`: *PASS, NO_OPTION*
- 4 *M_GA_macro_args (sched_getscheduler; sched.h;;)*
 SEE: Assertion *GA_macro_args* in 2.7.3.
 Conformance for `sched_getscheduler`: *PASS, NO_OPTION*

13.3.4.2 Description

`sched_getscheduler`

- IF** *PCTS_sched_getscheduler* **THEN**
 TEST: A successful call to `sched_getscheduler()` returns the scheduling policy of the process specified by *pid*.
 ELSE *NO_OPTION*
 Conformance for `sched_getscheduler`: *PASS, NO_OPTION*
- 5 **IF** *PCTS_sched_getscheduler* and a PCD.1b documents the following **THEN**
 TEST: A PCD.1b that documents the behavior of `sched_getscheduler()`, if the value of *pid* is negative, does so in 13.3.4.2.
 ELSE *NO_OPTION*
 Conformance for `sched_getscheduler`: *PASS, NO_OPTION*
- 6 **IF** *PCTS_sched_getscheduler* **THEN**
 TEST: The values that can be returned by `sched_getscheduler()` are defined in the header file `<sched.h>`.
 ELSE *NO_OPTION*
 Conformance for `sched_getscheduler`: *PASS, NO_OPTION*

7 IF *PCTS_sched_getscheduler* **THEN**
TEST: When a process specified by *pid* exists, and if the calling process has permission, the scheduling policy is returned for the process whose process ID is equal to *pid*.
ELSE NO_OPTION
Conformance for sched_getscheduler: PASS, NO_OPTION

8 IF *PCTS_sched_getscheduler* **THEN**
TEST: When *pid* is zero, the scheduling policy is returned for the calling process.
ELSE NO_OPTION
Conformance for sched_getscheduler: PASS, NO_OPTION

D_1 IF *PCTS_sched_getscheduler* and a PCD.1b documents the following **THEN**
TEST: A PCD.1b that documents whether or not it supports the *sched_getscheduler()* function does so in 13.3.4.2.
ELSE NO_OPTION
Conformance for sched_getscheduler: PASS, NO_OPTION

13.3.4.3 Returns

R_1 IF *PCTS_sched_getscheduler* **THEN**
TEST: When a call to *sched_getscheduler()* completes successfully, the interface returns the former policy of the specified process.
ELSE NO_OPTION
SEE: Assertion *sched_getscheduler* in 13.3.4.2

R_2 IF *PCTS_sched_getscheduler* **THEN**
TEST: When a call to *sched_getscheduler()* completes unsuccessfully, the interface returns a value of -1 and sets *errno* to indicate the error.
ELSE NO_OPTION
SEE: All assertions in 13.3.4.4

13.3.4.4 Errors

9 IF not *PCTS_sched_getscheduler* **THEN**
TEST: A call to *sched_getscheduler()* returns a value of -1 and sets *errno* to [ENOSYS].
ELSE NO_OPTION
Conformance for sched_getscheduler: PASS, NO_OPTION

10 IF *PCTS_sched_getscheduler* **THEN**
TEST: A call to *sched_getscheduler()*, when the requesting process does not have permission to determine the scheduling policy of the specified process, returns a value of -1 and sets *errno* to [EPERM].
ELSE NO_OPTION
Conformance for sched_getscheduler: PASS, NO_OPTION

11 IF *PCTS_sched_getscheduler* **THEN**
TEST: A call to *sched_getscheduler()*, when no process can be found corresponding to that specified by *pid*, returns a value of -1 and sets *errno* to [ESRCH].
NOTE: A subroutine is recommended that returns a *pid* that doesn't correspond to any existing process.
ELSE NO_OPTION
Conformance for sched_getscheduler: PASS, NO_OPTION

13.3.5 Yield Processor

Function: *sched_yield()*.

2

1

M_GA_stdC_proto_decl(int; sched_yield; sched.h;;)**SEE:** Assertion GA_stdC_proto_decl in 2.7.3.*Conformance for sched_yield: PASS[1, 2], NO_OPTION*

2

M_GA_commonC_int_result_decl(sched_yield; sched.h;;)**SEE:** Assertion GA_commonC_int_result_decl in 2.7.3.*Conformance for sched_yield: PASS[1, 2], NO_OPTION*

3

M_GA_macro_result_decl(int; sched_yield; sched.h;;)**SEE:** Assertion GA_macro_result_decl in 1.3.4.*Conformance for sched_yield: PASS, NO_OPTION*

4

M_GA_macro_args (sched_yield; sched.h;;)**SEE:** Assertion GA_macro_args in 2.7.3.*Conformance for sched_yield: PASS, NO_OPTION*

13.3.5.2 Description

sched_yield

IF *PCTS_sched_yield* **THEN****TEST:** A successful call to *sched_yield()* forces the running process to relinquish the process until it again becomes the head of its process list, and returns the value zero.**NOTE:** There is no known portable test method for this assertion.**ELSE** *NO_OPTION**Conformance for sched_yield: PASS, NO_TEST, NO_OPTION***D_1 IF** *PCTS_sched_yield* and a PCD.1b documents the following **THEN****TEST:** A PCD.1b that documents whether or not it supports the *sched_yield()* function does so in 13.3.5.2.**ELSE** *NO_OPTION**Conformance for sched_yield: PASS, NO_OPTION*

13.3.5.3 Returns

R_1 IF *PCTS_sched_yield* **THEN****TEST:** When a call to *sched_yield()* completes successfully, the interface returns 0.**ELSE** *NO_OPTION***SEE:** Assertion sched_yield in 13.3.5.2.**R_2 IF** *PCTS_sched_yield* **THEN****TEST:** When a call to *sched_yield()* completes unsuccessfully, the interface returns a value of -1, and sets *errno* to indicate the error.**ELSE** *NO_OPTION***SEE:** All assertions in 13.3.5.4.

13.3.5.4 Errors

5 IF not *PCTS_sched_yield* **THEN****TEST:** A call to *sched_yield()* returns a value of -1 and sets *errno* to [ENOSYS]**ELSE** *NO_OPTION**Conformance for sched_yield: PASS, NO_OPTION*

13.3.6 Get Scheduling Parameter Limits

Functions:

sched_get_priority_max(),
sched_get_priority_min(),
sched_rr_get_interval().

13.3.6.1 Synopsis

1

M_GA_stdC_proto_decl(int; sched_get_priority_max; int policy; sched.h;;)

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for *sched_get_priority_max*: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(sched_get_priority_max; sched.h;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for *sched_get_priority_max*: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; sched_get_priority_max; sched.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.

Conformance for *sched_get_priority_max*: PASS, NO_OPTION

4

M_GA_macro_args (sched_get_priority_max; sched.h;;)

SEE: Assertion GA_macro_args in 2.7.3.

Conformance for *sched_get_priority_max*: PASS, NO_OPTION

5

M_GA_stdC_proto_decl(int; sched_get_priority_min; int policy; sched.h;;)

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for *sched_get_priority_min*: PASS[5,6], NO_OPTION

6

M_GA_commonC_int_result_decl(sched_get_priority_min; int policy; sched.h;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for *sched_get_priority_min*: PASS[5, 6], NO_OPTION

7

M_GA_macro_result_decl(int; sched_get_priority_min; sched.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.

Conformance for *sched_get_priority_min*: PASS, NO_OPTION

8

M_GA_macro_args (sched_get_priority_min; sched.h;;)

SEE: Assertion GA_macro_args in 2.7.3.

Conformance for *sched_get_priority_min*: PASS, NO_OPTION

9

*M_GA_stdC_proto_decl(int; sched_rr_get_interval; pid_t pid, struct timespec *interval; sched.h;;)*

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for *sched_rr_get_interval*: PASS[9, 10], NO_OPTION

10

*M_GA_commonC_int_result_decl(sched_rr_get_interval; pid_t pid, struct timespec *interval; sched.h;;)*

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.
Conformance for sched_rr_get_interval: PASS[9, 10], NO_OPTION

11

M_GA_macro_result_decl(int; sched_rr_get_interval; sched.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.
Conformance for sched_rr_get_interval: PASS, NO_OPTION

12

M_GA_macro_args (sched_rr_get_interval; sched.h;;)

SEE: Assertion GA_macro_args in 2.7.3
Conformance for sched_rr_get_interval: PASS, NO_OPTION

13.3.6.2 Description

sched_get_priority_max

IF PCTS_sched_get_priority_max **THEN**

TEST: A successful call to sched_get_priority_max() returns the appropriate maximum for the scheduling policy specified by *policy*.

TR: Test for SCHED_FIFO, SCHED_RR, and SCHED_OTHER.

ELSE NO_OPTION

Conformance for sched_get_priority_max: PASS, NO_OPTION

sched_get_priority_min

IF PCTS_sched_get_priority_min **THEN**

TEST: A successful call to sched_get_priority_min () returns the appropriate minimum for the scheduling policy specified by *policy*.

TR: Test for SCHED_FIFO, SCHED_RR, and SCHED_OTHER.

ELSE NO_OPTION

Conformance for sched_get_priority_min: PASS, NO_OPTION

sched_rr_get_interval

IF PCTS_sched_rr_get_interval **THEN**

TEST: A successful call to sched_rr_get_interval() updates the *timespec* structure referenced by the *interval* argument to contain the current execution time limit (i.e., time quantum) for the process specified by *pid*, and returns the value zero.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

Conformance for sched_rr_get_interval: PASS, NO_TEST, NO_OPTION

13

IF PCTS_sched_rr_get_interval **THEN**

TEST: When *pid* is zero, sched_rr_get_interval() returns the current execution time limit for the calling process.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

Conformance for sched_rr_get_interval: PASS, NO_TEST, NO_OPTION

14

IF PCTS_sched_get_priority_max **THEN**

TEST: In the call to sched_get_priority_max(*policy*), the value of *policy* is one of the scheduling policy values defined in <sched.h>.

NOTE: A subroutine is recommended that either returns an invalid scheduling policy, or indicates that there is no way to generate an invalid scheduling policy on the system.

ELSE NO_OPTION

Conformance for sched_get_priority_max: PASS, NO_OPTION

15

IF PCTS_sched_get_priority_min **THEN**

TEST: In the call *sched_get_priority_min(policy)*, the value of *policy* is one of the scheduling policy values defined in *<sched.h>*.

NOTE: A subroutine is recommended that either returns an invalid scheduling policy, or indicates that there is no way to generate an invalid scheduling policy on the system.

ELSE NO_OPTION

Conformance for *sched_get_priority_min*: PASS, NO_OPTION

D_1 IF *PCTS_sched_get_priority_max* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not it supports the *sched_get_priority_max()* function does so in 13.3.6.2.

ELSE NO_OPTION

Conformance for *sched_get_priority_max*: PASS, NO_OPTION

D_2 IF *PCTS_sched_get_priority_min* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not it supports the *sched_get_priority_min()* function does so in 13.3.6.2.

ELSE NO_OPTION

Conformance for *sched_get_priority_min*: PASS, NO_OPTION

D_3 IF *PCTS_sched_rr_get_interval* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not it supports the *sched_rr_get_interval()* function does so in 13.3.6.2.

ELSE NO_OPTION

Conformance for *sched_rr_get_interval*: PASS, NO_OPTION

13.3.6.3 Returns

R_1 IF *PCTS_sched_get_priority_max* **THEN**

TEST: When a call to *sched_get_priority_max()* completes successfully, the interface returns the appropriate maximum value.

ELSE NO_OPTION

SEE: Assertion *sched_get_priority_max* in 13.3.6.2.

R_2 IF *PCTS_sched_get_priority_min* **THEN**

TEST: When a call to *sched_get_priority_min()* completes successfully, the interface returns the appropriate minimum value.

ELSE NO_OPTION

SEE: Assertion *sched_get_priority_min* in 13.3.6.2.

R_3 IF *PCTS_sched_get_priority_max* **THEN**

TEST: When a call to *sched_get_priority_max()* completes successfully, the interface returns a value of -1, and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: All assertions in 13.3.6.4.

R_4 IF *PCTS_sched_get_priority_min* **THEN**

TEST: When a call to *sched_get_priority_min()* completes unsuccessfully, the interface returns a value of -1, and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: All assertions in 13.3.6.4.

R_5 IF *PCTS_sched_rr_get_interval* **THEN**

TEST: When a call to *sched_rr_get_interval()* completes successfully, the interface returns 0.

ELSE NO_OPTION

SEE: Assertion *sched_rr_get_interval* in 13.3.6.2.

R_6 IF *PCTS_sched_rr_get_interval* THEN

TEST: When a call to *sched_rr_get_interval()* completes unsuccessfully, the interface returns a value of -1, and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: All assertions in 13.3.6.4.

13.3.6.4 Errors**14 IF *PCTS_sched_get_priority_max* THEN**

TEST: A call to *sched_get_priority_max()*, when the value of the *policy* parameter does not represent a defined scheduling policy, returns a value of -1 and sets *errno* to [EINVAL].

NOTE: A subroutine is recommended that either returns an invalid scheduling policy, or indicates that there is no way to generate an invalid scheduling policy on the system.

ELSE NO_OPTION

Conformance for *sched_get_priority_max*: PASS, NO_OPTION

17 IF *PCTS_sched_get_priority_min* THEN

TEST: A call to *sched_get_priority_min()*, when the value of the *policy* parameter does not represent a defined scheduling policy, returns a value of -1 and sets *errno* to [EINVAL].

NOTE: A subroutine is recommended that either returns an invalid scheduling policy, or indicates that there is no way to generate an invalid scheduling policy on the system.

ELSE NO_OPTION

Conformance for *sched_get_priority_min*: PASS, NO_OPTION

18 IF not *PCTS_sched_get_priority_max* THEN

TEST: A call to *sched_get_priority_max()* returns a value of -1 and sets *errno* to [ENOSYS]

ELSE NO_OPTION

Conformance for *sched_get_priority_max*: PASS, NO_OPTION

19 IF not *PCTS_sched_get_priority_min* THEN

TEST: A call to *sched_get_priority_min()* returns a value of -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *sched_get_priority_min*: PASS, NO_OPTION

20 IF not *PCTS_sched_rr_get_interval* THEN

TEST: A call to *sched_rr_get_interval()* returns a value of -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *sched_rr_get_interval*: PASS, NO_OPTION

21 IF *PCTS_sched_get_priority_max* THEN

TEST: A call to *sched_get_priority_max()*, when no process can be found corresponding to that specified by *pid*, returns a value of -1 and sets *errno* to [ESRCH].

ELSE NO_OPTION

Conformance for *sched_get_priority_max*: PASS, NO_OPTION

22 IF *PCTS_sched_get_priority_min* THEN

TEST: A call to *sched_get_priority_min()*, when no process can be found corresponding to that specified by *pid*, returns a value of -1 and sets *errno* to [ESRCH].

NOTE: A subroutine is recommended that returns a *pid* that doesn't correspond to any existing process.

ELSE NO_OPTION

Conformance for sched_get_priority_min: PASS, NO_OPTION

23 IF *PCTS_sched_rr_get_interval* THEN

TEST: A call to *sched_rr_get_interval*(), when no process can be found corresponding to that specified by *pid*, returns a value of -1 and sets *errno* to [ESRCH].

NOTE: A subroutine is recommended that returns a *pid* that doesn't correspond to any existing process.

ELSE NO_OPTION

Conformance for sched_rr_get_interval: PASS, NO_OPTION

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Section 14: Clocks and Timers

14.1 Data Definitions for Clocks and Timers

14.1.1 Time Value Specification Structures

- 1 **SETUP:** Include the header `<time.h>`.
 TEST: The structure *timespec* is defined, and includes the members

Member Type	Member Name	Description
<i>time_t</i>	<i>tv_sec</i>	Seconds
<i>long</i>	<i>tv_nsec</i>	Nanoseconds

Conformance for timer_hdr: PASS

D_1 IF a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents extensions to *timespec*, as permitted in POSIX.1b{3}, 1.3.1.1 item (2), does so in 14.1.1.

ELSE NO_OPTION

Conformance for timer_hdr: PASS, NO_OPTION

- 2 **SETUP:** Include the header `<time.h>`.
 TEST: Extensions to *timespec* that may change the behavior of the application with respect to this standard when those fields in the structure are uninitialized, are enabled as required by POSIX.1b{3} 1.3.1.1.
 NOTE: The corresponding statement in IEEE Std 1003.1b-1993 is not specific enough to write a portable test.
 Conformance for timer_hdr: PASS, NO_TEST

- 3 **TEST:** The *tv_nsec* member of *timespec* is valid only if it is less than the number of nanoseconds in a second (1000 million).
 Conformance for timer_hdr: PASS

- 4 **IF** {*int_max*} $\leq 10E9$ **THEN**

TEST: The *tv_nsec* member of *timespec* is valid only if it less than the number of nanoseconds in a second (1000 million).

ELSE NO_TEST_SUPPORT

Conformance for timer_hdr: PASS, NO_TEST_SUPPORT

- 5 **TEST:** The time interval described by *timespec* is $(tv\_sec \times 10^9 + tv\_nsec)$ nanoseconds.
 Conformance for timer_hdr: PASS

- 6 **SETUP:** Include the header `<time.h>`.

TEST: The structure *itimerspec* is defined and includes the members

Member Type	Member Name	Description
<i>struct timespec</i>	<i>it_interval</i>	Timer period
<i>struct timespec</i>	<i>it_value</i>	Timer expiration

Conformance for timer_hdr: PASS

D_2 IF a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents extensions to *itimerspec*, as permitted in POSIX.1b{3}, 1.3.1.1, item (2), does so in 14.1.

Conformance for timer_hdr: PASS, NO_OPTION

7 SETUP: Include the header `<time.h>`.

TEST: Extensions to *itimerspec* that may change the behavior of the application with respect to this standard, when those fields in the structure are uninitialized, are enabled as required by POSIX.1b {3} 1.3.1.1.

NOTE: The corresponding statement in IEEE Std 1003.1b-1993 is not specific enough to write a portable test.

Conformance for timer_hdr: PASS, NO_TEST

8 TEST: When the value described by *it_value* is nonzero, it indicates the time to or time of the next timer expiration for relative and absolute timer values, respectively.

Conformance for timer_hdr: PASS

9 TEST: When the value described by *it_value* is zero, the timer is disarmed.

Conformance for timer_hdr: PASS

10 TEST: When the value described by *it_interval* is nonzero, it specifies an interval to be used in reloading the timer when it expires; that is, a periodic timer is specified.

Conformance for timer_hdr: PASS

11 TEST: When the value described by *it_interval* is zero, the timer is disarmed after its next expiration; that is, a “one-shot” timer is specified.

Conformance for timer_hdr: PASS

14.1.2 Timer Event Notification Control Block

12 IF `{_POSIX_REALTIME_SIGNALS}` **THEN**

TEST: Per-process timers can be created that notify the process of timer expirations by queuing a realtime extended signal.

ELSE `NO_TEST_SUPPORT`

Conformance for timer_hdr: PASS, NO_TEST_SUPPORT

14.1.3 Type Definitions

13 SETUP: Include the header `<sys/types.h>`.

TEST: The types *clockid_t* and *timer_t* are defined.

Conformance for timer_hdr: PASS

14.1.4 Manifest Constants

14 SETUP: Include the header `<time.h>`.

TEST: The constants `CLOCK_REALTIME` and `TIMER_ABSTIME` are defined.

Conformance for timer_hdr: PASS

15 SETUP: Include the header `<unistd.h>`.

TEST: The constant `{_POSIX_CLOCKRES_MIN}` is defined as 20 ms (1/50 of a second).

Conformance for timer_hdr: PASS

16 TEST: The maximum allowable resolution for the `CLOCK_REALTIME` clock, and all times based on this clock, including the `nanosleep()` function, is `{_POSIX_CLOCKRES_MIN}`.

Conformance for timer_hdr: PASS

D_3 IF a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents support for smaller values of resolution for the `CLOCK_REALTIME` clock to provide finer granularity time bases, does so in 14.1.4.

ELSE NO_OPTION

Conformance for timer_hdr: PASS, NO_OPTION

17 TEST: The actual resolution for a specific clock is obtained using functions defined in this section.

Conformance for timer_hdr: PASS

D_4 IF a PCD.1b documents the following **THEN**

TEST: The PCD.1b documents the actual resolution supported for the `nanosleep()` function of timers based on this clock, if it differs from the resolution supported for the clock, in 14.1.4.

ELSE NO_OPTION

Conformance for timer_hdr: PASS, NO_OPTION

18 TEST: The maximum value of the `CLOCK_REALTIME` clock, and of the absolute timers based on it, is at least the same as that defined by the C Standard {2} for the `time_t` type.

Conformance for timer_hdr: PASS

D_5 IF a PCD.1b documents the following **THEN**

TEST: The PCD.1b documents the difference between the maximum value supported by the `nanosleep()` function or timers based on this clock and the maximum value supported by the clock, if such a difference exists, in 14.1.4.

Conformance for timer_hdr: PASS, NO_OPTION

14.2 Clocks and Timer Functions

14.2.1 Clocks

Functions: `clock_settime()`, `clock_gettime()`, `clock_getres()`.

14.2.1.1 Synopsis

1

`M_GA_stdC_proto_decl(int; clock_settime; clockid_t clock_id, const struct timespec *tp; time.h;;)`

SEE: Assertion `GA_stdC_proto_decl` in 2.7.3.

Conformance for clock_settime: PASS[1, 2], NO_OPTION

2

`M_GA_commonC_int_result_decl(clock_settime; time.h;;)`

SEE: Assertion `GA_commonC_int_result_decl` in 2.7.3.

Conformance for clock_settime: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; clock_settime; time.h;;)**SEE:** Assertion GA_macro_result_decl in 1.3.4.*Conformance for clock_settime: PASS, NO_OPTION*

4

M_GA_macro_args (clock_settime; time.h;;)**SEE:** Assertion GA_macro_args in 2.7.3.*Conformance for clock_settime: PASS, NO_OPTION*

5

M_GA_stdC_proto_decl(int; clock_gettime; clockid_t clock_id, struct timespec *tp; time.h;;)**SEE:** Assertion GA_stdC_proto_decl in 2.7.3.*Conformance for clock_gettime: PASS[5, 6], NO_OPTION*

6

M_GA_commonC_int_result_decl(clock_gettime; clockid_t clock_id, struct timespec *tp; time.h;;)**SEE:** Assertion GA_commonC_int_result_decl in 2.7.3.*Conformance for clock_gettime: PASS[5, 6], NO_OPTION*

7

M_GA_macro_result_decl(int; clock_gettime; time.h;;)**SEE:** Assertion GA_macro_result_decl in 1.3.4.*Conformance for clock_gettime: PASS, NO_OPTION*

8

M_GA_macro_args (clock_gettime; time.h;;)**SEE:** Assertion GA_macro_args in 2.7.3.*Conformance for clock_gettime: PASS, NO_OPTION*

9

M_GA_stdC_proto_decl(int; clock_getres; , clockid_t clock_id, struct timespec *res; time.h;;)**SEE:** Assertion GA_stdC_proto_decl in 2.7.3*Conformance for clock_getres: PASS[9, 10], NO_OPTION*

10

M_GA_commonC_int_result_decl(clock_getres; , clockid_t clock_id, struct timespec *res; time.h;;)**SEE:** Assertion GA_commonC_int_result_decl in 2.7.3*Conformance for clock_getres: PASS[9, 10], NO_OPTION*

11

M_GA_macro_result_decl(int; clock_getres; time.h;;)**SEE:** Assertion GA_macro_result_decl in 1.3.4*Conformance for clock_getres: PASS, NO_OPTION*

12

M_GA_macro_args (clock_getres; time.h;;)**SEE:** Assertion GA_macro_args in 2.7.3*Conformance for clock_getres: PASS, NO_OPTION*

14.2.1.2 Description

clock_settime

IF PCTS_clock_settime **THEN****IF** PCTS_GAP_clock_settime and PCTS_DETECT_EPERM_clock_settime **THEN****TEST:** A successful call to clock_settime (clock_id, tp) sets the specified clock, clock_id, to the value specified by tp and returns 0.**ELSE** NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for clock_settime: PASS, NO_TEST_SUPPORT, NO_OPTION

13 IF PCTS_clock_settime THEN

IF PCTS_GAP_clock_settime and PCTS_DETECT_EPERM_clock_settime THEN

TEST: In a call to *clock_settime()*, time values that are between two consecutive non-negative integer multiples of the resolution of the specified clock are truncated down to the smaller multiple of the resolution.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for clock_settime: PASS, NO_TEST_SUPPORT, NO_OPTION

clock_gettime

IF PCTS_clock_gettime THEN

TEST: A successful call to *clock_gettime (clock_id, tp)* returns the current value *tp* for the specified clock, *clock_id*.

ELSE NO_OPTION

Conformance for clock_gettime: PASS, NO_OPTION

clock_getres

IF PCTS_clock_getres THEN

TEST: A successful call to *clock_getres (clock_id, res)*, with a non_NULL value of the argument *res*, stores the resolution of the clock specified by *clock_id* into the location pointed to by *res*, and returns 0.

ELSE NO_OPTION

Conformance for clock_getres: PASS, NO_OPTION

D_1

IF PCTS_clock_getres THEN

TEST: The PCD.1b documents clock resolutions, in 14.2.1.2.

ELSE NO_OPTION

Conformance for clock_getres: PASS, NO_OPTION

15

TEST: Clock resolutions cannot be set by a process.

Conformance for clock_settime: PASS

16

IF PCTS_clock_getres THEN

TEST: When the *res* argument to the call *clock_getres (clockid_t clock_id, res)* is NULL, the clock resolution is not returned.

ELSE NO_OPTION

Conformance for clock_getres: PASS, NO_OPTION

17

IF PCTS_clock_settime THEN

IF PCTS__clock_getres and PCTS_GAP_clock_settime and PCTS_DETECT_EPERM_clock_settime THEN

TEST: When the time argument of *clock_settime()* is not a multiple of the clock resolution *res*, as determined by a call to *clock_getres(clock_id, res)*, then the value is truncated to a multiple of *res*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for clock_settime: PASS, NO_TEST_SUPPORT, NO_OPTION

D_2 TEST:

The PCD.1b documents whether the clocks are systemwide (i.e., visible to all processes), or per-process (i.e., measuring time that is meaningful only within a process), in 14.2.1.2.

Conformance for clock_settime: PASS

18

SETUP: Include the header `<time.h>`.

TEST: The constant `CLOCK_REALTIME` is defined.

Conformance for clock_settime: PASS

- 19 TEST:** When the value `CLOCK_REALTIME` is used for `clock_id`, the call `clock_settime(clock_id, tp)` sets the realtime clock for the system.
Conformance for clock_settime: PASS
- 20 TEST:** When the value `CLOCK_REALTIME` is used for `clock_id`, the call `clock_gettime(clock_id, tp)` interrogates the realtime clock for the system.
Conformance for clock_settime: PASS
- 21 TEST:** When the value `CLOCK_REALTIME` is used for `clock_id`, the call `clock_get_res(, clock_id, res)` gets the resolution of the realtime clock for the system.
Conformance for clock_settime: PASS
- 22 IF `PCTS_clock_gettime` THEN**
TEST: When the value `CLOCK_REALTIME` is used for `clock_id`, the value returned by `clock_gettime(clock_id, tp)` represents the amount of time (in seconds and nanoseconds) since the Epoch.
ELSE `NO_OPTION`
Conformance for clock_gettime: PASS, NO_OPTION
- 23 IF `PCTS_clock_settime` THEN**
IF `PCTS_GAP_clock_settime` and `PCTS_DETECT_EPERM_clock_settime` THEN
TEST: When the value `CLOCK_REALTIME` is used for `clock_id`, the value specified by `clock_settime(clock_id, tp)` represents the amount of time (in seconds and nanoseconds) since the Epoch.
ELSE `NO_TEST_SUPPORT`
ELSE `NO_OPTION`
Conformance for clock_settime: PASS, NO_TEST_SUPPORT, NO_OPTION
- D_1 IF a PCD.1b documents the following THEN**
TEST: A PCD.1b that documents whether clocks in addition to the realtime clock are supported, and the interpretation of time values for any such clocks, does so in 14.2.1.2.
ELSE `NO_OPTION`
Conformance for clock_settime: PASS, NO_OPTION
- 24 IF `PCTS_clock_settime` THEN**
TEST: The PCD.1b documents the effect of setting a clock via `clock_settime()` on armed per-process times associated with that clock, in 14.2.1.2.
ELSE `NO_OPTION`
Conformance for clock_settime: PASS, NO_OPTION
- 25 IF `PCTS_clock_settime` THEN**
TEST: The PCD.1b documents the appropriate privilege to set a particular clock in 14.2.1.2.
ELSE `NO_OPTION`
Conformance for clock_settime: PASS, NO_OPTION
- D_3 IF `PCTS_clock_settime` and a PCD.1b documents the following THEN**
TEST: A PCD.1b that documents whether or not it supports the `clock_settime()` function does so in 14.2.1.2.
ELSE `NO_OPTION`
Conformance for clock_settime: PASS, NO_OPTION
- D_4 IF `PCTS_clock_gettime` and a PCD.1b documents the following THEN**
TEST: A PCD.1b that documents whether or not it supports the `clock_gettime()` function does so in 14.2.1.2.
ELSE `NO_OPTION`
Conformance for clock_gettime: PASS, NO_OPTION

D_5 IF *PCTS_clock_getres* and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not it supports the *clock_getres()* function does so in 14.2.1.2.

ELSE NO_OPTION

Conformance for *clock_getres*: PASS, NO_OPTION

14.2.1.3 Returns

R_1 IF *PCTS_clock_settime* **THEN**

IF *PCTS_GAP_clock_settime* and *PCTS_DETECT_EPERM_clock_settime* **THEN**

TEST: When a call to *clock_settime()* completes successfully, the interface returns a value of 0.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion *clock_settime* in 14.2.1.4.

R_2 IF *PCTS_clock_settime* **THEN**

IF *PCTS_GAP_clock_settime* and *PCTS_DETECT_EPERM_clock_settime* **THEN**

TEST: When a call to *clock_settime()* completes unsuccessfully, the interface returns a value of -1 and sets *errno* to indicate the error.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: All assertions in 14.2.1.4 controlled by *clock_settime()*.

R_3 IF *PCTS_clock_gettime* **THEN**

TEST: When a call to *clock_gettime()* completes successfully, the interface returns a value of 0.

ELSE NO_OPTION

SEE: Assertion *clock_gettime* in 14.2.1.4.

R_4 IF *PCTS_clock_gettime* **THEN**

TEST: When a call to *clock_gettime()* completes unsuccessfully, the interface returns a value of -1 and sets *errno* to indicate the error.

clock_gettime()

ELSE NO_OPTION

SEE: All assertions in 14.2.1.4 controlled by *clock_gettime()*.

R_5 IF *PCTS_clock_getres* **THEN**

TEST: When a call to *clock_getres()* completes successfully, the interface returns a value of 0.

ELSE NO_OPTION

SEE: Assertion *clock_getres* in 14.2.1.4.

R_6 IF *PCTS_clock_getres* **THEN**

TEST: When a call to *clock_gettime()* completes unsuccessfully, the interface returns a value of -1 and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: All assertions in 14.2.1.4 controlled by *clock_getres()*.

14.2.1.4 Errors

26 IF *PCTS_clock_settime* **THEN**

IF *PCTS_GAP_clock_settime* and *PCTS_DETECT_EPERM_clock_settime* **THEN**

TEST: A call to *clock_settime* (*clock_id*, *tp*), when the *clock_id* argument does not specify a known clock, returns a value of -1 and sets *errno* to [EINVAL].

NOTE: A subroutine is recommended that either returns an invalid clock name, or indicates that there is no way to generate an invalid clock name on the system.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *clock_settime*: PASS, NO_TEST_SUPPORT, NO_OPTION

27 **IF** *PCTS_clock_gettime* **THEN**

TEST: A call to *clock_gettime* (*clock_id*, *tp*), when the *clock_id* argument does not specify a known clock, returns a value of -1 and sets *errno* to [EINVAL].

NOTE: A subroutine is recommended that either returns an invalid clock name, or indicates that there is no way to generate an invalid clock name on the system.

ELSE NO_OPTION

Conformance for *clock_gettime*: PASS, NO_OPTION

28 **IF** *PCTS_clock_getres* **THEN**

TEST: A call to *clock_getres* (*clock_id*, *res*), when the *clock_id* argument does not specify a known clock, returns a value of -1 and sets *errno* to [EINVAL].

NOTE: A subroutine is recommended that either returns an invalid clock name, or indicates that there is no way to generate an invalid clock name on the system.

ELSE NO_OPTION

Conformance for *clock_getres*: PASS, NO_OPTION

29 **IF** not *PCTS_clock_gettime* **THEN**

TEST: A call to *clock_settime*() returns a value of -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *clock_settime*: PASS, NO_OPTION

30 **IF** not *PCTS_clock_gettime* **THEN**

TEST: A call to *clock_gettime*() returns a value of -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *clock_gettime*: PASS, NO_OPTION

31 **IF** not *PCTS_clock_getres* **THEN**

TEST: A call to *clock_getres*() returns a value of -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *clock_getres*: PASS, NO_OPTION

32 **IF** *PCTS_clock_settime* **THEN**

IF *PCTS_GAP_clock_settime* and *PCTS_DETECT_EPERM_clock_settime* **THEN**

TEST: A call to *clock_settime* (*clock_id*, *tp*), when the *tp* argument is outside the range for the given clock id, returns a value of -1 and sets *errno* to [EINVAL].

NOTE: A subroutine is recommended that either returns a value outside the range value for any given clock id, or indicates that there is no way to generate a value outside the range value for any given clock id on the system.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *clock_settime*: PASS, NO_TEST_SUPPORT, NO_OPTION

33 **IF** *PCTS_clock_settime* **THEN**

IF *PCTS_GAP_clock_settime* and *PCTS_DETECT_EPERM_clock_settime* **THEN**

TEST: A call to *clock_settime* (*clock_id*, *tp*), when the *tp* argument specified a nanosecond value less than zero, returns a value of -1 and sets *errno* to [EINVAL].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *clock_settime*: PASS, NO_TEST_SUPPORT, NO_OPTION

34 **IF** *PCTS_clock_settime* **THEN**

IF *PCTS_GAP_clock_settime* and *PCTS_DETECT_EPERM_clock_settime* and {*INT_MAX*} <=10e9
THEN

TEST: A call to *clock_settime* (*clock_id*, *tp*), when the *tp* argument specified a nanosecond value greater than or equal to 1000 million, returns a value of -1 and sets *errno* to [EINVAL].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *clock_settime*: PASS, NO_TEST_SUPPORT, NO_OPTION

35 **IF** *PCTS_clock_settime* **THEN**

IF *PCTS_RAP_clock_settime* and *PCTS_DETECT_EPERM_clock_settime* **THEN**

TEST: A call to *clock_settime*(), when the requesting process does not have the appropriate privilege to set the specified clock, returns a value of -1 and sets *errno* to [EPERM].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *clock_settime*: PASS, NO_TEST_SUPPORT, NO_OPTION

14.2.2 Create a Per-Process Timer

Function: *timer_create*().

14.2.2.1 Synopsis

1

M_GA_stdC_proto_decl(*int*; *timer_create*; *clockid_t* *clock_id*, *struct sigevent* **evp*, *timer_t* **timerid*; *signal.h*; *time.h*;;)

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for *timer_create*: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(*timer_create*; *signal.h*; *time.h*;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for *timer_create*: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(*int*; *timer_create*; *signal.h*; *time.h*;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.

Conformance for *timer_create*: PASS, NO_OPTION

4

M_GA_macro_args (*timer_create*; *signal.h*; *time.h*;;)

SEE: Assertion GA_macro_args in 2.7.3.

Conformance for *timer_create*: PASS, NO_OPTION

14.2.2.2 Description

timer_create

IF *PCTS_timer_create* **THEN**

TEST: A successful call to *timer_create*(*clock_id*, *evp*, *timerid*) creates a per-process timer using the specified clock *clock_id* as the timing base; sets the location referenced by *timerid* to a timer ID of type *timer_t*, used to identify the timer in timer requests (see 14.2.4), and returns the value zero.

ELSE NO_OPTION

Conformance for *timer_create*: PASS, NO_OPTION

5

IF *PCTS_timer_create* **THEN**

- TEST:** Following a call to *timer_create(clock_id, evp, timerid)*, the timer ID, to which the argument *timerid* is set, is unique within the calling process until the timer is deleted.
- ELSE NO_OPTION**
Conformance for *timer_create*: PASS, NO_OPTION
- 6 **TEST:** In calls to *timer_create(clock_id, evp, timerid)*, all legal values of *clock_id* are defined in *<time.h>*.
Conformance for *timer_create*: PASS
- 7 **IF PCTS_timer_create THEN**
TEST: The timer whose ID is returned is in a disarmed state upon return from *timer_create()*.
ELSE NO_OPTION
Conformance for *timer_create*: PASS, NO_OPTION
- 8 **IF PCTS_timer_create THEN**
TEST: Following the call *timer_create(clock_id, evp, timerid)*, the *evp* argument, if non-NULL, points to a *sigevent* structure that defines the asynchronous notification that will occur when the timer expires.
ELSE NO_OPTION
Conformance for *timer_create*: PASS, NO_OPTION
- 9 **IF PCTS_timer_create THEN**
TEST: In the call *timer_create(clock_id, evp, timerid)*, the *evp* argument must be allocated by the application.
ELSE NO_OPTION
Conformance for *timer_create*: PASS, NO_OPTION
- 10 **IF PCTS_timer_create THEN**
SETUP: Include the header *<time.h>*.
TEST: The constants *SIGEV_SIGNAL* and *SIGEV_NONE* are defined and have different values.
ELSE NO_OPTION
Conformance for *timer_create*: PASS, NO_OPTION
- 11 **IF PCTS_timer_create THEN**
TEST: Following the call *timer_create(clock_id, evp, timerid)*, if the *sigev_notify* member of *evp* is *SIGEV_SIGNAL*, then the structure contains the signal number and an application-specific data value to be sent to the process when the timer expires.
ELSE NO_OPTION
Conformance for *timer_create*: PASS, NO_OPTION
- 12 **IF PCTS_timer_create THEN**
TEST: Following the call *timer_create(clock_id, evp, timerid)*, if the *sigev_notify* member is *SIGEV_NONE*, no notification is sent.
ELSE NO_OPTION
Conformance for *timer_create*: PASS, NO_OPTION
- 13 **IF PCTS_timer_create THEN**
TEST: The PCD.1b documents the behavior for any value of *sigev_notify*, other than *SIGEV_NONE* or *SIGEV_SIGNAL*, in 14.2.2.2.
ELSE NO_OPTION
Conformance for *timer_create*: PASS, NO_OPTION
- 14 **IF PCTS_timer_create THEN**
TEST: There is a set of clocks that can be used as timing bases for per-process timers.
ELSE NO_OPTION
Conformance for *timer_create*: PASS, NO_OPTION

- 15** **IF** *PCTS_timer_create* **THEN**
 TEST: There is at least one mechanism for notifying the process of timer expiration events.
 ELSE NO_OPTION
 Conformance for *timer_create*: PASS, NO_OPTION
- D_1** **IF** *PCTS_timer_create* **THEN**
 TEST: The PCD.1b documents the set of clocks that can be used as timing bases for per-process timers, and one or more mechanisms for notifying the process of timer expiration events, in 14.2.2.2.
 ELSE NO_OPTION
 Conformance for *timer_create*: PASS, NO_OPTION
- 16** **IF** *PCTS_timer_create* **THEN**
 SETUP: Include the header `<time.h>`.
 TEST: The constant `CLOCK_REALTIME` is defined.
 ELSE NO_OPTION
 Conformance for *timer_create*: PASS, NO_OPTION
- 17** **IF** *PCTS_timer_create* **THEN**
 TEST: In a call to *timer_create*(*clock_id*, *evp*, *timerid*), `CLOCK_REALTIME` is a legitimate value for *clock_id*.
 ELSE NO_OPTION
 Conformance for *timer_create*: PASS, NO_OPTION
- 18** **IF** *PCTS_timer_create* **THEN**
 IF `{_POSIX_REALTIME_SIGNALS}` **THEN**
 SETUP: Call *timer_create*(*clock_id*, *evp*, *timerid*), with *evp* argument pointing to a *sigevent* structure that specifies `SIGEV_SIGNAL`, and `SA_SIGINFO` set for the expiration signal.
 TEST: The signal and application-defined value specified in the *sigevent* structure are queued to the process on timer expiration.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *timer_create*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 19** **IF** *PCTS_timer_create* **THEN**
 IF `{_POSIX_REALTIME_SIGNALS}` **THEN**
 SETUP: Call *timer_create*(*clock_id*, *evp*, *timerid*), with *evp* argument set to `NULL` and `SA_SIGINFO` set for the expiration signal.
 TEST: A default signal is queued to the process, and the signal data value is set to the timer ID.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *timer_create*: PASS, NO_TEST_SUPPORT, NO_OPTION
- D_2** **IF** *PCTS_timer_create* and a PCD.1b documents the following **THEN**
 TEST: A PCD.1b that documents whether the realtime signal is queued and what value, if any, is sent, if `SA_SIGINFO` is not set for the expiration signal, does so in 14.2.2.2.
 ELSE NO_OPTION
 Conformance for *timer_create*: PASS, NO_OPTION
- 20** **IF** *PCTS_timer_create* **THEN**
 IF not `{_POSIX_REALTIME_SIGNALS}` **THEN**
 SETUP: Call *timer_create*(*clock_id*, *evp*, *timerid*), with *evp* pointing to a *sigevent* structure that specifies `SIGEV_SIGNAL`.

TEST: The signal number defined in the *sigevent* structure is sent to the process on timer expiration.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *timer_create*: PASS, NO_TEST_SUPPORT, NO_OPTION

21 IF PCTS_timer_create THEN

IF not {_POSIX_REALTIME_SIGNALS} **THEN**

TEST: Following the call *timer_create(clock_id, evp, timerid)*, if *evp* is NULL, then a default signal is sent to the process.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *timer_create*: PASS, NO_TEST_SUPPORT, NO_OPTION

22 IF PCTS_timer_create THEN

SETUP: Call *timer_create(clock_id, evp, timerid)*, with a *clock_id* value of CLOCK_REALTIME and an *evp* of NULL.

TEST: The default signal is SIGALRM.

ELSE NO_OPTION

Conformance for *timer_create*: PASS, NO_OPTION

23 IF PCTS_timer_create THEN

TEST: The PCD.1b documents the default signal number for any clock other than CLOCK_REALTIME in 14.2.2.2.

ELSE NO_OPTION

Conformance for *timer_create*: PASS, NO_OPTION

24 IF PCTS_timer_create THEN

TEST: Per-process timers are not inherited by a child process across a *fork()*.

ELSE NO_OPTION

Conformance for *timer_create*: PASS, NO_OPTION

25 FOR: *execl()*, *execv()*, *execle()*, *execve()*, *exelp()*, and *execvp()*

IF PCTS_timer_create THEN

TEST: Per-process timers are disarmed and deleted by a successful call to *function()*.

NOTE: The assertion is to be tested once for each function specified in the FOR clause. The assertion is to be read by substituting *function()* with the current function specified in the FOR clause. The name of the function also is to be substituted for each occurrence in the construct *PCTS_function*.

ELSE NO_OPTION

Conformance for *timer_create*: PASS, NO_OPTION

D_3 IF PCTS_timer_create and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents whether or not it supports the *timer_create()* function does so in 14.2.2.2.

ELSE NO_OPTION

Conformance for *timer_create*: PASS, NO_OPTION

14.2.2.3 Returns

R_1 IF PCTS_timer_create THEN

TEST: When a call to *timer_create(clock_id, evp, timerid)* completes successfully, the interface returns a value of 0, and updates the location referenced by *timerid* to a *timer_t*, which can be passed to the per-process timer calls (see 14.2.4).

ELSE NO_OPTION

SEE: Assertion `timer_create` in 14.2.2.4.

R_2 IF PCTS_timer_create THEN

TEST: When a call to `timer_create(clock_id, evp, timerid)` completes unsuccessfully, the interface returns a value of -1 and sets `errno` to indicate the error.

ELSE NO_OPTION

SEE: All assertions in 14.2.2.4.

D_4 IF PCTS_timer_create and A PCD.1b documents the following THEN

TEST: A PCD.1b that documents the value of `timerid` if an error occurs, following a call to `timer_create(clock_id, evp, timerid)`, does so in 14.2.2.4.

ELSE NO_OPTION

Conformance for `timer_create`: PASS, NO_OPTION

14.2.2.4 Errors

26 IF PCTS_timer_create THEN

TEST: A call to `timer_create()`, when the system lacks sufficient signal queuing resources to honor the request, returns a value of -1 and sets `errno` to [EAGAIN].

NOTE: The corresponding statement in IEEE Std 1003.1b-1993 is not specific enough to write a portable test.

ELSE NO_OPTION

Conformance for `timer_create`: PASS, NO_OPTION

27 IF PCTS_timer_create THEN

IF {TIMER_MAX} <= PCTS_TIMER_MAX THEN

TEST: A call to `timer_create()`, when the calling process has already created all of the timers it is allowed by this implementation, returns a value of -1 and sets `errno` to [EAGAIN].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for `timer_create`: PASS, NO_TEST_SUPPORT, NO_OPTION

28 IF PCTS_timer_create THEN

TEST: A call to `timer_create()`, when the specified clock ID is not defined, returns a value of -1 and sets `errno` to [EINVAL].

NOTE: A subroutine is recommended that either returns a value outside the range value for any given clock id, or indicates that there is no way to generate a value outside the range value for any given clock id on the system.

ELSE NO_OPTION

Conformance for `timer_create`: PASS, NO_OPTION

29 IF not PCTS_timer_create THEN

TEST: A call to `timer_create()` returns a value of -1 and sets `errno` to [ENOSYS].

ELSE NO_OPTION

Conformance for `timer_create`: PASS, NO_OPTION

14.2.3 Delete a Per-Process Timer

Function: `timer_delete()`.

14.2.3.1 Synopsis

1

`M_GA_stdC_proto_decl(int; timer_delete; timer_t timerid; time.h;;;)`

SEE: Assertion `GA_stdC_proto_decl` in 2.7.3.

Conformance for `timer_delete`: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(timer_delete; time.h;;)**SEE:** Assertion GA_commonC_int_result_decl in 2.7.3.*Conformance for timer_delete: PASS[1, 2], NO_OPTION*

3

M_GA_macro_result_decl(int; timer_delete; time.h;;)**SEE:** Assertion GA_macro_result_decl in 1.3.4.*Conformance for timer_delete: PASS, NO_OPTION*

4

M_GA_macro_args (timer_delete; time.h;;)**SEE:** Assertion GA_macro_args in 2.7.3.*Conformance for timer_delete: PASS, NO_OPTION*

14.2.3.2 Description

timer_delete

IF *PCTS_timer_delete* **THEN****IF** *PCTS_timer_create* **THEN****TEST:** A successful call to *timer_delete(timerid)* deletes the specified timer *timerid*, previously created by the *timer_create()* function, and returns the value zero.**ELSE** *NO_TEST_SUPPORT***ELSE** *NO_OPTION**Conformance for timer_delete: PASS, NO_TEST_SUPPORT, NO_OPTION*

5

IF *PCTS_timer_delete* **THEN****TEST:** When the timer is armed when *timer_delete()* is called, the behavior is as if the timer is automatically disarmed before removal.**ELSE** *NO_OPTION**Conformance for timer_delete: PASS, NO_OPTION***D_1 IF** *PCTS_timer_delete* and a PCD.1b documents the following **THEN****TEST:** A PCD.1b that documents the disposition of pending signals for the deleted timer, does so in 14.2.3.2.**ELSE** *NO_OPTION**Conformance for timer_delete: PASS, NO_OPTION***D_2 IF** *PCTS_timer_delete* and a PCD.1b documents the following **THEN****TEST:** A PCD.1b that documents whether or not it supports the *timer_delete()* function does so in 14.2.3.2.**ELSE** *NO_OPTION**Conformance for timer_delete: PASS, NO_OPTION*

14.2.3.3 Returns

R_1 IF *PCTS_timer_delete* **THEN****TEST:** When a call to *timer_delete()* completes successfully, the interface returns a value of 0.**ELSE** *NO_OPTION***SEE:** Assertion *timer_delete* in 14.2.3.4.**R_2 IF** *PCTS_timer_delete* **THEN****TEST:** When a call to *timer_delete()* completes unsuccessfully, the interface returns a value of -1, and sets *errno* to indicate the error.**ELSE** *NO_OPTION***SEE:** All assertions in 14.2.3.4.

14.2.3.4 Errors

- 6** **IF** *PCTS_timer_delete* **THEN**
 TEST: A call to *timer_delete(timerid)*, when the timer ID specified by *timerid* is not a valid timer ID, returns a value of -1 and sets *errno* to [EINVAL].
 NOTE: A subroutine is recommended that either returns an invalid timer ID, or indicates that there is no way to generate an invalid timer ID on the system.
 ELSE NO_OPTION
 Conformance for *timer_delete*: PASS, NO_OPTION
- 7** **IF** not *PCTS_timer_delete* **THEN**
 TEST: A call to *timer_delete()* returns a value of -1 and sets *errno* to [ENOSYS].
 ELSE NO_OPTION
 Conformance for *timer_delete*: PASS, NO_OPTION

14.2.4 Per-Process Timers

Functions: *timer_settime()*, *timer_gettime()*, *timer_getoverrun()*

14.2.4.1 Synopsis

- 1** *M_GA_stdC_proto_decl(int; timer_settime; timer_t timerid, int flags, const struct itimerspec *value, struct itimerspec *ovalue; time.h;;)*
 SEE: Assertion GA_stdC_proto_decl in 2.7.3.
 Conformance for *timer_settime*: PASS[1, 2], NO_OPTION
- 2** *M_GA_commonC_int_result_decl(timer_settime; time.h;;)*
 SEE: Assertion GA_commonC_int_result_decl in 2.7.3.
 Conformance for *timer_settime*: PASS[1, 2], NO_OPTION
- 3** *M_GA_macro_result_decl(int; timer_settime; time.h;;)*
 SEE: Assertion GA_macro_result_decl in 1.3.4.
 Conformance for *timer_settime*: PASS, NO_OPTION
- 4** *M_GA_macro_args (timer_settime; time.h;;)*
 SEE: Assertion GA_macro_args in 2.7.3.
 Conformance for *timer_settime*: PASS, NO_OPTION
- 5** *M_GA_stdC_proto_decl(int; timer_gettime; timer_t timerid, struct itimerspec *value; time.h;;)*
 SEE: Assertion GA_stdC_proto_decl in 2.7.3.
 Conformance for *timer_gettime*: PASS[5, 6], NO_OPTION
- 6** *M_GA_commonC_int_result_decl(timer_gettime; timer_t timerid, struct itimerspec *value; time.h;;)*
 SEE: Assertion GA_commonC_int_result_decl in 2.7.3.
 Conformance for *timer_gettime*: PASS[5, 6], NO_OPTION
- 7** *M_GA_macro_result_decl(int; timer_gettime; time.h;;)*
 SEE: Assertion GA_macro_result_decl in 1.3.4.
 Conformance for *timer_gettime*: PASS, NO_OPTION

8

M_GA_macro_args (timer_gettime; time.h;;)**SEE:** Assertion GA_macro_args in 2.7.3.

Conformance for timer_gettime: PASS, NO_OPTION

9

M_GA_stdC_proto_decl(int; timer_getoverrun; , timer_t timerid; time.h;;)**SEE:** Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for timer_getoverrun: PASS[9, 10], NO_OPTION

10

M_GA_commonC_int_result_decl(timer_getoverrun;,timer_t timerid; time.h;;)**SEE:** Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for timer_getoverrun: PASS[9, 10], NO_OPTION

11

M_GA_macro_result_decl(int; timer_getoverrun; time.h;;)**SEE:** Assertion GA_macro_result_decl in 1.3.4.

Conformance for timer_getoverrun: PASS, NO_OPTION

12

M_GA_macro_args (timer_getoverrun; time.h;;)**SEE:** Assertion GA_macro_args in 2.7.3.

Conformance for timer_getoverrun: PASS, NO_OPTION

14.2.4.2 Description**timer_settime****IF PCTS_timer_settime THEN****TEST:** A successful call to *timer_settime(timerid, flags, value, ovalue)* sets the time until the next expiration of the timer specified by *timerid* from the *it_value* member of the *value* is nonzero, and returns the value zero.**ELSE NO_OPTION**

Conformance for timer_settime: PASS, NO_OPTION

13

IF PCTS_timer_settime THEN**TEST:** When the specified timer is already armed when *timer_settime(timerid, flags, value, ovalue)* is called, this call resets the time until the next expiration to the *value* specified.**ELSE NO_OPTION**

Conformance for timer_settime: PASS, NO_OPTION

14

IF PCTS_timer_settime THEN**TEST:** In a successful call to *timer_settime(timerid, flags, value, ovalue)*, if the *it_value* member of *value* is zero, the timer is disarmed.**ELSE NO_OPTION**

Conformance for timer_settime: PASS, NO_OPTION

D.1 IF PCTS_timer_settime and a PCD.1b documents the following THEN**TEST:** A PCD.1b that documents the effect of disarming or resetting a timer on pending expiration notifications, does so in 14.2.4.2.**ELSE NO_OPTION**

Conformance for timer_settime: PASS, NO_OPTION

15

IF PCTS_timer_settime THEN**SETUP:** Include the header `<timer.h>`.**TEST:** The constant `TIMER_ABSTIME` is defined.**ELSE NO_OPTION**

Conformance for timer_settime: PASS, NO_OPTION

- 16 IF PCTS_timer_settime THEN**
TEST: When the flag `TIMER_ABSTIME` is not set in the argument *flags*, `timer_settime(timerid, flags, value, ovalue)` behaves as if the time until next expiration is set to be equal to the interval specified by the *it_value* member of *value*; that is, the timer expires in *it_value* nanoseconds from when the call is made (see POSIX.1b {3}, 14.1.1).
ELSE NO_OPTION
 Conformance for `timer_settime`: PASS, NO_OPTION
- 17 IF PCTS_timer_settime THEN**
TEST: When the flag `TIMER_ABSTIME` is not set in the argument *flags*, `timer_settime(timerid, flags, value, ovalue)` behaves as if the time until the next expiration is set to be equal to the difference between the absolute time specified by the *it_value* member of *value* and the current value of the clock associated with *timerid*; that is, the timer expires when the clock reaches the value specified by the *it_value* member of *value*.
ELSE NO_OPTION
 Conformance for `timer_settime`: PASS, NO_OPTION
- 18 IF PCTS_timer_settime THEN**
TEST: When the flag `TIMER_ABSTIME` is set in the argument *flags*, and the specified time has already passed, `timer_settime(timerid, flags, value, ovalue)` succeeds and the expiration notification is made.
ELSE NO_OPTION
 Conformance for `timer_settime`: PASS, NO_OPTION
- 19 IF PCTS_timer_settime THEN**
TEST: A successful call to `timer_settime(timerid, flags, value, ovalue)`, with a zero value of *it_interval*, specifies a nonperiodic (one-time) timer.
ELSE NO_OPTION
 Conformance for `timer_settime`: PASS, NO_OPTION
- 20 IF PCTS_timer_settime THEN**
TEST: A successful call to `timer_settime(timerid, flags, value, ovalue)`, with a nonzero *it_interval* specifies a periodic (or repetitive) timer, with the reload value of the timer set to the value specified by the *it_interval* member of *value*.
ELSE NO_OPTION
 Conformance for `timer_settime`: PASS, NO_OPTION
- 21 IF PCTS_timer_settime THEN**
TEST: In calls to `timer_settime()`, time values that are between two consecutive nonnegative integer multiples of the resolution of the specified timer are rounded up to the larger multiple of the resolution; quantization error does not cause the timer to expire earlier than the rounded time value.
ELSE NO_OPTION
 Conformance for `timer_settime`: PASS, NO_OPTION
- 22 IF PCTS_timer_settime THEN**
TEST: When the timer *timerid* is armed and the argument *ovalue* is not NULL, the call `timer_settime(timerid, flags, value, ovalue)` stores, in the location referenced by *ovalue*, a value representing the previous amount of time before the timer would have expired and the previous timer reload value.
ELSE NO_OPTION
 Conformance for `timer_settime`: PASS, NO_OPTION
- 23 IF PCTS_timer_settime THEN**

TEST: When the timer *timerid* is disarmed and the argument *ovalue* is not **NULL**, the call *timer_settime(timerid, flags, value, ovalue)* stores, in the location referenced by *ovalue*, a value representing zero and the previous timer reload value.

ELSE NO_OPTION

Conformance for *timer_settime*: PASS, NO_OPTION

24 **IF PCTS_timer_settime THEN**

IF PCTS_timer_gettime THEN

TEST: In the call *timer_settime(timerid, flags, value, ovalue)*, the members of *ovalue* are subject to the resolution of the timer, and they are the same values that would be returned by a *timer_gettime()* call at that point in the time.

NOTE: There is no known portable test method for this assertion.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *timer_settime*: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION

timer_gettime

IF PCTS_timer_gettime THEN

TEST: A successful call to *timer_gettime()* stores both the reload value of the timer and the amount of time until the specified timer *timerid* expires, into the space pointed to by the *value* argument; and returns the value zero.

The *it_value* member of this structure contains the amount of time before the timer expires, or zero if the timer is disarmed.

The *it_interval* member of *value* contains the reload value last set by *timer_settime()*.

ELSE NO_OPTION

Conformance for *timer_gettime*: PASS, NO_OPTION

25 **IF PCTS_timer_gettime THEN**

TEST: The amount of time before the timer expires is returned as the interval until timer expiration, even if the timer is armed with absolute time.

ELSE NO_OPTION

Conformance for *timer_gettime*: PASS, NO_OPTION

26 **IF {_POSIX_REALTIME_SIGNALS} THEN**

TEST: Only a single signal is queued to the process for a given timer at any point in time.

ELSE NO_TEST_SUPPORT

Conformance for *timer_settime*: PASS, NO_TEST_SUPPORT

27 **IF {_POSIX_REALTIME_SIGNALS} THEN**

TEST: When a timer for which a signal is still pending expires, and no signal is queued, a timer overrun occurs.

ELSE NO_TEST_SUPPORT

Conformance for *timer_settime*: PASS, NO_TEST_SUPPORT

timer_getoverrun

IF PCTS_timer_getoverrun THEN

IF {_POSIX_REALTIME_SIGNALS} THEN

TEST: When a timer expiration signal is delivered to a process, the *timer_getoverrun()* function returns the timer expiration overrun count for the specified timer.

NOTE: There is no known portable test method for this assertion.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *timer_getoverrun*: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION

28 **IF PCTS_timer_getoverrun THEN**

TEST: The PCD.1b documents the value of {DELAYTIMER_MAX} in 14.2.4.2.

ELSE NO_OPTION

Conformance for timer_getoverrun: PASS, NO_OPTION

29 IF PCTS_timer_getoverrun THEN

TEST: The overrun count returned by *timer_getoverrun()* contains the number of extra timer expirations that occurred between the time the signal was generated (queued) and when it was delivered.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

Conformance for timer_getoverrun: PASS, NO_TEST, NO_OPTION

30 IF PCTS_timer_getoverrun THEN

IF {DELAYTIMER_MAX} <= PCTS_DELAYTIMER_MAX THEN

TEST: When the number of extra expirations is greater than or equal to {DELAYTIMER_MAX}, then *timer_getoverrun()* returns {DELAYTIMER_MAX}.

NOTE: There is no known portable test method for this assertion.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for timer_getoverrun: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION

31 IF PCTS_timer_getoverrun THEN

TEST: The value returned by *timer_getoverrun()* applies to the most recent expiration signal delivery for the timer.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

Conformance for timer_getoverrun: PASS, NO_TEST, NO_OPTION

D_2 IF PCTS_timer_getoverrun and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the meaning of the overrun count returned, if no expiration signal has been delivered for the timer, or if {_POSIX_REALTIME_SIGNALS} is not supported, does so in 14.2.4.2.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

Conformance for timer_getoverrun: PASS, NO_OPTION

D_3 IF PCTS_timer_settime and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents whether or not it supports the *timer_settime()* function does so in 14.2.4.2.

ELSE NO_OPTION

Conformance for timer_settime: PASS, NO_OPTION

D_4 IF PCTS_timer_gettime and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents whether or not it supports the *timer_gettime()* function does so in 14.2.4.2.

ELSE NO_OPTION

Conformance for timer_gettime: PASS, NO_OPTION

D_5 IF PCTS_timer_getoverrun and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents whether or not it supports the *timer_getoverrun()* function does so in 14.2.4.2.

ELSE NO_OPTION

Conformance for timer_getoverrun: PASS, NO_OPTION

14.2.4.3 Returns

R_1 IF PCTS_timer_settime THEN

TEST: When a call to *timer_settime()* completes successfully, the interface returns a value of 0.

ELSE NO_OPTION

SEE: Assertion *timer_settime* in 14.2.4.4.

R_2 IF PCTS_timer_gettime THEN

TEST: When a call to *timer_gettime()* completes successfully, the interface returns a value of 0.

ELSE NO_OPTION

SEE: Assertion *timer_gettime* in 14.2.4.4.

R_3 IF PCTS_timer_settime THEN

TEST: When a call to *timer_settime()* completes unsuccessfully, the interface returns a value of -1, and sets *errno* to indicate the error.

timer_settime()

ELSE NO_OPTION

SEE: All assertions in 14.2.4.4 controlled by *timer_settime()*.

R_4 IF PCTS_timer_gettime THEN

TEST: When a call to *timer_gettime()* completes unsuccessfully, the interface returns a value of -1, and sets *errno* to indicate the error.

timer_gettime()

ELSE NO_OPTION

SEE: All assertions in 14.2.4.4 controlled by *timer_gettime()*.

R_5 IF PCTS_timer_getoverrun THEN

TEST: When a call to *timer_getoverrun()* completes successfully, the interface returns the timer expiration overrun count as explained in POSIX.1b {3}, 14.2.4.2.

ELSE NO_OPTION

SEE: Assertion *timer_getoverrun* in 14.2.4.4.

14.2.4.4 Errors

32 IF PCTS_timer_settime THEN

IF PCTS_timer_create and PCTS_timer_delete THEN

TEST: A call to *timer_settime()*, when the *timerid* argument does not correspond to an ID returned by *timer_create()* but not yet deleted by *timer_delete()*, returns a value of -1 and sets *errno* to [EINVAL].

NOTE: A subroutine is recommended that either returns an invalid timer ID, or indicates that there is no way to generate an invalid timer ID on the system.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *timer_settime*: PASS, NO_TEST_SUPPORT, NO_OPTION

33 IF PCTS_timer_gettime THEN

IF PCTS_timer_create and PCTS_timer_delete THEN

TEST: A call to *timer_gettime()*, when the *timerid* argument does not correspond to an ID returned by *timer_create()* but not yet deleted by *timer_delete()*, returns a value of -1 and sets *errno* to [EINVAL].

NOTE: A subroutine is recommended that either returns an invalid timer ID, or indicates that there is no way to generate an invalid timer ID on the system.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *timer_gettime*: PASS, NO_TEST_SUPPORT, NO_OPTION

34 IF PCTS_timer_getoverrun THEN

IF PCTS_timer_create and PCTS_timer_delete THEN

TEST: A call to `timer_getoverrun(, timerid)`, when the `timerid` argument does not correspond to an ID returned by `timer_create()` but not yet deleted by `timer_delete()`, returns a value of -1 and sets `errno` to [EINVAL].

NOTE: A subroutine is recommended that either returns an invalid timer ID, or indicates that there is no way to generate an invalid timer ID on the system.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for `timer_getoverrun`: PASS, NO_TEST_SUPPORT, NO_OPTION

35 **IF** not `PCTS_timer_settime` **THEN**

TEST: A call to `timer_settime()` returns a value of -1 and sets `errno` to [ENOSYS].

ELSE NO_OPTION

Conformance for `timer_settime`: PASS, NO_OPTION

36 **IF** not `PCTS_timer_gettime` **THEN**

TEST: A call to `timer_gettime()` returns a value of -1 and sets `errno` to [ENOSYS].

ELSE NO_OPTION

Conformance for `timer_gettime`: PASS, NO_OPTION

37 **IF** not `PCTS_timer_getoverrun` **THEN**

TEST: A call to `timer_getoverrun` returns a value of -1 and sets `errno` to [ENOSYS].

ELSE NO_OPTION

Conformance for `timer_getoverrun`: PASS, NO_OPTION

38 **IF** `PCTS_timer_settime` **THEN**

TEST: A call to `timer_settime(timerid, flags, value, ovalue)`, when the `value` structure specifies a nanosecond value less than zero, returns a value of -1 and sets `errno` to [EINVAL].

ELSE NO_OPTION

Conformance for `timer_settime`: PASS, NO_OPTION

39 **IF** `PCTS_timer_settime` **THEN**

IF {INT_MAX} <= 10e9 **THEN**

TEST: A call to `timer_settime(timerid, flags, value, ovalue)`, when the `value` structure specifies a nanosecond greater than or equal to 1000 million, returns a value of -1 and sets `errno` to [EINVAL].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for `timer_settime`: PASS, NO_TEST_SUPPORT, NO_OPTION

14.2.5 High Resolution Sleep

Function: `nanosleep()`

14.2.5.1 Synopsis

1

`M_GA_stdC_proto_decl(int; nanosleep; const struct timespec *rmt; time.h;;)`

SEE: Assertion `GA_stdC_proto_decl` in 2.7.3.

Conformance for `nanosleep`: PASS[1, 2], NO_OPTION

2

`M_GA_commonC_int_result_decl(nanosleep; time.h;;)`

SEE: Assertion `GA_commonC_int_result_decl` in 2.7.3.

Conformance for `nanosleep`: PASS[1, 2], NO_OPTION

3

`M_GA_macro_result_decl(int; nanosleep; time.h;;)`

SEE: Assertion GA_macro_result_decl in 1.3.4.
Conformance for nanosleep: PASS, NO_OPTION

4

M_GA_macro_args (nanosleep; time.h;;;)
SEE: Assertion GA_macro_args in 2.7.3.
Conformance for nanosleep: PASS, NO_OPTION

14.2.5.2 Description

nanosleep

IF PCTS_nanosleep **THEN**

TEST: A successful call to *nanosleep(rqtp, rmtp)* causes the current process to be suspended from execution until the time interval specified by the *rqtp* argument has elapsed, whereupon it returns 0.

ELSE NO_OPTION

Conformance for nanosleep: PASS, NO_OPTION

5

IF PCTS_nanosleep **THEN**

TEST: In a successful call to *nanosleep(rqtp, rmtp)*, the suspension time is not less than the time specified by the *rqtp*, as measured by the system clock, CLOCK_REALTIME.

ELSE NO_OPTION

Conformance for nanosleep: PASS, NO_OPTION

6

IF PCTS_nanosleep **THEN**

TEST: In a successful call to *nanosleep(rqtp, rmtp)*, the suspension time may be longer than requested, because the argument value is rounded up to an integer multiple of the sleep resolution.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

Conformance for nanosleep: PASS, NO_TEST, NO_OPTION

7

IF PCTS_nanosleep **THEN**

TEST: In a successful call to *nanosleep(rqtp, rmtp)*, the suspension time may be longer than requested because of the scheduling of other activity by the system.

NOTE: There is no known portable test method for this assertion.

ELSE NO_OPTION

Conformance for nanosleep: PASS, NO_TEST, NO_OPTION

8

IF PCTS_nanosleep **THEN**

TEST:

ELSE NO_OPTION

Conformance for nanosleep: PASS, NO_OPTION

9

IF PCTS_nanosleep **THEN**

TEST: The use of the *nanosleep()* function has no effect on the action or blockage of any signal.

ELSE NO_OPTION

Conformance for nanosleep: PASS, NO_OPTION

D_1 IF PCTS_nanosleep and a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents whether or not it supports the *nanosleep()* function does so in 14.2.5.2.

ELSE NO_OPTION

Conformance for nanosleep: PASS, NO_OPTION

14.2.5.3 Returns

R_1 IF PCTS_nanosleep **THEN**

TEST: When a call to *nanosleep()* returns because the requested time has elapsed, the interface returns a value of 0.

ELSE NO_OPTION

SEE: Assertion *nanosleep* in 14.2.5.4.

R_2 IF PCTS_nanosleep THEN

TEST: When a call to *nanosleep()* returns because it has been interrupted by a signal, the interface returns a value of -1, and sets *errno* to indicate the interruption.

ELSE NO_OPTION

SEE: All assertions in 14.2.5.4.

10 IF PCTS_nanosleep THEN

TEST: When the *rmt* argument is non-NULL, the *timespec* structure referenced by it is updated by *nanosleep(rqtp, rmt)* to contain the amount of time remaining in the interval (the requested time minus the time actually slept).

ELSE NO_OPTION

Conformance for *nanosleep*: PASS, NO_OPTION

11 IF PCTS_nanosleep THEN

TEST: When the *rmt* argument is NULL, the remaining time is not returned by *nanosleep(rqtp, rmt)*.

ELSE NO_OPTION

Conformance for *nanosleep*: PASS, NO_OPTION

R_3 IF PCTS_nanosleep THEN

TEST: When a call to *nanosleep()* completes unsuccessfully, the interface returns a value of -1, and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: All assertions in 14.2.5.4.

14.2.5.4 Errors

12 IF PCTS_nanosleep THEN

TEST: A call to *nanosleep()*, when the *nanosleep()* function is interrupted by a signal, returns a value of -1 and sets *errno* to [EINTR].

ELSE NO_OPTION

Conformance for *nanosleep*: PASS, NO_OPTION

13 IF PCTS_nanosleep THEN

TEST: A call to *nanosleep(rqtp, rmt)*, when the *rqtp* argument specifies a nanosecond value less than zero, returns a value -1 and sets *errno* to [EINVAL].

ELSE NO_OPTION

Conformance for *nanosleep*: PASS, NO_OPTION

14 IF PCTS_nanosleep THEN

IF INT_MAX ≤ 10e9 THEN

TEST: A call to *nanosleep(rqtp, rmt)*, when the *rqtp* argument specifies a nanosecond value greater than or equal to 1000 million, returns a value of -1 and sets *errno* to [EINVAL].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *nanosleep*: PASS, NO_TEST_SUPPORT, NO_OPTION

15 IF not PCTS_nanosleep THEN

TEST: A call to *nanosleep()* returns a value of -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *nanosleep*: PASS, NO_OPTION

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Section 15: Message Passing

15.1 Data Definitions for Message Queues

D_1 SETUP: Include the header `<mqqueue.h>`.

TEST: A PCD.1b that documents that the symbols allowed by this standard to be in the headers `<sys/types.h>`, `<fcntl.h>`, `<time.h>`, `<signal.h>`, are visible does so in 15.1.

ELSE NO_OPTION

Conformance for `mq_intro`: PASS, NO_OPTION

15.1.1 Data Structures

1 SETUP: Include the header `<mqqueue.h>`.

TEST: The types `mqd_t` and `struct sigevent` are defined.

Conformance for `mq_hdr`: PASS

D_1 TEST: The PCD.1b documents the definition of `mqd_t` and `struct sigevent`, in 15.1.1.

Conformance for `mq_hdr`: PASS

3 SETUP: Include the header `<mqqueue.h>`.

TEST: The structure `mq_attr` is defined and has at least the following members.

Member Type	Member Name	Description
long	<code>mq_flags</code>	Message queue flags
long	<code>mq_maxmsg</code>	Maximum number of messages
long	<code>mq_msgsize</code>	Maximum message size
long	<code>mq_curmsgs</code>	Number of messages currently queued

Conformance for `mq_hdr`: PASS

D_2 IF a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents extensions to `mq_attr`, as permitted in POSIX.1b{3}, 1.3.1.1, item (2), does so in 15.1.1.

ELSE NO_OPTION

Conformance for `mq_hdr`: PASS, NO_OPTION

4 SETUP: Include the header `<mqqueue.h>`.

TEST: Extensions to `mq_attr` that may change the behavior of the application with respect to this standard when those fields in the structure are uninitialized, are enabled as required by POSIX.1b {3} 1.3.1.1.

NOTE: The corresponding statement in IEEE Std 1003.1b-1993 is not specific enough to write a portable test.

Conformance for `mq_hdr`: PASS, NO_TEST

D_3 IF a PCD.1b documents the following **THEN**

TEST: A PCD.1b that documents the existence of flags other than O_NONBLOCK, does so in 15.1.1.

ELSE NO_OPTION

Conformance for mq_hdr: PASS, NO_OPTION

M_GA_mqOpenMaxFD () =

IF PCTS_MQ_FILE_DESCRIPTOR **THEN**

IF ({OPEN_MAX} <= PCTS_OPEN_MAX) and PCTS_mq_open **THEN**

TEST: A process calling mq_open() can simultaneously open a combination of files and message queues totaling at least {OPEN_MAX}.

TR: Test for opening {OPEN_MAX} message queues.

Test for opening a message queue after opening {OPEN_MAX} -1 files.

Test for opening a file after opening {OPEN_MAX} -1 message queues.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

GA_mqOpenMaxFD

FOR: mq_open()

M_GA_mqOpenMaxFD()

Conformance for mq_hdr: PASS, NO_OPTION

M_GA_mqPCTSOpenMaxFD () =

IF PCTS_MQ_FILE_DESCRIPTOR **THEN**

IF ({OPEN_MAX} > PCTS_OPEN_MAX) and PCTS_mq_open **THEN**

TEST: A process calling mq_open() can simultaneously open a combination of files and message queues totaling at least PCTS_OPEN_MAX.

TR: Test for opening PCTS_OPEN_MAX message queues.

Test for opening a message queue after opening PCTS_OPEN_MAX-1 files.

Test for opening a file after opening PCTS_OPEN_MAX-1 message queues.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

GA_mqPCTSOpenMaxFD

FOR: mq_open()

M_GA_mqPCTSOpenMaxFD()

Conformance for mq_hdr: PASS, NO_OPTION

15.2 Message Passing Functions

15.2.1 Open a Message Queue

Function: mq_open().

15.2.1.1 Synopsis

1

M_GA_stdC_proto_decl(mqd_t; mq_open; const char *name, int oflag, ... oflag; mqueue.h;;)

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for mq_open: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(mqd_t; mq_open; mqueue.h;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for *mq_open*: *PASS*[1, 2], *NO_OPTION*

3

M_GA_macro_result_decl(mqd_t; mq_open; mqueue.h;;)

SEE: Assertion *GA_macro_result_decl* in 1.3.4.

Conformance for *mq_open*: *PASS*, *NO_OPTION*

4

M_GA_macro_args (mq_open; mqueue.h;;)

SEE: Assertion *GA_macro_args* in 2.7.3.

Conformance for *mq_open*: *PASS*, *NO_OPTION*

15.2.1.2 Description

M_GA_mqOpenMaxFD()

SEE: Assertion *GA_mqOpenMaxFD* in 15.1.1.

Conformance for *mq_open*: *PASS*[*OpenMaxMqs*, *PCTSopenMaxMqs*]

M_GA_mqPCTSOpenMaxFD()

SEE: Assertion *GA_mqPCTSOpenMaxFD* in 15.1.1.

Conformance for *mq_open*: *PASS*[*OpenMaxMqs*, *PCTSopenMaxMqs*]

mq_open

IF *PCTS_mq_open* **THEN**

IF *PCTS_GAP_mq_open* **THEN**

TEST: A successful call to *mq_open()* establishes a connection between a process and a message queue, *name*, and returns a message queue, descriptor which can be used by other functions to refer to that message queue.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for *mq_open*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*

D_1 IF *PCTS_mq_open* and a PCD.1b documents the following **THEN**

IF *PCTS_GAP_mq_open* **THEN**

TEST: A PCD.1b that documents whether the name appears in the file system and is visible to other functions that take pathnames as arguments does so in 15.2.1.2.

ELSE *NO_TEST_SUPPORT*

ELSE *NO_OPTION*

Conformance for *mq_open*: *PASS*, *NO_TEST_SUPPORT*, *NO_OPTION*

5

M_GA_portableFilenames(mq_open)

SEE: Assertion *GA_portableFilenames* in 2.2.2.40.

Conformance for *mq_open*: *PASS*, *NO_OPTION*

6

M_GA_upperLowerNames(mq_open)

SEE: Assertion *GA_upperLowerNames* in 2.2.2.40.

Conformance for *mq_open*: *PASS*, *NO_OPTION*

7

M_GA_PRNoTrunc(mq_open)

SEE: Assertion *GA_PRNoTrunc* in 2.3.6.

Conformance for *mq_open*: *PASS*, *NO_OPTION*

8

M_GA_PRNoTruncError(mq_open)

SEE: Assertion *GA_PRNoTruncError* in 2.2.2.40.

Conformance for *mq_open*: PASS, NO_OPTION

- 9** **IF** *PCTS_mq_open* **THEN**
 IF *PCTS_GAP_mq_open* **THEN**
 TEST: When *name* begins with the slash character, then processes calling *mq_open(name, oflag, ...)* with the same value of *name* refer to the same message queue object, as long as that name has not been removed.
 TR: Try the interface both in the same process that created the queue and in another process.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *mq_open*: PASS, NO_TEST_SUPPORT, NO_OPTION
- D_2** **IF** *PCTS_mq_open* **THEN**
 TEST: The PCD.1b documents the effect of calling *mq_open(name, oflag, ...)*, if *name* does not begin with the slash character, in 15.2.1.2.
 ELSE NO_OPTION
 Conformance for *mq_open*: PASS, NO_OPTION
- D_3** **IF** *PCTS_mq_open* **THEN**
 TEST: The PCD.1b documents the interpretation of slash characters, other than the leading slash character, in *name* in 15.2.1.2.
 ELSE NO_OPTION
 Conformance for *mq_open*: PASS, NO_OPTION
- R_1** **IF** *PCTS_mq_open* **THEN**
 TEST: When the *name* argument is not the name of an existing message queue and O_CREAT is not set, *mq_open(name, oflag, ...)* fails and returns an error.
 ELSE NO_OPTION
 SEE: Assertion *mq_open_ENOENT* in 15.2.1.4.
- 10** **IF** *PCTS_mq_open* **THEN**
 IF *PCTS_GAP_mq_open* **THEN**
 TEST: The access permission to receive messages or send messages, as specified by *oflag*, is granted if the calling process would be granted read or write access, respectively, to an equivalently protected file.
 Read and write access to files is determined as described in 2.3.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *mq_open*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 11** **FOR:** *mq_open*
 M_GA_AP_classAccess(mq_open)
 SEE: Assertion GA_AP_class Access in 2.3.2.
 Conformance for *mq_open*: PASS
- 12** **FOR:** *mq_open*
 M_GA_AP_OVERRIDEFILEACCESS(mq_open)
 SEE: Assertion GA_AP_overrideFile Access in 2.3.2.
 Conformance for *mq_open*: PASS
- 13** **IF** *PCTS_mq_open* **THEN**
 SETUP: Include the header *<mqqueue.h>*.
 TEST: The constants O_RDONLY, O_WRONLY, O_RDWR, O_CREAT, O_EXCL, and O_NONBLOCK are defined and have different values.
 ELSE NO_OPTION
 Conformance for *mq_open*: PASS, NO_TEST

- 14** **IF** *PCTS_mq_open* **THEN**
 IF *PCTS_mq_send* and *PCTS_mq_receive* and *PCTS_GAP_mq_open* **THEN**
 TEST: When a message queue is opened with the call *mq_open(name, oflag, ...)*,
 and the flag *O_RDONLY* is set in *oflag*, the process can use the returned
 message queue descriptor with *mq_receive()*, but not with *mq_send()*.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *mq_open*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 15** **IF** *PCTS_mq_open* **THEN**
 IF *PCTS_GAP_mq_open* **THEN**
 TEST: A message queue may be opened multiple times in the same or different
 processes with the call *mq_open(name, oflag, ...)* and the flag *O_RDONLY* set
 in *oflag*.
 TR: Try the interface both in the same process that created the queue and in another
 process.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *mq_open*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 16** **IF** *PCTS_mq_open* **THEN**
 IF *PCTS_mq_open* and *PCTS_mq_send* and *PCTS_mq_receive* **THEN**
 TEST: When a message queue is opened with the call *mq_open(name, oflag, ...)*
 and the flag *O_WRONLY* is set in *oflag*, the process can use the returned
 message queue descriptor with *mq_send()*, but not with *mq_receive()*.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *mq_open*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 17** **IF** *PCTS_mq_open* **THEN**
 IF *PCTS_GAP_mq_open* **THEN**
 TEST: A message queue may be opened multiple times in the same or different
 processes with the call *mq_open(name, oflag, ...)* and the flag *O_WRONLY* set
 in *oflag*.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *mq_open*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 18** **IF** *PCTS_mq_open* **THEN**
 IF *PCTS_mq_open* and *PCTS_mq_send* and *PCTS_mq_receive* **THEN**
 TEST: When a message queue is opened with the call *mq_open(name, oflag, ...)*,
 and the flag *O_RDWR* is set in *oflag*, the process can use any of the functions
 allowed for *O_RDONLY* and *O_WRONLY*.
 TR: Try both *mq_send()* and *mq_receive()*.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *mq_open*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 19** **IF** *PCTS_mq_open* **THEN**
 IF *PCTS_GAP_mq_open* **THEN**
 TEST: When a message queue is opened with the call *mq_open(name, oflag, ...)*,
 and the flag *O_RDWR* is set in *oflag*, it may be open multiple times in the
 same or different processes for sending messages.
 ELSE NO_TEST_SUPPORT
 ELSE NO_OPTION
 Conformance for *mq_open*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 20** **IF** *PCTS_mq_open* **THEN**

- IF** *PCTS_GAP_mq_open* **THEN**
TEST: When a message queue is opened with the call *mq_open(name, oflag, mode, attr)* the named message queue does not already exist, and the flag *O_CREAT* is set in *oflag*, a message queue is created without any messages in it.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *mq_open*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 21 **IF** *PCTS_mq_open* **THEN**
IF *PCTS_GAP_mq_open* **THEN**
TEST: When *mq_open(name, oflag, mode, attr)* is called with *O_CREAT* set and *O_EXCL* cleared, and the named message queue already exists, the *O_CREAT* flag has no effect.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *mq_open*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 22 **IF** *PCTS_mq_open* **THEN**
IF *PCTS_GAP_mq_open* **THEN**
TEST: When a new message queue is created with *mq_open()*, the user ID of the message queue is set to the effective user ID of the process.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *mq_open*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 23 **IF** *PCTS_mq_open* **THEN**
IF *PCTS_GAP_mq_open* **THEN**
TEST: When a new message queue is created with *mq_open()*, the group ID of the message queue is set to the effective group ID of the process.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *mq_open*: PASS, NO_TEST_SUPPORT, NO_OPTION
- 24 **IF** *PCTS_mq_open* **THEN**
IF *PCTS_GAP_mq_open* **THEN**
TEST: When a new message queue is created with *mq_open(name, oflag, ...)*, the "file permission bits" are set to the value of *mode*.
TR: Test for octal values 0000 through 0777.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for *mq_open*: PASS, NO_TEST_SUPPORT, NO_OPTION
- D_4 IF** *PCTS_mq_open* **THEN**
TEST: The PCD.1b documents the effect when bits in *mode* are set, other than file permission bits, in 15.2.1.2.
ELSE NO_OPTION
Conformance for *mq_open*: PASS, NO_OPTION
- D_5 IF** *PCTS_mq_open* **THEN**
TEST: The PCD.1b documents the implementation-defined default message queue attributes with which message queues are created, if *mq_open(name, oflag, mode, attr)* is called and *attr* is NULL, in 15.2.1.2.
ELSE NO_OPTION
Conformance for *mq_open*: PASS, NO_OPTION
- 25 **IF** *PCTS_mq_open* **THEN**
IF *PCTS_GAP_mq_open* **THEN**
TEST: When *attr* is non_NULL and the calling process has the appropriate privilege on *name*, the message queue *mq_maxmsg* and *mq_msgsize* attributes are set

to the values of the corresponding members in the *mq_attr* structure referred to by *attr*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *mq_open*: PASS, NO_TEST_SUPPORT, NO_OPTION

R_2 IF PCTS_mq_open THEN

TEST: When *attr* is non_NULL, but the calling process does not have the appropriate privilege on *name*, the *mq_open()* function fails and returns an error without creating the message queue.

ELSE NO_OPTION

SEE: Assertion *mq_open_EACCESS2* in 15.2.1.4.

R_3 IF PCTS_mq_open THEN

TEST: When O_EXCL and O_CREAT are set, *mq_open()* fails if the message queue *name* exists.

ELSE NO_OPTION

SEE: Assertion *mq_open_EEXIST* in 15.2.1.4.

26 IF PCTS_mq_open THEN

IF PCTS_GAP_mq_open THEN

TEST: The check for the existence of the message queue and the creation of the message queue if it does not exist, is atomic with respect to other processes executing *mq_open()* naming the same *name* with O_EXCL and O_CREAT set. There is no known reliable test method for this assertion.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *mq_open*: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION

D_6 IF PCTS_mq_open and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents the result of calling *mq_open(name, oflag, ...)*, if O_EXCL is set and O_CREAT is not set, does so in 15.2.2.2.

ELSE NO_OPTION

Conformance for *mq_open*: PASS, NO_OPTION

27 IF PCTS_mq_open THEN

IF PCTS_GAP_mq_open THEN

TEST: The setting of O_NONBLOCK is associated with the open message queue descriptor, and determines whether a *mq_send()* or *mq_receive()* waits for resources or messages that are not currently available, or fails with *errno* set to [EAGAIN].

See *mq_send()* and *mq_receive()* for details.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *mq_open*: PASS, NO_TEST_SUPPORT, NO_OPTION

28 IF PCTS_mq_open THEN

IF PCTS_GAP_mq_open THEN

TEST: The *mq_open()* function does not add or remove messages from the queue.

TR: Open a message queue; send a single message; re-open the same queue; then try two successive reads.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *mq_open*: PASS, NO_TEST_SUPPORT, NO_OPTION

D_7 IF PCTS_mq_open and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents whether or not it supports the *mq_open()* function does so in 15.2.1.2.

ELSE NO_OPTION

Conformance for mq_open: PASS, NO_OPTION

15.2.1.3 Returns

R_4 IF PCTS_mq_open THEN

TEST: When a call to *mq_open()* completes successfully, the function returns a message queue descriptor.

ELSE NO_OPTION

SEE: Assertion *mq_open* in 15.2.1.2.

R_5 IF PCTS_mq_open THEN

TEST: When a call to *mq_open()* completes unsuccessfully, the function returns (*mqd_t*) - 1 and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: All assertions in 15.2.1.4.

15.2.1.4 Errors

mq_open_EACCESS1

IF PCTS_mq_open THEN

IF PCTS_GAP_mq_open THEN

TEST: A call to *mq_open(name, oflag, ...)*, when the message queue exists and the permissions specified by *oflag* are denied, returns a value of -1 and sets *errno* to [EACCESS].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for mq_open: PASS, NO_TEST_SUPPORT, NO_OPTION

mq_open_EACCESS2

IF PCTS_mq_open THEN

IF PCTS_RAP_mq_open THEN

TEST: A call to *mq_open(name, oflag, ...)*, when the message queue does not exist and permission to create the message queue is denied, returns a value of -1 and sets *errno* to [EACCESS].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for mq_open: PASS, NO_TEST_SUPPORT, NO_OPTION

mq_open_EEXIST

IF PCTS_mq_open THEN

IF PCTS_GAP_mq_open THEN

TEST: A call to *mq_open(name, oflag, ...)*, when O_CREAT and O_EXCL are set and the named message queue already exists, returns a value of -1 and sets *errno* to [EEXIST].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for mq_open: PASS, NO_TEST_SUPPORT, NO_OPTION

29

IF PCTS_mq_open THEN

IF PCTS_GAP_mq_open THEN

TEST: A call to *mq_open()*, when the *mq_open()* operation is interrupted by a signal, returns a value of -1 and sets *errno* to [EINTR].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for mq_open: PASS, NO_TEST_SUPPORT, NO_OPTION

- 30** **IF** *PCTS_mq_open* **THEN**
 IF *PCTS_GAP_mq_open* **THEN**
 TEST: A call to *mq_open()*, when the *mq_open(name, oflag, ...)* operation is not supported for the given name, returns a value of -1 and sets *errno* to [EINVAL].
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *mq_open*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- D_8** **IF** *PCTS_mq_open* **THEN**
 TEST: The PCD.1b documents under what circumstances the error [EINVAL] may be returned in 15.2.1.4.
 ELSE *NO_OPTION*
 Conformance for *mq_open*: *PASS, NO_OPTION*
- 31** **IF** *PCTS_mq_open* **THEN**
 IF *PCTS_GAP_mq_open* **THEN**
 TEST: A call to *mq_open(name, oflag, ...)*, when *O_CREAT* is specified in *oflag*, the value of *attr* is not NULL, and *mq_maxmsg* is less than or equal to zero, returns a value of -1 and sets *errno* to [EINVAL].
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *mq_open*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 32** **IF** *PCTS_mq_open* **THEN**
 IF *PCTS_GAP_mq_open* **THEN**
 TEST: A call to *mq_open(name, oflag, ...)*, when *O_CREAT* is specified in *oflag*, the value of *attr* is not NULL, and *mq_msgsize* is less than or equal to zero, returns a value of -1 and sets *errno* to [EINVAL].
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *mq_open*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 33** **IF** *PCTS_mq_open* **THEN**
 IF *PCTS_GAP_mq_open* and ({ *OPEN_MAX* } ≤ *PCTS_OPEN_MAX*) **THEN**
 TEST: A call to *mq_open()*, when too many message queue descriptors or file descriptors are currently in use by this process, returns a value of -1 and sets *errno* to [EMFILE].
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *mq_open*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 34** **IF** *PCTS_mq_open* **THEN**
 IF *PCTS_GAP_mq_open* and { *MQ_OPEN_MAX* } ≤ *PCTS_MQ_OPEN_MAX* **THEN**
 TEST: A call to *mq_open()*, when too many message queue descriptors or file descriptors are currently in use by this process, returns a value of -1 and sets *errno* to [EMFILE].
 ELSE *NO_TEST_SUPPORT*
 ELSE *NO_OPTION*
 Conformance for *mq_open*: *PASS, NO_TEST_SUPPORT, NO_OPTION*
- 35** **IF** *PCTS_mq_open* **THEN**
 IF *PCTS_GAP_mq_open* and { *_POSIX_NO_TRUNC* } and ({ *PATH_MAX* } ≤ *PCTS_PATH_MAX*) **THEN**
 TEST: A call to *mq_open(name, oflag, ...)*, when the length of the *name* string exceeds { *PATH_MAX* }, while { *_POSIX_NO_TRUNC* } is in effect, returns a value of -1 and sets *errno* to [ENAMETOOLONG].
 ELSE *NO_TEST_SUPPORT*

ELSE NO_OPTION

Conformance for mq_open: PASS, NO_TEST_SUPPORT, NO_OPTION

36 IF PCTS_mq_open THEN
IF PCTS_GAP_mq_open and { _POSIX_NO_TRUNC } and ({ NAME_MAX } <= PCTS_NAME_MAX)
THEN
TEST: A call to *mq_open* (*name*, *oflag*, ...), when a pathname component is longer than { NAME_MAX }, while { _POSIX_NO_TRUNC } is in effect, returns a value of -1 and sets *errno* to [ENAMETOOLONG].
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for mq_open: PASS, NO_TEST_SUPPORT, NO_OPTION

37 IF PCTS_mq_open THEN
IF PCTS_GAP_mq_open THEN
TEST: A call to *mq_open* (), when too many message queues are currently open in the system, returns a value of -1 and sets *errno* to [ENFILE].
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for mq_open: PASS, NO_TEST_SUPPORT, NO_OPTION

mq_open_ENOENT

IF PCTS_mq_open THEN
IF PCTS_GAP_mq_open THEN
TEST: A call to *mq_open* (), when O_CREAT is not set and the named message queue does not exist, returns a value of -1 and sets *errno* to [ENOENT].
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for mq_open: PASS, NO_TEST_SUPPORT, NO_OPTION

38 IF PCTS_mq_open THEN
IF PCTS_GAP_mq_open THEN
TEST: A call to *mq_open* (), when there is insufficient space for the creation of the new message queue, returns a value of -1 and sets *errno* to [ENOSPC].
There is no known reliable test method for this assertion.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for mq_open: PASS, NO_TEST, NO_TEST_SUPPORT, NO_OPTION

39 IF not PCTS_mq_open THEN
TEST: A call to *mq_open* () returns a value of -1 and sets *errno* to [ENOSYS].
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for mq_open: PASS, NO_OPTION

15.2.2 Close a Message Queue

Function: *mq_close*().

15.2.2.1 Synopsis

1

M_GA_stdC_proto_decl(int; mq_close; mqd_t mqdes; mqueue.h;;)

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for mq_close: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(mq_close; mqueue.h;;)**SEE:** Assertion GA_commonC_int_result_decl in 2.7.3.*Conformance for mq_close: PASS[1, 2], NO_OPTION*

3

M_GA_macro_result_decl(int; mq_close; mqueue.h;;)**SEE:** Assertion GA_macro_result_decl in 1.3.4.*Conformance for mq_close: PASS, NO_OPTION*

4

M_GA_macro_args (mq_close; mqueue.h;;)**SEE:** Assertion GA_macro_args in 2.7.3.*Conformance for mq_close: PASS, NO_OPTION***15.2.2.2 Description****mq_close****IF PCTS_mq_close THEN****TEST:** A call to *mq_close()* removes the association between the message queue descriptor, *mqdes*, and its message queue, and returns a value of zero.**ELSE NO_OPTION***Conformance for mq_close: PASS, NO_OPTION***D_1 IF PCTS_mq_close and a PCD.1b documents the following THEN****TEST:** A PCD.1b that documents the results of using this message queue descriptor after successful return from this *mq_close()*, and until the return of this message queue descriptor from a subsequent *mq_open()*, does so in 15.2.2.2.**ELSE NO_OPTION***Conformance for mq_close: PASS, NO_OPTION*

5

IF PCTS_mq_close THEN**IF PCTS_mq_notify THEN****TEST:** When the process has successfully attached a notification request to the message queue via *mqdes*, a call to *mq_close()* removes this attachment and makes the message queue available for another process to attach for notification.**ELSE NO_TEST_SUPPORT****ELSE NO_OPTION***Conformance for mq_close: PASS, NO_TEST_SUPPORT, NO_OPTION***D_2 IF PCTS_mq_close and a PCD.1b documents the following THEN****TEST:** A PCD.1b that documents whether or not it supports the *mq_close()* function does so in 15.2.2.2.**ELSE NO_OPTION***Conformance for mq_close: PASS, NO_OPTION***15.2.2.3 Returns****R_1 IF PCTS_mq_close THEN****TEST:** When a call to *mq_close()* completes successfully, it returns a value of 0.**ELSE NO_OPTION****SEE:** Assertion mq_close in 15.2.2.2.**R_2 IF PCTS_mq_close THEN****TEST:** When a call to *mq_close()* completes unsuccessfully, the function returns a value of -1 and sets *errno* to indicate the error.**ELSE NO_OPTION**

SEE: All assertions in 15.2.2.4.

15.2.2.4 Errors

- 6 **IF** *PCTS_mq_close* **THEN**
 TEST: A call to *mq_close(mqdes)*, when the *mqdes* argument is not a valid message queue descriptor, returns a value of -1 and sets *errno* to [EBADF].
 ELSE NO_OPTION
 Conformance for *mq_close*: PASS, NO_OPTION
- 7 **IF** not *PCTS_mq_close* **THEN**
 TEST: A call to *mq_close()* returns a value of -1 and sets *errno* to [ENOSYS].
 ELSE NO_OPTION
 Conformance for *mq_close*: PASS, NO_OPTION

15.2.3 Remove a Message Queue

Function: *mq_unlink()*.

15.2.3.1 Synopsis

- 1
 *M_GA_stdC_proto_decl(int; mq_unlink; const char *name; mqueue.h;;;)*
 SEE: Assertion GA_stdC_proto_decl in 2.7.3.
 Conformance for *mq_unlink*: PASS[1, 2], NO_OPTION
- 2
 M_GA_commonC_int_result_decl(mq_unlink; mqueue.h;;;)
 SEE: Assertion GA_commonC_int_result_decl in 2.7.3.
 Conformance for *mq_unlink*: PASS[1, 2], NO_OPTION
- 3
 M_GA_macro_result_decl(int; mq_unlink; mqueue.h;;;)
 SEE: Assertion GA_macro_result_decl in 1.3.4.
 Conformance for *mq_unlink*: PASS, NO_OPTION
- 4
 M_GA_macro_args (mq_unlink; mqueue.h;;;)
 SEE: Assertion GA_macro_args in 2.7.3.
 Conformance for *mq_unlink*: PASS, NO_OPTION

15.2.3.2 Description

mq_unlink

IF *PCTS_mq_unlink* **THEN**
 TEST: A successful call to *mq_unlink(name)* removes the message queue named by the pathname *name* and returns a value of 0.
 ELSE NO_OPTION
 Conformance for *mq_unlink*: PASS, NO_OPTION

R_1 IF *PCTS_mq_unlink* **THEN**

IF *PCTS_mq_open* and *PCTS_gap_mq_open* **THEN**

TEST: After a successful call to *mq_unlink(name)*, a call to *mq_open(name, oflag, ...)* fails if the flag O_CREAT is not set in *flags*.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

SEE: Assertion mq_unlink_ENOENT in 15.2.3.4.

5 IF PCTS_mq_unlink THEN

TEST: When one or more processes have the message queue open when *mq_unlink()* is called, destruction of the message queue is postponed until all references to the message queue have been closed.

ELSE NO_OPTION

Conformance for *mq_unlink*: PASS, NO_OPTION

D_1 IF PCTS_mq_unlink and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents whether or not it supports the *mq_link()* function does so in 15.2.3.4.

ELSE NO_OPTION

Conformance for *mq_unlink*: PASS, NO_OPTION

15.2.3.3 Returns

R_2 IF PCTS_mq_unlink THEN

TEST: When a call to *mq_link()* completes successfully, the function returns a value of 0.

ELSE NO_OPTION

SEE: Assertion mq_unlink in 15.2.3.2.

R_3 IF PCTS_mq_unlink THEN

TEST: When a call to *mq_link()* completes unsuccessfully, the named message queue is unchanged and the function returns a value of -1 and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: All assertions in 15.2.3.4.

15.2.3.4 Errors

6 IF PCTS_mq_unlink THEN

TEST: A call to *mq_unlink(name)*, when permission is denied to unlink the named message queue, returns a value of -1 and sets *errno* to [EACCES].

ELSE NO_OPTION

Conformance for *mq_unlink*: PASS, NO_OPTION

7 IF PCTS_mq_unlink THEN

IF { _POSIX_NO_TRUNC } and ({ NAME_MAX } <= PCTS_NAME_MAX) THEN

TEST: A call to *mq_unlink(name)*, when the length of the *name* string exceeds { NAME_MAX } while { _POSIX_NO_TRUNC } is in effect, returns a value of -1 and sets *errno* to [ENAMETOOLONG].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *mq_unlink*: PASS, NO_TEST_SUPPORT, NO_OPTION

mq_unlink_ENOENT

IF PCTS_mq_unlink THEN

TEST: A call to *mq_unlink(name)*, when the named message queue does not exist, returns a value of -1 and sets *errno* to [ENOENT].

ELSE NO_OPTION

Conformance for *mq_unlink*: PASS, NO_OPTION

8 IF not PCTS_mq_unlink THEN

TEST: A call to *mq_unlink()* returns a value of -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *mq_unlink*: PASS, NO_OPTION

15.2.4 Send a Message to a Message Queue

Function: *mq_send()*.

15.2.4.1 Synopsis

1

*M_GA_stdC_proto_decl(int; mq_send; mqd_t mqdes, const char *msg_ptr, size_t msg_len, unsigned int msg_prio; mqqueue.h;;)*

SEE: Assertion *GA_stdC_proto_decl* in 2.7.3.
Conformance for *mq_send*: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(mq_send; mqqueue.h;;)

SEE: Assertion *GA_commonC_int_result_decl* in 2.7.3.
Conformance for *mq_send*: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; mq_send; mqqueue.h;;)

SEE: Assertion *GA_macro_result_decl* in 1.3.4.
Conformance for *mq_send*: PASS, NO_OPTION

4

M_GA_macro_args (mq_send; mqqueue.h;;)

SEE: Assertion *GA_macro_args* in 2.7.3.
Conformance for *mq_send*: PASS, NO_OPTION

15.2.4.2 Description

mq_send

IF *PCTS_mq_send* THEN

TEST: A successful call to *mq_send()* adds the message pointed to by the argument *msg_ptr* to the message queue specified by *mqdes*, and returns a value of zero.

ELSE NO_OPTION

Conformance for *mq_send*: PASS, NO_OPTION

R_1

IF *PCTS_mq_send* THEN

TEST: When the value of *msg_len*, which specifies the length of the message in bytes pointed to by *msg_ptr*, is greater than the *mq_msgsize* attribute of the message queue, *mq_send()* fails.

ELSE NO_OPTION

SEE: Assertion *mq_send_MSGSIZE* in 15.2.4.4.

5

IF *PCTS_mq_send* THEN

TEST: When the specified message queue is not full, *mq_send()* behaves as if the message is inserted into the message queue at the position indicated by the *msg_prio* argument.

ELSE NO_OPTION

Conformance for *mq_send*: PASS, NO_OPTION

6

IF *PCTS_mq_send* THEN

TEST: A message with a larger numeric value of *msg_prio* is inserted before messages with lower values of *msg_prio*.

ELSE NO_OPTION

Conformance for mq_send: PASS, NO_OPTION

- 7 IF PCTS_mq_send THEN**
TEST: A message is inserted after other messages in the queue, if any, with equal *msg_prio*.
ELSE NO_OPTION
Conformance for mq_send: PASS, NO_OPTION
- R_2 IF PCTS_mq_send THEN**
TEST: The value of *msg_prio* is less than or equal to {MQ_PRIO_MAX}.
ELSE NO_OPTION
SEE: Assertion *mq_send_EINVAL* in 15.2.4.4.
- 8 IF PCTS_mq_send THEN**
TEST: When the specified message queue is full and O_NONBLOCK is not set in the message queue description associated with *mqdes*, *mq_send()* blocks until space becomes available to enqueue the message, or until *mq_send()* is interrupted by a signal.
ELSE NO_OPTION
Conformance for mq_send: PASS, NO_OPTION
- 9 IF PCTS_mq_send THEN**
IF {_POSIX_PRIORITY_SCHEDULING} THEN
TEST: When more than one process is waiting to send when space becomes available in the message queue, and the {_POSIX_PRIORITY_SCHEDULING} option is supported, then the process of the highest priority that has been waiting the longest is unblocked to send its message.
ELSE NO_TEST_SUPPORT
ELSE NO_OPTION
Conformance for mq_send: PASS, NO_TEST_SUPPORT, NO_OPTION
- D_1 IF PCTS_mq_send and a PCD.1b documents the following THEN**
TEST: A PCD.1b that documents which waiting process is unblocked does so in 15.2.4.2.
ELSE NO_OPTION
Conformance for mq_send: PASS, NO_OPTION
- R_3 IF PCTS_mq_send THEN**
TEST: When the specified message queue is full, and O_NONBLOCK is set in the message queue description associated with *mqdes*, the message is not queued and *mq_send()* returns an error.
ELSE NO_OPTION
SEE: Assertion *mq_send_EAGAIN* in 15.2.4.4.
- D_2 IF PCTS_mq_send and a PCD.1b documents the following THEN**
TEST: A PCD.1b that documents whether or not it supports the *mq_send()* function does so in 15.2.4.2.
ELSE NO_OPTION
Conformance for mq_send: PASS, NO_OPTION

15.2.4.3 Returns

- R_4 IF PCTS_mq_send THEN**
TEST: When a call to *mq_send()* completes successfully, it returns a value of 0.
ELSE NO_OPTION
SEE: Assertion *mq_send* in 15.2.4.2.

R_5 IF PCTS_mq_send THEN

TEST: When a call to *mq_send()* completes unsuccessfully, no message is enqueued, the function returns -1 and *errno* is set to indicate the error.

ELSE NO_OPTION

SEE: All assertions in 15.2.4.4.

15.2.4.4 Errors

mq_send_EAGAIN

IF PCTS_mq_send THEN

TEST: A call to *mq_send(mqdes, msg_ptr, msg_len, msg_prio)*, when the *O_NONBLOCK* flag is set in the message queue description associated with *mqdes*, and the specified message queue is full, returns a value of -1 and sets *errno* to [EAGAIN].

ELSE NO_OPTION

Conformance for *mq_send*: PASS, NO_OPTION

10 IF PCTS_mq_send THEN

TEST: A call to *mq_send(mqdes, msg_ptr, msg_len, msg_prio)*, when the *mqdes* argument is not a valid message queue descriptor open for writing, returns a value of -1 and sets *errno* to [EBADF].

TR: Open a message queue *O_RDONLY*; then send to that queue.

Send to an invalid message queue.

ELSE NO_OPTION

Conformance for *mq_send*: PASS, NO_OPTION

11 IF PCTS_mq_send THEN

TEST: A call to *mq_send()*, when a signal interrupts the call, returns a value of -1 and sets *errno* to [EINTR].

ELSE NO_OPTION

Conformance for *mq_send*: PASS, NO_OPTION

mq_send_EINVAL

IF PCTS_mq_send THEN

IF {MQ_PRIO_MAX} < {UINT_MAX} THEN

TEST: A call to *mq_send(mqdes, msg_ptr, msg_len, msg_prio)*, when the value of *msg_prio* is outside the valid range, returns a value of -1 and sets *errno* to [EINVAL].

TR: Try a value of {MQ_PRIO_MAX}+1 if it is less than {UINT_MAX}.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *mq_send*: PASS, NO_TEST_SUPPORT, NO_OPTION

mq_send EMSGSIZE

IF PCTS_mq_send THEN

TEST: A call to *mq_send(mqdes, msg_ptr, msg_len, msg_prio)*, when the specified message length *msg_len* exceeds the message size attribute of the message queue, returns a value of -1 and sets *errno* to [EMSGSIZE].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *mq_send*: PASS, NO_OPTION

12 IF not PCTS_mq_send THEN

TEST: A call to *mq_send()* returns a value of -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *mq_send*: PASS, NO_OPTION

15.2.5 Receive a Message From a Message Queue

Function: *mq_receive()*.

15.2.5.1 Synopsis

1

*M_GA_stdC_proto_decl(ssize_t; mq_receive; mqd_t mqdes, char *msg_ptr, size_t msg_len, unsigned int *msg_prio; mqueue.h;;)*

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for *mq_receive*: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(ssize_t; mq_receive; mqueue.h;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for *mq_receive*: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(ssize_t; mq_receive; mqueue.h;;)

SEE: Assertion GA_macro_result_decl in 1.3.4.

Conformance for *mq_receive*: PASS, NO_OPTION

4

M_GA_macro_args (mq_receive; mqueue.h;;)

SEE: Assertion GA_macro_args in 2.7.3.

Conformance for *mq_receive*: PASS, NO_OPTION

15.2.5.2 Description

mq_receive

IF *PCTS_mq_receive* THEN

TEST: A successful call to *mq_receive* () receives the oldest of the highest priority message(s) from the message queue specified by *mqdes*, copying it to the buffer pointed to by the *msg_ptr* argument, removing it from the queue, and returning its length in bytes.

ELSE NO_OPTION

Conformance for *mq_receive*: PASS, NO_OPTION

5

IF *PCTS_mq_receive* THEN

TEST: When the size of the buffer in bytes, specified by the *msg_len* argument, is less than the *mq_msgsize* attribute of the message queue, the function *mq_receive*(*mqdes*, *msg_ptr*, *msg_len*, *msg_prio*) fails and returns an error.

ELSE NO_OPTION

Conformance for *mq_receive*: PASS, NO_OPTION

6

IF *PCTS_mq_receive* THEN

TEST: When the argument *msg_prio* is not NULL, the priority of the selected message is stored in the location referenced by *msg_prio*.

ELSE NO_OPTION

Conformance for *mq_receive*: PASS, NO_OPTION

7

IF *PCTS_mq_receive* THEN

TEST: When the specified message queue is empty, and O_NONBLOCK is not set in the message queue description associated with *mqdes*, *mq_receive*() blocks until a

message is enqueued on the message queue, or until *mq_receive()* is interrupted by a signal.

ELSE NO_OPTION

Conformance for mq_receive: PASS, NO_OPTION

8

IF PCTS_mq_receive THEN

IF { _POSIX_PRIORITY_SCHEDULING } THEN

TEST: When more than one process is waiting to receive a message when a message arrives at an empty queue, and the { _POSIX_PRIORITY_SCHEDULING } option is supported, then the process of highest priority that has been waiting the longest is selected to receive the message.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for mq_receive: PASS, NO_TEST_SUPPORT, NO_OPTION

D_1 IF PCTS_mq_receive and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents which waiting process receives the message, if more than one process is waiting to receive a message when a message arrives at an empty queue, and the { _POSIX_PRIORITY_SCHEDULING } option is not supported, does so in 15.2.5.2.

ELSE NO_OPTION

Conformance for mq_receive: PASS, NO_OPTION

R_1 IF PCTS_mq_receive THEN

TEST: When the specified message queue is empty, and O_NONBLOCK is set in the message queue description associated with *mqdes*, no message is removed from the queue and *mq_receive()* returns an error.

ELSE NO_OPTION

SEE: Assertion for *mq_receive_EAGAIN* in 15.2.5.4.

D_2 IF PCTS_mq_receive and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents whether or not it supports the *mq_receive()* function does so in 15.2.5.2.

ELSE NO_OPTION

Conformance for mq_receive: PASS, NO_OPTION

15.2.5.3 Returns

R_2 IF PCTS_mq_receive THEN

TEST: When a call to *mq_receive()* completes successfully, it returns the length of the selected message in bytes and the message is removed from the queue.

ELSE NO_OPTION

SEE: Assertion for *mq_receive* in 15.2.5.2.

R_3 IF PCTS_mq_receive THEN

TEST: When a call to *mq_receive()* completes unsuccessfully, no message is removed from the queue, the function returns a value of -1 and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: All assertions in 15.2.5.4.

15.2.5.4 Errors

mq_receive_EAGAIN

IF PCTS_mq_receive THEN

TEST: A test to *mq_receive(mqdes, msg_ptr, msg_len, msg_prio)*, when O_NONBLOCK is set in the message description associated with *mqdes*, and the specified message queue is empty, returns a value of -1 and sets *errno* to [EAGAIN].

ELSE NO_OPTION

Conformance for *mq_receive*: PASS, NO_OPTION

9 IF PCTS_mq_receive THEN

TEST: A call to *mq_receive*(*mqdes*, *msg_ptr*, *msg_len*, *msg_prio*), when the *mqdes* argument is not a valid message queue descriptor open for reading, returns a value of -1 and sets *errno* to [EBADF].

TR: Open a message queue O_WRONLY; then receive from that queue.

Receive from an invalid message queue.

ELSE NO_OPTION

Conformance for *mq_receive*: PASS, NO_OPTION

10 IF PCTS_mq_receive THEN

TEST: A call to *mq_receive*(*mqdes*, *msg_ptr*, *msg_len*, *msg_prio*), when the specified message buffer size, *msg_len*, is less than the message size attribute of the message queue, returns a value of -1 and sets *errno* to [EMSGSIZE].

ELSE NO_OPTION

Conformance for *mq_receive*: PASS, NO_OPTION

11 IF PCTS_mq_receive THEN

TEST: A call to *mq_receive*(), when operation is interrupted by a signal, returns a value of -1 and sets *errno* to [EINTR].

ELSE NO_OPTION

Conformance for *mq_receive*: PASS, NO_OPTION

12 IF not PCTS_mq_receive THEN

TEST: A call to *mq_receive*() returns a value of -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *mq_receive*: PASS, NO_OPTION

13 IF PCTS_mq_receive THEN

IF PCTS_DETECT_MESSAGE_DATA_CORRUPTION THEN

TEST: A call to *mq_receive*(), when the implementation has detected a data corruption problem with the message, returns a value of -1 and sets *errno* to [EBADMSG].

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *mq_receive*: PASS, NO_TEST_SUPPORT, NO_OPTION

15.2.6 Notify Process that a Message is Available on a Queue

Function: *mq_notify*().

15.2.6.1 Synopsis

1

M_GA_stdC_proto_decl(*int*; *mq_notify*; *mqd_t* *mqdes*, *const struct sigevent* **notification*; *mqueue.h*;;;)

SEE: Assertion GA_stdC_proto_decl in 2.7.3.

Conformance for *mq_notify*: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(*mq_notify*; *mqueue.h*;;;)

SEE: Assertion GA_commonC_int_result_decl in 2.7.3.

Conformance for *mq_notify*: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; mq_notify; mqueue.h;;;)**SEE:** Assertion GA_macro_result_decl in 1.3.4.*Conformance for mq_notify: PASS, NO_OPTION*

4

M_GA_macro_args (mq_notify; mqueue.h;;;)**SEE:** Assertion GA_macro_args in 2.7.3.*Conformance for mq_notify: PASS, NO_OPTION***15.2.6.2 Description****mq_notify****IF PCTS_mq_notify THEN****TEST:** A call to *mq_notify(mqdes, notification)*, if the argument *notification* is not **NULL**, registers the calling process to be notified of message arrival at an empty message queue associated with the specified message queue descriptor *mqdes* and returns a value of 0.The notification specified by the *notification* argument is sent to the process when the message queue transitions from empty to nonempty.**ELSE NO_OPTION***Conformance for mq_notify: PASS, NO_OPTION***R_1 IF PCTS_mq_notify THEN****TEST:** At any time, only one process may be registered for notification by a message queue. When the calling process, or any other process, has already registered for notification of message arrival at the specified message queue, subsequent attempts to register for that message queue fail.**ELSE NO_OPTION****SEE:** Assertion mq_notify_EBUSY in 15.2.5.4.

5

IF PCTS_mq_notify THEN**TEST:** When *notification* is **NULL**, and the process is currently registered for notification by the specified message queue, the existing registration for notification is removed.**ELSE NO_OPTION***Conformance for mq_notify: PASS, NO_OPTION*

6

IF PCTS_mq_notify THEN**TEST:** When notification is sent to the registered process, its registration is removed and the message queue is made available for registration.**ELSE NO_OPTION***Conformance for mq_notify: PASS, NO_OPTION*

7

IF PCTS_mq_notify THEN**IF PCTS_mq_receive THEN****TEST:** When a process has registered for notification of message arrival at a message queue, and some process is blocked in *mq_receive()* waiting to receive a message when a message arrives at the queue, the arriving message satisfies the appropriate *mq_receive()* (see POSIX.1b {3}, 15.2.5).

The resulting behavior is as if the message queue remains empty, and no notification is sent.

ELSE NO_TEST_SUPPORT**ELSE NO_OPTION***Conformance for mq_notify: PASS, NO_TEST_SUPPORT, NO_OPTION***D_1 IF PCTS_mq_notify and a PCD.1b documents the following THEN****TEST:** A PCD.1b that documents whether or not it supports the *mq_notify()* function does so in 15.2.6.2.

ELSE NO_OPTION

Conformance for *mq_notify*: PASS, NO_OPTION

15.2.6.3 Returns

R_2 IF PCTS_mq_notify THEN

TEST: When a call to *mq_notify()* completes successfully, it returns a value of 0.

ELSE NO_OPTION

SEE: Assertion *mq_notify* in 15.2.6.2.

R_3 IF PCTS_mq_notify THEN

TEST: When a call to *mq_notify()* completes unsuccessfully, it returns a value of -1 and sets *errno* to indicate the error.

ELSE NO_OPTION

SEE: All assertions in 15.2.6.4.

15.2.6.4 Errors

8 IF PCTS_mq_notify THEN

TEST: A call to *mq_notify(mqdes, notification)*, when the *mqdes* argument is not a valid message queue descriptor, returns a value of -1 and sets *errno* to [EBADF].

ELSE NO_OPTION

Conformance for *mq_notify*: PASS, NO_OPTION

mq_notify_EBUSY

IF PCTS_mq_notify THEN

TEST: A call to *mq_notify()*, when a process is already registered for notification by the message queue, returns a value of -1 and sets *errno* to [EBUSY].

ELSE NO_OPTION

Conformance for *mq_notify*: PASS, NO_OPTION

9 IF not PCTS_mq_notify THEN

TEST: A call to *mq_notify()* returns a value of -1 and sets *errno* to [ENOSYS].

ELSE NO_OPTION

Conformance for *mq_notify*: PASS, NO_OPTION

15.2.7 Set Message Queue Attributes

Function: *mq_setattr()*.

15.2.7.1 Synopsis

1

*M_GA_stdC_proto_decl(int; mq_setattr; mqd_t mqdes, const struct mq_attr *mqstat, struct mq_attr *omqstat; mqqueue.h;;)*

SEE: Assertion *GA_stdC_proto_decl* in 2.7.3.

Conformance for *mq_setattr*: PASS[1, 2], NO_OPTION

2

M_GA_commonC_int_result_decl(mq_setattr; mqqueue.h;;)

SEE: Assertion *GA_commonC_int_result_decl* in 2.7.3.

Conformance for *mq_setattr*: PASS[1, 2], NO_OPTION

3

M_GA_macro_result_decl(int; mq_setattr; mqqueue.h;;)

SEE: Assertion *GA_macro_result_decl* in 1.3.4.

Conformance for *mq_setattr*: PASS, NO_OPTION

4

M_GA_macro_args (*mq_setattr*; *mqueue.h*;;)

SEE: Assertion *GA_macro_args* in 2.7.3.

Conformance for *mq_setattr*: PASS, NO_OPTION

15.2.7.2 Description

mq_setattr

IF *PCTS_mq_setattr* THEN

TEST: A call to *mq_setattr*() sets attributes associated with the message queue specified by *mqdes* and returns a value of zero.

ELSE NO_OPTION

Conformance for *mq_setattr*: PASS, NO_OPTION

5

IF *PCTS_mq_setattr* THEN

TEST: The message queue attributes corresponding to *mq_flags*, defined in the *mq_attr* structure, are set to the specified values upon successful completion of *mq_setattr*().

ELSE NO_OPTION

Conformance for *mq_setattr*: PASS, NO_OPTION

D_1 IF *PCTS_mq_setattr* THEN

TEST: The PCD.1b documents any implementation-defined flags that can be set in *mq_flags* in 15.2.7.2.

ELSE NO_OPTION

Conformance for *mq_setattr*: PASS, NO_OPTION

6

IF *PCTS_mq_setattr* THEN

TEST: The values of the *mq_maxmsg*, *mq_msgsize*, and *mq_curmsgs* members of the *mq_attr* structure are ignored by *mq_setattr*().

ELSE NO_OPTION

Conformance for *mq_setattr*: PASS, NO_OPTION

7

IF *PCTS_mq_setattr* THEN

IF *PCTS_mq_getattr* THEN

TEST: When *omqstat* is non-NULL, the function *mq_setattr*() stores, in the location referenced by *omqstat*, the previous message queue attributes and the current queue status.

These values are the same as would be returned by a call to *mq_getattr*() at that point.

ELSE NO_TEST_SUPPORT

ELSE NO_OPTION

Conformance for *mq_setattr*: PASS, NO_TEST_SUPPORT, NO_OPTION

D_2 IF *PCTS_mq_setattr* and a PCD.1b documents the following THEN

TEST: A PCD.1b that documents whether or not it supports the *mq_setattr*() function does so in 15.2.7.2.

ELSE NO_OPTION

Conformance for *mq_setattr*: PASS, NO_OPTION

15.2.7.3 Returns

R_1 IF *PCTS_mq_setattr* THEN

TEST: When a call to *mq_setattr*() completes successfully, the function returns a value of 0 and changes the attributes of the message queue as specified.

ELSE NO_OPTION

SEE: Assertion `mq_setattr` in 15.2.7.2.

R_2 IF PCTS_mq_setattr THEN

TEST: When a call to `mq_setattr()` completes unsuccessfully, the message queue attributes are unchanged, and the function returns a value of -1 and sets `errno` to indicate the error.

ELSE NO_OPTION

SEE: All assertions in 15.2.7.4.

15.2.7.4 Errors

9 IF not PCTS_mq_setattr THEN

TEST: A call to `mq_setattr()` returns a value of -1 and sets `errno` to `[ENOSYS]`.

ELSE NO_OPTION

Conformance for `mq_setattr`: *PASS, NO_OPTION*

15.2.8 Get Message Queue Attributes

Function: `mq_getattr()`

15.2.8.1 Synopsis

1

`M_GA_stdC_proto_decl(int; mq_getattr; mqd_t mqdes, struct mq_attr *mqstat; mqueue.h;;)`

SEE: Assertion `GA_stdC_proto_decl` in 2.7.3.

Conformance for `mq_getattr`: *PASS[1, 2], NO_OPTION*

2

`M_GA_commonC_int_result_decl(mq_getattr; mqueue.h;;)`

SEE: Assertion `GA_commonC_int_result_decl` in 2.7.3.

Conformance for `mq_getattr`: *PASS[1, 2], NO_OPTION*

3

`M_GA_macro_result_decl(int; mq_getattr; mqueue.h;;)`

SEE: Assertion `GA_macro_result_decl` in 1.3.4.

Conformance for `mq_getattr`: *PASS, NO_OPTION*

4

`M_GA_macro_args (mq_getattr; mqueue.h;;)`

SEE: Assertion `GA_macro_args` in 2.7.3.

Conformance for `mq_getattr`: *PASS, NO_OPTION*

15.2.8.2 Description

mq_getattr

IF PCTS_mq_getattr THEN

TEST: A call to `mq_getattr()` gets status information and attributes associated with the message queue specified in `mqdes` and returns 0.

ELSE NO_OPTION

Conformance for `mq_getattr`: *PASS, NO_OPTION*

5

IF PCTS_mq_getattr THEN

IF PCTS_mq_setattr THEN

TEST: After a successful call to `mq_getattr(mqdes, mqstat)`, the `mq_flags` member within the `mq_attr` structure referenced by the `mqstat` argument has the value that was set