

RTEMS POSIX 1003.1 Compliance Guide

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On-Line Applications Research Corporation

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Preface

This document lists the functions, constant, macros, feature flags, and types defined in the POSIX 1003.1 standard. Each section in this document corresponds to a section in the 1003.1 standard and the implementation status of the items required by the standard are listed.

RTEMS supports a number of POSIX process, user, and group oriented routines in what is referred to as a "SUSP" (Single-User, Single Process) manner. RTEMS supports a single process, multithreaded POSIX 1003.1b environment. In a pure world, there would be no reason to even include routines like `getpid()` when there can only be one process. But providing routines like `getpid()` and making them work in a sensible fashion for an embedded environment while not returning ENOSYS (for not implemented) makes it significantly easier to port code from a UNIX environment without modifying it.

1 General

1.1 Scope

1.2 Normative References

1.3 Conformance

NGROUPS_MAX, Feature Flag,
_POSIX_ASYNCHRONOUS_IO, Feature Flag,
_POSIX_CHOWN_RESTRICTED, Feature Flag,
_POSIX_FSYNC, Feature Flag,
_POSIX_JOB_CONTROL, Feature Flag,
_POSIX_MAPPED_FILES, Feature Flag,
_POSIX_MEMLOCK, Feature Flag,
_POSIX_MEMLOCK_RANGE, Feature Flag,
_POSIX_MEMORY_PROTECTION, Feature Flag,
_POSIX_MESSAGE_PASSING, Feature Flag,
_POSIX_PRIORITIZED_IO, Feature Flag,
_POSIX_PRIORITY_SCHEDULING, Feature Flag,
_POSIX_REALTIME_SIGNALS, Feature Flag,
_POSIX_SEMAPHORES, Feature Flag,
_POSIX_SHARED_MEMORY_OBJECTS, Feature Flag,
_POSIX_SYNCHRONIZED_IO, Feature Flag,
_POSIX_TIMERS, Feature Flag,
_POSIX_THREAD_PRIO_INHERIT, Feature Flag,
_POSIX_THREAD_PRIORITY_SCHEDULING, Feature Flag,
_POSIX_THREADS, Feature Flag,
_POSIX_THREAD_SAFE_FUNCTIONS, Feature Flag,

2 Terminology and General Requirements

2.1 Conventions

2.2 Definitions

2.3 General Concepts

2.4 Error Numbers

E2BIG, Constant, Implemented
EACCES, Constant, Implemented
EAGAIN, Constant, Implemented
EBADF, Constant, Implemented
EBADMSG, Constant, Implemented
EBUSY, Constant, Implemented
ECANCELED, Constant, Unimplemented
ECHILD, Constant, Implemented
EDEADLK, Constant, Implemented
EDOM, Constant, Implemented
EEXIST, Constant, Implemented
EFAULT, Constant, Implemented
EFBIG, Constant, Implemented
EINPROGRESS, Constant, Implemented
EINTR, Constant, Implemented
EINVAL, Constant, Implemented
EIO, Constant, Implemented
EISDIR, Constant, Implemented
EMFILE, Constant, Implemented
EMLINK, Constant, Implemented
EMSGSIZE, Constant, Implemented
ENAMETOOLONG, Constant, Implemented
ENFILE, Constant, Implemented
ENODEV, Constant, Implemented
ENOENT, Constant, Implemented
ENOEXEC, Constant, Implemented
ENOLCK, Constant, Implemented
ENOMEM, Constant, Implemented
ENOSPC, Constant, Implemented
ENOSYS, Constant, Implemented
ENOTDIR, Constant, Implemented
ENOTEMPTY, Constant, Implemented
ENOTSUP, Constant, Implemented
ENOTTY, Constant, Implemented
ENXIO, Constant, Implemented
EPERM, Constant, Implemented

EPIPE, Constant, Implemented
ERANGE, Constant, Implemented
EROFS, Constant, Implemented
ESPIPE, Constant, Implemented
ESRCH, Constant, Implemented
ETIMEDOUT, Constant, Implemented
EXDEV, Constant, Implemented

2.5 Primitive System Types

dev_t, Type, Implemented
gid_t, Type, Implemented
ino_t, Type, Implemented
mode_t, Type, Implemented
nlink_t, Type, Implemented
off_t, Type, Implemented
pid_t, Type, Implemented
pthread_t, Type, Implemented
pthread_attr_t, Type, Implemented
pthread_mutex_t, Type, Implemented
pthread_mutex_attr_t, Type, Implemented
pthread_cond_t, Type, Implemented
pthread_cond_attr_t, Type, Implemented
pthread_key_t, Type, Implemented
pthread_once_t, Type, Implemented
size_t, Type, Implemented
ssize_t, Type, Implemented
time_t, Type, Implemented
uid_t, Type, Implemented

NOTE: time_t is not listed in this section but is used by many functions.

2.6 Environment Description

2.7 C Language Definitions

2.7.1 Symbols From the C Standard

NULL, Constant, Implemented

2.7.2 POSIX.1 Symbols

_POSIX_C_SOURCE, Feature Flag,

2.8 Numerical Limits

2.9 C Language Limits

CHAR_BIT, Constant, Implemented
CHAR_MAX, Constant, Implemented

CHAR_MIN, Constant, Implemented
 INT_MAX, Constant, Implemented
 INT_MIN, Constant, Implemented
 LONG_MAX, Constant, Implemented
 LONG_MIN, Constant, Implemented
 MB_LEN_MAX, Constant, Implemented
 SCHAR_MAX, Constant, Implemented
 SCHAR_MIN, Constant, Implemented
 SHRT_MAX, Constant, Implemented
 SHRT_MIN, Constant, Implemented
 UCHAR_MAX, Constant, Implemented
 UINT_MAX, Constant, Implemented
 ULONG_MAX, Constant, Implemented
 USHRT_MAX, Constant, Implemented

NOTE: These are implemented in GCC's limits.h file.

2.9.1 Minimum Values

_POSIX_AIO_LISTIO_MAX, Constant, Implemented
 _POSIX_AIO_MAX, Constant, Implemented
 _POSIX_ARG_MAX, Constant, Implemented
 _POSIX_CHILD_MAX, Constant, Implemented
 _POSIX_DELAYTIMER_MAX, Constant, Implemented
 _POSIX_LINK_MAX, Constant, Implemented
 _POSIX_LOGIN_NAME_MAX, Constant, Implemented
 _POSIX_MAX_CANON, Constant, Implemented
 _POSIX_MAX_INPUT, Constant, Implemented
 _POSIX_MQ_OPEN_MAX, Constant, Implemented
 _POSIX_MQ_PRIO_MAX, Constant, Implemented
 _POSIX_NAME_MAX, Constant, Implemented
 _POSIX_NGROUPS_MAX, Constant, Implemented
 _POSIX_OPEN_MAX, Constant, Implemented
 _POSIX_PATH_MAX, Constant, Implemented
 _POSIX_PIPE_BUF, Constant, Implemented
 _POSIX_RTSIG_MAX, Constant, Implemented
 _POSIX_SEM_NSEMS_MAX, Constant, Implemented
 _POSIX_SEM_VALUE_MAX, Constant, Implemented
 _POSIX_SIGQUEUE_MAX, Constant, Implemented
 _POSIX_SSIZE_MAX, Constant, Implemented
 _POSIX_STREAM_MAX, Constant, Implemented
 _POSIX_THREAD_DESTRUCTOR_ITERATIONS, Constant, Implemented
 _POSIX_THREAD_KEYS_MAX, Constant, Implemented
 _POSIX_THREAD_THREADS_MAX, Constant, Implemented
 _POSIX_TTY_NAME_MAX, Constant, Implemented
 _POSIX_TIME_MAX, Constant, Unimplemented
 _POSIX_TZNAME_MAX, Constant, Implemented

2.9.2 Run-Time Increaseable Values

_POSIX_NGROUPS_MAX, Constant, Implemented

2.9.3 Run-Time Invariant Values (Possible Indeterminate)

AIO_LISTIO_MAX, Constant, Implemented

AIO_MAX, Constant, Implemented

AIO_PRIO_DELTA_MAX, Constant, Implemented

ARG_MAX, Constant, Implemented

CHILD_MAX, Constant, Implemented

DELAYTIMER_MAX, Constant, Implemented

LOGIN_NAME_MAX, Constant, Implemented

MQ_OPEN_MAX, Constant, Implemented

OPEN_MAX, Constant, Implemented

PAGESIZE, Constant, Implemented

PTHREAD_DESTRUCTOR_ITERATIONS, Constant, Implemented

PTHREAD_KEYS_MAX, Constant, Implemented

PTHREAD_STACK_MIN, Constant, Implemented

PTHREAD_THREADS_MAX, Constant, Implemented

RTSIG_MAX, Constant, Implemented

SEM_NSEMS_MAX, Constant, Implemented

SEM_VALUE_MAX, Constant, Implemented

SIGQUEUE_MAX, Constant, Implemented

STREAM_MAX, Constant, Implemented

TIMER_MAX, Constant, Implemented

TTY_NAME_MAX, Constant, Implemented

TZNAME_MAX, Constant, Implemented

2.9.4 Pathname Variable Values

LINK_MAX, Constant, Implemented

MAX_CANON, Constant, Implemented

MAX_INPUT, Constant, Implemented

NAME_MAX, Constant, Implemented

PATH_MAX, Constant, Implemented

PIPE_BUF, Constant, Implemented

2.9.5 Invariant Values

SSIZE_MAX, Constant, Implemented

2.9.6 Maximum Values

_POSIX_CLOCKRES_MIN, Constant, Implemented

2.10 Symbolic Constants

2.10.1 Symbolic Constants for the access Function

R_OK, Constant, Implemented

W_OK, Constant, Implemented

X_OK, Constant, Implemented
F_OK, Constant, Implemented

2.10.2 Symbolic Constants for the lseek Function

SEEK_SET, Constant, Implemented
SEEK_CUR, Constant, Implemented
SEEK_END, Constant, Implemented

2.10.3 Compile-Time Symbolic Constants for Portability Specifications

_POSIX_ASYNCHRONOUS_IO, Feature Flag,
_POSIX_FSYNC, Feature Flag,
_POSIX_JOB_CONTROL, Feature Flag,
_POSIX_MAPPED_FILES, Feature Flag,
_POSIX_MEMLOCK, Feature Flag,
_POSIX_MEMLOCK_RANGE, Feature Flag,
_POSIX_MEMORY_PROTECTION, Feature Flag,
_POSIX_MESSAGE_PASSING, Feature Flag,
_POSIX_PRIORITIZED_IO, Feature Flag,
_POSIX_PRIORITY_SCHEDULING, Feature Flag,
_POSIX_REALTIME_SIGNALS, Feature Flag,
_POSIX_SAVED_IDS, Feature Flag,
_POSIX_SEMAPHORES, Feature Flag,
_POSIX_SHARED_MEMORY_OBJECTS, Feature Flag,
_POSIX_SYNCHRONIZED_IO, Feature Flag,
_POSIX_THREADS, Feature Flag,
_POSIX_THREAD_ATTR_STACKADDR, Feature Flag,
_POSIX_THREAD_ATTR_STACKSIZE, Feature Flag,
_POSIX_THREAD_PRIORITY_SCHEDULING, Feature Flag,
_POSIX_THREAD_PRIO_INHERIT, Feature Flag,
_POSIX_THREAD_PRIO_CEILING, Feature Flag,
_POSIX_THREAD_PROCESS_SHARED, Feature Flag,
_POSIX_THREAD_SAFE_FUNCTIONS, Feature Flag,
_POSIX_TIMERS, Feature Flag,
_POSIX_VERSION, Feature Flag,

2.10.4 Execution-Time Symbolic Constants for Portability Specifications

_POSIX_ASYNC_IO, Feature Flag,
_POSIX_CHOWN_RESTRICTED, Feature Flag,
_POSIX_NO_TRUNC, Feature Flag,
_POSIX_PRIO_IO, Feature Flag,
_POSIX_SYNC_IO, Feature Flag,
_POSIX_VDISABLE, Feature Flag,

3 Process Primitives

3.1 Process Creation and Execution

3.1.1 Process Creation

`fork()`, Function, Unimplementable, Requires Processes

3.1.2 Execute a File

`execl()`, Function, Unimplementable, Requires Processes

`execv()`, Function, Unimplementable, Requires Processes

`execle()`, Function, Unimplementable, Requires Processes

`execve()`, Function, Unimplementable, Requires Processes

`execlp()`, Function, Unimplementable, Requires Processes

`execvp()`, Function, Unimplementable, Requires Processes

3.1.3 Register Fork Handlers

`pthread_atfork()`, Function, Unimplementable, Requires Processes

3.2 Process Termination

3.2.1 Wait for Process Termination

`wait()`, Function, Unimplementable, Requires Processes

`waitpid()`, Function, Unimplementable, Requires Processes

`WNOHANG`, Constant, Unimplementable, Requires Processes

`WUNTRACED`, Constant, Unimplementable, Requires Processes

`WIFEXITED()`, Function, Unimplementable, Requires Processes

`WEXITSTATUS()`, Function, Unimplementable, Requires Processes

`WIFSIGNALED()`, Function, Unimplementable, Requires Processes

`WTERMSIG()`, Function, Unimplementable, Requires Processes

`WIFSTOPPED()`, Function, Unimplementable, Requires Processes

`WSTOPSIG()`, Function, Unimplementable, Requires Processes

3.2.2 Terminate a Process

`_exit()`, Function, Implemented

3.3 Signals

3.3.1 Signal Concepts

3.3.1.1 Signal Names

`sigset_t`, Type, Implemented

`SIG_DFL`, Constant, Implemented

`SIG_IGN`, Constant, Implemented

`SIG_ERR`, Constant, Implemented

`SIGABRT`, Constant, Implemented

```

SIGALRM, Constant, Implemented
SIGFPE, Constant, Implemented
SIGHUP, Constant, Implemented
SIGILL, Constant, Implemented
SIGINT, Constant, Implemented
SIGKILL, Constant, Implemented
SIGPIPE, Constant, Implemented
SIGQUIT, Constant, Implemented
SIGSEGV, Constant, Implemented
SIGTERM, Constant, Implemented
SIGUSR1, Constant, Implemented
SIGUSR2, Constant, Implemented
SIGCHLD, Constant, Unimplemented
SIGCONT, Constant, Unimplemented
SIGSTOP, Constant, Unimplemented
SIGTSTP, Constant, Unimplemented
SIGTTIN, Constant, Unimplemented
SIGTTOU, Constant, Unimplemented
SIGBUS, Constant, Implemented
SIGRTMIN, Constant, Implemented
SIGRTMAX, Constant, Implemented

```

NOTE: SIG_ERR is technically an extension to the C Library which is not documented anywhere else according to the index.

3.3.1.2 Signal Generation and Delivery

```

struct sigevent, Type, Implemented
union sigval, Type, Implemented
SIGEV_NONE, Constant, Implemented
SIGEV_SIGNAL, Constant, Implemented
SIGEV_THREAD, Constant, Implemented

```

3.3.1.3 Signal Actions

```

siginfo_t, Type, Implemented
SI_USER, Constant, Implemented
SI_QUEUE, Constant, Implemented
SI_TIMER, Constant, Implemented
SI_ASYNCIO, Constant, Implemented
SI_MSGQ, Constant, Implemented

```

3.3.2 Send a Signal to a Process

```

kill(), Function, Implemented

```

3.3.3 Manipulate Signal Sets

```

sigemptyset(), Function, Implemented
sigfillset(), Function, Implemented
sigaddset(), Function, Implemented

```

`sigdelset()`, Function, Implemented
`sigismember()`, Function, Implemented

3.3.4 Examine and Change Signal Action

`sigaction()`, Function, Implemented
`sigaction`, Type, Implemented
`SA_NOCLDSTOP`, Constant, Implemented
`SA_SIGINFO`, Constant, Implemented

3.3.5 Examine and Change Blocked Signals

`pthread_sigmask()`, Function, Implemented
`sigprocmask()`, Function, Implemented
`SIG_BLOCK`, Constant, Implemented
`SIG_UNBLOCK`, Constant, Implemented
`SIG_SETMASK`, Constant, Implemented

3.3.6 Examine Pending Signals

`sigpending()`, Function, Implemented

3.3.7 Wait for a Signal

`sigsuspend()`, Function, Implemented

3.3.8 Synchronously Accept a Signal

`sigwait()`, Function, Implemented
`sigwaitinfo()`, Function, Implemented
`sigtimedwait()`, Function, Implemented

3.3.9 Queue a Signal to a Process

`sigqueue()`, Function, Implemented

3.3.10 Send a Signal to a Thread

`pthread_kill()`, Function, Implemented

3.4 Timer Operations

3.4.1 Schedule Alarm

`alarm()`, Function, Implemented

3.4.2 Suspend Process Execution

`pause()`, Function, Implemented

3.4.3 Delay Process Execution

`sleep()`, Function, Implemented

4 Process Environment

4.1 Process Identification

4.1.1 Get Process and Parent Process IDs

`getpid()`, Function, Implemented, SUSP Functionality
`getppid()`, Function, Implemented, SUSP Functionality

4.2 User Identification

4.2.1 Get Real User Effective User Real Group and Effective Group IDs

`getuid()`, Function, Implemented, SUSP Functionality
`geteuid()`, Function, Implemented, SUSP Functionality
`getgid()`, Function, Implemented, SUSP Functionality
`getegid()`, Function, Implemented, SUSP Functionality

4.2.2 Set User and Group IDs

`setuid()`, Function, Implemented, SUSP Functionality
`setgid()`, Function, Implemented, SUSP Functionality

4.2.3 Get Supplementary Group IDs

`getgroups()`, Function, Implemented, SUSP Functionality

4.2.4 Get User Name

`getlogin()`, Function, Implemented, SUSP Functionality
`getlogin_r()`, Function, Implemented, SUSP Functionality

4.3 Process Groups

4.3.1 Get Process Group ID

`getpgrp()`, Function, Implemented, SUSP Functionality

4.3.2 Create Session and Set Process Group ID

`setsid()`, Function, Implemented, SUSP Functionality

4.3.3 Set Process Group ID for Job Control

`setpgid()`, Function, Dummy Implementation

4.4 System Identification

4.4.1 Get System Name

`struct utsname`, Type, Implemented
`uname()`, Function, Implemented

4.5 Time

4.5.1 Get System Time

`time()`, Function, Implemented

4.5.2 Get Process Times

`struct tms`, Type, Implemented
`times()`, Function, Implemented

NOTE: `times` always returns 0 for `tms_stime`, `tms_cutime`, and `tms_cstime` fields of the `struct tms` returned.

4.6 Environment Variables

4.6.1 Environment Access

`getenv()`, Function, Implemented

4.7 Terminal Identification

4.7.1 Generate Terminal Pathname

`ctermid()`, Function, Implemented

4.7.2 Determine Terminal Device Name

`ttyname()`, Function, Implemented, untested
`ttyname_r()`, Function, Implemented, untested
`isatty()`, Function, Implemented

4.8 Configurable System Variables

4.8.1 Get Configurable System Variables

`sysconf()`, Function, Dummy Implementation
`_SC_AIO_LISTIO_MAX`, Constant, Implemented
`_SC_AIO_MAX`, Constant, Implemented
`_SC_AIO_PRIO_DELTA_MAX`, Constant, Implemented
`_SC_ARG_MAX`, Constant, Implemented
`_SC_CHILD_MAX`, Constant, Implemented
`_SC_CLK_TCK`, Constant, Implemented
`CLK_TCK`, Constant, Implemented
`_SC_DELAYTIMER_MAX`, Constant, Implemented
`_SC_GETGR_R_SIZE_MAX`, Constant, Implemented
`_SC_GETPW_R_SIZE_MAX`, Constant, Implemented
`_SC_LOGIN_NAME_MAX`, Constant, Implemented
`_SC_MQ_OPEN_MAX`, Constant, Implemented
`_SC_MQ_PRIO_MAX`, Constant, Implemented
`_SC_NGROUPS_MAX`, Constant, Implemented
`_SC_OPEN_MAX`, Constant, Implemented

```
_SC_PAGESIZE, Constant, Implemented
_SC_RTSIG_MAX, Constant, Implemented
_SC_SEM_NSEMS_MAX, Constant, Implemented
_SC_SEM_VALUE_MAX, Constant, Implemented
_SC_SIGQUEUE_MAX, Constant, Implemented
_SC_STREAM_MAX, Constant, Implemented
_SC_THREAD_DESTRUCTOR_ITERATIONS, Constant, Implemented
_SC_THREAD_KEYS_MAX, Constant, Implemented
_SC_THREAD_STACK_MIN, Constant, Implemented
_SC_THREAD_THREADS_MAX, Constant, Implemented
_SC_TIMER_MAX, Constant, Implemented
_SC_TTY_NAME_MAX, Constant, Implemented
_SC_TZNAME_MAX, Constant, Implemented
_SC_ASYNCHRONOUS_IO, Constant, Implemented
_SC_FSYNC, Constant, Implemented
_SC_JOB_CONROL, Constant, Implemented
_SC_MAPPED_FILES, Constant, Implemented
_SC_MEMLOCK, Constant, Implemented
_SC_MEMLOCK_RANGE, Constant, Implemented
_SC_MEMORY_PROTECTION, Constant, Implemented
_SC_MESSAGE_PASSING, Constant, Implemented
_SC_PRIORITIZED_IO, Constant, Implemented
_SC_PRIORITY_SCHEDULING, Constant, Unimplemented
_SC_REALTIME_SIGNALS, Constant, Implemented
_SC_SAVED_IDS, Constant, Implemented
_SC_SEMAPHORES, Constant, Implemented
_SC_SHARED_MEMORY_OBJECTS, Constant, Implemented
_SC_SYNCHRONIZED_IO, Constant, Implemented
_SC_TIMERS, Constant, Implemented
_SC_THREADS, Constant, Implemented
_SC_THREAD_ATTR_STACKADDR, Constant, Implemented
_SC_THREAD_ATTR_STACKSIZE, Constant, Implemented
_SC_THREAD_PRIORITY_SCHEDULING, Constant, Implemented
_SC_THREAD_PRIO_INHERIT, Constant, Implemented
_SC_THREAD_PRIO_PROTECT, Constant, Unimplemented
_SC_THREAD_PROCESS_SHARED, Constant, Implemented
_SC_THREAD_SAFE_FUNCTIONS, Constant, Implemented
_SC_VERSION, Constant, Implemented
```


5 Files and Directories

5.1 Directories

5.1.1 Format of Directory Entries

5.1.2 Directory Operations

```
struct dirent, Type, Implemented
opendir(), Function, Implemented
readdir(), Function, Implemented
readdir_r(), Function, Implemented
rewinddir(), Function, Implemented
closedir(), Function, Implemented
```

5.2 Working Directory

5.2.1 Change Current Working Directory

```
chdir(), Function, Implemented
```

5.2.2 Get Working Directory Pathname

```
getcwd(), Function, Implemented
```

5.3 General File Creation

5.3.1 Open a File

```
open(), Function, Implemented
O_RDONLY, Constant, Implemented
O_WRONLY, Constant, Implemented
O_RDWR, Constant, Implemented
O_APPEND, Constant, Implemented
O_CREAT, Constant, Implemented
O_DSYNC, Constant, Unimplemented
O_EXCL, Constant, Implemented
O_NOCTTY, Constant, Implemented
O_NONBLOCK, Constant, Implemented
O_RSYNC, Constant, Unimplemented
O_SYNC, Constant, Implemented
O_TRUNC, Constant, Implemented
```

NOTE: In the newlib fcntl.h, O_SYNC is defined only if _POSIX_SOURCE is not defined. This seems wrong.

5.3.2 Create a New File or Rewrite an Existing One

```
creat(), Function, Implemented
```

5.3.3 Set File Creation Mask

`umask()`, Function, Implemented

5.3.4 Link to a File

`link()`, Function, Implemented

5.4 Special File Creation

5.4.1 Make a Directory

`mkdir()`, Function, Implemented

5.4.2 Make a FIFO Special File

`mkfifo()`, Function, Untested Implementation

NOTE: `mkfifo()` is implemented but no filesystem supports FIFOs.

5.5 File Removal

5.5.1 Remove Directory Entries

`unlink()`, Function, Implemented

5.5.2 Remove a Directory

`rmdir()`, Function, Implemented

5.5.3 Rename a File

`rename()`, Function, Implemented

5.6 File Characteristics

5.6.1 File Characteristics Header and Data Structure

`struct stat`, Type, Implemented

5.6.1.1 <sys/stat.h> File Types

`S_ISBLK()`, Function, Implemented
`S_ISCHR()`, Function, Implemented
`S_ISDIR()`, Function, Implemented
`S_ISFIFO()`, Function, Implemented
`S_ISREG()`, Function, Implemented
`S_TYPEISMQ()`, Function, Unimplemented
`S_TYPEISSEM()`, Function, Unimplemented
`S_TYPEISSHM()`, Function, Unimplemented

5.6.1.2 <sys/stat.h> File Modes

S_IRWXU, Constant, Implemented
S_IRUSR, Constant, Implemented
S_IWUSR, Constant, Implemented
S_IXUSR, Constant, Implemented
S_IRWXG, Constant, Implemented
S_IRGRP, Constant, Implemented
S_IWGRP, Constant, Implemented
S_IXGRP, Constant, Implemented
S_IRWXO, Constant, Implemented
S_IROTH, Constant, Implemented
S_IWOTH, Constant, Implemented
S_IXOTH, Constant, Implemented
S_ISUID, Constant, Implemented
S_ISGID, Constant, Implemented

5.6.1.3 <sys/stat.h> Time Entries

5.6.2 Get File Status

stat(), Function, Implemented
fstat(), Function, Implemented

5.6.3 Check File Accessibility

access(), Function, Implemented

5.6.4 Change File Modes

chmod(), Function, Implemented
fchmod(), Function, Implemented

5.6.5 Change Owner and Group of a File

chown(), Function, Implemented

5.6.6 Set File Access and Modification Times

struct utimbuf, Type, Implemented
utime(), Function, Implemented

5.6.7 Truncate a File to a Specified Length

ftruncate(), Function, Implemented

5.7 Configurable Pathname Variable

5.7.1 Get Configurable Pathname Variables

pathconf(), Function, Implemented
fpathconf(), Function, Implemented
_PC_LINK_MAX, Constant, Implemented
_PC_MAX_CANON, Constant, Implemented

```
_PC_MAX_INPUT, Constant, Implemented
_PC_MAX_INPUT, Constant, Implemented
_PC_NAME_MAX, Constant, Implemented
_PC_PATH_MAX, Constant, Implemented
_PC_PIPE_BUF, Constant, Implemented
_PC_ASYNC_IO, Constant, Implemented
_PC_CHOWN_RESTRICTED, Constant, Implemented
_PC_NO_TRUNC, Constant, Implemented
_PC_PRIO_IO, Constant, Implemented
_PC_SYNC_IO, Constant, Implemented
_PC_VDISABLE, Constant, Implemented
```

NOTE: The newlib unistd.h and sys/unistd.h are installed and the include search patch is used to get the right one. There are conflicts between the newlib unistd.h and RTEMS' version.

6 Input and Output Primitives

6.1 Pipes

6.1.1 Create an Inter-Process Channel

`pipe()`, Function, Dummy Implementation

NOTE: `pipe()` returns `ENOSYS`.

6.2 File Descriptor Manipulation

6.2.1 Duplicate an Open File Descriptor

`dup()`, Function, Implemented

`dup2()`, Function, Implemented

6.3 File Descriptor Deassignment

6.3.1 Close a File

`close()`, Function, Implemented

6.4 Input and Output

6.4.1 Read from a File

`read()`, Function, Implemented

6.4.2 Write to a File

`write()`, Function, Implemented

6.5 Control Operations on Files

6.5.1 Data Definitions for File Control Operations

6.5.2 File Control

`struct flock`, Type, Implemented

`fcntl()`, Function, Implemented

`F_DUPFD`, Constant, Implemented

`F_GETFD`, Constant, Implemented

`F_GETLK`, Constant, Implemented

`F_SETFD`, Constant, Implemented

`F_GETFL`, Constant, Implemented

`F_SETFL`, Constant, Implemented

`F_SETLK`, Constant, Implemented

`F_SETLKW`, Constant, Implemented

`FD_CLOEXEC`, Constant, Implemented

`F_RDLCK`, Constant, Implemented

F_UNLCK, Constant, Implemented
 F_WRLCK, Constant, Implemented
 O_ACCMODE, Constant, Implemented

NOTE: A number of constants are used by both `open` and `fcntl`. `O_CREAT`, `O_EXCL`, `O_NOCTTY`, `O_TRUNC`, `O_APPEND`, `O_DSYNC`, `O_NONBLOCK`, `O_RSYNC`, `O_SYNC`, `O_RDONLY`, `O_RDWR`, and `O_WRONLY` are also included in another section. See [Section 5.3.1 \[Open a File\]](#), page 19.

6.5.3 Reposition Read/Write File Offset

lseek(), Function, Implemented
 SEEK_SET, Constant, Implemented
 SEEK_CUR, Constant, Implemented
 SEEK_END, Constant, Implemented

6.6 File Synchronization

6.6.1 Synchronize the State of a File

fsync(), Function, Implemented

6.6.2 Synchronize the Data of a File

fdatasync(), Function, Implemented

6.7 Asynchronous Input and Output

6.7.1 Data Definitions for Asynchronous Input and Output

6.7.1.1 Asynchronous I/O Control Block

struct aiocb, Type, Untested Implementation

6.7.1.2 Asynchronous I/O Manifest Constants

AIO_CANCELED, Constant, Implemented
 AIO_NOTCANCELED, Constant, Implemented
 AIO_ALLDONE, Constant, Implemented
 LIO_WAIT, Constant, Implemented
 LIO_NOWAIT, Constant, Implemented
 LIO_READ, Constant, Implemented
 LIO_WRITE, Constant, Implemented
 LIO_NOP, Constant, Implemented

6.7.2 Asynchronous Read

aio_read(), Function, Dummy Implementation

6.7.3 Asynchronous Write

aio_write(), Function, Dummy Implementation

6.7.4 List Directed I/O

lio_listio(), Function, Dummy Implementation

6.7.5 Retrieve Error Status of Asynchronous I/O Operation

`aio_error()`, Function, Dummy Implementation

6.7.6 Retrieve Return Status of Asynchronous I/O Operation

`aio_return()`, Function, Dummy Implementation

6.7.7 Cancel Asynchronous I/O Request

`aio_cancel()`, Function, Dummy Implementation

6.7.8 Wait for Asynchronous I/O Request

`aio_suspend()`, Function, Dummy Implementation

6.7.9 Asynchronous File Synchronization

`aio_fsync()`, Function, Dummy Implementation

7 Device- and Class-Specific Functions

7.1 General Terminal Interface

7.1.1 Interface Characteristics

7.1.1.1 Opening a Terminal Device File

7.1.1.2 Process Groups (TTY)

7.1.1.3 The Controlling Terminal

7.1.1.4 Terminal Access Control

7.1.1.5 Input Processing and Reading Data

7.1.1.6 Canonical Mode Input Processing

7.1.1.7 Noncanonical Mode Input Processing

- Case A - MIN > 0 and TIME > 0
- Case B - MIN > 0 and TIME = 0
- Case C - MIN = 0 and TIME > 0
- Case D - MIN = 0 and TIME = 0

7.1.1.8 Writing Data and Output Processing

7.1.1.9 Special Characters

INTR, Constant, Implemented
QUIT, Constant, Implemented
ERASE, Constant, Implemented
KILL, Constant, Implemented
EOF, Constant, Implemented
NL, Constant, Implemented
EOL, Constant, Implemented
SUSP, Constant, Implemented
STOP, Constant, Implemented
START, Constant, Implemented
CR, Constant, Implemented

7.1.1.10 Modem Disconnect

7.1.1.11 Closing a Terminal Device File

7.1.2 Parameters That Can Be Set

7.1.2.1 termios Structure

tcflag_t, Type, Implemented
cc_t, Type, Implemented
struct termios, Type, Implemented

7.1.2.2 Input Modes

BRKINT, Constant, Implemented
ICRNL, Constant, Implemented
IGNBREAK, Constant, Unimplemented
IGNCR, Constant, Implemented
IGNPAR, Constant, Implemented
INLCR, Constant, Implemented
INPCK, Constant, Implemented
ISTRIP, Constant, Implemented
IXOFF, Constant, Implemented
IXON, Constant, Implemented
PARMRK, Constant, Implemented

7.1.2.3 Output Modes

OPOST, Constant, Implemented

7.1.2.4 Control Modes

CLOCAL, Constant, Implemented
CREAD, Constant, Implemented
CSIZE, Constant, Implemented
CS5, Constant, Implemented
CS6, Constant, Implemented
CS7, Constant, Implemented
CS8, Constant, Implemented
CSTOPB, Constant, Implemented
HUPCL, Constant, Implemented
PARENB, Constant, Implemented
PARODD, Constant, Implemented

7.1.2.5 Local Modes

ECHO, Constant, Implemented
ECHOE, Constant, Implemented
ECHOK, Constant, Implemented
ECHONL, Constant, Implemented
ICANON, Constant, Implemented
IEXTEN, Constant, Implemented
ISIG, Constant, Implemented
NOFLSH, Constant, Implemented
TOSTOP, Constant, Implemented

7.1.2.6 Special Control Characters

VEOF, Constant, Implemented
VEOL, Constant, Implemented
VERASE, Constant, Implemented
VINTR, Constant, Implemented
VKILL, Constant, Implemented

VQUIT, Constant, Implemented
VSUSP, Constant, Implemented
VSTART, Constant, Implemented
VSTOP, Constant, Implemented
VMIN, Constant, Implemented
VTIME, Constant, Implemented

7.1.3 Baud Rate Values

B0, Constant, Implemented
B50, Constant, Implemented
B75, Constant, Implemented
B110, Constant, Implemented
B134, Constant, Implemented
B150, Constant, Implemented
B200, Constant, Implemented
B300, Constant, Implemented
B600, Constant, Implemented
B1200, Constant, Implemented
B1800, Constant, Implemented
B2400, Constant, Implemented
B4800, Constant, Implemented
B9600, Constant, Implemented
B19200, Constant, Implemented
B38400, Constant, Implemented

7.1.3.1 Baud Rate Functions

cfgetospeed(), Function, Implemented
cfsetospeed(), Function, Implemented
cfgetispeed(), Function, Implemented
cfsetispeed(), Function, Implemented
TCIFLUSH, Constant, Implemented
TCOFLUSH, Constant, Implemented
TCIOFLUSH, Constant, Implemented
TCOOFF, Constant, Implemented
TCOON, Constant, Implemented
TCIOOFF, Constant, Implemented
TCIOON, Constant, Implemented

7.2 General Terminal Interface Control Functions

7.2.1 Get and Set State

tcgetattr(), Function, Implemented
tcsetattr(), Function, Implemented

7.2.2 Line Control Functions

tcsendbreak(), Function, Dummy Implementation

`tcdrain()`, Function, Implemented
`tcflush()`, Function, Dummy Implementation
`tcflow()`, Function, Dummy Implementation

7.2.3 Get Foreground Process Group ID

`tcgetprgrp()`, Function, Implemented, SUSP

7.2.4 Set Foreground Process Group ID

`tcsetprgrp()`, Function, Dummy Implementation

8 Language-Specific Services for the C Programming Language

8.1 Referenced C Language Routines

ANSI C Section 4.2 — Diagnostics

`assert()`, Function, Implemented

ANSI C Section 4.3 — Character Handling

`isalnum()`, Function, Implemented
`isalpha()`, Function, Implemented
`iscntrl()`, Function, Implemented
`isdigit()`, Function, Implemented
`isgraph()`, Function, Implemented
`islower()`, Function, Implemented
`isprint()`, Function, Implemented
`ispunct()`, Function, Implemented
`isspace()`, Function, Implemented
`isupper()`, Function, Implemented
`isxdigit()`, Function, Implemented
`tolower()`, Function, Implemented
`toupper()`, Function, Implemented

ANSI C Section 4.4 — Localization

`setlocale()`, Function, Implemented

ANSI C Section 4.5 — Mathematics

`acos()`, Function, Implemented
`asin()`, Function, Implemented
`atan()`, Function, Implemented
`atan2()`, Function, Implemented
`cos()`, Function, Implemented
`sin()`, Function, Implemented
`tan()`, Function, Implemented
`cosh()`, Function, Implemented
`sinh()`, Function, Implemented
`tanh()`, Function, Implemented
`exp()`, Function, Implemented
`frexp()`, Function, Implemented
`ldexp()`, Function, Implemented
`log()`, Function, Implemented
`log10()`, Function, Implemented
`modf()`, Function, Implemented
`pow()`, Function, Implemented
`sqrt()`, Function, Implemented
`ceil()`, Function, Implemented
`fabs()`, Function, Implemented

`floor()`, Function, Implemented
`fmod()`, Function, Implemented

ANSI C Section 4.6 — Non-Local Jumps

`setjmp()`, Function, Implemented
`longjmp()`, Function, Implemented

ANSI C Section 4.9 — Input/Output

`FILE`, Type, Implemented
`clearerr()`, Function, Implemented
`fclose()`, Function, Implemented
`feof()`, Function, Implemented
`ferror()`, Function, Implemented
`fflush()`, Function, Implemented
`fgetc()`, Function, Implemented
`fgets()`, Function, Implemented
`fopen()`, Function, Implemented
`fputc()`, Function, Implemented
`fputs()`, Function, Implemented
`fread()`, Function, Implemented
`freopen()`, Function, Implemented
`fseek()`, Function, Implemented
`ftell()`, Function, Implemented
`fwrite()`, Function, Implemented
`getc()`, Function, Implemented
`getchar()`, Function, Implemented
`gets()`, Function, Implemented
`perror()`, Function, Implemented
`printf()`, Function, Implemented
`fprintf()`, Function, Implemented
`sprintf()`, Function, Implemented
`putc()`, Function, Implemented
`putchar()`, Function, Implemented
`puts()`, Function, Implemented
`remove()`, Function, Implemented
`rewind()`, Function, Implemented
`scanf()`, Function, Implemented
`fscanf()`, Function, Implemented
`sscanf()`, Function, Implemented
`setbuf()`, Function, Implemented
`tmpfile()`, Function, Implemented
`tmpnam()`, Function, Implemented
`ungetc()`, Function, Implemented

NOTE: `rename` is also included in another section. [Section 5.5.3 \[Rename a File\]](#), page 20.

ANSI C Section 4.10 — General Utilities

abs(), Function, Implemented
atof(), Function, Implemented
atoi(), Function, Implemented
atol(), Function, Implemented
rand(), Function, Implemented
srand(), Function, Implemented
calloc(), Function, Implemented
free(), Function, Implemented
malloc(), Function, Implemented
realloc(), Function, Implemented
abort(), Function, Implemented
exit(), Function, Implemented
bsearch(), Function, Implemented
qsort(), Function, Implemented

NOTE: `getenv` is also included in another section. [Section 4.6.1 \[Environment Access\]](#), [page 16](#).

ANSI C Section 4.11 — String Handling

strcpy(), Function, Implemented
strncpy(), Function, Implemented
strcat(), Function, Implemented
strncat(), Function, Implemented
strcmp(), Function, Implemented
strncmp(), Function, Implemented
strchr(), Function, Implemented
strcspn(), Function, Implemented
strpbrk(), Function, Implemented
strrchr(), Function, Implemented
strspn(), Function, Implemented
strstr(), Function, Implemented
strtok(), Function, Implemented
strlen(), Function, Implemented

ANSI C Section 4.12 — Date and Time Handling

asctime(), Function, Implemented
ctime(), Function, Implemented
gmtime(), Function, Implemented
localtime(), Function, Implemented
mktime(), Function, Implemented
strftime(), Function, Implemented

NOTE: RTEMS has no notion of time zones.

NOTE: `time` is also included in another section. [Section 4.5.1 \[Get System Time\]](#), [page 16](#).

From Surrounding Text

EXIT_SUCCESS, Constant, Implemented

EXIT_FAILURE, Constant, Implemented

8.1.1 Extensions to Time Functions

8.1.2 Extensions to setlocale Function

LC_CTYPE, Constant, Implemented
LC_COLLATE, Constant, Implemented
LC_TIME, Constant, Implemented
LC_NUMERIC, Constant, Implemented
LC_MONETARY, Constant, Implemented
LC_ALL, Constant, Implemented

8.2 C Language Input/Output Functions

8.2.1 Map a Stream Pointer to a File Descriptor

fileno(), Function, Implemented
STDIN_FILENO, Constant, Implemented
STDOUT_FILENO, Constant, Implemented
STDERR_FILENO, Constant, Implemented

8.2.2 Open a Stream on a File Descriptor

fdopen(), Function, Implemented

8.2.3 Interactions of Other FILE-Type C Functions

8.2.4 Operations on Files - the remove Function

8.2.5 Temporary File Name - the tmpnam Function

8.2.6 Stdio Locking Functions

flockfile(), Function, Unimplemented
ftrylockfile(), Function, Unimplemented
funlockfile(), Function, Unimplemented

8.2.7 Stdio With Explicit Client Locking

getc_unlocked(), Function, Unimplemented
getchar_unlocked(), Function, Unimplemented
putc_unlocked(), Function, Unimplemented
putchar_unlocked(), Function, Unimplemented

8.3 Other C Language Functions

8.3.1 Nonlocal Jumps

sigjmp_buf, Type, Implemented
sigsetjmp(), Function, Implemented
siglongjmp(), Function, Implemented

8.3.2 Set Time Zone

`tzset()`, Function, Unimplemented

8.3.3 Find String Token

`strtok_r()`, Function, Implemented

8.3.4 ASCII Time Representation

`asctime_r()`, Function, Implemented

8.3.5 Current Time Representation

`ctime_r()`, Function, Implemented

8.3.6 Coordinated Universal Time

`gmtime_r()`, Function, Implemented

8.3.7 Local Time

`localtime_r()`, Function, Implemented

8.3.8 Pseudo-Random Sequence Generation Functions

`rand_r()`, Function, Implemented

9 System Databases

9.1 System Databases Section

9.2 Database Access

9.2.1 Group Database Access

```
struct group, Type, Implemented  
getgrgid(), Function, Implemented  
getgrgid_r(), Function, Implemented  
getgrname(), Function, Implemented  
getgrnam_r(), Function, Implemented
```

NOTE: Creates `/etc/group` if none exists.

9.2.2 User Database Access

```
struct passwd, Type, Implemented  
getpwuid(), Function, Implemented  
getpwuid_r(), Function, Implemented  
getpwnam(), Function, Implemented  
getpwnam_r(), Function, Implemented
```

NOTE: Creates `/etc/passwd` if none exists.

10 Data Interchange Format

10.1 Archive/Interchange File Format

10.1.1 Extended tar Format

tar format, Type, Unimplemented
TMAGIC, Constant, Unimplemented
TMAGLEN, Constant, Unimplemented
TVERSION, Constant, Unimplemented
TVERSLEN, Constant, Unimplemented
REGTYPE, Constant, Unimplemented
AREGTYPE, Constant, Unimplemented
LNKTYPE, Constant, Unimplemented
SYMTYPE, Constant, Unimplemented
CHRTYPE, Constant, Unimplemented
BLKTYPE, Constant, Unimplemented
DIRTYPE, Constant, Unimplemented
FIFOTYPE, Constant, Unimplemented
CONTTYPE, Constant, Unimplemented
TSUID, Constant, Unimplemented
TSGID, Constant, Unimplemented
TSVTX, Constant, Unimplemented
TUREAD, Constant, Unimplemented
TUWRITE, Constant, Unimplemented
TUEXEC, Constant, Unimplemented
TGREAD, Constant, Unimplemented
TGWRITE, Constant, Unimplemented
TGEXEC, Constant, Unimplemented
TOREAD, Constant, Unimplemented
TOWRITE, Constant, Unimplemented
TOEXEC, Constant, Unimplemented

NOTE: Requires <tar.h> which is not in newlib.

10.1.2 Extended cpio Format

cpio format, Type, Unimplemented
C_IRUSER, Constant, Unimplemented
C_IWUSER, Constant, Unimplemented
C_IXUSER, Constant, Unimplemented
C_IRGRP, Constant, Unimplemented
C_IWGRP, Constant, Unimplemented
C_IXGRP, Constant, Unimplemented
C_IROTH, Constant, Unimplemented
C_IWOTH, Constant, Unimplemented
C_IXOTH, Constant, Unimplemented
C_ISUID, Constant, Unimplemented

`C_ISGID`, Constant, Unimplemented

`C_ISVTX`, Constant, Unimplemented

NOTE: POSIX does not require a header file or structure. RedHat Linux 5.0 does not have a `<cpio.h>` although Solaris 2.6 does.

10.1.3 Multiple Volumes

11 Synchronization

11.1 Semaphore Characteristics

NOTE: Semaphores are implemented but only unnamed semaphores are currently tested.

`sem_t`, Type, Implemented

11.2 Semaphore Functions

11.2.1 Initialize an Unnamed Semaphore

`sem_init()`, Function, Implemented
`SEM_FAILED`, Constant, Implemented

11.2.2 Destroy an Unnamed Semaphore

`sem_destroy()`, Function, Implemented

11.2.3 Initialize/Open a Named Semaphore

`sem_open()`, Function, Implemented

11.2.4 Close a Named Semaphore

`sem_close()`, Function, Implemented

11.2.5 Remove a Named Semaphore

`sem_unlink()`, Function, Implemented

11.2.6 Lock a Semaphore

`sem_wait()`, Function, Implemented
`sem_trywait()`, Function, Implemented

11.2.7 Unlock a Semaphore

`sem_post()`, Function, Implemented

11.2.8 Get the Value of a Semaphore

`sem_getvalue()`, Function, Implemented

11.3 Mutexes

11.3.1 Mutex Initialization Attributes

`pthread_mutexattr_init()`, Function, Implemented
`pthread_mutexattr_destroy()`, Function, Implemented
`pthread_mutexattr_getpshared()`, Function, Implemented
`pthread_mutexattr_setpshared()`, Function, Implemented
`PTHREAD_PROCESS_SHARED`, Constant, Implemented
`PTHREAD_PROCESS_PRIVATE`, Constant, Implemented

11.3.2 Initializing and Destroying a Mutex

`pthread_mutex_init()`, Function, Implemented
`pthread_mutex_destroy()`, Function, Implemented
`PTHREAD_MUTEX_INITIALIZER`, Constant, Implemented

11.3.3 Locking and Unlocking a Mutex

`pthread_mutex_lock()`, Function, Implemented
`pthread_mutex_trylock()`, Function, Implemented
`pthread_mutex_unlock()`, Function, Implemented

11.4 Condition Variables

11.4.1 Condition Variable Initialization Attributes

`pthread_condattr_init()`, Function, Implemented
`pthread_condattr_destroy()`, Function, Implemented
`pthread_condattr_getpshared()`, Function, Implemented
`pthread_condattr_setpshared()`, Function, Implemented

11.4.2 Initialization and Destroying Condition Variables

`pthread_cond_init()`, Function, Implemented
`pthread_cond_destroy()`, Function, Implemented
`PTHREAD_COND_INITIALIZER`, Constant, Implemented

11.4.3 Broadcasting and Signaling a Condition

`pthread_cond_signal()`, Function, Implemented
`pthread_cond_broadcast()`, Function, Implemented

11.4.4 Waiting on a Condition

`pthread_cond_wait()`, Function, Implemented
`pthread_cond_timedwait()`, Function, Implemented

12 Memory Management

12.1 Memory Locking Functions

12.1.1 Lock/Unlock the Address Space of a Process

`mlockall()`, Function, Unimplemented
`munlockall()`, Function, Unimplemented
`MCL_CURRENT`, Constant, Unimplemented
`MCL_FUTURE`, Constant, Unimplemented

12.1.2 Lock/Unlock a Rand of Process Address Space

`mlock()`, Function, Unimplemented
`munlock()`, Function, Unimplemented

12.2 Memory Mapping Functions

12.2.1 Map Process Addresses to a Memory Object

`mmap()`, Function, Unimplemented
`PROT_READ`, Constant, Unimplemented
`PROT_WRITE`, Constant, Unimplemented
`PROT_EXEC`, Constant, Unimplemented
`PROT_NONE`, Constant, Unimplemented
`MAP_SHARED`, Constant, Unimplemented
`MAP_PRIVATE`, Constant, Unimplemented
`MAP_FIXED`, Constant, Unimplemented

12.2.2 Unmap Previously Mapped Addresses

`munmap()`, Function, Unimplemented

12.2.3 Change Memory Protection

`mprotect()`, Function, Unimplemented

12.2.4 Memory Object Synchronization

`msync()`, Function, Unimplemented, Unimplemented
`MS_ASYNC`, Constant, Unimplemented
`MS_SYNC`, Constant, Unimplemented
`MS_INVALIDATE`, Constant, Unimplemented

12.3 Shared Memory Functions

12.3.1 Open a Shared Memory Object

`shm_open()`, Function, Unimplemented

12.3.2 Remove a Shared Memory Object

`shm_unlink()`, Function, Unimplemented

13 Execution Scheduling

13.1 Scheduling Parameters

`struct sched_param, Type, Implemented`

13.2 Scheduling Policies

`SCHED_FIFO, Constant, Implemented`
`SCHED_RR, Constant, Implemented`
`SCHED_OTHER, Constant, Implemented`

NOTE: RTEMS adds `SCHED_SPORADIC`.

13.2.1 SCHED_FIFO

13.2.2 SCHED_RR

13.2.3 SCHED_OTHER

13.3 Process Scheduling Functions

13.3.1 Set Scheduling Parameters

`sched_setparam(), Function, Dummy Implementation`

13.3.2 Get Scheduling Parameters

`sched_getparam(), Function, Dummy Implementation`

13.3.3 Set Scheduling Policy and Scheduling Parameters

`sched_setscheduler(), Function, Dummy Implementation`

13.3.4 Get Scheduling Policy

`sched_getscheduler(), Function, Dummy Implementation`

13.3.5 Yield Processor

`sched_yield(), Function, Implemented`

13.3.6 Get Scheduling Parameter Limits

`sched_get_priority_max(), Function, Implemented`
`sched_get_priority_min(), Function, Implemented`
`sched_get_priority_rr_get_interval(), Function, Implemented`

13.4 Thread Scheduling

13.4.1 Thread Scheduling Attributes

PTHREAD_SCOPE_PROCESS, Constant, Implemented

PTHREAD_SCOPE_SYSTEM, Constant, Implemented

13.4.2 Scheduling Contention Scope

13.4.3 Scheduling Allocation Domain

13.4.4 Scheduling Documentation

13.5 Thread Scheduling Functions

13.5.1 Thread Creation Scheduling Attributes

pthread_attr_setscope(), Function, Implemented

pthread_attr_getscope(), Function, Implemented

pthread_attr_setinheritsched(), Function, Implemented

pthread_attr_getinheritsched(), Function, Implemented

pthread_attr_setschedpolicy(), Function, Implemented

pthread_attr_getschedpolicy(), Function, Implemented

pthread_attr_setschedparam(), Function, Implemented

pthread_attr_getschedparam(), Function, Implemented

PTHREAD_INHERIT_SCHED, Constant, Implemented

PTHREAD_EXPLICIT_SCHED, Constant, Implemented

13.5.2 Dynamic Thread Scheduling Parameters Access

pthread_setschedparam(), Function, Implemented

pthread_getschedparam(), Function, Implemented

13.6 Synchronization Scheduling

13.6.1 Mutex Initialization Scheduling Attributes

pthread_mutexattr_setprotocol(), Function, Implemented

pthread_mutexattr_getprotocol(), Function, Implemented

pthread_mutexattr_setprioceiling(), Function, Implemented

pthread_mutexattr_getprioceiling(), Function, Implemented

PTHREAD_PRIO_NONE, Constant, Implemented

PTHREAD_PRIO_INHERIT, Constant, Implemented

PTHREAD_PRIO_PROTECT, Constant, Implemented

13.6.2 Change the Priority Ceiling of a Mutex

pthread_mutex_setprioceiling(), Function, Implemented

pthread_mutex_getprioceiling(), Function, Implemented

14 Clocks and Timers

14.1 Data Definitions for Clocks and Timers

14.1.1 Time Value Specification Structures

```
struct timespec, Type, Implemented  
struct itimerspec, Type, Implemented
```

14.1.2 Timer Event Notification Control Block

14.1.3 Type Definitions

```
clockid_t, Type, Implemented  
timerid_t, Type, Implemented
```

14.1.4 Timer Event Notification Manifest Constants

```
CLOCK_REALTIME, Constant, Implemented  
TIMER_ABSTIME, Constant, Implemented
```

14.2 Clock and Timer Functions

14.2.1 Clocks

```
clock_settime(), Function, Partial Implementation  
clock_gettime(), Function, Partial Implementation  
clock_getres(), Function, Implemented
```

14.2.2 Create a Per-Process Timer

```
timer_create(), Function, Implemented
```

14.2.3 Delete a Per-Process Timer

```
timer_delete(), Function, Implemented
```

14.2.4 Per-Process Timers

```
timer_settime(), Function, Implemented  
timer_gettime(), Function, Implemented  
timer_getoverrun(), Function, Implemented
```

14.2.5 High Resolution Sleep

```
nanosleep(), Function, Implemented
```


15 Message Passing

15.1 Data Definitions for Message Queues

15.1.1 Data Structures

NOTE: Semaphores are implemented but only unnamed semaphores are currently tested.

```
mqd_t, Type, Implemented
struct mq_attr, Type, Implemented
```

15.2 Message Passing Functions

15.2.1 Open a Message Queue

```
mq_open(), Function, Implemented
```

15.2.2 Close a Message Queue

```
mq_close(), Function, Implemented
```

15.2.3 Remove a Message Queue

```
mq_unlink(), Function, Implemented
```

15.2.4 Send a Message to a Message Queue

```
mq_send(), Function, Implemented
```

15.2.5 Receive a Message From a Message Queue

```
mq_receive(), Function, Implemented
```

15.2.6 Notify Process That a Message is Available on a Queue

```
mq_notify(), Function, Implemented
```

15.2.7 Set Message Queue Attributes

```
mq_setattr(), Function, Implemented
```

15.2.8 Get Message Queue Attributes

```
mq_getattr(), Function, Implemented
```


16 Thread Management

16.1 Threads

16.2 Thread Functions

16.2.1 Thread Creation Attributes

`pthread_attr_init()`, Function, Implemented
`pthread_attr_destroy()`, Function, Implemented
`pthread_attr_setstacksize()`, Function, Implemented
`pthread_attr_getstacksize()`, Function, Implemented
`pthread_attr_setstackaddr()`, Function, Implemented
`pthread_attr_getstackaddr()`, Function, Implemented
`pthread_attr_setdetachstate()`, Function, Implemented
`pthread_attr_getdetachstate()`, Function, Implemented
`PTHREAD_CREATE_JOINABLE`, Constant, Implemented
`PTHREAD_CREATE_DETACHED`, Constant, Implemented

16.2.2 Thread Creation

`pthread_create()`, Function, Implemented

16.2.3 Wait for Thread Termination

`pthread_join()`, Function, Implemented

16.2.4 Detaching a Thread

`pthread_detach()`, Function, Implemented

16.2.5 Thread Termination

`pthread_exit()`, Function, Implemented

16.2.6 Get Thread ID

`pthread_self()`, Function, Implemented

16.2.7 Compare Thread IDs

`pthread_equal()`, Function, Implemented

16.2.8 Dynamic Package Initialization

`pthread_once()`, Function, Implemented
`PTHREAD_ONCE_INIT`, Constant, Implemented

17 Thread-Specific Data

17.1 Thread-Specific Data Functions

17.1.1 Thread-Specific Data Key Creation

`pthread_key_create()`, Function, Implemented

17.1.2 Thread-Specific Data Management

`pthread_key_setspecific()`, Function, Implemented

`pthread_key_getspecific()`, Function, Implemented

17.1.3 Thread-Specific Data Key Deletion

`pthread_key_delete()`, Function, Implemented

18 Thread Cancellation

18.1 Thread Cancellation Overview

18.1.1 Cancelability States

PTHREAD_CANCEL_DISABLE, Constant, Implemented
PTHREAD_CANCEL_ENABLE, Constant, Implemented
PTHREAD_CANCEL_ASYNCHRONOUS, Constant, Implemented
PTHREAD_CANCEL_DEFERRED, Constant, Implemented

18.1.2 Cancellation Points

18.1.3 Thread Cancellation Cleanup Handlers

PTHREAD_CANCELED, Constant, Unimplemented

18.1.4 Async-Cancel Safety

18.2 Thread Cancellation Functions

18.2.1 Canceling Execution of a Thread

pthread_cancel(), Function, Implemented

18.2.2 Setting Cancelability State

pthread_setcancelstate(), Function, Implemented
pthread_setcanceltype(), Function, Implemented
pthread_testcancel(), Function, Implemented

18.2.3 Establishing Cancellation Handlers

pthread_cleanup_push(), Function, Implemented
pthread_cleanup_pop(), Function, Implemented

18.3 Language-Independent Cancellation Functionality

18.3.1 Requesting Cancellation

18.3.2 Associating Cleanup Code With Scopes

18.3.3 Controlling Cancellation Within Scopes

18.3.4 Defined Cancellation Sequence

18.3.5 List of Cancellation Points

19 Compliance Summary

19.1 General Chapter

Functions:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Data Types:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Feature Flags:

Total Number	: 21
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

FEATURE FLAG COUNTS DO NOT ADD UP!!

Constants:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

19.2 Terminology and General Requirements Chapter

Functions:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Data Types:

Total Number	: 19
Implemented	: 19
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Feature Flags:

Total Number	: 32
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

FEATURE FLAG COUNTS DO NOT ADD UP!!

Constants:

Total Number	: 126
Implemented	: 124
Unimplemented	: 2
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

19.3 Process Primitives Chapter

Functions:

Total Number	: 36
Implemented	: 20
Unimplemented	: 0
Unimplementable	: 16
Partial	: 0
Dummy	: 0
Untested	: 0

Data Types:

Total Number	: 5
Implemented	: 5
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Feature Flags:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Constants:

Total Number	: 40
Implemented	: 32
Unimplemented	: 6
Unimplementable	: 2
Partial	: 0
Dummy	: 0
Untested	: 0

19.4 Process Environment Chapter

Functions:

Total Number	: 23
Implemented	: 21
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 2
Untested	: 0

Data Types:

Total Number	: 2
Implemented	: 2
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Feature Flags:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Constants:

Total Number	: 53
Implemented	: 51
Unimplemented	: 2
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

19.5 Files and Directories Chapter

Functions:

Total Number	: 35
Implemented	: 30
Unimplemented	: 3
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 1

FUNCTION COUNTS DO NOT ADD UP!!

Data Types:

Total Number	: 3
Implemented	: 3
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Feature Flags:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Constants:

Total Number	: 39
Implemented	: 37
Unimplemented	: 2
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

19.6 Input and Output Primitives Chapter

Functions:

Total Number	: 19
Implemented	: 9
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 9
Untested	: 0

FUNCTION COUNTS DO NOT ADD UP!!

Data Types:

Total Number	: 2
Implemented	: 1
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 1

Feature Flags:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Constants:

Total Number	: 24
Implemented	: 24
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

19.7 Device- and Class-Specific Functions Chapter

Functions:

Total Number	: 12
Implemented	: 8
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 4
Untested	: 0

Data Types:

Total Number	: 3
Implemented	: 3
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Feature Flags:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Constants:

Total Number	: 77
Implemented	: 76
Unimplemented	: 1
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

19.8 Language-Specific Services for the C Programming Language Chapter

Functions:

Total Number	: 125
Implemented	: 117
Unimplemented	: 8
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Data Types:

Total Number	: 2
Implemented	: 2
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Feature Flags:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Constants:

Total Number	: 11
Implemented	: 11
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

19.9 System Databases Chapter

Functions:

Total Number	: 8
Implemented	: 8
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Data Types:

Total Number	: 2
Implemented	: 2
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Feature Flags:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Constants:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

19.10 Data Interchange Format Chapter

Functions:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Data Types:

Total Number	: 2
Implemented	: 0
Unimplemented	: 2
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Feature Flags:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Constants:

Total Number	: 37
Implemented	: 0
Unimplemented	: 37
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

19.11 Synchronization Chapter

Functions:

Total Number	: 28
Implemented	: 28
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Data Types:

Total Number	: 1
Implemented	: 1
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Feature Flags:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Constants:

Total Number	: 5
Implemented	: 5
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

19.12 Memory Management Chapter

Functions:

Total Number	: 10
Implemented	: 0
Unimplemented	: 10
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Data Types:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Feature Flags:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Constants:

Total Number	: 12
Implemented	: 0
Unimplemented	: 12
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

19.13 Execution Scheduling Chapter

Functions:

Total Number	: 24
Implemented	: 20
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 4
Untested	: 0

Data Types:

Total Number	: 1
Implemented	: 1
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Feature Flags:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Constants:

Total Number	: 10
Implemented	: 10
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

19.14 Clocks and Timers Chapter

Functions:

Total Number	: 9
Implemented	: 7
Unimplemented	: 0
Unimplementable	: 0
Partial	: 2
Dummy	: 0
Untested	: 0

Data Types:

Total Number	: 4
Implemented	: 4
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Feature Flags:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Constants:

Total Number	: 2
Implemented	: 2
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

19.15 Message Passing Chapter

Functions:

Total Number	: 8
Implemented	: 8
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Data Types:

Total Number	: 2
Implemented	: 2
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Feature Flags:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Constants:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

19.16 Thread Management Chapter

Functions:

Total Number	: 15
Implemented	: 15
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Data Types:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Feature Flags:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Constants:

Total Number	: 3
Implemented	: 3
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

19.17 Thread-Specific Data Chapter

Functions:

Total Number	: 4
Implemented	: 4
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Data Types:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Feature Flags:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Constants:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

19.18 Thread Cancellation Chapter

Functions:

Total Number	: 6
Implemented	: 6
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Data Types:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Feature Flags:

Total Number	: 0
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

Constants:

Total Number	: 5
Implemented	: 4
Unimplemented	: 1
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

19.19 Overall Summary

Functions:

Total Number	: 362
Implemented	: 301
Unimplemented	: 21
Unimplementable	: 16
Partial	: 2
Dummy	: 19
Untested	: 1

FUNCTION COUNTS DO NOT ADD UP!!

Data Types:

Total Number	: 48
Implemented	: 45
Unimplemented	: 2
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 1

Feature Flags:

Total Number	: 53
Implemented	: 0
Unimplemented	: 0
Unimplementable	: 0
Partial	: 0
Dummy	: 0
Untested	: 0

FEATURE FLAG COUNTS DO NOT ADD UP!!

Constants:

Total Number	: 444
Implemented	: 379
Unimplemented	: 63
Unimplementable	: 2
Partial	: 0
Dummy	: 0
Untested	: 0

Command and Variable Index

There are currently no Command and Variable Index entries.

Concept Index

There are currently no Concept Index entries.

