

# **RTEMS POSIX 1003.1 Compliance Guide**

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Edition 4.9.6, for RTEMS 4.9.6

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**On-Line Applications Research Corporation**

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# Table of Contents

|  |           |
|--|-----------|
| <b>Preface</b> .....   | <b>1</b>  |
| <b>1 General</b> .....   | <b>3</b>  |
| 1.1 Scope .....  | 3         |
| 1.2 Normative References .....   | 3         |
| 1.3 Conformance .....  | 3         |
| <b>2 Terminology and General Requirements</b> .....                              | <b>5</b>  |
| 2.1 Conventions .....  | 5         |
| 2.2 Definitions .....  | 5         |
| 2.3 General Concepts .....   | 5         |
| 2.4 Error Numbers .....  | 5         |
| 2.5 Primitive System Types .....   | 6         |
| 2.6 Environment Description .....  | 6         |
| 2.7 C Language Definitions .....   | 6         |
| 2.7.1 Symbols From the C Standard .....  | 6         |
| 2.7.2 POSIX.1 Symbols .....  | 6         |
| 2.8 Numerical Limits .....   | 6         |
| 2.9 C Language Limits .....  | 6         |
| 2.9.1 Minimum Values .....   | 7         |
| 2.9.2 Run-Time Inceasable Values .....   | 8         |
| 2.9.3 Run-Time Invariant Values (Possible Indeterminate) .....                   | 8         |
| 2.9.4 Pathname Variable Values .....   | 8         |
| 2.9.5 Invariant Values .....   | 8         |
| 2.9.6 Maximum Values .....   | 8         |
| 2.10 Symbolic Constants .....  | 8         |
| 2.10.1 Symbolic Constants for the access Function .....                          | 8         |
| 2.10.2 Symbolic Constants for the lseek Function .....                           | 9         |
| 2.10.3 Compile-Time Symbolic Constants for Portability<br>Specifications .....   | 9         |
| 2.10.4 Execution-Time Symbolic Constants for Portability<br>Specifications ..... | 9         |
| <b>3 Process Primitives</b> .....  | <b>11</b> |
| 3.1 Process Creation and Execution .....   | 11        |
| 3.1.1 Process Creation .....   | 11        |
| 3.1.2 Execute a File .....   | 11        |
| 3.1.3 Register Fork Handlers .....   | 11        |
| 3.2 Process Termination .....  | 11        |
| 3.2.1 Wait for Process Termination .....   | 11        |
| 3.2.2 Terminate a Process .....  | 11        |
| 3.3 Signals .....  | 11        |

|          |  |           |
|----------|--|-----------|
| 3.3.1    | Signal Concepts .....  | 11        |
| 3.3.1.1  | Signal Names .....   | 11        |
| 3.3.1.2  | Signal Generation and Delivery .....                                     | 12        |
| 3.3.1.3  | Signal Actions .....   | 12        |
| 3.3.2    | Send a Signal to a Process .....   | 12        |
| 3.3.3    | Manipulate Signal Sets .....   | 12        |
| 3.3.4    | Examine and Change Signal Action .....                                   | 13        |
| 3.3.5    | Examine and Change Blocked Signals .....                                 | 13        |
| 3.3.6    | Examine Pending Signals .....  | 13        |
| 3.3.7    | Wait for a Signal .....  | 13        |
| 3.3.8    | Synchronously Accept a Signal .....                                      | 13        |
| 3.3.9    | Queue a Signal to a Process .....  | 13        |
| 3.3.10   | Send a Signal to a Thread .....  | 13        |
| 3.4      | Timer Operations .....   | 13        |
| 3.4.1    | Schedule Alarm .....   | 13        |
| 3.4.2    | Suspend Process Execution .....  | 13        |
| 3.4.3    | Delay Process Execution .....  | 13        |
| <b>4</b> | <b>Process Environment .....</b>   | <b>15</b> |
| 4.1      | Process Identification .....   | 15        |
| 4.1.1    | Get Process and Parent Process IDs .....                                 | 15        |
| 4.2      | User Identification .....  | 15        |
| 4.2.1    | Get Real User Effective User Real Group and Effective Group<br>IDs ..... | 15        |
| 4.2.2    | Set User and Group IDs .....   | 15        |
| 4.2.3    | Get Supplementary Group IDs .....  | 15        |
| 4.2.4    | Get User Name .....  | 15        |
| 4.3      | Process Groups .....   | 15        |
| 4.3.1    | Get Process Group ID .....   | 15        |
| 4.3.2    | Create Session and Set Process Group ID .....                            | 15        |
| 4.3.3    | Set Process Group ID for Job Control .....                               | 15        |
| 4.4      | System Identification .....  | 15        |
| 4.4.1    | Get System Name .....  | 15        |
| 4.5      | Time .....   | 16        |
| 4.5.1    | Get System Time .....  | 16        |
| 4.5.2    | Get Process Times .....  | 16        |
| 4.6      | Environment Variables .....  | 16        |
| 4.6.1    | Environment Access .....   | 16        |
| 4.7      | Terminal Identification .....  | 16        |
| 4.7.1    | Generate Terminal Pathname .....   | 16        |
| 4.7.2    | Determine Terminal Device Name .....                                     | 16        |
| 4.8      | Configurable System Variables .....                                      | 16        |
| 4.8.1    | Get Configurable System Variables .....                                  | 16        |

|          |  |           |
|----------|--|-----------|
| <b>5</b> | <b>Files and Directories</b>                   | <b>19</b> |
| 5.1      | Directories                                    | 19        |
| 5.1.1    | Format of Directory Entries                    | 19        |
| 5.1.2    | Directory Operations                           | 19        |
| 5.2      | Working Directory                              | 19        |
| 5.2.1    | Change Current Working Directory               | 19        |
| 5.2.2    | Get Working Directory Pathname                 | 19        |
| 5.3      | General File Creation                          | 19        |
| 5.3.1    | Open a File                                    | 19        |
| 5.3.2    | Create a New File or Rewrite an Existing One   | 19        |
| 5.3.3    | Set File Creation Mask                         | 20        |
| 5.3.4    | Link to a File                                 | 20        |
| 5.4      | Special File Creation                          | 20        |
| 5.4.1    | Make a Directory                               | 20        |
| 5.4.2    | Make a FIFO Special File                       | 20        |
| 5.5      | File Removal                                   | 20        |
| 5.5.1    | Remove Directory Entries                       | 20        |
| 5.5.2    | Remove a Directory                             | 20        |
| 5.5.3    | Rename a File                                  | 20        |
| 5.6      | File Characteristics                           | 20        |
| 5.6.1    | File Characteristics Header and Data Structure | 20        |
| 5.6.1.1  | <sys/stat.h> File Types                        | 20        |
| 5.6.1.2  | <sys/stat.h> File Modes                        | 21        |
| 5.6.1.3  | <sys/stat.h> Time Entries                      | 21        |
| 5.6.2    | Get File Status                                | 21        |
| 5.6.3    | Check File Accessibility                       | 21        |
| 5.6.4    | Change File Modes                              | 21        |
| 5.6.5    | Change Owner and Group of a File               | 21        |
| 5.6.6    | Set File Access and Modification Times         | 21        |
| 5.6.7    | Truncate a File to a Specified Length          | 21        |
| 5.7      | Configurable Pathname Variable                 | 21        |
| 5.7.1    | Get Configurable Pathname Variables            | 21        |
| <b>6</b> | <b>Input and Output Primitives</b>             | <b>23</b> |
| 6.1      | Pipes  | 23        |
| 6.1.1    | Create an Inter-Process Channel                | 23        |
| 6.2      | File Descriptor Manipulation                   | 23        |
| 6.2.1    | Duplicate an Open File Descriptor              | 23        |
| 6.3      | File Descriptor Deassignment                   | 23        |
| 6.3.1    | Close a File                                   | 23        |
| 6.4      | Input and Output                               | 23        |
| 6.4.1    | Read from a File                               | 23        |
| 6.4.2    | Write to a File                                | 23        |
| 6.5      | Control Operations on Files                    | 23        |
| 6.5.1    | Data Definitions for File Control Operations   | 23        |
| 6.5.2    | File Control                                   | 23        |
| 6.5.3    | Reposition Read/Write File Offset              | 24        |
| 6.6      | File Synchronization                           | 24        |

|          |   |           |
|----------|---|-----------|
| 6.6.1    | Synchronize the State of a File .....                     | 24        |
| 6.6.2    | Synchronize the Data of a File.....                       | 24        |
| 6.7      | Asynchronous Input and Output .....                       | 24        |
| 6.7.1    | Data Definitions for Asynchronous Input and Output .....  | 24        |
| 6.7.1.1  | Asynchronous I/O Control Block .....                      | 24        |
| 6.7.1.2  | Asynchronous I/O Manifest Constants .....                 | 24        |
| 6.7.2    | Asynchronous Read .....                                   | 24        |
| 6.7.3    | Asynchronous Write .....                                  | 24        |
| 6.7.4    | List Directed I/O .....                                   | 24        |
| 6.7.5    | Retrieve Error Status of Asynchronous I/O Operation ..... | 25        |
| 6.7.6    | Retrieve Return Status of Asynchronous I/O Operation...   | 25        |
| 6.7.7    | Cancel Asynchronous I/O Request.....                      | 25        |
| 6.7.8    | Wait for Asynchronous I/O Request .....                   | 25        |
| 6.7.9    | Asynchronous File Synchronization .....                   | 25        |
| <b>7</b> | <b>Device- and Class-Specific Functions .....</b>         | <b>27</b> |
| 7.1      | General Terminal Interface .....                          | 27        |
| 7.1.1    | Interface Characteristics.....                            | 27        |
| 7.1.1.1  | Opening a Terminal Device File .....                      | 27        |
| 7.1.1.2  | Process Groups (TTY) .....                                | 27        |
| 7.1.1.3  | The Controlling Terminal.....                             | 27        |
| 7.1.1.4  | Terminal Access Control.....                              | 27        |
| 7.1.1.5  | Input Processing and Reading Data.....                    | 27        |
| 7.1.1.6  | Canonical Mode Input Processing.....                      | 27        |
| 7.1.1.7  | Noncanonical Mode Input Processing .....                  | 27        |
| 7.1.1.8  | Writing Data and Output Processing .....                  | 27        |
| 7.1.1.9  | Special Characters.....                                   | 27        |
| 7.1.1.10 | Modem Disconnect .....                                    | 27        |
| 7.1.1.11 | Closing a Terminal Device File .....                      | 27        |
| 7.1.2    | Parameters That Can Be Set .....                          | 27        |
| 7.1.2.1  | termios Structure.....                                    | 27        |
| 7.1.2.2  | Input Modes .....   | 28        |
| 7.1.2.3  | Output Modes .....  | 28        |
| 7.1.2.4  | Control Modes .....                                       | 28        |
| 7.1.2.5  | Local Modes .....   | 28        |
| 7.1.2.6  | Special Control Characters .....                          | 28        |
| 7.1.3    | Baud Rate Values .....                                    | 29        |
| 7.1.3.1  | Baud Rate Functions .....                                 | 29        |
| 7.2      | General Terminal Interface Control Functions.....         | 29        |
| 7.2.1    | Get and Set State.....                                    | 29        |
| 7.2.2    | Line Control Functions.....                               | 29        |
| 7.2.3    | Get Foreground Process Group ID.....                      | 30        |
| 7.2.4    | Set Foreground Process Group ID .....                     | 30        |

|           |  |           |
|-----------|--|-----------|
| <b>8</b>  | <b>Language-Specific Services for the C Programming Language</b> | <b>31</b> |
| 8.1       | Referenced C Language Routines                                   | 31        |
| 8.1.1     | Extensions to Time Functions                                     | 34        |
| 8.1.2     | Extensions to setlocale Function                                 | 34        |
| 8.2       | C Language Input/Output Functions                                | 34        |
| 8.2.1     | Map a Stream Pointer to a File Descriptor                        | 34        |
| 8.2.2     | Open a Stream on a File Descriptor                               | 34        |
| 8.2.3     | Interactions of Other FILE-Type C Functions                      | 34        |
| 8.2.4     | Operations on Files - the remove Function                        | 34        |
| 8.2.5     | Temporary File Name - the tmpnam Function                        | 34        |
| 8.2.6     | Stdio Locking Functions  | 34        |
| 8.2.7     | Stdio With Explicit Client Locking                               | 34        |
| 8.3       | Other C Language Functions                                       | 34        |
| 8.3.1     | Nonlocal Jumps   | 34        |
| 8.3.2     | Set Time Zone  | 35        |
| 8.3.3     | Find String Token  | 35        |
| 8.3.4     | ASCII Time Representation  | 35        |
| 8.3.5     | Current Time Representation                                      | 35        |
| 8.3.6     | Coordinated Universal Time                                       | 35        |
| 8.3.7     | Local Time   | 35        |
| 8.3.8     | Pseudo-Random Sequence Generation Functions                      | 35        |
| <b>9</b>  | <b>System Databases</b>  | <b>37</b> |
| 9.1       | System Databases Section   | 37        |
| 9.2       | Database Access  | 37        |
| 9.2.1     | Group Database Access  | 37        |
| 9.2.2     | User Database Access   | 37        |
| <b>10</b> | <b>Data Interchange Format</b>                                   | <b>39</b> |
| 10.1      | Archive/Interchange File Format                                  | 39        |
| 10.1.1    | Extended tar Format  | 39        |
| 10.1.2    | Extended cpio Format   | 39        |
| 10.1.3    | Multiple Volumes   | 40        |
| <b>11</b> | <b>Synchronization</b>   | <b>41</b> |
| 11.1      | Semaphore Characteristics  | 41        |
| 11.2      | Semaphore Functions  | 41        |
| 11.2.1    | Initialize an Unnamed Semaphore                                  | 41        |
| 11.2.2    | Destroy an Unnamed Semaphore                                     | 41        |
| 11.2.3    | Initialize/Open a Named Semaphore                                | 41        |
| 11.2.4    | Close a Named Semaphore  | 41        |
| 11.2.5    | Remove a Named Semaphore   | 41        |
| 11.2.6    | Lock a Semaphore   | 41        |
| 11.2.7    | Unlock a Semaphore   | 41        |
| 11.2.8    | Get the Value of a Semaphore                                     | 41        |
| 11.3      | Mutexes  | 41        |

|           |   |           |
|-----------|---|-----------|
| 11.3.1    | Mutex Initialization Attributes .....                   | 41        |
| 11.3.2    | Initializing and Destroying a Mutex .....               | 42        |
| 11.3.3    | Locking and Unlocking a Mutex .....                     | 42        |
| 11.4      | Condition Variables .....                               | 42        |
| 11.4.1    | Condition Variable Initialization Attributes .....      | 42        |
| 11.4.2    | Initialization and Destroying Condition Variables ..... | 42        |
| 11.4.3    | Broadcasting and Signaling a Condition .....            | 42        |
| 11.4.4    | Waiting on a Condition .....                            | 42        |
| <b>12</b> | <b>Memory Management .....</b>                          | <b>43</b> |
| 12.1      | Memory Locking Functions .....                          | 43        |
| 12.1.1    | Lock/Unlock the Address Space of a Process .....        | 43        |
| 12.1.2    | Lock/Unlock a Rand of Process Address Space .....       | 43        |
| 12.2      | Memory Mapping Functions .....                          | 43        |
| 12.2.1    | Map Process Addresses to a Memory Object .....          | 43        |
| 12.2.2    | Unmap Previously Mapped Addresses .....                 | 43        |
| 12.2.3    | Change Memory Protection .....                          | 43        |
| 12.2.4    | Memory Object Synchronization .....                     | 43        |
| 12.3      | Shared Memory Functions .....                           | 43        |
| 12.3.1    | Open a Shared Memory Object .....                       | 43        |
| 12.3.2    | Remove a Shared Memory Object .....                     | 43        |
| <b>13</b> | <b>Execution Scheduling .....</b>                       | <b>45</b> |
| 13.1      | Scheduling Parameters .....                             | 45        |
| 13.2      | Scheduling Policies .....                               | 45        |
| 13.2.1    | SCHED_FIFO .....  | 45        |
| 13.2.2    | SCHED_RR .....  | 45        |
| 13.2.3    | SCHED_OTHER .....                                       | 45        |
| 13.3      | Process Scheduling Functions .....                      | 45        |
| 13.3.1    | Set Scheduling Parameters .....                         | 45        |
| 13.3.2    | Get Scheduling Parameters .....                         | 45        |
| 13.3.3    | Set Scheduling Policy and Scheduling Parameters .....   | 45        |
| 13.3.4    | Get Scheduling Policy .....                             | 45        |
| 13.3.5    | Yield Processor .....                                   | 45        |
| 13.3.6    | Get Scheduling Parameter Limits .....                   | 45        |
| 13.4      | Thread Scheduling .....                                 | 46        |
| 13.4.1    | Thread Scheduling Attributes .....                      | 46        |
| 13.4.2    | Scheduling Contention Scope .....                       | 46        |
| 13.4.3    | Scheduling Allocation Domain .....                      | 46        |
| 13.4.4    | Scheduling Documentation .....                          | 46        |
| 13.5      | Thread Scheduling Functions .....                       | 46        |
| 13.5.1    | Thread Creation Scheduling Attributes .....             | 46        |
| 13.5.2    | Dynamic Thread Scheduling Parameters Access .....       | 46        |
| 13.6      | Synchronization Scheduling .....                        | 46        |
| 13.6.1    | Mutex Initialization Scheduling Attributes .....        | 46        |
| 13.6.2    | Change the Priority Ceiling of a Mutex .....            | 46        |



|           |  |           |
|-----------|--|-----------|
| <b>14</b> | <b>Clocks and Timers</b> .....                           | <b>47</b> |
| 14.1      | Data Definitions for Clocks and Timers .....             | 47        |
| 14.1.1    | Time Value Specification Structures .....                | 47        |
| 14.1.2    | Timer Event Notification Control Block .....             | 47        |
| 14.1.3    | Type Definitions .....                                   | 47        |
| 14.1.4    | Timer Event Notification Manifest Constants .....        | 47        |
| 14.2      | Clock and Timer Functions .....                          | 47        |
| 14.2.1    | Clocks .....   | 47        |
| 14.2.2    | Create a Per-Process Timer .....                         | 47        |
| 14.2.3    | Delete a Per-Process Timer .....                         | 47        |
| 14.2.4    | Per-Process Timers .....                                 | 47        |
| 14.2.5    | High Resolution Sleep .....                              | 47        |
| <b>15</b> | <b>Message Passing</b> .....                             | <b>49</b> |
| 15.1      | Data Definitions for Message Queues .....                | 49        |
| 15.1.1    | Data Structures .....                                    | 49        |
| 15.2      | Message Passing Functions .....                          | 49        |
| 15.2.1    | Open a Message Queue .....                               | 49        |
| 15.2.2    | Close a Message Queue .....                              | 49        |
| 15.2.3    | Remove a Message Queue .....                             | 49        |
| 15.2.4    | Send a Message to a Message Queue .....                  | 49        |
| 15.2.5    | Receive a Message From a Message Queue .....             | 49        |
| 15.2.6    | Notify Process That a Message is Available on a Queue .. | 49        |
| 15.2.7    | Set Message Queue Attributes .....                       | 49        |
| 15.2.8    | Get Message Queue Attributes .....                       | 49        |
| <b>16</b> | <b>Thread Management</b> .....                           | <b>51</b> |
| 16.1      | Threads .....  | 51        |
| 16.2      | Thread Functions .....                                   | 51        |
| 16.2.1    | Thread Creation Attributes .....                         | 51        |
| 16.2.2    | Thread Creation .....                                    | 51        |
| 16.2.3    | Wait for Thread Termination .....                        | 51        |
| 16.2.4    | Detaching a Thread .....                                 | 51        |
| 16.2.5    | Thread Termination .....                                 | 51        |
| 16.2.6    | Get Thread ID .....                                      | 51        |
| 16.2.7    | Compare Thread IDs .....                                 | 51        |
| 16.2.8    | Dynamic Package Initialization .....                     | 51        |
| <b>17</b> | <b>Thread-Specific Data</b> .....                        | <b>53</b> |
| 17.1      | Thread-Specific Data Functions .....                     | 53        |
| 17.1.1    | Thread-Specific Data Key Creation .....                  | 53        |
| 17.1.2    | Thread-Specific Data Management .....                    | 53        |
| 17.1.3    | Thread-Specific Data Key Deletion .....                  | 53        |

|           |  |           |
|-----------|--|-----------|
| <b>18</b> | <b>Thread Cancellation</b> .....   | <b>55</b> |
| 18.1      | Thread Cancellation Overview .....   | 55        |
| 18.1.1    | Cancelability States .....   | 55        |
| 18.1.2    | Cancellation Points .....  | 55        |
| 18.1.3    | Thread Cancellation Cleanup Handlers .....                                 | 55        |
| 18.1.4    | Async-Cancel Safety .....  | 55        |
| 18.2      | Thread Cancellation Functions .....  | 55        |
| 18.2.1    | Canceling Execution of a Thread .....                                      | 55        |
| 18.2.2    | Setting Cancelability State .....  | 55        |
| 18.2.3    | Establishing Cancellation Handlers .....                                   | 55        |
| 18.3      | Language-Independent Cancellation Functionality .....                      | 55        |
| 18.3.1    | Requesting Cancellation .....  | 55        |
| 18.3.2    | Associating Cleanup Code With Scopes .....                                 | 55        |
| 18.3.3    | Controlling Cancellation Within Scopes .....                               | 55        |
| 18.3.4    | Defined Cancellation Sequence .....  | 55        |
| 18.3.5    | List of Cancellation Points .....  | 55        |
| <b>19</b> | <b>Compliance Summary</b> .....  | <b>57</b> |
| 19.1      | General Chapter .....  | 57        |
| 19.2      | Terminology and General Requirements Chapter .....                         | 58        |
| 19.3      | Process Primitives Chapter .....   | 59        |
| 19.4      | Process Environment Chapter .....  | 60        |
| 19.5      | Files and Directories Chapter .....  | 61        |
| 19.6      | Input and Output Primitives Chapter .....                                  | 62        |
| 19.7      | Device- and Class-Specific Functions Chapter .....                         | 63        |
| 19.8      | Language-Specific Services for the C Programming Language<br>Chapter ..... | 64        |
| 19.9      | System Databases Chapter .....   | 65        |
| 19.10     | Data Interchange Format Chapter .....                                      | 66        |
| 19.11     | Synchronization Chapter .....  | 67        |
| 19.12     | Memory Management Chapter .....  | 68        |
| 19.13     | Execution Scheduling Chapter .....   | 69        |
| 19.14     | Clocks and Timers Chapter .....  | 70        |
| 19.15     | Message Passing Chapter .....  | 71        |
| 19.16     | Thread Management Chapter .....  | 72        |
| 19.17     | Thread-Specific Data Chapter .....   | 73        |
| 19.18     | Thread Cancellation Chapter .....  | 74        |
| 19.19     | Overall Summary .....  | 75        |
|           | <b>Command and Variable Index</b> .....                                    | <b>77</b> |
|           | <b>Concept Index</b> .....   | <b>79</b> |

## 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\_MESGQ, 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.

