INTERNATIONAL STANDARD

ISO/IEC/ IEEE 9945

Information technology — Portable Operating System Interface (POSIX®) Base Specifications, Issue 7

TECHNICAL CORRIGENDUM 2

Technologies de l'information — Spécifications de base de l'interface pour la portabilité des systèmes (POSIX®), Issue 7

RECTIFICATIF TECHNIQUE 2

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IEEE Std 1003.1™-2008/Cor 2-2016
(Corrigendum to
IEEE Std 1003.1-2008)

The Open Group Technical Standard
Base Specifications, Issue 7

IEEE Standard for Information Technology—Portable Operating System Interface (POSIX®)

Base Specifications, Issue 7—Technical Corrigendum 2

Sponsor

Portable Applications Standards Committee
of the
IEEE Computer Society

and
The Open Group

Approved 30 June 2016

IEEE-SA Standards Board

Approved 20 June 2016

The Open Group

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Abstract: Problems discovered since the approval of IEEE Std 1003.1-2008 and IEEE Std 1003.1-2008/Cor 1-2013 are addressed.

Keywords: API, application program interface, argument, asynchronous, basic regular expression, batch job, batch system, BRE, built-in utility, byte, child, command language interpreter, CPU, ERE, extended regular expression, FIFO, file access control mechanism, IEEE 1003.1™, input/output, I/O, job control, network, portable operating system interface, POSIX®

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Participants

IEEE Std 1003.1™-2008/Cor 2-2016 was prepared by the Austin Group, sponsored by the Portable Applications Standards Committee of the IEEE Computer Society, The Open Group, and ISO/IEC JTC 1/SC22.

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At the time this draft standard was completed, the Austin Group had the following membership:

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Introduction

This introduction is not part of IEEE Std 1003.1-2008/Cor 2, IEEE Standard for Information Technology—Portable Operating System Interface (POSIX®)/Base Specifications, Issue 7—Technical Corrigendum 2 .

This Technical Corrigendum addresses issues raised in defect reports and interpretation requests submitted up to 24 August 2015 that meet all of the following criteria:

a)   They are in the scope of the approved standard.

b)   They contain no new APIs (functions/utilities); however, they may add enumeration symbols, non-function #defines, and reserve additional namespaces.

c)   They address contradictions between different parts of the standard, or add consistency between the standard and overriding standards, or address security-related problems.

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NOTE—The editing instructions contained in this corrigendum define how to merge the material contained therein into the existing base standard to form the comprehensive standard.

1 **1. Changes to the Front Matter**

2 This section contains the set of changes to the text of the front matter.

3 [*Note to reviewers: References to defect reports are provided to aid reviewers.*]

4 **Change Number: Front Matter/TC2/D4/0001** [885]

5 On Page: xlv Line: NA Section: Referenced Documents
6 (2013 edition Page: xlvii Line: NA)

7 In the line below the **Source Documents** header, change from:

8 base documents for POSIX.1-2008

9 to:

10 base documents for POSIX.1-2001

11 *Rationale*: Austin Group Defect Report(s) applied: 885. See http://austingroupbugs.net/view.php?id=885.

12 **Change Number: Front Matter/TC2/D4/0002** [726]

13 On Page: xxxviii Line: NA Section: Acknowledgements

14 Remove the period from the first bullet list item.

15 *Rationale*: Austin Group Defect Report(s) applied: 726. See http://austingroupbugs.net/view.php?id=726.
16 Editorial change.

17

18 ## 2. Changes to Base Definitions

19 This section contains the set of changes to the text of the Base Definitions.

20 [*Note to reviewers: References to defect reports are provided to aid reviewers.*]

21 **Change Number: XBD/TC2/D4/0001** [591]

22 On Page: 9 Line: 266 Section: 1.7.1 Codes

23 Change from:

```
24   [OH]#include <sys/types.h>[/OH]
25   #include <grp.h>
26   struct group *getgrnam(const char *name);
```

27 The OH margin legend indicates that the marked header is not required on XSI-conformant systems.

28 to:

```
29   [OH]#include <sys/stat.h>[/OH]
30   #include <fcntl.h>
31   int open(const char *path, int oflag, ...);
```

32 The OH margin legend indicates that the optional header defines constants that will be needed if the
33 function is called with certain flag arguments; thus it may be required for some of the functionality
34 described, but is not needed otherwise.

35 *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

36 **Change Number: XBD/TC2/D4/0002** [810]

37 On Page: 16 Line: 493 Section: 2.1.1 Requirements

38 At the end of section 2.1.1, add a small-font note:

39 **Note:** If the documented method of setting up a conforming environment includes the need to set one or
40 more environment variables, then the values of those environment variables cannot include any <space>
41 characters, since the *confstr*() function must be able to return them in a <space>-separated list of
42 variable=value pairs. See [xref to XSH confstr()].

43 *Rationale*: Austin Group Defect Report(s) applied: 810. See http://austingroupbugs.net/view.php?id=810.

44 **Change Number: XBD/TC2/D4/0003** [637]

45 On Page: 17 Line: 561 Section: 2.1.3 POSIX Conformance

46 Change from:

```
47       _POSIX_TIMERS
48
49   -- Symbolic constants defined with a value greater than zero:
```

```
50      _POSIX_JOB_CONTROL
51      _POSIX_SAVED_IDS
```

52   to:

```
53      _POSIX_TIMERS
54      _POSIX2_C_BIND
55
56    -- Symbolic constants defined with a value greater than zero:
57      _POSIX_JOB_CONTROL
58      _POSIX_REGEXP
59      _POSIX_SAVED_IDS
60      _POSIX_SHELL
```

61   *Rationale*: Austin Group Defect Report(s) applied: 637. See http://austingroupbugs.net/view.php?id=637.

62   **Change Number: XBD/TC2/D4/0004** [937]

63   On Page: 35 Line: 1195 Section: 3.17 Application
64   (2013 edition Page: 35 Line: 1199)

65   After:

66   A computer program that performs some desired function.

67   add a new paragraph:

68   When the User Portability Utilities option is supported, requirements placed on applications relating to the
69   use of standard utilities shall also apply to the actions of a user who is entering shell command language
70   statements into an interactive shell.

71   *Rationale*: Austin Group Defect Report(s) applied: 937. See http://austingroupbugs.net/view.php?id=937.

72   **Change Number: XBD/TC2/D4/0005** [516]

73   On Page: 37 Line: 1229 Section: 3.27 Async-Signal-Safe Function

74   Change the definition from:

75   A function that may be invoked, without restriction, from signal-catching functions. No function is async-
76   signal-safe unless explicitly described as such.

77   to:

78   A function that can be called, without restriction, from signal-catching functions. Note that, although there
79   is no restriction on the calls themselves, for certain functions there are restrictions on subsequent behavior
80   after the function is called from a signal-catching function. No function is async-signal-safe unless
81   explicitly described as such.

82   Note: Async-signal-safety is defined in detail in [xref to XSH 2.4.3].

83   *Rationale*: Austin Group Defect Report(s) applied: 516. See http://austingroupbugs.net/view.php?id=516.
84   The restrictions on using longjmp() and siglongjmp() are more restrictive than they need to be on POSIX

85 systems. The loosened restrictions presented here do not break existing implementations and make it easier
86 for application writers to create portable applications.

87 **Change Number: XBD/TC2/D4/0006** [653]

88 On Page: 39 Line: 1274 Section: 3.40 Basename

89 Change from:

90 The final, or only, filename in a pathname.

91 to:

92 For pathnames containing at least one filename: the final, or only, filename in the pathname. For pathnames
93 consisting only of <slash> characters: either "/" or "//" if the pathname consists of exactly two <slash>
94 characters, and "/" otherwise.

95 *Rationale*: Austin Group Defect Report(s) applied: 653. See http://austingroupbugs.net/view.php?id=653.

96 **Change Number: XBD/TC2/D4/0007** [834]

97 On Page: 60 Line: 1775 Section: 3.168 File Mode

98 Change from:

99 An object containing the file mode bits and file type of a file.

100 to:

101 An object containing the file mode bits and some information about the file type of a file.

102 *Rationale*: Austin Group Defect Report(s) applied: 834. See http://austingroupbugs.net/view.php?id=834.

103 **Change Number: XBD/TC2/D4/0008** [511]

104 On Page: 63 Line: 1855 Section: 3.188 Group ID

105 Add a sentence:

106 The value (**gid_t**)-1 shall not be a valid group ID, but does have a defined use in some interfaces defined in
107 this standard.

108 *Rationale*: Austin Group Defect Report(s) applied: 511. See http://austingroupbugs.net/view.php?id=511.

109 **Change Number: XBD/TC2/D4/0009** [584]

110 On Page: 63 Line: 1859 Section: 3.189 Group Name

111 Change from:

112   <hyphen>

113   to:

114   <hyphen-minus>

115   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

116   **Change Number: XBD/TC2/D4/0010** [690]

117   On Page: 66 Line: 1926 Section: 3 Definitions
118   (2013 edition Page: 66 Line: 1935)

119   After section 3.208 ("Link Count"), insert a new section **3.209 Live Process** whose contents are copied
120   from section 3.289 ("Process") page 80 lines 2243-2250 (2013 edition section 3.291 page 80 lines 2269-
121   2275):

122   An address space with one or more threads executing within that address space, and the required system
123   resources for those threads.

124   <small>**Note:** Many of the system resources defined by POSIX.1-2008 are shared among all of the threads
125   within a process. These include the process ID, the parent process ID, process group ID, session
126   membership, real, effective, and saved set-user-ID, real, effective, and saved set-group-ID, supplementary
127   group IDs, current working directory, root directory, file mode creation mask, and file descriptors.</small>

128   *Rationale*: Austin Group Defect Report(s) applied: 690. See http://austingroupbugs.net/view.php?id=690.

129   **Change Number: XBD/TC2/D4/0011** [625]

130   On Page: 69 Line: 2000 Section: 3 Definitions

131   Add the following definitions in alphabetical order:

132   **Multi-threaded library**

133   A library containing object files that were produced by compiling with *c99* using the flags output by
134   `getconf POSIX_V7_THREADS_CFLAGS`, or by compiling using a non-standard utility with equivalent
135   flags, and which makes use of interfaces that are only made available by *c99* when the -**l pthread** option is
136   used or makes use of SIGEV_THREAD notifications.

137   **Multi-threaded process**

138   A process that contains more than one thread.

139   **Multi-threaded program**

140   A program whose executable file was produced by compiling with *c99* using the flags output by `getconf`
141   `POSIX_V7_THREADS_CFLAGS`, and linking with *c99* using the flags output by `getconf`
142   `POSIX_V7_THREADS_LDFLAGS` and the -**l pthread** option, or by compiling and linking using a non-
143   standard utility with equivalent flags. Execution of a multi-threaded program initially creates a single-
144   threaded process; the process can create additional threads using *pthread_create*() or SIGEV_THREAD

145 notifications.

Single-threaded process

A process that contains a single thread.

Single-threaded program

A program whose executable file was produced by compiling with *c99* without using the flags output by `getconf POSIX_V7_THREADS_CFLAGS` and linking with *c99* using neither the flags output by `getconf POSIX_V7_THREADS_LDFLAGS` nor the **-l pthread** option, or by compiling and linking using a non-standard utility with equivalent flags. Execution of a single-threaded program creates a single-threaded process; if the process attempts to create additional threads using *pthread_create*() or SIGEV_THREAD notifications, the behavior is undefined. If the process uses *dlopen*() to load a multi-threaded library, the behavior is undefined.

Rationale: Austin Group Defect Report(s) applied: 625. See http://austingroupbugs.net/view.php?id=625. The standard does not adequately address the differences between single-threaded and multi-threaded processes and programs.

Change Number: XBD/TC2/D4/0012 [584]

On Page: 77 Line: 2193 Section: 3. Definitions

After Section 3.275, add a new section:

3.2xx Portable Filename

A filename consisting only of characters from the portable filename character set.

<small>Note: Applications should avoid using filenames that have the <hyphen-minus> character as the first character since this may cause problems when filenames are passed as command line arguments.</small>

Rationale: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584. This is a layered change on XBD/TC1/D5/0010 [291]. The change is to replace <hyphen> with <hyphen-minus>.

Change Number: XBD/TC2/D4/0013 [584]

On Page: 77 Line: 2199 Section: 3.276 Portable Filename Character Set

Change from:

<hyphen>

to:

<hyphen-minus>

Rationale: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

177   **Change Number: XBD/TC2/D4/0014** [690]

178   On Page: 80 Line: 2244-2250 Section: 3.289 Process
179   (2013 edition Page: 80 Line: 2269-2275 Section: 3.291)

180   Replace the definition with:

181   A live process (see Section 3.xxx) or a zombie process (see Section 3.xxx). The lifetime of a process is
182   described in Section 3.xxx.

183   On Page: 81 Line: 2270-2279 Section: 3.295 Process Lifetime
184   (2013 edition Page: 81 Line: 2295-2304 Section: 3.297)

185   Change from:

186   The period of time that begins when a process is created and ends when its process ID is returned to the
187   system. After a process is created by *fork*(), *posix_spawn*(), or *posix_spawnp*(), it is considered active. At
188   least one thread of control and address space exist until it terminates. It then enters an inactive state where
189   certain resources may be returned to the system, although some resources, such as the process ID, are still
190   in use. When another process executes a *wait*(), *waitid*(), or *waitpid*() function for an inactive process, the
191   remaining resources are returned to the system. The last resource to be returned to the system is the process
192   ID. At this time, the lifetime of the process ends.
193
194   <small>**Note:** The *fork*(), *posix_spawn*(), *posix_spawnp*(), *wait*(), *waitid*(), and *waitpid*() functions are
195   defined in detail in the System Interfaces volume of POSIX.1-2008.</small>

196   to:

197   The period of time that begins when a process is created and ends when its process ID is returned to the
198   system.
199
200   See also *Live Process* in Section 3.xxx, *Process Termination* in Section 3.xxx, and *Zombie Process* in
201   Section 3.xxx.
202
203   <small>**Note:** Process creation is defined in detail in the descriptions of the *fork*(), *posix_spawn*(), and
204   *posix_spawnp*() functions in the System Interfaces volume of POSIX.1-2008.</small>

205   On Page: 81 Line: 2293-2294 Section: 3.297 Process Termination
206   (2013 edition Page: 81 Line: 2318-2319 Section: 3.299)

207   Change from:

208   <small>**Note:** The *_exit*(), *_Exit*(), *abort*(), and *exit*() functions are defined in detail in the System
209   Interfaces volume of POSIX.1-2008.</small>

210   to:

211   <small>**Note:** The consequences of process termination can be found in the description of the *_Exit*()
212   function in the System Interfaces volume of POSIX.1-2008. The *_exit*(), *_Exit*(), *abort*(), and *exit*()
213   functions are defined in detail in the System Interfaces volume of POSIX.1-2008.</small>

214   *Rationale*: Austin Group Defect Report(s) applied: 690. See http://austingroupbugs.net/view.php?id=690.

215 **Change Number: XBD/TC2/D4/0015** [896]

216 On Page: 90 Line: 2485 Section: 3.351 Source Code
217 (2013 edition Page: 90 Line: 2510 Section: 3.353 Source Code)

218 Change from:

219 *... ed, lex, ...*

220 to:

221 *... ed, ex, lex, ...*

222 On Page: 90 Line: 2487 Section: 3.351 Source Code
223 (2013 edition Page: 90 Line: 2512 Section: 3.353 Source Code)

224 Change from:

225 *... ed, lex, ...*

226 to:

227 *... ed, ex, lex, ...*

228 *Rationale*: Austin Group Defect Report(s) applied: 896. See http://austingroupbugs.net/view.php?id=896.

229 **Change Number: XBD/TC2/D4/0016** [511]

230 On Page: 102 Line: 2782 Section: 3.428 User ID

231 Add a sentence:

232 The value (**uid_t**)-1 shall not be a valid user ID, but does have a defined use in some interfaces defined in
233 this standard.

234 *Rationale*: Austin Group Defect Report(s) applied: 511. See http://austingroupbugs.net/view.php?id=511.

235 **Change Number: XBD/TC2/D4/0017** [584]

236 On Page: 102 Line: 2786 Section: 3.429 User Name

237 Change from:

238 <hyphen>

239 to:

240 <hyphen-minus>

241 *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

242

243 **Change Number: XBD/TC2/D4/0018** [690]

244 On Page: 105 Line: 2845-2846 Section: 3.444 Zombie Process
245 (2013 edition Page: 105 Line: 2871-2872 Section: 3.446)

246 Change from:

247 A process that has terminated and that is deleted when its exit status has been reported to another process
248 which is waiting for that process to terminate.

249 to:

250 The remains of a live process (see Section 3.xxx) after it terminates (see Section 3.xxx) and before its status
251 information (see XSH Section 2.13) is consumed by its parent process.

252 *Rationale*: Austin Group Defect Report(s) applied: 690. See http://austingroupbugs.net/view.php?id=690.

253 **Change Number: XBD/TC2/D4/0019** [934]

254 On Page: 107 Line: 2858 Section: 4 General Concepts
255 (2013 edition Page: 107 Line: 2884)

256 Add a new section (and renumber subsequent sections as needed):

257 **4.2 Default Initialization**

258 Default initialization causes an object to be initialized according to these rules:

259 • If it has pointer type, it is initialized to a null pointer.
260 • If it has arithmetic type, it is initialized to (positive or unsigned) zero.
261 • If it is an aggregate, every member is initialized (recursively) according to these rules.
262 • If it is a union, the first named member is initialized (recursively) according to these rules.

263 For an object of aggregate type with an explicit initializer, the initialization shall occur in initializer list
264 order, each initializer provided for a particular subobject overriding any previously listed initializer for the
265 same subobject; all subobjects that are not initialized explicitly shall be initialized implicitly according to
266 the rules for default initialization.

267 Objects with static storage duration but no explicit initializer shall be initialized implicitly according to the
268 rules for default initialization.

269 An explicit initializer of { 0 } works to perform explicit default initialization for any object of scalar or
270 aggregate type, and for any storage duration.

271 <small>Note: The C standard does not require a compiler to set any field alignment padding bits in a
272 structure or array definition to a particular value. Because of this, a structure initialized using { 0 } might
273 not *memcmp*() as equal to the same structure initialized using *memset*() to zero. For consistent results,
274 portable applications comparing structures should test each field individually.

275 Note: If an implementation treats the all-zero bit pattern of a pointer object as a null pointer, and the all-
276 zero bit pattern of a floating point object as equivalent to positive 0, then *memset*() to zero and *calloc*()
277 have the same effects as default initialization for all named members of a structure. [MX]Implementations

278   that define __STDC_IEC_559__ guarantee that the all-zero bit pattern of a floating point object represents
279   0.0.[/MX]</small>

280   *Rationale*: Austin Group Defect Report(s) applied: 934. See http://austingroupbugs.net/view.php?id=934.

281   **Change Number: XBD/TC2/D4/0020** [584]

282   On Page: 109 Line: 2914 Section: 4.7 Filename Portability

283   Change from:

284   <hyphen>

285   to:

286   <hyphen-minus>

287   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

288   **Change Number: XBD/TC2/D4/0021** [626]

289   On Page: 109 Line: 2917 Section: 4.8 File Times Update

290   Insert a new paragraph at the start of the section:

291   Many operations have requirements to update file timestamps. These requirements do not apply to streams
292   that have no underlying file description (for example, memory streams created by *open_memstream*() have
293   no underlying file description).

294   *Rationale*: Austin Group Defect Report(s) applied: 626. See http://austingroupbugs.net/view.php?id=626.

295   **Change Number: XBD/TC2/D4/0022** [863]

296   On Page: 110 Line: 2980 Section: 4.11 Memory Synchronization
297   (2013 edition Page: 110 Line: 3004)

298   Change from:

299   The *pthread_once*() function shall synchronize memory for the first call in each thread for a given
300   **pthread_once_t** object.

301   to:

302   The *pthread_once*() function shall synchronize memory for the first call in each thread for a given
303   **pthread_once_t** object. If the *init_routine* called by *pthread_once*() is a cancellation point and is canceled,
304   a call to *pthread_once*() for the same **pthread_once_t** object made from a cancellation cleanup handler
305   shall also synchronize memory.

306   *Rationale*: Austin Group Defect Report(s) applied: 863. See http://austingroupbugs.net/view.php?id=863.

307

308   **Change Number: XBD/TC2/D4/0023** [541,649,825]

309   On Page: 112 Line: 3026 Section: 4.12 Pathname Resolution

310   Change from:

311   In all other cases, the system shall prefix the remaining pathname, if any, with the contents of the symbolic
312   link. If the combined length exceeds {PATH_MAX}, and the implementation considers this to be an error,
313   *errno* shall be set to [ENAMETOOLONG] and an error indication shall be returned.

314   to:

315   In all other cases, the system shall prefix the remaining pathname, if any, with the contents of the symbolic
316   link, except that if the contents of the symbolic link is the empty string, then either pathname resolution
317   shall fail with functions reporting an [ENOENT] error and utilities writing an equivalent diagnostic
318   message, or the pathname of the directory containing the symbolic link shall be used in place of the
319   contents of the symbolic link. If the contents of the symbolic link consist solely of <slash> characters, then
320   all leading <slash> characters of the remaining pathname shall be omitted from the resulting combined
321   pathname, leaving only the leading <slash> characters from the symbolic link contents. In the cases where
322   prefixing occurs, if the combined length exceeds {PATH_MAX}, and the implementation considers this to
323   be an error, pathname resolution shall fail with functions reporting an [ENAMETOOLONG] error and
324   utilities writing an equivalent diagnostic message.

325   *Rationale*: Austin Group Defect Report(s) applied: 541,649,825. See
326   http://austingroupbugs.net/view.php?id=541.
327   See http://austingroupbugs.net/view.php?id=649.
328   See http://austingroupbugs.net/view.php?id=825.
329   The previous text was not historic practice on implementations that support //hostname as a special case in
330   pathname resolution. For implementations that do not treat // as special, the change in handling of all-slash
331   symbolic links has no effect on pathname resolution.

332   **Change Number: XBD/TC2/D4/0024** [825]

333   On Page: 112 Line: 3032 Section: 4.12 Pathname Resolution
334   (2013 edition Page: 112 Line: 3056 Section: 4.12)

335   Change from:

336   If the system detects a loop in the pathname resolution process, it shall set *errno* to [ELOOP] and return an
337   error indication.

338   to:

339   If the system detects a loop in the pathname resolution process, pathname resolution shall fail with
340   functions reporting an [ELOOP] error and utilities writing an equivalent diagnostic message.

341   *Rationale*: Austin Group Defect Report(s) applied: 825. See http://austingroupbugs.net/view.php?id=825.

342

IEEE Std 1003.1™-2008/Cor 2-2016
IEEE Standard for Information Technology—Portable Operating System Interface (POSIX®)
Base Specifications, Issue 7—Technical Corrigendum 2

343   **Change Number: XBD/TC2/D4/0025** [543]

344   On Page: 116 Line: 3205 Section: 4.19 Treatment of Error Conditions for Mathematical Functions

345   Add a new paragraph before the last paragraph:

346   On implementations that support the IEC 60559 Floating-Point option, whether or when functions in the
347   <**math.h**> header raise an undeserved underflow floating-point exception is unspecified. Otherwise, as
348   implied by [xref to XSH *feraiseexcept*()] the <**math.h**> functions do not raise spurious floating-point
349   exceptions (detectable by the user), other than the inexact floating-point exception.

350   *Rationale*: Austin Group Defect Report(s) applied: 543. See http://austingroupbugs.net/view.php?id=543.

351   **Change Number: XBD/TC2/D4/0026** [584]

352   On Page: 123 Line: 3411 Section: 5 File Format Notation

353   Change from:

354   indicates either a <plus-sign> or minus-sign),

355   to:

356   indicates either a <plus-sign> or <hyphen-minus>),

357   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

358   **Change Number: XBD/TC2/D4/0027** [584,967]

359   On Page: 125 Line: 3454 Section: 6.1 Portable Character Set
360   (2013 edition Page: 125 Line: 3479)

361   Change from:

362   The first eight entries in [xref to Table 6-1] are defined in the ISO/IEC 6429:1992 standard and the rest of
363   the characters are defined in the ISO/IEC 10646-1:2000 standard.

364   to:

365   The first eight entries in [xref to Table 6-1] and all characters in [xref to Table 6-2] are defined in the
366   ISO/IEC 6429:1992 standard. The rest of the characters in [xref to Table 6-1] are defined in the ISO/IEC
367   10646-1:2000 standard.

368   On Page: 125 Line: 3458 Section: 6.1 Portable Character Set
369   (2013 edition Page: 125 Line: 3483)

370   Change from:

371   **Symbolic Name**

372   to:

373   **Symbolic Name(s)**

374   On Page: 125 Line: 3460-3466 Section: 6.1 Portable Character Set
375   (2013 edition Page: 125 Line: 3485-3491)

376   Change from:

<alert>	<U0007>	BELL (BEL)
<backspace>	<U0008>	BACKSPACE (BS)
<tab>	<U0009>	CHARACTER TABULATION (HT)
<carriage-return>	<U000D>	CARRIAGE RETURN (CR)
<newline>	<U000A>	LINE FEED (LF)
<vertical-tab>	<U000B>	LINE TABULATION (VT)
<form-feed>	<U000C>	FORM FEED (FF)

377

378   to (note the description column changes to match the Unicode spec, and the change in line order):

<alert>, <BEL>	<U0007>	BELL
<backspace>, <BS>	<U0008>	BACKSPACE
<tab>, <HT>	<U0009>	CHARACTER TABULATION
<newline>, <LF>	<U000A>	LINE FEED (LF)
<vertical-tab>, <VT>	<U000B>	LINE TABULATION
<form-feed>, <FF>	<U000C>	FORM FEED (FF)
<carriage-return>, <CR>	<U000D>	CARRIAGE RETURN (CR)

379

380   On Page: 125 Line: 3480-3485 Section: 6.1 Portable Character Set
381   (2013 edition Page: 125 Line: 3505-3510)

382   Change from:

<hyphen-minus>	-	<U002D>	HYPHEN-MINUS
<hyphen>	-	<U002D>	HYPHEN-MINUS
<full-stop>	.	<U002E>	FULL STOP
<period>	.	<U002E>	FULL STOP
<slash>	/	<U002F>	SOLIDUS
<solidus>	/	<U002F>	SOLIDUS

383

384 to (note that the glyph used for <hyphen-minus>, <hyphen> should be the same one that is used in the
385 construct "('-')" in the rest of the standard):

<hyphen-minus>, <hyphen>	-	<U002D>	HYPHEN-MINUS
<full-stop>, <period>	.	<U002E>	FULL STOP
<slash>, <solidus>	/	<U002F>	SOLIDUS

386 On Page: 126 Line: 3531-3532 Section: 6.1 Portable Character Set
387 (2013 edition Page: 126 Line: 3556-3557)

388 Change from:

<backslash>	\	<U005C>	REVERSE SOLIDUS
<reverse-solidus>	\	<U005C>	REVERSE SOLIDUS

389

390 to:

<backslash>, <reverse-solidus>	\	<U005C>	REVERSE SOLIDUS

391

392 On Page: 126 Line: 3534-3537 Section: 6.1 Portable Character Set
393 (2013 edition Page: 126 Line: 3559-3562)

394 Change from:

<circumflex-accent>	^	<U005E>	CIRCUMFLEX ACCENT

15

<circumflex>	^	<U005E>	CIRCUMFLEX ACCENT
<low-line>	_	<U005F>	LOW LINE
<underscore>	_	<U005F>	LOW LINE

395

396 to:

<circumflex-accent>, <circumflex>	^	<U005E>	CIRCUMFLEX ACCENT
<low-line>, <underscore>	_	<U005F>	LOW LINE

397

398 On Page: 127 Line: 3566-3567 Section: 6.1 Portable Character Set
399 (2013 edition Page: 127 Line: 3591-3592)

400 Change from:

<left-brace>	{	<U007B>	LEFT CURLY BRACKET
<left-curly-bracket>	{	<U007B>	LEFT CURLY BRACKET

401

402 to:

<left-brace>, <left-curly-bracket>	{	<U007B>	LEFT CURLY BRACKET

403

404 On Page: 127 Line: 3569-3570 Section: 6.1 Portable Character Set
405 (2013 edition Page: 127 Line: 3594-3595)

406 Change from:

<right-brace>	}	<U007D>	RIGHT CURLY BRACKET
<right-curly-bracket>	}	<U007D>	RIGHT CURLY BRACKET

407

408 to:

<right-brace>, <right-curly-bracket>	}	<U007D>	RIGHT CURLY BRACKET

409

410 On Page: 127 Line: 3576-3578 Section: 6.1 Portable Character Set
411 (2013 edition Page: 127 Line: 3601-3603)

412 Delete the sentence:

413 The table contains more than one symbolic character name for characters whose traditional name differs
414 from the chosen name.

415 *Rationale*: Austin Group Defect Report(s) applied: 584,967. See
416 http://austingroupbugs.net/view.php?id=584.
417 See http://austingroupbugs.net/view.php?id=967.

418 **Change Number: XBD/TC2/D4/0028** [745]

419 On Page: 128 Line: 3589 Section: 6.1 Portable Character Set

420 Add a sentence as a new bullet item:

421 • The encoded values associated with <period>, <slash>, <newline> and <carriage-return> shall be
422 invariant across all locales supported by the implementation.

423 *Rationale*: Austin Group Defect Report(s) applied: 745. See http://austingroupbugs.net/view.php?id=745.
424 This is a layered change on XBD/TC1/D5/0019 [291].

425 **Change Number: XBD/TC2/D4/0029** [663,967]

426 On Page: 128 Line: 3596 Section: 6.2 Character Encoding
427 (2013 edition Page: 128 Line: 3623)

428 Change from:

429 The POSIX locale contains the characters in [xref to Table 6-1], which have the properties listed in [xref to
430 7.3.1]. In other locales, the presence, meaning, and representation of any additional characters are locale-
431 specific.

432 to:

433 The POSIX locale shall contain 256 single-byte characters including the characters in [xref to Table 6-1]
434 and [xref to Table 6-2], which have the properties listed in [xref to 7.3.1]. It is unspecified whether
435 characters not listed in those two tables are classified as **punct** or **cntrl**, or neither. Other locales shall
436 contain the characters in [xref to Table 6-1] and may contain any or all of the control characters identified
437 in [xref to Table 6-2]; the presence, meaning, and representation of any additional characters are locale-
438 specific.

439 *Rationale*: Austin Group Defect Report(s) applied: 663,967. See
440 http://austingroupbugs.net/view.php?id=663.
441 See http://austingroupbugs.net/view.php?id=967.

442   This is a layered change on XBD/TC1/D5/0020 [216].

443   The intention was always that the POSIX locale should have an 8-bit-clean single-byte encoding. The

444   omission of an explicit statement to that effect was an oversight.

445   **Change Number: XBD/TC2/D4/0030** [745]

446   On Page: 128 Line: 3619 Section: 6.2 Character Encoding

447   Add a sentence:

448   Likewise, the byte values used to encode <period>, <slash>, <newline> and <carriage-return> shall not

449   occur as part of any other character in any locale.

450   *Rationale*: Austin Group Defect Report(s) applied: 745. See http://austingroupbugs.net/view.php?id=745.

451   This is a layered change on XBD/TC1/D5/0021 [291].

452   **Change Number: XBD/TC2/D4/0031** [967]

453   On Page: 129 Line: 3655 Section: 6.4 Character Set Description File

454   (2013 edition Page: 129 Line: 3683)

455   Change from:

456   Each symbolic name specified in [xref to Table 6-1] shall be included in the file and shall be mapped to a

457   unique coding value, except as noted below. The glyphs represented by the C character constants `'{'`, `'}'`,

458   `'_'`, `'~'`, `'/'`, `'\\'`, `'.'`, and `'^'` have more than one symbolic name; all symbolic names for each such

459   glyph shall be included, each with identical encoding. If some or all of the control characters identified in

460   [xref to Table 6-2] are supported by the implementation, the symbolic names and their corresponding

461   encoding values shall be included in the file. The encoding values shall each be represented in a single

462   byte. Some of the encodings associated with the symbolic names in [xref to Table 6-2] may be the same as

463   characters found in [xref to Table 6-1]; both names shall be provided for each encoding.

464   to:

465   Each symbolic name specified in [xref to Table 6-1] shall be included in the file. Each character in [xref to

466   Table 6-1] (each row in the table) shall be mapped to a unique coding value. For each character in [xref to

467   Table 6-2] that exists in the character set described by the file, the character's symbolic name(s) from [xref

468   to Table 6-2] and the character's single-byte encoding value shall be included in the file.

469   On Page: 130 Line: 3664-3670 Section: 6.4 Character Set Description File

470   (2013 edition Page: 130 Line: 3692-3698)

471   Change from:

472   **Table 6-2** Control Character Set

473

   <ACK>   <DC2>   <ENQ>   <FS>   <IS4>   <SOH>

   <BEL>   <DC3>   <EOT>   <GS>   <LF>   <STX>

\<BS\>	\<DC4\>	\<ESC\>	\<HT\>	\<NAK\>	\<SUB\>
\<CAN\>	\<DEL\>	\<ETB\>	\<IS1\>	\<RS\>	\<SYN\>
\<CR\>	\<DLE\>	\<ETX\>	\<IS2\>	\<SI\>	\<US\>
\<DC1\>	\<EM\>	\<FF\>	\<IS3\>	\<SO\>	\<VT\>

474   to:

475   **Table 6-2** Non-Portable Control Characters

476

Symbolic Name(s)	UCS	Description
\<SOH\>	\<U0001\>	START OF HEADING
\<STX\>	\<U0002\>	START OF TEXT
\<ETX\>	\<U0003\>	END OF TEXT
\<EOT\>	\<U0004\>	END OF TRANSMISSION
\<ENQ\>	\<U0005\>	ENQUIRY
\<ACK\>	\<U0006\>	ACKNOWLEDGE
\<SO\>	\<U000E\>	SHIFT OUT
\<SI\>	\<U000F\>	SHIFT IN
\<DLE\>	\<U0010\>	DATA LINK ESCAPE
\<DC1\>	\<U0011\>	DEVICE CONTROL ONE
\<DC2\>	\<U0012\>	DEVICE CONTROL TWO
\<DC3\>	\<U0013\>	DEVICE CONTROL THREE
\<DC4\>	\<U0014\>	DEVICE CONTROL FOUR
\<NAK\>	\<U0015\>	NEGATIVE ACKNOWLEDGE
\<SYN\>	\<U0016\>	SYNCHRONOUS IDLE
\<ETB\>	\<U0017\>	END OF TRANSMISSION BLOCK

<CAN>	<U0018>	CANCEL
<EM>	<U0019>	END OF MEDIUM
<SUB>	<U001A>	SUBSTITUTE
<ESC>	<U001B>	ESCAPE
<IS4>, <FS>	<U001C>	INFORMATION SEPARATOR FOUR
<IS3>, <GS>	<U001D>	INFORMATION SEPARATOR THREE
<IS2>, <RS>	<U001E>	INFORMATION SEPARATOR TWO
<IS1>, <US>	<U001F>	INFORMATION SEPARATOR ONE
<DEL>	<U007F>	DELETE

477

478 *Rationale*: Austin Group Defect Report(s) applied: 967. See http://austingroupbugs.net/view.php?id=967.

479 **Change Number: XBD/TC2/D4/0032** [796]

480 On Page: 136 Line: 3846 Section: 7.2 POSIX Locale
481 (2013 edition Page: 136 Line: 3882)

482 After:

483 Conforming systems shall provide a POSIX locale, also known as the C locale.

484 add:

485 In POSIX.1 the requirements for the POSIX locale are more extensive than the requirements for the C
486 locale as specified in the C standard. However, in a conforming POSIX implementation, the POSIX locale
487 and the C locale are identical.

488 *Rationale*: Austin Group Defect Report(s) applied: 796. See http://austingroupbugs.net/view.php?id=796.

489 **Change Number: XBD/TC2/D4/0033** [663]

490 On Page: 136 Line: 3849 Section: 7.2 POSIX locale
491 (2013 edition Page: 136 Line: 3885)

492 Delete:

493 The tables in Section 7.3 describe the characteristics and behavior of the POSIX locale for data consisting
494 entirely of characters from the portable character set and the control character set. For other characters, the
495 behavior is unspecified.

496   On Page: 139 Line: 3996 Section: 7.3.1 LC_CTYPE
497   (2013 edition Page: 139 Line: 4032)

498   Change from:

499   In the POSIX locale, the 26 uppercase letters shall be included:

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

501   to:

502   In the POSIX locale, only:

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

504   shall be included.

505   On Page: 139 Line: 4003 Section: 7.3.1 LC_CTYPE
506   (2013 edition Page: 139 Line: 4039)

507   Change from:

508   In the POSIX locale, the 26 lowercase letters shall be included:

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

510   to:

511   In the POSIX locale, only:

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

513   shall be included.

514   On Page: 139 Line: 4009 Section: 7.3.1 LC_CTYPE
515   (2013 edition Page: 140 Line: 4045)

516   Change from:

517   In the POSIX locale, all characters in the classes **upper** and **lower** shall be included.

518   to:

519   In the POSIX locale, only characters in the classes **upper** and **lower** shall be included.

520   On Page: 141 Line: 4091 Section: 7.3.1 LC_CTYPE
521   (2013 edition Page: 141 Line: 4127)

522   Change from:

523   In the POSIX locale, at a minimum, the 26 lowercase characters:

524   to:

525   In the POSIX locale, the 26 lowercase characters:

526   On Page: 142 Line: 4105 Section: 7.3.1 LC_CTYPE
527   (2013 edition Page: 142 Line: 4141)

528   Change from:

529   In the POSIX locale, at a minimum, the 26 uppercase characters:

530   to:

531   In the POSIX locale, the 26 uppercase characters:

532   *Rationale*: Austin Group Defect Report(s) applied: 663. See http://austingroupbugs.net/view.php?id=663.

533   **Change Number: XBD/TC2/D4/0034** [663]

534   On Page: 143 Line: 4142 Section: 7.3.1.1 LC_CTYPE Category in the POSIX Locale
535   (2013 edition Page: 143 Line: 4178)

536   Change from:

537   The character classifications for the POSIX locale follow; the code listing depicts the *localedef* input, and
538   the table represents the same information, sorted by character.

539   to:

540   The minimum character classifications for the POSIX locale follow; the code listing depicts the *localedef*
541   input, and the table represents the same information, sorted by character. Implementations may add
542   additional characters to the **cntrl** and **punct** classifications but shall not make any other additions.

543   On Page: 143 Line: 4145 Section: 7.3.1.1 LC_CTYPE Category in the POSIX Locale
544   (2013 edition Page: 143 Line: 4181)

545   Change from:

```
546    # The following is the POSIX locale LC_CTYPE.
547    # "alpha" is by default "upper" and "lower"
548    # "alnum" is by definition "alpha" and "digit"
549    # "print" is by default "alnum", "punct", and the <space>
550    # "graph" is by default "alnum" and "punct"
```

551   to:

```
552    # The following is the minimum POSIX locale LC_CTYPE.
553    # "alpha" is by definition "upper" and "lower"
554    # "alnum" is by definition "alpha" and "digit"
555    # "print" is by definition "alnum", "punct", and the <space>
556    # "graph" is by definition "alnum" and "punct"
```

557   *Rationale*: Austin Group Defect Report(s) applied: 663. See http://austingroupbugs.net/view.php?id=663.

558   **Change Number: XBD/TC2/D4/0035** [584]

559   On Page: 143 Line: 4173 Section: 7.3.1.1 LC_CTYPE Category in the POSIX Locale

560   Change from:

561   <hyphen>

562   to:

563   <hyphen-minus>

564   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

565   **Change Number: XBD/TC2/D4/0036** [584]

566   On Page: 144 Line: 4243 Section: 7.3.1.1 LC_CTYPE Category in the POSIX Locale

567   Change from:

568   <hyphen>

569   to:

570   <hyphen-minus>

571   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

572   **Change Number: XBD/TC2/D4/0037** [938]

573   On Page: 146 Line: 4330 Section: 7.3.2 LC_COLLATE
574   (2013 edition Page: 147 Line: 4366)

575   Change from:

576   (*sort*, *uniq*, and so on)

577   to:

578   (*ls*, *sort*, and so on)

579   On Page: 147 Line: 4357 Section: 7.3.2 LC_COLLATE
580   (2013 edition Page: 147 Line: 4393)

581   Add a new paragraph and two small-font notes after the numbered list:

582   All implementation-provided locales (either preinstalled or provided as locale definitions which can be
583   installed later) should define a collation sequence that has a total ordering of all characters unless the locale
584   name has an '@' modifier indicating that it has a special collation sequence (for example, @icase could
585   indicate that each upper- and lower-case character pair collates equally).

586 <small>Note: a future version of this standard may require these locales to define a collation sequence that
587 has a total ordering of all characters (by changing "should" to "shall").</small>

588 <small>Note: users installing their own locales should ensure that they define a collation sequence with a
589 total ordering of all characters unless an '@' modifier in the locale name (such as @icase) indicates that it
590 has a special collation sequence.</small>

591 On Page: 149 Line: 4467 Section: 7.3.2.4 Collation Order
592 (2013 edition Page: 150 Line: 4503)

593 Add a new paragraph and a small-font note:

594 Weights should be assigned such that the collation sequence has a total ordering of all characters unless an
595 '@' modifier in the locale name indicates that it has a special collation sequence.

596 <small>Note: a future version of this standard may require a total ordering of all characters for
597 implementation-provided locales that do not have an '@' modifier in the locale name. See [xref to
598 7.3.2].</small>

599 On Page: 150 Line: 4481 Section: 7.3.2.4 Collation Order
600 (2013 edition Page: 150 Line: 4517)

601 Change from:

602 Characters specified via an explicit or implicit UNDEFINED special symbol shall by default be assigned
603 the same primary weight (that is, they belong to the same equivalence class).

604 to:

605 Characters specified via an explicit or implicit UNDEFINED special symbol shall by default be assigned
606 the same primary weight (that is, they belong to the same equivalence class) if the collation order has more
607 than one weight level. If the collation order has only one weight level, these characters should be assigned
608 unique primary weights, equal to the relative order of their character in the character collation sequence,
609 but may be assigned the same primary weight.

610 <small>Note: a future version of this standard may require these characters to be assigned unique primary
611 weights if the collation order has only one weight level.</small>

612 On Page: 150 Line: 4503 Section: 7.3.2.4 Collation Order
613 (2013 edition Page: 151 Line: 4539)

614 Delete the first entry in the example collation order:

615 `UNDEFINED IGNORE;IGNORE`

616 On Page: 150 Line: 4516 Section: 7.3.2.4 Collation Order
617 (2013 edition Page: 151 Line: 4552)

618 Add the following as the last entry in the example collation order:

619 `UNDEFINED IGNORE;...`

620 On Page: 151 Line: 4519 Section: 7.3.2.4 Collation Order
621 (2013 edition Page: 151 Line: 4555)

622 Delete item 1 in the numbered list:

623 The **UNDEFINED** means that all characters not specified in this definition (explicitly or via the ellipsis)
624 shall be ignored for collation purposes.

625 and renumber items 2-4 to be 1-3.

626 On Page: 151 Line: 4527 Section: 7.3.2.4 Collation Order
627 (2013 edition Page: 151 Line: 4563)

628 Add a new item 4 to the numbered list:

629 The **UNDEFINED** means that all characters not specified in this definition (explicitly or via the ellipsis)
630 shall be ignored when comparing primary weights, and have individual secondary weights based on their
631 ordinal encoded values.

632 *Rationale*: Austin Group Defect Report(s) applied: 938. See http://austingroupbugs.net/view.php?id=938.

633 **Change Number: XBD/TC2/D4/0038** [663]

634 On Page: 151 Line: 4531 Section: 7.3.2.6 LC_COLLATE Category in the POSIX Locale
635 (2013 edition Page: 151 Line: 4567)

636 Change from:

637 The collation sequence definition of the POSIX locale follows; the code listing depicts the *localedef* input.

638 to:

639 The minimum collation sequence definition of the POSIX locale follows; the code listing depicts the
640 *localedef* input. All characters not explicitly listed here shall be inserted in the character collation order
641 after the listed characters and shall be assigned unique primary weights. If the listed characters have ASCII
642 encoding, the other characters shall be in ascending order according to their coded character set values;
643 otherwise, the order of the other characters is unspecified. The collation sequence shall not include any
644 multi-character collating elements.

645 On Page: 151 Line: 4534 Section: 7.3.2.6 LC_COLLATE Category in the POSIX Locale
646 (2013 edition Page: 151 Line: 4570)

647 Change from:

648 `# This is the POSIX locale definition for the LC_COLLATE category.`
649 `# The order is the same as in the ASCII codeset.`

650 to:

651 `# This is the minimum input for the POSIX locale definition for the`
652 `# LC_COLLATE category. Characters in this list are in the same order`
653 `# as in the ASCII codeset.`

654   *Rationale*: Austin Group Defect Report(s) applied: 663. See http://austingroupbugs.net/view.php?id=663.

655   **Change Number: XBD/TC2/D4/0039** [584]

656   On Page: 152 Line: 4582 Section: 7.3.2.6 LC_COLLATE Category in the POSIX Locale

657   Change from:

658   <hyphen>

659   to:

660   <hyphen-minus>

661   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

662   **Change Number: XBD/TC2/D4/0040** [912]

663   On Page: 163 Line: 5073 Section: 7.3.5.3 LC_TIME Category in the POSIX Locale
664   (2013 edition Page: 163 Line: 5109)

665   In the LC_TIME category definition, change from:

666   <percent_sign>

667   to:

668   <percent-sign>

669   *Rationale*: Austin Group Defect Report(s) applied: 912. See http://austingroupbugs.net/view.php?id=912.

670   **Change Number: XBD/TC2/D4/0041** [584]

671   On Page: 179 Line: 5728 Section: 8.3 Other Environment Variables

672   In the description of TZ change from:

673   <plus-sign> ('+') character, or the minus-sign

674   to:

675   <plus-sign> ('+') character, or the <hyphen-minus>

676   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

677   **Change Number: XBD/TC2/D4/0042** [554]

678   On Page: 182 Line: 5842-5848 Section: 9.2 Regular Expression General Requirements

679   Change from:

680   In the regular expression processing described in POSIX.1-2008, the <newline> is regarded as an ordinary
681   character and both a <period> and a non-matching list can match one. The Shell and Utilities volume of
682   POSIX.1-2008 specifies within the individual descriptions of those standard utilities employing regular
683   expressions whether they permit matching of <newline> characters; if not stated otherwise, the use of
684   literal <newline> characters or any escape sequence equivalent produces undefined results.

685   to:

686   In the functions processing regular expressions described in the System Interfaces volume of POSIX.1-
687   2008, the <newline> is regarded as an ordinary character and both a <period> and a non-matching list can
688   match one. The Shell and Utilities volume of POSIX.1-2008 specifies within the individual descriptions of
689   those standard utilities employing regular expressions whether they permit matching of <newline>
690   characters; if not stated otherwise, the use of literal <newline> characters or any escape sequence
691   equivalent in either patterns or matched text produces undefined results .

692   **Change Number: XBD/TC2/D4/0043** [554]

693   On Page: 183 Line: 5875 Section: 9.3.2 BRE Ordinary Characters

694   Change from:

695   The interpretation of an ordinary character preceded by a <backslash> ('\\') is undefined, except for:

696   to:

697   The interpretation of an ordinary character preceded by an unescaped <backslash> ('\\') is undefined, except
698   for:

699   On Page: 183 Line: 5887 Section: 9.3.3 BRE Special Characters

700   Change from:

701   that is not preceded by a <backslash>

702   to:

703   that is unescaped

704   On Page: 184 Line: 5894-5896 Section: 9.3.3 BRE Special Characters

705   Change from:

706   The <circumflex> shall be special when used as:
707   - An anchor (see Section XXX on page YYY)
708   - The first character of a bracket expression (see Section AAA on page BBB)

709   to:

710   The <circumflex> shall be special when used as an anchor (see Section XXX, on page YYY). The
711   <circumflex> shall signify a non matching list expression when it occurs first in a list, immediately
712   following a <left-square-bracket> (see Section AAA on page BBB).

713   *Rationale*: Austin Group Defect Report(s) applied: 554. See http://austingroupbugs.net/view.php?id=554.

714   **Change Number: XBD/TC2/D4/0044** [938]

715   On Page: 184 Line: 5902 Section: 9.3.5 RE Bracket Expression
716   (2013 edition Page: 184 Line: 5944)

717   Change from:

718   A bracket expression (an expression enclosed in square brackets, "[ ]") is an RE that shall match a single
719   collating element contained in the non-empty set of collating elements represented by the bracket
720   expression.

721   to:

722   A bracket expression (an expression enclosed in square brackets, "[ ]") is an RE that shall match a specific
723   set of single characters, and may match a specific set of multi-character collating elements, based on the
724   non-empty set of list expressions contained in the bracket expression.

725   On Page: 184 Line: 5907 Section: 9.3.5 RE Bracket Expression
726   (2013 edition Page: 184 Line: 5949)

727   In list item 1, change from:

728   It consists of one or more expressions: collating elements, collating symbols, ...

729   to:

730   It consists of one or more expressions: ordinary characters, collating elements, collating symbols, ...

731   On Page: 184 Line: 5921 Section: 9.3.5 RE Bracket Expression
732   (2013 edition Page: 184 Line: 5963)

733   In list item 2, change from:

734   A matching list expression specifies a list that shall match any single-character collating element in any of
735   the expressions represented in the list. The first character in the list shall not be the <circumflex>; for
736   example, "[abc]" is an RE that matches any of the characters 'a', 'b', or 'c'.

737   to:

738   A matching list expression specifies a list that shall match any single character that is matched by one of
739   the expressions represented in the list. The first character in the list can not be the <circumflex>. An
740   ordinary character in the list should only match that character, but may match any single character that
741   collates equally with that character; for example, "[abc]" is an RE that should only match one of the
742   characters 'a', 'b', or 'c'.

743   <small>Note: a future version of this standard may require that an ordinary character in the list only
744   matches that character.</small>

745   *Rationale*: Austin Group Defect Report(s) applied: 938. See http://austingroupbugs.net/view.php?id=938.

746   **Change Number: XBD/TC2/D4/0045** [872]

747   On Page: 184 Line: 5926 Section: 9.3.5 RE Bracket Expression
748   (2013 edition Page: 184 Line: 5968)

749   In list item 3, change from:

750   A non-matching list expression begins with a <circumflex> ('**^**'), and specifies a list that shall match any
751   single-character collating element except for the expressions represented in the list after the leading
752   <circumflex>.

753   to:

754   A non-matching list expression begins with a <circumflex> ('**^**'), and the matching behavior shall be the
755   logical inverse of the corresponding matching list expression (the same bracket expression but without the
756   leading <circumflex>).

757   *Rationale*: Austin Group Defect Report(s) applied: 872. See http://austingroupbugs.net/view.php?id=872.

758   **Change Number: XBD/TC2/D4/0046** [938]

759   On Page: 184 Line: 5928 Section: 9.3.5 RE Bracket Expression
760   (2013 edition Page: 184 Line: 5970)

761   In list item 3, change from:

762   For example, "[^abc]" is an RE that matches any character except the characters 'a', 'b', or 'c'.

763   to:

764   For example, if the RE "[abc]" only matches 'a', 'b', or 'c', then "[^abc]" is an RE that matches any character
765   except 'a', 'b', or 'c'.

766   On Page: 185 Line: 5953 Section: 9.3.5 RE Bracket Expression
767   (2013 edition Page: 185 Line: 5995)

768   In list item 6, change from:

769   The set of single-character collating elements whose characters belong to the character class

770   to:

771   The set of single characters that belong to the character class

772   *Rationale*: Austin Group Defect Report(s) applied: 938. See http://austingroupbugs.net/view.php?id=938.

773   **Change Number: XBD/TC2/D4/0047** [584]

774   On Page: 185 Line: 5972 Section: 9.3.5 RE Bracket Expression

775   Change from:

776   <hyphen>

777   to:

778   <hyphen-minus>

779   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

780   **Change Number: XBD/TC2/D4/0048** [584]

781   On Page: 186 Line: 5982,5989,5992 Section: 9.3.5 RE Bracket Expression

782   Change from:

783   <hyphen>

784   to:

785   <hyphen-minus>

786   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

787   **Change Number: XBD/TC2/D4/0049** [595]

788   On Page: 186 Line: 6016 Section: 9.3.6 BREs Matching Multiple Characters

789   Change rule 3 from:

790
791   For example, the expression "^\(.*\)\1$" matches lines consisting of two adjacent appearances of the same string,

792   to:

793
794   For example, the expression "^\(.*\)\1$" matches strings consisting of two adjacent appearances of the same substring,

795   On Page: 187 Line: 6053 Section: 9.3.8 BRE Expression Anchoring

796   Change from:

797   A BRE can be limited to matching strings that begin or end a line; this is called "anchoring".

798   to:

799   A BRE can be limited to matching expressions that begin or end a string; this is called "anchoring".

800   *Rationale*: Austin Group Defect Report(s) applied: 595. See http://austingroupbugs.net/view.php?id=595.

801

IEEE Std 1003.1™-2008/Cor 2-2016
IEEE Standard for Information Technology—Portable Operating System Interface (POSIX®)
Base Specifications, Issue 7—Technical Corrigendum 2

802   **Change Number: XBD/TC2/D4/0050** [554]

803   On Page: 188 Line: 6082-6083 Section: 9.4.2 ERE Ordinary Characters

804   Change from:

805   The interpretation of an ordinary character preceded by a <backslash> ('\\') is undefined.

806   to:

807   The interpretation of an ordinary character preceded by an unescaped <backslash> ('\\') is undefined, except
808   in the context of a bracket expression (see XREF to ERE bracket expression).

809   On Page: 188 Line: 6092 Section: 9.4.3 ERE Special Characters

810   Add the following text after line 6092:

811   A <left-square-bracket> that is unescaped and is not part of a bracket expression also produces undefined
812   results.

813   On Page: 188 Line: 6098-6099 Section: 9.4.3 ERE Special Characters

814   Change from:

815   If these characters appear first in an ERE, or immediately following a <vertical-line>, <circumflex>, or
816   <left-parenthesis>

817   to:

818   If these characters appear first in an ERE, or immediately following an unescaped <vertical-line>,
819   <circumflex>, <dollar-sign>, or <left-parenthesis>

820   On Page: 189 Line: 6106-6109 Section: 9.4.3 ERE Special Characters

821   Change from:

822   The <circumflex> shall be special when used as:
823   - An anchor (see Section XXX on page YYY)
824   - The first character of a bracket expression (see Section AAA on page BBB)

825   to:

826   The <circumflex> shall be special when used as an anchor (see Section XXX, on page YYY). The
827   <circumflex> shall signify a non matching list expression when it occurs first in a list, immediately
828   following a <left-square-bracket> (see Section AAA on page BBB).

829   *Rationale*: Austin Group Defect Report(s) applied: 554. See http://austingroupbugs.net/view.php?id=554.

830

831   **Change Number: XBD/TC2/D4/0051** [595]

832   On Page: 190 Line: 6175 Section: 9.4.9 ERE Expression Anchoring

833   Change from:

834   An ERE can be limited to matching strings that begin or end a line; this is called "anchoring".

835   to:

836   An ERE can be limited to matching expressions that begin or end a string; this is called "anchoring".

837   *Rationale*: Austin Group Defect Report(s) applied: 595. See http://austingroupbugs.net/view.php?id=595.

838   **Change Number: XBD/TC2/D4/0052** [554]

839   On Page: 192 Line: 6233 Section: 9.5.1 BRE/ERE Grammar Lexical Conventions

840   For token SPEC_CHAR delete the phrase:

841   or when first in a bracket expression

842   On Page: 195 Line: 6379-6380 Section: 9.5.3 ERE Grammar

843   Change from:

844   The ERE grammar does not permit several constructs that previous sections specify as having undefined
845   results:

846   to:

847   The ERE grammar does not permit several constructs that previous sections specify as having undefined
848   results. Additionally, there are some constructs which the grammar permits but which still give undefined
849   results:

850   On Page: 195 Line: 6381 Section: 9.5.3 ERE Grammar

851   Change from:

852   ORD_CHAR preceded by a <backslash> character

853   to:

854   ORD_CHAR preceded by an unescaped <backslash> character

855   On Page: 195 Line: 6383 Section: 9.5.3 ERE Grammar

856   Add '$' to the list of characters.

857   *Rationale*: Austin Group Defect Report(s) applied: 554. See http://austingroupbugs.net/view.php?id=554.

858   **Change Number: XBD/TC2/D4/0053** [916]

859   On Page: 195 Line: 6387 Section: 9.5.3 ERE Grammar
860   (2013 edition Page: 195 Line: 6433)

861   Change from:

862   Conforming applications cannot use such constructs.

863   to:

864   Strictly conforming applications cannot use such constructs.

865   *Rationale*: Austin Group Defect Report(s) applied: 916. See http://austingroupbugs.net/view.php?id=916.

866   **Change Number: XBD/TC2/D4/0054** [967]

867   On Page: 198 Line: 6438-6454 Section: 10.2 Output Devices and Terminal Types
868   (2013 edition Page: 198 Line: 6484-6500)

869   Delete the two **Symbolic Name** columns from Table 10-1.

870   *Rationale*: Austin Group Defect Report(s) applied: 967. See http://austingroupbugs.net/view.php?id=967.

871   **Change Number: XBD/TC2/D4/0055** [745]

872   On Page: 204 Line: 6682,6684 Section: 11.1.9 Special Characters

873   On line 6682, for CR change from:

874   carriage-return

875   to:

876   <carriage-return>

877   On line 6684, append a sentence to the description of CR:

878   It cannot be changed.

879   *Rationale*: Austin Group Defect Report(s) applied: 745. See http://austingroupbugs.net/view.php?id=745.

880   **Change Number: XBD/TC2/D4/0056** [584]

881   On Page: 213 Line: 7006 Section: 12.1 Utility Argument Syntax

882   Change from:

883   <hyphen>

884   to:

885   <hyphen-minus>

886   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

887   **Change Number: XBD/TC2/D4/0057** [813]

888   On Page: 214 Line: 7056 Section: 12.1 Utility Argument Syntax

889   After the third bullet item, add a new bullet item:

890   • When the utility description states that the number is a file size-related value (such as a file size or
891   offset, line number, or block count), numerals in the range 0 to the maximum file size supported
892   by the implementation are syntactically recognized as numeric values (see XCU 1.5
893   Considerations for Utilities in Support of Files of Arbitrary Size). Where negative values are
894   permitted, any value in the range -(maximum file size) to the maximum file size is accepted.

895   *Rationale*: Austin Group Defect Report(s) applied: 813. See http://austingroupbugs.net/view.php?id=813.
896   The normative requirement in XCU 1.5 does not match the syntax utility guidelines which suggest very
897   large values may be supported but are not required to be.

898   **Change Number: XBD/TC2/D4/0058** [579]

899   On Page: 220 Line: 7211 Section: <aio.h>

900   In the DESCRIPTION section, change from:

901   The tag **sigevent** shall be declared as naming an incomplete structure type, the contents of which are
902   described in the <**signal.h**> header.

903   to:

904   The <**aio.h**> header shall define the **sigevent** structure and **sigval** union as described in <**signal.h**>.

905   *Rationale*: Austin Group Defect Report(s) applied: 579. See http://austingroupbugs.net/view.php?id=579.

906   **Change Number: XBD/TC2/D4/0059** [496]

907   On Page: 236 Line: 7737 Section: <errno.h>

908   In the DESCRIPTION section, change from:

909   [ENOSYS] Function not supported.

910   to:

911   [ENOSYS] Functionality not supported.

912   *Rationale*: Austin Group Defect Report(s) applied: 496. See http://austingroupbugs.net/view.php?id=496.

913 **Change Number: XBD/TC2/D4/0060** [847]

914 On Page: 240 Line: 7878 Section: <fcntl.h>
915 (2013 edition Page: 238 Line: 7885)

916 In the DESCRIPTION section, change from:

917 O_DIRECTORY Fail if not a directory.

918 to:

919 O_DIRECTORY Fail if file is a non-directory file.

920 *Rationale*: Austin Group Defect Report(s) applied: 847. See http://austingroupbugs.net/view.php?id=847.

921 **Change Number: XBD/TC2/D4/0061** [666]

922 On Page: 270 Line: 8853-8856 Section: <limits.h>

923 In the DESCRIPTION section, delete:

924 {RE_DUP_MAX}
925   Maximum number of repeated occurrences of a BRE or ERE interval expression; see Section 9.3.6
926   (on page 186) and Section 9.4.6 (on page 189).
927   Minimum Acceptable Value: {_POSIX2_RE_DUP_MAX}

928 On Page: 273 Line: 9001-9003 Section: <limits.h>

929 Change from:

930 {RE_DUP_MAX}
931   Maximum number of repeated occurrences of a regular expression permitted when using the interval
932   notation \{m,n\}; see Chapter 9 (on page 181).

933 to (copied from line 8854):

934 {RE_DUP_MAX}
935   Maximum number of repeated occurrences of a BRE or ERE interval expression; see Section 9.3.6
936   (on page 186) and Section 9.4.6 (on page 189).

937 On Page: 273 Line: 9004 Section: <limits.h>

938 Change from:

939 {_POSIX2_RE_DUP_MAX}

940 to:

941 {_POSIX_RE_DUP_MAX}

942 On Page: 275 Line: 9076-9077 Section: <limits.h>

943   Change from:

944   The number of repeated occurrences of a BRE permitted by the *regexec*() and *regcomp*() functions when
945   using the interval notation {\(*m,n*\}; see Section 9.3.6 (on page 186).

946   to (copied from line 8854):

947   Maximum number of repeated occurrences of a BRE or ERE interval expression; see Section 9.3.6 (on
948   page 186) and Section 9.4.6 (on page 189).

949   On Page: 277 Line: 9174-9175 Section: <limits.h>

950   Change from:

951   Maximum number of repeated occurrences of a regular expression permitted when using the interval
952   notation \{*m,n*\}; see Chapter 9 (on page 181).

953   to (copied from line 8854):

954   Maximum number of repeated occurrences of a BRE or ERE interval expression; see Section 9.3.6 (on
955   page 186) and Section 9.4.6 (on page 189).

956   *Rationale*: Austin Group Defect Report(s) applied: 666. See http://austingroupbugs.net/view.php?id=666.

957   **Change Number: XBD/TC2/D4/0062** [781]

958   On Page: 283 Line: 9438 Section: <locale.h>
959   (2013 edition Page: 286 Line: 9521)

960   In the DESCRIPTION section, change from:

961   Implementations may add additional masks using the form *LC_** and an uppercase letter.

962   to:

963   Additional macro definitions, beginning with the characters *LC_* and an uppercase letter, may also be
964   specified by the implementation.

965   On Page: 284 Line: 9447 Section: <locale.h>
966   (2013 edition Page: 287 Line: 9530)

967   Delete:

968   [CX]Implementations may add additional masks using the form *LC_*_MASK*.[/CX]

969   On Page: 284 Line: 9464 Section: <locale.h>
970   (2013 edition Page: 287 Line: 9547)

971   In the RATIONALE section, change from:

972   None.

973   to:

974   It is suggested that each category macro name for use in *setlocale*() have a corresponding macro name

975   ending in *_MASK* for use in *newlocale*().

976   *Rationale*: Austin Group Defect Report(s) applied: 781. See http://austingroupbugs.net/view.php?id=781.

977   **Change Number: XBD/TC2/D4/0063** [801]

978   On Page: 286 Line: 9512 Section: <math.h>

979   (2013 edition Page: 289 Line: 9596)

980   In the DESCRIPTION section, change from:

981   shall be accurate within the precision of the **double** type

982   to:

983   shall be accurate to at least the precision of the **double** type

984   *Rationale*: Austin Group Defect Report(s) applied: 801. See http://austingroupbugs.net/view.php?id=801.

985   **Change Number: XBD/TC2/D4/0064** [801]

986   On Page: 292 Line: 9776 Section: <math.h>

987   (2013 edition Page: 295 Line: 9860)

988   Add a note to the APPLICATION USAGE section:

989   Note that if FLT_EVAL_METHOD is neither 0 nor 1, then some constants might

990   not compare equal as expected, for example `(double)M_PI == M_PI` can fail.

991   *Rationale*: Austin Group Defect Report(s) applied: 801. See http://austingroupbugs.net/view.php?id=801.

992   **Change Number: XBD/TC2/D4/0065** [934]

993   On Page: 303 Line: 10154 Section: <netinet/in.h>

994   (2013 edition Page: 306 Line: 10238)

995   In the DESCRIPTION section, change from:

996   The **sockaddr_in6** structure shall be set to zero by an application prior to using it, since implementations

997   are free to have additional, implementation-defined fields in **sockaddr_in6**.

998   to:

999   Prior to calling a function in this standard which reads values from a **sockaddr_in6** structure (for example,

1000   *bind*() or *connect*()), the application shall ensure that all members of the structure, including any additional

1001   non-standard members, if any, are initialized. If the **sockaddr_in6** structure has a non-standard member,

1002   and that member has a value other than the value that would result from default initialization, the behavior

1003   of any function in this standard that reads values from the **sockaddr_in6** structure is implementation-

1004   defined. All functions in this standard that return data in a **sockaddr_in6** structure (for example,
1005   *getaddrinfo*() or *accept*()) shall initialize the structure in a way that meets the above requirements, and shall
1006   ensure that each non-standard member, if any, has a value that produces the same behavior as default
1007   initialization would in all functions in this standard which read values from a **sockaddr_in6** structure.

1008   *Rationale*: Austin Group Defect Report(s) applied: 934. See http://austingroupbugs.net/view.php?id=934.

1009   **Change Number: XBD/TC2/D4/0066** [952]

1010   On Page: 304 Line: 10185 Section: <netinet/in.h>
1011   (2013 edition Page: 307 Line: 10269)

1012   In the DESCRIPTION section, change from:

1013   The **<netinet/in.h>** header shall define the following symbolic constants for use as destination addresses
1014   for *connect*(), *sendmsg*(), and *sendto*():

1015   INADDR_ANY   IPv4 local host address.

1016   INADDR_BROADCAST   IPv4 broadcast address.

1017   to:

1018   The **<netinet/in.h>** header shall define the following symbolic constant for use as a local address in the
1019   structure passed to *bind*():

1020   INADDR_ANY   IPv4 wildcard address.

1021   The **<netinet/in.h>** header shall define the following symbolic constant for use as a destination address in
1022   the structures passed to *connect*(), *sendmsg*(), and *sendto*():

1023   INADDR_BROADCAST   IPv4 broadcast address.

1024   *Rationale*: Austin Group Defect Report(s) applied: 952. See http://austingroupbugs.net/view.php?id=952.

1025   **Change Number: XBD/TC2/D4/0067** [934]

1026   On Page: 306 Line: 10239 Section: <netinet/in.h>
1027   (2013 edition Page: 309 Line: 10323)

1028   In the APPLICATION USAGE section, change from:

1029   None.

1030   to:

1031   Although applications are required to initialize all members (including any non-standard ones) of a
1032   **sockaddr_in6** structure, the same is not required for the **sockaddr_in** structure, since historically many
1033   applications only initialized the standard members. Despite this, applications are encouraged to initialize
1034   **sockaddr_in** structures in a manner similar to the required initialization of **sockaddr_in6** structures.

1035   Although it is common practice to initialize a **sockaddr_in6** structure using:

```
1036    struct sockaddr_in6 sa;
1037    memset(&sa, 0, sizeof sa);
```

1038   this method is not portable according to this standard, because the structure can contain pointer or floating
1039   point members that are not required to have an all-bits-zero representation after default initialization.
1040   Portable methods make use of default initialization, for example:

```
1041    struct sockaddr_in6 sa = { 0 };
```

1042   or

```
1043    static struct sockaddr_in6 sa_init;
1044    struct sockaddr_in6 sa = sa_init;
```

1045   A future version of this standard may require that a pointer object with an all-bits-zero representation is a
1046   null pointer, and that **sockaddr_in6** does not have any floating-point members if a floating-point object
1047   with an all-bits-zero representation does not have the value 0.0.

1048   *Rationale*: Austin Group Defect Report(s) applied: 934. See http://austingroupbugs.net/view.php?id=934.

1049   **Change Number: XBD/TC2/D4/0068** [952]

1050   On Page: 306 Line: 10241 Section: <netinet/in.h>
1051   (2013 edition Page: 309 Line: 10325)

1052   In the RATIONALE section, change from:

1053   None.

1054   to:

1055   The INADDR_ANY and INADDR_BROADCAST values are byte-order-neutral and thus their byte order
1056   is not specified. Many implementations have additional constants as extensions, such as
1057   INADDR_LOOPBACK, that are not byte-order-neutral. Traditionally, these constants are in host byte
1058   order, requiring the use of *htonl*() when using them in a **sockaddr_in** structure.

1059   *Rationale*: Austin Group Defect Report(s) applied: 952. See http://austingroupbugs.net/view.php?id=952.

1060   **Change Number: XBD/TC2/D4/0069** [624]

1061   On Page: 312 Line: 10448-10449 Section: <pthread.h>

1062   In the DESCRIPTION section, delete pthread_cleanup_push and pthread_cleanup_pop from the list of
1063   functions.

1064   Add a new paragraph after line 10542:
1065
1066   The following may be declared as functions, or defined as macros, or both.
1067   If functions are declared, function prototypes shall be provided.
1068

1069   *pthread_cleanup_pop*
1070   *pthread_cleanup_push*

1071   *Rationale*: Austin Group Defect Report(s) applied: 624. See http://austingroupbugs.net/view.php?id=624.

1072   **Change Number: XBD/TC2/D4/0070** [536]

1073   On Page: 329 Line: 11005-11006 Section: <signal.h>

1074   In the DESCRIPTION section, change from:

1075   [CX]The ISO C standard only requires the signal names SIGABRT, SIGFPE, SIGILL, SIGINT,
1076   SIGSEGV, and SIGTERM to be defined.[/CX]

1077   to:

1078   The ISO C standard only requires the signal names SIGABRT, SIGFPE, SIGILL, SIGINT, SIGSEGV, and
1079   SIGTERM to be defined. An implementation need not generate any of these six signals, except as a result
1080   of explicit use of interfaces that generate signals, such as *raise*(), [CX]*kill*(), the General Terminal Interface
1081   (see section 11.1.9), and the *kill* utility, unless otherwise stated (see for example XSH 2.8.3.3)[/CX].

1082   *Rationale*: Austin Group Defect Report(s) applied: 536. See http://austingroupbugs.net/view.php?id=536.

1083   **Change Number: XBD/TC2/D4/0071** [690]

1084   On Page: 331 Line: 11073 Section: <signal.h>
1085   (2013 edition Page: 334 Line: 11158)

1086   In the DESCRIPTION section change from:

1087   [CX]SA_NOCLDWAIT Causes implementations not to create zombie processes on child death.[/CX]

1088   to:

1089   [XSI]SA_NOCLDWAIT Causes implementations not to create zombie processes or status information on
1090   child termination. See *sigaction*(), page 1932.[/XSI]

1091   (Note the change from CX shading to XSI shading.)

1092   *Rationale*: Austin Group Defect Report(s) applied: 690. See http://austingroupbugs.net/view.php?id=690.

1093   **Change Number: XBD/TC2/D4/0072** [594]

1094   On Page: 334 Line: 11164 Section: <signal.h>

1095   In the DESCRIPTION section, in the "Value" column for "**int** *si_status*" change from:

1096   Exit value or signal.

1097   to:

1098   If *si_code* is equal to CLD_EXITED, then *si_status* holds the exit value of the process; otherwise, it is
1099   equal to the signal that caused the process to change state. The exit value in *si_status* shall be equal to the
1100   full exit value (that is, the value passed to *_exit*(), *_Exit*() or *exit*(), or returned from *main*()); it shall not be
1101   limited to the least significant eight bits of the value.

1102   *Rationale*: Austin Group Defect Report(s) applied: 594. See http://austingroupbugs.net/view.php?id=594.
1103   The standard is unclear about when si_status contains an exit status and when it contains a signal.

1104   **Change Number: XBD/TC2/D4/0073** [844]

1105   On Page: 334 Line: 11193 Section: <signal.h>
1106   (2013 edition Page: 337 Line: 11278)

1107   In the DESCRIPTION section, change from:

1108   `int    sigqueue(pid_t, int, const union sigval);`

1109   to:

1110   `int    sigqueue(pid_t, int, union sigval);`

1111   *Rationale*: Austin Group Defect Report(s) applied: 844. See http://austingroupbugs.net/view.php?id=844.

1112   **Change Number: XBD/TC2/D4/0074** [536]

1113   On Page: 335 Line: 11213 Section: <signal.h>

1114   In the SEE ALSO section, add:

1115   XCU *kill*

1116   *Rationale*: Austin Group Defect Report(s) applied: 536. See http://austingroupbugs.net/view.php?id=536.

1117   **Change Number: XBD/TC2/D4/0075** [663]

1118   On Page: 355 Line: 11953 Section: <stdlib.h>
1119   (2013 edition Page: 358 Line: 12042)

1120   After:

1121   {MB_CUR_MAX} Maximum number of bytes in a character specified by the current locale (category
1122   LC_CTYPE).

1123   add a new sentence:

1124   [CX]In the POSIX locale the value of {MB_CUR_MAX} shall be 1.[/CX]

1125   *Rationale*: Austin Group Defect Report(s) applied: 663. See http://austingroupbugs.net/view.php?id=663.
1126   The intention was always that the POSIX locale should have an 8-bit-clean single-byte encoding. The
1127   omission of an explicit statement to that effect was an oversight.

1128 **Change Number: XBD/TC2/D4/0076** [801]

1129 On Page: 365 Line: 12336 Section: <stropts.h>
1130 (2013 edition Page: 368 Line: 12425)

1131 In the DESCRIPTION section, add a new paragraph before the text "The following shall be declared...":

1132 The **<stropts.h>** header may also define macros for message types using names that start with M_.

1133 *Rationale*: Austin Group Defect Report(s) applied: 801. See http://austingroupbugs.net/view.php?id=801.

1134 **Change Number: XBD/TC2/D4/0077** [934]

1135 On Page: 385 Line: 12911 Section: <sys/socket.h>
1136 (2013 edition Page: 388 Line: 13000)

1137 In the DESCRIPTION section, add a new paragraph:

1138 The value of AF_UNSPEC shall be 0.

1139 *Rationale*: Austin Group Defect Report(s) applied: 934. See http://austingroupbugs.net/view.php?id=934.
1140 Historically some applications initialize just the standard members of sockaddr_in, and some initialize the
1141 whole structure (using default initialization or memset()). There may be applications which do the latter
1142 and then rely on the zero value of the sin_family member being set to AF_UNSPEC. Therefore the
1143 standard should require that AF_UNSPEC has the value 0.

1144 **Change Number: XBD/TC2/D4/0078** [531]

1145 On Page: 390 Line: 13129 Section: <sys/stat.h>

1146 At the end of the DESCRIPTION section, add:

1147 Inclusion of the <**sys/stat.h**> header may make visible all symbols from the <**time.h**> header.

1148 *Rationale*: Austin Group Defect Report(s) applied: 531. See http://austingroupbugs.net/view.php?id=531.

1149 **Change Number: XBD/TC2/D4/0079** [856]

1150 On Page: 399 Line: 13386 Section: <sys/types.h>
1151 (2013 edition Page: 402 Line: 13477)

1152 In the DESCRIPTION section, remove the XSI shading from the line:

1153 **suseconds_t** Used for time in microseconds.

1154 *Rationale*: Austin Group Defect Report(s) applied: 856. See http://austingroupbugs.net/view.php?id=856.

1155

1156 **Change Number: XBD/TC2/D4/0080** [659]

1157 On Page: 399 Line: 13408 Section: <sys/types.h>

1158 In the DESCRIPTION section:

1159 Add **timer_t** to the list of exceptions to the arithmetic types requirement.

1160 On Page: 400 Line: 13438 Section: <sys/types.h>

1161 In the DESCRIPTION section:

1162 Add **timer_t** to the list of types that have no comparison or assignment operators.

1163 *Rationale*: Austin Group Defect Report(s) applied: 659. See http://austingroupbugs.net/view.php?id=659.

1164 **Change Number: XBD/TC2/D4/0081** [934]

1165 On Page: 403 Line: 13525 Section: <sys/un.h>
1166 (2013 edition Page: 406 Line: 13620)

1167 In the APPLICATION USAGE section, add a new paragraph:

1168 Although applications are required to initialize all members (including any non-standard ones) of a
1169 **sockaddr_in6** structure (see **<netinet/in.h>**), the same is not required for the **sockaddr_un** structure, since
1170 historically many applications only initialized the standard members. Despite this, applications are
1171 encouraged to initialize **sockaddr_un** structures in a manner similar to the required initialization of
1172 **sockaddr_in6** structures.

1173 *Rationale*: Austin Group Defect Report(s) applied: 934. See http://austingroupbugs.net/view.php?id=934.

1174 **Change Number: XBD/TC2/D4/0082** [579]

1175 On Page: 405 Line: 13598 Section: <sys/wait.h>

1176 In the DESCRIPTION section, change from:

1177 The <**sys/wait.h**> header shall define the **siginfo_t** type as described in <**signal.h**>.

1178 to:

1179 The <**sys/wait.h**> header shall define the **siginfo_t** type and the **sigval** union as described in <**signal.h**>.

1180 *Rationale*: Austin Group Defect Report(s) applied: 579. See http://austingroupbugs.net/view.php?id=579.

1181 **Change Number: XBD/TC2/D4/0083** [564]

1182 On Page: 406 Line: 13621 Section: <sys/wait.h>

1183 In the CHANGE HISTORY section, add a new paragraph:

1184 The requirement for <**sys/wait.h**> to define the **rusage** structure as described in <**sys/resource.h**> is
1185 removed, and <**sys/wait.h**> is no longer allowed to make visible all symbols from <**sys/resource.h**>.

1186 *Rationale*: Austin Group Defect Report(s) applied: 564. See http://austingroupbugs.net/view.php?id=564.

1187 **Change Number: XBD/TC2/D4/0084** [707]

1188 On Page: 409 Line: 13695-13698 Section: <tar.h>
1189 (2013 edition Page: 412 Line: 13791-13794)

1190 In the DESCRIPTION section, replace the entries in the "General Definitions" table with:

TMAGIC	`"ustar"`	Used in the *magic* field in the **ustar** header block, including the trailing null byte
TMAGLEN	6	Length in octets of the *magic* field
TVERSION	`"00"`	Used in the *version* field in the **ustar** header block, excluding the trailing null byte
TVERSLEN	2	Length in octets of the *version* field

1191

1192 *Rationale*: Austin Group Defect Report(s) applied: 707. See http://austingroupbugs.net/view.php?id=707.

1193 **Change Number: XBD/TC2/D4/0085** [783]

1194 On Page: 431 Line: 14489 Section: <unistd.h>

1195 In the DESCRIPTION section:

1196 Add IP6 margin marker and shading to _POSIX_IPV6 (lines 14489-14492)

1197 *Rationale*: Austin Group Defect Report(s) applied: 783. See http://austingroupbugs.net/view.php?id=783.

1198 **Change Number: XBD/TC2/D4/0086** [911]

1199 On Page: 437 Line: 14773 Section: <unistd.h>
1200 (2013 edition Page: 440 Line: 14878)

1201 In the DESCRIPTION section, change from:

1202 This is the value for the *PATH* environment variable that finds all standard utilities.

1203 to:

1204 This is the value for the *PATH* environment variable that finds all of the standard utilities that are provided
1205 in a manner accessible via the *exec* family of functions.

1206   *Rationale*: Austin Group Defect Report(s) applied: 911. See http://austingroupbugs.net/view.php?id=911.

1207   **Change Number: XBD/TC2/D4/0087** [566]

1208   On Page: 443 Line: 15037 Section: <unistd.h>

1209   In the DESCRIPTION section, change from:

1210   **intptr_t** type as described in <**inttypes.h**>.

1211   to:

1212   **intptr_t** type as described in <**stdint.h**>.

1213   On Page: 445 Line: 15127 Section: <unistd.h>

1214   In the DESCRIPTION section, add a new paragraph:

1215   Inclusion of the <**unistd.h**> header may make visible all symbols from the headers <**stddef.h**>, <**stdint.h**>,
1216   and <**stdio.h**>.

1217   *Rationale*: Austin Group Defect Report(s) applied: 566. See http://austingroupbugs.net/view.php?id=566.

1218   **Change Number: XBD/TC2/D4/0088** [73]

1219   On Page: 454 Line: 15481-15482 Section: <wchar.h>

1220   In the DESCRIPTION section, change from:

1221   The following shall be declared as functions and may also be defined as macros. Function prototypes shall
1222   be provided for use with ISO C standard compilers.

1223   to:

1224   The following shall be declared as functions and may also be defined as macros. Function prototypes shall
1225   be provided for use with ISO C standard compilers. Arguments to functions in this list can point to arrays
1226   containing **wchar_t** values that do not correspond to members of the character set of the current locale.
1227   Such values shall be processed according to the specified semantics, unless otherwise stated.

1228   *Rationale*: Austin Group Defect Report(s) applied: 73. See http://austingroupbugs.net/view.php?id=73.
1229
1230   A clarification has been made in the C11 standard.

1231

3. Changes to System Interfaces

1232

1233 This section contains the set of changes to the text of the System Interfaces.
1234 [*Note to reviewers: References to defect reports are provided to aid reviewers.*]

1235 **Change Number: XSH/TC2/D4/0001** [801]

1236 On Page: 471 Line: 15977 Section: 2.2.2 The Name Space
1237 (2013 edition Page: 475 Line: 16085)

1238 Add an M_ prefix reservation for <math.h> in the table, shaded XSI.

1239 *Rationale*: Austin Group Defect Report(s) applied: 801. See http://austingroupbugs.net/view.php?id=801.

1240 **Change Number: XSH/TC2/D4/0002** [780]

1241 On Page: 471 Line: 15991-15992 Section: 2.2.2 The Name Space

1242 Add CX shading to the two unshaded lines in the **<signal.h>** table row.

1243 *Rationale*: Austin Group Defect Report(s) applied: 780. See http://austingroupbugs.net/view.php?id=780.

1244 **Change Number: XSH/TC2/D4/0003** [790]

1245 On Page: 471 Line: 15997 Section: 2.2.2 The Name Space

1246 Remove the <stdint.h> row from the table and append the following sentence to the small-font note after
1247 the table:

1248 The C standard reserves int[0-9a-z_]*_t and uint[0-9a-z_]*_t in **<stdint.h>**; this is not included in the table
1249 above because it is covered by the reserved _t suffix for any header.

1250 *Rationale*: Austin Group Defect Report(s) applied: 790. See http://austingroupbugs.net/view.php?id=790.
1251 These patterns are redundant as _t is a reserved suffix.

1252 **Change Number: XSH/TC2/D4/0004** [780]

1253 On Page: 472 Line: 16025-16035 Section: 2.2.2 The Name Space

1254 On lines 16025-16027 add CX shading to the **<time.h>** table row.

1255 On line 16029 add OB shading to the **<utime.h>** table row.

1256 On line 16035 add CX shading to the **ANY header** table row.

1257 *Rationale*: Austin Group Defect Report(s) applied: 780. See http://austingroupbugs.net/view.php?id=780.

1258

1259   **Change Number: XSH/TC2/D4/0005** [790]

1260   On Page: 472 Line: 16036 Section: 2.2.2 The Name Space

1261   Change from:

1262   The notation [A-Z] indicates any uppercase letter in the portable character set.

1263   to:

1264   The notation [0-9] indicates any digit. The notation [A-Z] indicates any uppercase letter in the portable
1265   character set.

1266   *Rationale*: Austin Group Defect Report(s) applied: 790. See http://austingroupbugs.net/view.php?id=790.

1267   **Change Number: XSH/TC2/D4/0006** [782]

1268   On Page: 472 Line: 16038 Section: 2.2.2 The Name Space
1269   (2013 edition Page: 476 Line: 16146)

1270   Add a new paragraph (not as part of the preceding Note):

1271   Implementations may also add symbols to the **<complex.h>** header with the following complete names or
1272   the same names suffixed with f or l:
1273

    cerf   cexpm1   clog2

    cerfc   clog10   clgamma

    cexp2   clog1p   ctgamma

1274   *Rationale*: Austin Group Defect Report(s) applied: 782. See http://austingroupbugs.net/view.php?id=782.

1275   **Change Number: XSH/TC2/D4/0007** [790]

1276   On Page: 473 Line: 16069 Section: 2.2.2 The Name Space

1277   Change from:

1278   The notation [0-9] indicates any digit. The notation [A-Z] indicates any uppercase letter in the portable
1279   character set. The notation [0-9a-z_] indicates any digit, any lowercase letter in the portable character set,
1280   or <underscore>.

1281   to:

1282   The notation [0-9] indicates any digit. The notation [A-Z] indicates any uppercase letter in the portable
1283   character set. The notation [Xa-z] indicates the character 'X' or any lowercase letter in the portable
1284   character set. The notation [0-9A-Za-z_]* indicates zero or more occurrences of any of the following: a
1285   digit, an uppercase or lowercase letter in the portable character set, or an <underscore>.

1286   *Rationale*: Austin Group Defect Report(s) applied: 790. See http://austingroupbugs.net/view.php?id=790.

1287   **Change Number: XSH/TC2/D4/0008** [790]

1288   On Page: 475-476 Line: 16095-16178 Section: 2.2.2 The Name Space

1289   In the table of reserved identifiers:

1290   Change cexmp1 to cexpm1.
1291   Change cexmp1f to cexpm1f.
1292   Change cexmp1l to cexpm1l.
1293   Change ltime to ctime.
1294   Delete isblank and iswblank.
1295   Delete strtof, strtoimax, strtold, strtoll, strtoull, and strtoumax.
1296   Delete wcstof, wcstoimax, wcstold, wcstoll, wcstoull, and wcstoumax.
1297   Delete wcwidth.
1298   Delete wmem[a-z]*.

1299   Add the following to the table of reserved identifiers in the correct alphabetical position:

1300   btowc
1301   ctanh
1302   ctanhf
1303   ctanhl
1304   erf
1305   erfc
1306   hypot
1307   lgamma
1308   lldiv
1309   math_errhandling
1310   nextafter
1311   remainder
1312   snprintf
1313   va_copy
1314   vsnprintf
1315   wmemchr
1316   wmemcmp
1317   wmemcpy
1318   wmemmove
1319   wmemset

1320   Remove one of the two appearances of each of the following from the table of reserved identifiers:

1321   acosl
1322   asinl
1323   atanf
1324   atanh
1325   atanl
1326   catanh
1327   catanhf
1328   catanhl
1329   ceilf
1330   ceill
1331   ldiv

1332   On line 16178 add a new paragraph after the table:

1333   <small>**Note:** The notation [a-z] indicates any lowercase letter in the portable character set. The notation *
1334   indicates any sequence of zero or more characters that are valid in identifiers with external
1335   linkage.</small>

1336   *Rationale*: Austin Group Defect Report(s) applied: 790. See http://austingroupbugs.net/view.php?id=790.

1337   **Change Number: XSH/TC2/D4/0009** [496]

1338   On Page: 482 Line: 16415 Section: 2.3 Error Numbers

1339   Change the description of [ENOSYS] from:

1340   Function not implemented. An attempt was made to use a function that is not available in this
1341   implementation.

1342   to:

1343   Functionality not supported. An attempt was made to use optional functionality that is not supported in this
1344   implementation.

1345   *Rationale*: Austin Group Defect Report(s) applied: 496. See http://austingroupbugs.net/view.php?id=496.

1346   **Change Number: XSH/TC2/D4/0010** [681]

1347   On Page: 482 Line: 16442 Section: 2.3 Error Numbers
1348   (2013 edition Page: 486 Line: 16552)

1349   Change from:

1350   EOPNOTSUP

1351   to:

1352   EOPNOTSUPP

1353   *Rationale*: Austin Group Defect Report(s) applied: 681. See http://austingroupbugs.net/view.php?id=681.

1354   **Change Number: XSH/TC2/D4/0011** [690]

1355   On Page: 487 Line: 16657 Section: 2.4.3 Signal Actions
1356   (2013 edition Page: 491 Line: 16773-16779)

1357   In the description of SIG_IGN, change from:

1358   If a process sets the action for the SIGCHLD signal to SIG_IGN, the behavior is unspecified, [XSI]except
1359   as specified below.

1360   If the action for the SIGCHLD signal is set to SIG_IGN, child processes of the calling processes shall not
1361   be transformed into zombie processes when they terminate. If the calling process subsequently waits for its

1362 children, and the process has no unwaited-for children that were transformed into zombie processes, it shall
1363 block until all of its children terminate, and *wait*(), *waitid*(), and *waitpid*() shall fail and set *errno* to
1364 [ECHILD].[/XSI]

1365 to:

1366 If a process sets the action for the SIGCHLD signal to SIG_IGN, the behavior is unspecified[XSI], except
1367 as specified under "Consequences of Process Termination" in the description of the *_Exit*() function on
1368 page 549[/XSI].

1369 *Rationale*: Austin Group Defect Report(s) applied: 690. See http://austingroupbugs.net/view.php?id=690.

1370 **Change Number: XSH/TC2/D4/0012** [516]

1371 On Page: 489 Line: 16721 Section: 2.4.3 Signal Concepts

1372 Change from:

1373 Therefore, applications can invoke them, without restriction, from signal-catching functions:

1374 to:

1375 Therefore, applications can call them, without restriction, from signal-catching functions. Note that,
1376 although there is no restriction on the calls themselves, for certain functions there are restrictions on
1377 subsequent behavior after the function is called from a signal-catching function (see [xref to *longjmp*()]).

1378 At line 16722-16755 add *longjmp*() and *siglongjmp*() to the table of async-signal-safe functions.

1379 *Rationale*: Austin Group Defect Report(s) applied: 516. See http://austingroupbugs.net/view.php?id=516.

1380 **Change Number: XSH/TC2/D4/0013** [692]

1381 On Page: 489 Line: 16722 Section: 2.4.3 Signal Actions
1382 (2013 edition Page: 494 Line: 16845-16879)

1383 In the table of async-signal-safe functions, add the following in proper sorted order:

1384 *ffs*(), *htonl*(), *htons*(), *memccpy*(), *memchr*(), *memcmp*(), *memcpy*(), *memmove*(), *memset*(), *ntohl*(), *ntohs*(),
1385 *stpcpy*(), *stpncpy*(), *strcat*(), *strchr*(), *strcmp*(), *strcpy*(), *strcspn*(), *strlen*(), *strncat*(), *strncmp*(), *strncpy*(),
1386 *strnlen*(), *strpbrk*(), *strrchr*(), *strspn*(), *strstr*(), *strtok_r*(), *wcpcpy*(), *wcpncpy*(), *wcscat*(), *wcschr*(),
1387 *wcscmp*(), *wcscpy*(), *wcscspn*(), *wcslen*(), *wcsncat*(), *wcsncmp*(), *wcsncpy*(), *wcsnlen*(), *wcspbrk*(),
1388 *wcsrchr*(), *wcsspn*(), *wcsstr*(), *wcstok*(), *wmemchr*(), *wmemcmp*(), *wmemcpy*(), *wmemmove*(), *wmemset*()

1389 *Rationale*: Austin Group Defect Report(s) applied: 692. See http://austingroupbugs.net/view.php?id=692.
1390 Since these functions do not modify or depend on global state, there are no known implementations where
1391 these functions cannot be safely used in aysnc-signal-safe code.

1392 **Change Number: XSH/TC2/D4/0014** [615]

1393 On Page: 489 Line: 16756 Section: 2.4.3 Signal Concepts

1394   Change from:

1395   All functions not in the above table are considered to be unsafe with respect to signals.

1396   to:

1397   Any function not in the above table may be unsafe with respect to signals. Implementations may make
1398   other interfaces async-signal-safe.

1399   *Rationale*: Austin Group Defect Report(s) applied: 615. See http://austingroupbugs.net/view.php?id=615.

1400   **Change Number: XSH/TC2/D4/0015** [516]

1401   On Page: 490 Line: 16758 Section: 2.4.3 Signal Concepts

1402   Change from:

1403   ... with a single exception: when a signal interrupts an unsafe function and the signal-catching function calls
1404   an unsafe function, the behavior is undefined.

1405   to:

1406   ... with the exception that when a signal interrupts an unsafe function or equivalent (such as the processing
1407   equivalent to *exit*() performed after a return from the initial call to *main*()) and the signal-catching function
1408   calls an unsafe function, the behavior is undefined. Additional exceptions are specified in the descriptions
1409   of individual functions such as *longjmp*().

1410   *Rationale*: Austin Group Defect Report(s) applied: 516. See http://austingroupbugs.net/view.php?id=516.
1411   The restrictions on using longjmp() and siglongjmp() are more restrictive than they need to be on POSIX
1412   systems. The loosened restrictions presented here do not break existing implementations and make it easier
1413   for application writers to create portable applications.

1414   **Change Number: XSH/TC2/D4/0016** [807]

1415   On Page: 490 Line: 16761 Section: 2.4.3 Signal Concepts

1416   Change from:

1417   Operations which obtain the value of *errno* and operations which assign a value to *errno* shall be async-
1418   signal-safe.

1419   to:

1420   Operations which obtain the value of *errno* and operations which assign a value to *errno* shall be async-
1421   signal-safe, provided that the signal-catching function saves the value of *errno* upon entry and restores it
1422   before it returns.

1423   *Rationale*: Austin Group Defect Report(s) applied: 807. See http://austingroupbugs.net/view.php?id=807.

1424

1425   **Change Number: XSH/TC2/D4/0017** [807]

1426   On Page: 490 Line: 16775 Section: 2.4.4 Signal Effects on Other Functions
1427   (2013 edition Page: 495 Line: 16899)

1428   Change from:

1429   ... except as noted for unsafe functions.

1430   to:

1431   ... except as noted for unsafe functions. After returning from a signal-catching function, the value of *errno*
1432   is unspecified if the signal-catching function or any function it called assigned a value to *errno* and the
1433   signal-catching function did not save and restore the original value of *errno*.

1434   *Rationale*: Austin Group Defect Report(s) applied: 807. See http://austingroupbugs.net/view.php?id=807.

1435   **Change Number: XSH/TC2/D4/0018** [608]

1436   On Page: 490 Line: 16788 Section: 2.5 Standard I/O Streams

1437   Change from:

1438   All input takes place as if bytes were read by successive calls to *fgetc*(); all output takes place as if bytes
1439   were written by successive calls to *fputc*().

1440   to:

1441   The wide character input functions shall read characters from the stream and convert them to wide
1442   characters as if they were read by successive calls to the *fgetwc*() function. Each conversion shall occur as
1443   if by a call to the *mbrtowc*() function, with the conversion state described by the stream's own **mbstate_t**
1444   object (see [xref to 2.5.2]). The byte input functions shall read characters from the stream as if by
1445   successive calls to the *fgetc*() function.

1446   The wide character output functions shall convert wide characters to characters and write them to the
1447   stream as if they were written by successive calls to the *fputwc*() function. Each conversion shall occur as if
1448   by a call to the *wcrtomb*() function, with the conversion state described by the stream's own **mbstate_t**
1449   object (see [xref to 2.5.2]). The byte output functions shall write characters to the stream as if by successive
1450   calls to the *fputc*() function.

1451   The *perror*(), *psiginfo*() and *psignal*() functions shall behave as described above for the byte output
1452   functions if the stream is already byte-oriented, and shall behave as described above for the wide character
1453   output functions if the stream is already wide-oriented. If the stream has no orientation, they shall behave as
1454   described for the byte output functions except that they shall not change the orientation of the stream.

1455   Functions other than *perror*(), *psiginfo*() and *psignal*() that write to streams but are neither wide character
1456   output nor byte output functions (*getopt*() and *wordexp*()), shall behave as described above for the byte
1457   output functions, except that if the stream has no orientation, it is unspecified whether they set the stream to
1458   byte orientation or leave it with no orientation.

1459   *Rationale*: Austin Group Defect Report(s) applied: 608. See http://austingroupbugs.net/view.php?id=608.

1460   **Change Number: XSH/TC2/D4/0019** [480]

1461   On Page: 491 Line: 16844 Section: 2.5.1 Interaction of File Descriptors and Standard I/O Streams

1462   Change from:

1463   A handle which is a stream is considered to be closed when either an *fclose*() or *freopen*() is executed on it
1464   (the result of *freopen*() is a new stream, which cannot be a handle on the same open file description as its
1465   previous value),

1466   to:

1467   A handle which is a stream is considered to be closed when either an *fclose*(), or *freopen*() with non-null
1468   filename, is executed on it (for *freopen*() with a null filename, it is implementation-defined whether a new
1469   handle is created or the existing one reused),

1470   *Rationale*: Austin Group Defect Report(s) applied: 480. See http://austingroupbugs.net/view.php?id=480.
1471   The standard is contradictory on whether freopen() can reuse a file description when passed a null filename.

1472   **Change Number: XSH/TC2/D4/0020** [631]

1473   On Page: 507 Line: 17490-17492 Section: 2.9.1 Thread-Safety

1474   Remove getc_unlocked(), getchar_unlocked(), putc_unlocked(), and putchar_unlocked() from the list of
1475   functions that need not be thread-safe.

1476   *Rationale*: Austin Group Defect Report(s) applied: 631. See http://austingroupbugs.net/view.php?id=631.

1477   **Change Number: XSH/TC2/D4/0021** [826]

1478   On Page: 507 Line: 17498 Section: 2.9.1 Thread-Safety
1479   (2013 edition Page: 512 Line: 17626)

1480   Add setlocale() to the list of functions that need not be thread-safe.

1481   *Rationale*: Austin Group Defect Report(s) applied: 826. See http://austingroupbugs.net/view.php?id=826.

1482   **Change Number: XSH/TC2/D4/0022** [631]

1483   On Page: 507 Line: 17512 Section: 2.9.1 Thread-Safety

1484   Change from:

1485   The *wcrtomb*() and *wcsrtombs*() functions need not be thread-safe if passed a NULL *ps* argument.

1486   to:

1487   The *wcrtomb*() and *wcsrtombs*() functions need not be thread-safe if passed a NULL *ps* argument. The
1488   *getc_unlocked*(), *getchar_unlocked*(), *putc_unlocked*(), and *putchar_unlocked*() functions need not be
1489   thread-safe unless the invoking thread owns the (**FILE ***) object accessed by the call, as is the case after a
1490   successful call to the *flockfile*() or *ftrylockfile*() functions.

1491   *Rationale*: Austin Group Defect Report(s) applied: 631. See http://austingroupbugs.net/view.php?id=631.

1492   **Change Number: XSH/TC2/D4/0023** [627]

1493   On Page: 512 Line: 17704 Section: 2.9.5.2 Cancellation Points

1494   Remove system() from the list of mandatory cancellation points.

1495   *Rationale*: Austin Group Defect Report(s) applied: 627. See http://austingroupbugs.net/view.php?id=627.
1496   The system() function is not required to be thread-safe, yet the standard requires a cancellation point to
1497   occur when executing it.

1498   **Change Number: XSH/TC2/D4/0024** [627,632]

1499   On Page: 513-514 Line: 17715-17789 Section: 2.9.5.2 Cancellation Points

1500   Remove the following functions (which are not required to be thread-safe) from the list of optional
1501   cancellation points:

asctime()	endutxent()	getopt()	getutxid()
catgets()	ftw()	getprotobyname()	getutxline()
ctime()	getdate()	getprotobynumber()	localtime()
dbm_close()	getgrent()	getprotoent()	nftw()
dbm_delete()	getgrgid()	getpwent()	pututxline()
dbm_fetch()	getgrnam()	getpwnam()	readdir()
dbm_nextkey()	gethostent()	getpwuid()	setgrent()
dbm_open()	getlogin()	getservbyname()	setpwent()
dbm_store()	getnetbyaddr()	getservbyport()	setutxent()
endgrent()	getnetbyname()	getservent()	strerror()
endpwent()	getnetent()	getutxent()	ttyname()

1502   Remove pclose() from the list of optional cancellation points.

1503   *Rationale*: Austin Group Defect Report(s) applied: 627,632. See
1504   http://austingroupbugs.net/view.php?id=627.
1505   See http://austingroupbugs.net/view.php?id=632.

1506

1507 **Change Number: XSH/TC2/D4/0025** [627]

1508 On Page: 514 Line: 17789 Section: 2.9.5.2 Cancellation Points

1509 Add a new paragraph after the list of optional cancellation points:

1510 In addition, a cancellation point may occur when a thread is executing any function that this standard does
1511 not require to be thread-safe but the implementation documents as being thread-safe. If a thread is cancelled
1512 while executing a non-thread-safe function, the behavior is undefined.

1513 *Rationale*: Austin Group Defect Report(s) applied: 627. See http://austingroupbugs.net/view.php?id=627.

1514 **Change Number: XSH/TC2/D4/0026** [632]

1515 On Page: 514 Line: 17795 Section: 2.9.5.2 Cancellation Points

1516 Change from:

1517 Any such side-effects occur before any cancellation cleanup handlers are called.

1518 to:

1519 Any such side-effects occur before any cancellation cleanup handlers are called. For functions that are
1520 explicitly required not to return when interrupted (for example, *pclose*()), if a thread is canceled while
1521 executing the function, the behavior is undefined.

1522 *Rationale*: Austin Group Defect Report(s) applied: 632. See http://austingroupbugs.net/view.php?id=632.

1523 **Change Number: XSH/TC2/D4/0027** [622]

1524 On Page: 515 Line: 17840 Section: 2.9.5.4 Async-Cancel Safety

1525 Add two paragraphs to the end of the section:

1526 If a thread has asynchronous cancellation enabled and is cancelled during execution of a function that is not
1527 async-cancel-safe, the behavior is undefined.

1528 If a thread has deferred cancellation enabled, a signal catching function is called in that thread during
1529 execution of a function that is not async-cancel-safe, and the signal catching function calls any function that
1530 is a cancellation point while a cancellation is pending for the thread, the behavior is undefined.

1531 *Rationale*: Austin Group Defect Report(s) applied: 622. See http://austingroupbugs.net/view.php?id=622.

1532 **Change Number: XSH/TC2/D4/0028** [498]

1533 On Page: 516 Line: 17869 Section: 2.9.7 Thread Interactions with Regular File Operations

1534 Append the following text to the last paragraph:

1535 The requirement on the *close*() function shall also apply whenever a file descriptor is successfully closed
1536 however caused (for example, as a consequence of calling *close*(), calling *dup2*(), or of process

1537   termination).

1538   *Rationale*: Austin Group Defect Report(s) applied: 498. See http://austingroupbugs.net/view.php?id=498.

1539   **Change Number: XSH/TC2/D4/0029** [972]

1540   On Page: 517 Line: 17899 Section: 2.9 Threads
1541   (2013 edition Page: 522 Line: 18031)

1542   Add a new section:

1543   **2.9.9 Synchronization Object Copies and Alternative Mappings**

1544   For barriers, condition variables, mutexes, and read-write locks, [TSH]if the *process-shared* attribute is set
1545   to PTHREAD_PROCESS_PRIVATE,[/TSH] only the synchronization object at the address used to
1546   initialize it can be used for performing synchronization. The effect of referring to another mapping of the
1547   same object when locking, unlocking, or destroying the object is undefined. [TSH]If the *process-shared*
1548   attribute is set to PTHREAD_PROCESS_SHARED, only the synchronization object itself can be used for
1549   performing synchronization; however, it need not be referenced at the address used to initalize it (that is,
1550   another mapping of the same object can be used).[/TSH] The effect of referring to a copy of the object
1551   when locking, unlocking, or destroying it is undefined.

1552   For spin locks, the above requirements shall apply as if spin locks have a *process-shared* attribute that is set
1553   from the *pshared* argument to *pthread_spin_init*(). For semaphores, the above requirements shall apply as
1554   if semaphores have a *process-shared* attribute that is set to PTHREAD_PROCESS_PRIVATE if the
1555   *pshared* argument to *sem_init*() is zero and set to PTHREAD_PROCESS_SHARED if *pshared* is non-zero.

1556   *Rationale*: Austin Group Defect Report(s) applied: 972. See http://austingroupbugs.net/view.php?id=972.
1557   Most implementations of these private barriers, condition variables, mutexes, reader-writer locks,
1558   semaphores and spin locks use the address of the object to locate the object when using
1559   PTHREAD_PROCESS_PRIVATE (or equivalent pshared argument). The optimizations that can be
1560   performed when an object is not shared with other processes disappear if multiple mappings of one of these
1561   objects are allowed in this case. (If a process needs multiple mappings of an object, it can use
1562   PTHREAD_PROCESS_SHARED instead of PTHREAD_PROCESS_PRIVATE to get the desired
1563   behavior.)

1564   **Change Number: XSH/TC2/D4/0030** [733]

1565   On Page: 541 Line: 18857 Section: 2.12.1 Defined Types
1566   (2013 edition Page: 546 Line: 18989)

1567   In the description of sig_atomic_t, change from:

1568   Integer type ...

1569   to:

1570   Possibly volatile-qualified integer type ...

1571   *Rationale*: Austin Group Defect Report(s) applied: 733. See http://austingroupbugs.net/view.php?id=733.

1572

1573 **Change Number: XSH/TC2/D4/0031** [690]

1574 On Page: 541 Line: 18886 Section: 2 General Information
1575 (2013 edition Page: 546 Line: 19012)

1576 Add new section:

1577 **2.13 Status Information**

1578 Status information is data associated with a process detailing a change in the state of the process. It shall
1579 consist of:

1580 • The state the process transitioned into ('stopped', 'continued', or 'terminated').
1581 • The information necessary to populate the **siginfo_t** structure provided by *waitid*().
1582 • If the new state is 'terminated':
1583 — The low-order 8 bits of the status argument that the process passed to *_Exit*(), *_exit*(), or
1584 *exit*(), or the low-order 8 bits of the value the process returned from *main*(). Note that these 8
1585 bits are part of the complete value that is used to set the *si_status* member of the **siginfo_t**
1586 structure provided by *waitid*().

1587 — Whether the process terminated due to the receipt of a signal that was not caught, and if so,
1588 the number of the signal that caused the termination of the process.

1589 • If the new state is 'stopped':
1590 — The number of the signal that caused the process to stop.
1591 A process might not have any status information (such as immediately after a process has started).
1592
1593 Status information for a process shall be generated (made available to the parent process) when the process
1594 stops, continues, or terminates except in the following case:

1595 • If the parent process sets the action for the SIGCHLD signal to SIG_IGN, or if the parent sets the
1596 SA_NOCLDWAIT flag for the SIGCHLD signal action, process termination shall not generate
1597 new status information but shall cause any existing status information for the process to be
1598 discarded.

1599 If new status information is generated, and the process already had status information, the existing status
1600 information shall be discarded and replaced with the new status information.
1601
1602 Only the process's parent process can obtain the process's status information. The parent obtains a child's
1603 status information by calling *wait*(), *waitid*(), or *waitpid*().
1604
1605 Except when *waitid*() is called with the WNOWAIT flag set in the options argument, the status information
1606 obtained by a wait function shall be consumed (discarded) by that wait function; no two calls to *wait*(),
1607 *waitid*() (without WNOWAIT), or *waitpid*() shall obtain the same status information.
1608
1609 When status information becomes available to the parent process and more than one thread in the parent
1610 process is waiting for the status information (blocked in a call to *wait*(), *waitid*(), or *waitpid*() with
1611 arguments that would match the status information):

1612 • If none of the matching threads is in a call to *waitid*() with the WNOWAIT flag set in the options
1613 argument, the thread that obtains the status information is unspecified.
1614 • Otherwise (at least one of the matching threads is in a call to *waitid*() with the WNOWAIT flag
1615 set), the matching thread or threads that obtain the status information is unspecified except that at
1616 least one of the matching threads shall obtain the status information and at most one of the

1617 matching threads that are not calling *waitid*() with the WNOWAIT flag set shall obtain it.

1618 *Rationale*: Austin Group Defect Report(s) applied: 690. See http://austingroupbugs.net/view.php?id=690.

1619 **Change Number: XSH/TC2/D4/0032** [835]

1620 On Page: 541 Line: 18886 Section: 2 General Information

1621 Add new section:

1622 **2.14 File Descriptor Allocation**

1623 All functions that open one or more file descriptors shall, unless specified otherwise, atomically allocate the
1624 lowest numbered available (that is, not already open in the calling process) file descriptor at the time of
1625 each allocation. Where a single function allocates two file descriptors (for example *pipe*() or *socketpair*()),
1626 the allocations may be independent and therefore applications should not expect them to have adjacent
1627 values or depend on which has the higher value.

1628 *Rationale*: Austin Group Defect Report(s) applied: 835. See http://austingroupbugs.net/view.php?id=835.

1629 **Change Number: XSH/TC2/D4/0033** [594]

1630 On Page: 545 Line: 18913 Section: _Exit()

1631 In the DESCRIPTION section, change from:

1632 the least significant 8 bits (that is, *status* & 0377) shall be available to a waiting parent process

1633 to:

1634 the least significant 8 bits (that is, *status* & 0377) shall be available from *wait*() and *waitpid*(); the full value
1635 shall be available from *waitid*() and in the **siginfo_t** passed to a signal handler for SIGCHLD.

1636 *Rationale*: Austin Group Defect Report(s) applied: 594. See http://austingroupbugs.net/view.php?id=594.

1637 **Change Number: XSH/TC2/D4/0034** [594,690]

1638 On Page: 545 Line: 18925 Section: _Exit()
1639 (2013 edition Page: 549 Line: 19051)

1640 At "Consequences of Process Termination" change from:

1641 • If the parent process of the calling process is executing a *wait*(), *waitid*(), or *waitpid*(), [XSI]and
1642 has neither set its SA_NOCLDWAIT flag nor set SIGCHLD to SIG_IGN,[/XSI] it shall be
1643 notified of termination of the calling process and the low-order eight bits (that is, *bits* 0377) of
1644 *status* shall be made available to it. If the parent is not waiting, the child's status shall be made
1645 available to it when the parent subsequently executes *wait*(), *waitid*(), or *waitpid*().

1646 The semantics of the *waitid*() function shall be equivalent to *wait*().

1647 • If the parent process of the calling process is not executing a *wait*(), *waitid*(), or *waitpid*(),

1648	[XSI]and has neither set its SA_NOCLDWAIT flag nor set SIGCHLD to SIG_IGN,[/XSI] the
1649	calling process shall be transformed into a zombie process. A zombie process is an inactive
1650	process and it shall be deleted at some later time when its parent process executes *wait*(), *waitid*(),
1651	or *waitpid*().

1652 [XSI]The semantics of the *waitid*() function shall be equivalent to *wait*().[/XSI]

1653 • Termination of a process does not directly terminate its children. The sending of a SIGHUP signal
1654 as described below indirectly terminates children in some circumstances.

1655 • Either:
1656
1657 If the implementation supports the SIGCHLD signal, a SIGCHLD shall be sent to the parent
1658 process.
1659
1660 Or:
1661
1662 [XSI]If the parent process has set its SA_NOCLDWAIT flag, or set SIGCHLD to SIG_IGN, the
1663 status shall be discarded, and the lifetime of the calling process shall end immediately. If
1664 SA_NOCLDWAIT is set, it is implementation-defined whether a SIGCHLD signal is sent to the
1665 parent process.[/XSI]

1666 to:

1667 • [XSI]If the parent process of the calling process has set its SA_NOCLDWAIT flag or has set the
1668 action for the SIGCHLD signal to SIG_IGN:
1669 — The process's status information (see XSH Section 2.13), if any, shall be discarded.

1670 — The lifetime of the calling process shall end immediately. If SA_NOCLDWAIT is set, it is
1671 implementation-defined whether a SIGCHLD signal is sent to the parent process.

1672 — If a thread in the parent process of the calling process is blocked in *wait*(), *waitpid*(), or
1673 *waitid*(), and the parent process has no remaining child processes in the set of waited-for
1674 children, the *wait*(), *waitid*(), or *waitpid*() function shall fail and set *errno* to [ECHILD].

1675 Otherwise:[/XSI]

1676 — Status information (see XSH Section 2.13) shall be generated.

1677 — The calling process shall be transformed into a zombie process. Its status information shall be
1678 made available to the parent process until the process's lifetime ends.

1679 — The process's lifetime shall end once its parent obtains the process's status information via a
1680 currently-blocked or future call to *wait*(), *waitid*() (without WNOWAIT), or *waitpid*().

1681 — If one or more threads in the parent process of the calling process is blocked in a call to
1682 *wait*(), *waitid*(), or *waitpid*() awaiting termination of the process, one (or, if any are calling
1683 *waitid*() with WNOWAIT, possibly more) of these threads shall obtain the process's status
1684 information as specified in XSH Section 2.13 and become unblocked.

1685 — A SIGCHLD shall be sent to the parent process.

1686 • Termination of a process does not directly terminate its children. The sending of a SIGHUP signal
1687 as described below indirectly terminates children in some circumstances.

1688 *Rationale*: Austin Group Defect Report(s) applied: 594,690. See
1689 http://austingroupbugs.net/view.php?id=594.
1690 See http://austingroupbugs.net/view.php?id=690.

1691   **Change Number: XSH/TC2/D4/0035** [835]

1692   On Page: 559 Line: 19374 Section: accept()
1693   (2013 edition Page: 563 Line: 19500)

1694   After the text:

1695   ... and allocate a new file descriptor for that socket.

1696   add:

1697   The file descriptor shall be allocated as described in [xref to new section 2.14].

1698   *Rationale*: Austin Group Defect Report(s) applied: 835. See http://austingroupbugs.net/view.php?id=835.

1699   **Change Number: XSH/TC2/D4/0036** [836]

1700   On Page: 559 Line: 19398 Section: accept()

1701   In the RETURN VALUE section, change from:

1702   Otherwise, -1 shall be returned and *errno* set to indicate the error.

1703   to:

1704   Otherwise, -1 shall be returned, *errno* shall be set to indicate the error, and any object pointed to by
1705   *address_len* shall remain unchanged.

1706   *Rationale*: Austin Group Defect Report(s) applied: 836. See http://austingroupbugs.net/view.php?id=836.

1707   **Change Number: XSH/TC2/D4/0037** [873]

1708   On Page: 561 Line: 19442 Section: access()
1709   (2013 edition Page: 565 Line: 19569)

1710   In the NAME section, delete:

1711   relative to directory file descriptor

1712   *Rationale*: Austin Group Defect Report(s) applied: 873. See http://austingroupbugs.net/view.php?id=873.

1713   **Change Number: XSH/TC2/D4/0038** [591]

1714   On Page: 561 Line: 19444 Section: access()

1715   Before the faccessat SYNOPSIS line, insert a line with OH shading:

1716   ```
#include <fcntl.h>
```

1717    *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

1718    **Change Number: XSH/TC2/D4/0039** [838]

1719    On Page: 561 Line: 19449 Section: access()
1720    (2013 edition Page: 565 Line: 19576)

1721    In the DESCRIPTION section, change from:

1722    ... for accessibility according to the bit pattern contained in *amode*, using the real user ID in place of the
1723    effective user ID and the real group ID in place of the effective group ID.

1724    to:

1725    ... for accessibility according to the bit pattern contained in *amode*. The checks for accessibility (including
1726    directory permissions checked during pathname resolution) shall be performed using the real user ID in
1727    place of the effective user ID and the real group ID in place of the effective group ID.

1728    On Page: 561 Line: 19457 Section: access()
1729    (2013 edition Page: 565 Line: 19584)

1730    In the DESCRIPTION section, change from:

1731    The *faccessat*() function shall be equivalent to the *access*() function, except ...

1732    to:

1733    The *faccessat*() function when called with a *flag* value of zero shall be equivalent to the *access*() function,
1734    except ...

1735    *Rationale*: Austin Group Defect Report(s) applied: 838. See http://austingroupbugs.net/view.php?id=838.

1736    **Change Number: XSH/TC2/D4/0040** [817]

1737    On Page: 561 Line: 19460 Section: access()
1738    (2013 edition Page: 565 Line: 19587)

1739    In the DESCRIPTION section, change from:

1740    If the file descriptor was opened without O_SEARCH, the function shall check whether directory searches
1741    are permitted using the current permissions of the directory underlying the file descriptor. If the file
1742    descriptor was opened with O_SEARCH, the function shall not perform the check.

1743    to:

1744    If the access mode of the open file description associated with the file descriptor is not O_SEARCH, the
1745    function shall check whether directory searches are permitted using the current permissions of the directory
1746    underlying the file descriptor. If the access mode is O_SEARCH, the function shall not perform the check.

1747    *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

1748

1749     **Change Number: XSH/TC2/D4/0041** [487]

1750     On Page: 561 Line: 19464 Section: access()

1751     In the DESCRIPTION section, change from:

1752     If *faccessat*() is passed the special value AT_FDCWD in the *fd* parameter, the current working directory is
1753     used and the behavior shall be identical to a call to *access*().

1754     to:

1755     If *faccessat*() is passed the special value AT_FDCWD in the *fd* parameter, the current working directory
1756     shall be used and, if *flag* is zero, the behavior shall be identical to a call to *access*().

1757     *Rationale*: Austin Group Defect Report(s) applied: 487. See http://austingroupbugs.net/view.php?id=487.

1758     **Change Number: XSH/TC2/D4/0042** [838]

1759     On Page: 561 Line: 19468 Section: access()
1760     (2013 edition Page: 565 Line: 19595)

1761     In the DESCRIPTION section, for AT_EACCESS change from:

1762     The checks for accessibility are performed using the effective user and group IDs instead of the real user
1763     and group ID

1764     to:

1765     The checks for accessibility (including directory permissions checked during pathname resolution) shall be
1766     performed using the effective user ID and group ID instead of the real user ID and group ID

1767     *Rationale*: Austin Group Defect Report(s) applied: 838. See http://austingroupbugs.net/view.php?id=838.

1768     **Change Number: XSH/TC2/D4/0043** [817]

1769     On Page: 562 Line: 19488 Section: access()
1770     (2013 edition Page: 566 Line: 19616)

1771     In the ERRORS section, for the [EACCES] error, change from:

1772     *fd* was not opened with O_SEARCH and ...

1773     to:

1774     The access mode of the open file description associated with *fd* is not O_SEARCH and ...

1775     *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

1776

1777 **Change Number: XSH/TC2/D4/0044** [838]

1778 On Page: 562 Line: 19515 Section: access()
1779 (2013 edition Page: 566 Line: 19643)

1780 In the APPLICATION USAGE section, add the following paragraphs to the beginning of the section:

1781 Use of these functions is discouraged since by the time the returned information is acted upon, it is out of
1782 date. (That is, acting upon the information always leads to a time-of-check-to-time-of-use race condition.)
1783 An application should instead attempt the action itself and handle the EACCES error that occurs if the file
1784 is not accessible (with a change of effective user and group IDs beforehand, and perhaps a change back
1785 afterwards, in the case where *access*() or *faccessat*() without AT_EACCES would have been used.)

1786 Historically, one of the uses of *access*() was in set-user-ID root programs to check whether the user running
1787 the program had access to a file. This relied on "super-user" privileges which were granted based on the
1788 effective user ID being zero, so that when *access*() used the real user ID to check accessibility those
1789 privileges were not taken into account. On newer systems where privileges can be assigned which have no
1790 association with user or group IDs, if a program with such privileges calls *access*(), the change of IDs has
1791 no effect on the privileges and therefore they are taken into account in the accessibility checks. Thus
1792 *access*() (and *faccessat*() with *flag* zero) cannot be used for this historical purpose in such programs.
1793 Likewise, if a system provides any additional or alternate file access control mechanisms that are not user
1794 ID based, they will still be taken into account.

1795 If a relative pathname is used, no account is taken of whether the current directory (or the directory
1796 associated with the file descriptor *fd*) is accessible via any absolute pathname. Applications using *access*(),
1797 or *faccessat*() without AT_EACCES, may consequently act as if the file would be accessible to a user with
1798 the real user ID and group ID of the process when such a user would not in practice be able to access the
1799 file because access would be denied at some point above the current directory (or the directory associated
1800 with the file descriptor *fd*) in the file hierarchy.

1801 If *access*() or *faccessat*() is used with W_OK to check for write access to a directory which has the
1802 S_ISVTX bit set, a return value indicating the directory is writable can be misleading since some
1803 operations on files in the directory would not be permitted based on the ownership of those files (see [xref
1804 to XBD 4.2]).

1805 On Page: 563 Line: 19544 Section: access()
1806 (2013 edition Page: 567 Line: 19672)

1807 Change the FUTURE DIRECTIONS section from:

1808 None.

1809 to:

1810 These functions may be formally deprecated (for example by shading them OB) in a future revision of this
1811 standard.

1812 *Rationale*: Austin Group Defect Report(s) applied: 838. See http://austingroupbugs.net/view.php?id=838.

1813

1814 **Change Number: XSH/TC2/D4/0045** [671]

1815 On Page: 573 Line: 19824 Section: aio_fsync()

1816 In the ERRORS section, change from:

1817 The *aio_fildes* member of the **aiocb** structure referenced by the *aiocbp* argument is not a valid file
1818 descriptor open for writing.

1819 to:

1820 The *aio_fildes* member of the **aiocb** structure referenced by the *aiocbp* argument is not a valid file
1821 descriptor.

1822 On Page: 574 Line: 19973 Section: aio_fsync()

1823 In the APPLICATION USAGE section, change from:

1824 None.

1825 to:

1826 Note that even if the file descriptor is not open for writing, if there are any pending write requests on the
1827 underlying file, then that I/O will be completed prior to the return of a call to *aio_error*() or *aio_return*()
1828 indicating that the operation has completed.

1829 *Rationale*: Austin Group Defect Report(s) applied: 671. See http://austingroupbugs.net/view.php?id=671.
1830 The access mode of the file descriptor does not affect whether there are pending I/O operations on the
1831 underlying file.

1832 **Change Number: XSH/TC2/D4/0046** [892]

1833 On Page: 613 Line: 20931 Section: atol()
1834 (2013 edition Page: 618 Line: 21108)

1835 In the SYNOPSIS section, change from:

1836 `long atol(const char *str);`

1837 to:

1838 `long atol(const char *nptr);`

1839 On Page: 613 Line: 20937 Section: atol()
1840 (2013 edition Page: 618 Line: 21114)

1841 In the DESCRIPTION section, change from:

1842 The call *atol*(*str*) shall be equivalent to:

1843 `strtol(str, (char **)NULL, 10)`

1844    to:

1845    Except as noted below, the call *atol*(*nptr*) shall be equivalent to:

1846    `strtol(nptr, (char **)NULL, 10)`

1847    On Page: 613 Line: 20939 section atol()
1848    (2013 edition Page: 618 Line: 21116)

1849    In the DESCRIPTION section, change from:

1850    The call to *atoll*(*nptr*) shall be equivalent ...

1851    to:

1852    Except as noted below, the call to *atoll*(*nptr*) shall be equivalent ...

1853    On Page: 613 Line: 20941 section atol()
1854    (2013 edition Page: 618 Line: 21118)

1855    In the DESCRIPTION section, change from:

1856    except that the handling of errors may differ.

1857    to:

1858    The handling of errors may differ.

1859    On Page 613 Line: 20950 section atol()
1860    (2013 edition Page: 618 Line: 21127)

1861    In the APPLICATION USAGE section, change from:

1862    The *atol*( ) function is subsumed by *strtol*() but is retained because it is used extensively in existing code. If
1863    the number is not known to be in range, *strtol*() should be used because *atol*() is not required to perform
1864    any error checking.

1865    to:

1866    If the number is not known to be in range, *strtol*() or *strtoll*() should be used because *atol*() and *atoll*() are
1867    not required to perform any error checking.

1868    *Rationale*: Austin Group Defect Report(s) applied: 892. See http://austingroupbugs.net/view.php?id=892.

1869    **Change Number: XSH/TC2/D4/0047** [656]

1870    On Page: 614 Line: 20979 Section: basename()

1871    In the DESCRIPTION section, change from:

1872    The *basename*() function may modify the string pointed to by *path*, and may return a pointer to static

1873    storage that may then be overwritten by a subsequent call to *basename*().

1874    to:

1875    The *basename*() function may modify the string pointed to by *path*, and may return a pointer to internal
1876    storage. The returned pointer might be invalidated or the storage might be overwritten by a subsequent call
1877    to *basename*(). The returned pointer might also be invalidated if the calling thread is terminated.

1878    *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
1879    This item is a layered change on XSH/TC1/D5/0041 [75].

1880    The change is to add the following text to the end of the paragraph at 2013 edition P619, L21156-21158:

1881    The returned pointer might also be invalidated if the calling thread is terminated.

1882    **Change Number: XSH/TC2/D4/0048** [928]

1883    On Page: 614 Line: 20992 Section: basename()
1884    (2013 edition Page: 619 Line: 21170)

1885    In the EXAMPLES section, change from:

1886    `char *name = "/usr/lib";`

1887    to:

1888    `char name[] = "/usr/lib";`

1889    *Rationale*: Austin Group Defect Report(s) applied: 928. See http://austingroupbugs.net/view.php?id=928.

1890    **Change Number: XSH/TC2/D4/0049** [612]

1891    On Page: 614 Line: 20996-21004 Section: basename()

1892    In the EXAMPLES section change from:

1893    **Sample Input and Output Strings for basename()**
1894
1895    In the following table, the input string is the value pointed to by *path*, and the output string is the return
1896    value of the *basename*() function.

| Input String | Output String |
|---|---|
| `"/usr/lib"` | `"lib"` |
| `"/usr/"` | `"usr"` |
| `"/"` | `"/"` |

| | |
|---|---|
| `"///"` | `"/"` |
| `"//usr//lib//"` | `"lib"` |

1897

1898    to:

1899    **Sample Input and Output Strings for the *basename*() and *dirname*() functions and the *basename* and**
1900    ***dirname* utilities**

| *basename*() and *dirname*() functions *path* argument | string returned by *basename*() | string returned by *dirname*() | *basename* and *dirname* utilities *string* operand | output written by *basename* utility | output written by *dirname* utility |
|---|---|---|---|---|---|
| `"usr"` | `"usr"` | `"."` | usr | usr | . |
| `"usr/"` | `"usr"` | `"."` | usr/ | usr | . |
| `""` | `"."` | `"."` | `""` | . or *empty string* | . |
| `"/"` | `"/"` | `"/"` | / | / | / |
| `"//"` | `"/"` or `"//"` | `"/"` or `"//"` | // | / or // | / or // |
| `"///"` | `"/"` | `"/"` | /// | / | / |
| `"/usr/"` | `"usr"` | `"/"` | /usr/ | usr | / |
| `"/usr/lib"` | `"lib"` | `"/usr"` | /usr/lib | lib | /usr |
| `"//usr//lib//"` | `"lib"` | `"//usr"` | //usr//lib// | lib | //usr |
| `"/home//dwc//test"` | `"test"` | `"/home//dwc"` | /home//dwc//test | test | /home//dwc |

1901

1902    *Rationale*: Austin Group Defect Report(s) applied: 612. See http://austingroupbugs.net/view.php?id=612.

1903    **Change Number: XSH/TC2/D4/0050** [822]

1904    On Page: 617 Line: 21086 Section: bind()
1905    (2013 edition Page: 622 Line: 21267)

1906    In the ERRORS section, change from:

1907    [ENOENT]

1908    A component of the pathname does not name an existing file or the pathname is an empty string.

1909    to:

1910    [ENOENT]
1911        A component of the path prefix of the pathname in *address* does not name an existing file or the
1912        pathname is an empty string.

1913    [ENOENT] or [ENOTDIR]
1914        The pathname in *address* contains at least one non-<slash> character and ends with one or more
1915        trailing <slash> characters. If the pathname without the trailing <slash> characters would name an
1916        existing file, an [ENOENT] error shall not occur.

1917    *Rationale*: Austin Group Defect Report(s) applied: 822. See http://austingroupbugs.net/view.php?id=822.
1918
1919    This change layers upon XSH/TC1/D5/0043 [146], changing the last sentence of the change.

1920    **Change Number: XSH/TC2/D4/0051** [756]

1921    On Page: 620 Line: 21229 Section: bsearch()

1922    In the RATIONALE section, change from:

1923    ((char *)p - (char *(base) % width == 0

1924    to:

1925    ( (char *)p - (char *)base ) % width == 0

1926    *Rationale*: Austin Group Defect Report(s) applied: 756. See http://austingroupbugs.net/view.php?id=756.

1927    **Change Number: XSH/TC2/D4/0052** [663]

1928    On Page: 622 Line: 21263 Section: btowc()
1929    (2013 edition Page: 627 Line: 21451)

1930    In the RETURN VALUE section, add a new sentence:

1931    [CX]In the POSIX locale, *btowc*() shall not return WEOF if *c* has a value in the range 0 to 255
1932    inclusive.[/CX]

1933    *Rationale*: Austin Group Defect Report(s) applied: 663. See http://austingroupbugs.net/view.php?id=663.

1934    **Change Number: XSH/TC2/D4/0053** [526]

1935    On Page: 627 Line: 21395,21399 Section: calloc()

1936    In the DESCRIPTION section, at line 21395 change from:

1937    If the size of the space requested is 0, the behavior is implementation-defined: the value returned shall be
1938    either a null pointer or a unique pointer.

1939    to:

1940    If the size of the space requested is 0, the behavior is implementation-defined: either a null pointer shall be
1941    returned, or the behavior shall be as if the size were some nonzero value, except that the behavior is
1942    undefined if the returned pointer is used to access an object.

1943    In the RETURN VALUE section, at line 21399 change from:

1944    either a null pointer or a unique pointer that can be successfully passed to *free*() shall be returned.

1945    to:

1946    either:

1947    • a null pointer shall be returned [CX]and *errno* may be set to an implementation-defined
1948      value[/CX], or
1949    • a pointer to the allocated space shall be returned. The application shall ensure that the pointer is
1950      not used to access an object.

1951    *Rationale*: Austin Group Defect Report(s) applied: 526. See http://austingroupbugs.net/view.php?id=526.

1952    **Change Number: XSH/TC2/D4/0054** [645]

1953    On Page: 639 Line: 21683 Section: catopen()

1954    In the DESCRIPTION section, change from:

1955    complete name

1956    to:

1957    pathname

1958    *Rationale*: Austin Group Defect Report(s) applied: 645. See http://austingroupbugs.net/view.php?id=645.

1959    **Change Number: XSH/TC2/D4/0055** [497]

1960    On Page: 639 Line: 21685 Section: catopen()

1961    In the DESCRIPTION section, change from:

1962    ... on page 173). If *NLSPATH* exists in the environment ...

1963    to:

1964    ... on page 173); if *NLSPATH* exists in the environment ...

1965    *Rationale*: Austin Group Defect Report(s) applied: 497. See http://austingroupbugs.net/view.php?id=497.

1966

1967 **Change Number: XSH/TC2/D4/0056** [497]

1968 On Page: 640 Line: 21734 Section: catopen()

1969 In the APPLICATION USAGE section, add a new paragraph to the end of the section:

1970 To be sure that messages produced by an application running with appropriate privileges cannot be used by
1971 an attacker setting an unexpected value for *NLSPATH* in the environment to confuse a system
1972 administrator, such applications should use pathnames containing a '/' to get defined behavior when using
1973 *catopen*() to open a message catalog.

1974 *Rationale*: Austin Group Defect Report(s) applied: 497. See http://austingroupbugs.net/view.php?id=497.

1975 **Change Number: XSH/TC2/D4/0057** [873]

1976 On Page: 655 Line: 22155 Section: chmod()
1977 (2013 edition Page: 660 Line: 22337)

1978 In the NAME section, delete:

1979 relative to directory file descriptor

1980 *Rationale*: Austin Group Defect Report(s) applied: 873. See http://austingroupbugs.net/view.php?id=873.

1981 **Change Number: XSH/TC2/D4/0058** [591]

1982 On Page: 655 Line: 22157 Section: chmod()

1983 Before the fchmodat SYNOPSIS line, insert a line with OH shading:

1984 `#include <fcntl.h>`

1985 *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

1986 **Change Number: XSH/TC2/D4/0059** [817]

1987 On Page: 655 Line: 22178 Section: chmod()
1988 (2013 edition Page: 660 Line: 22358)

1989 In the DESCRIPTION section, change from:

1990 If the file descriptor was opened without O_SEARCH, the function shall check whether directory searches
1991 are permitted using the current permissions of the directory underlying the file descriptor. If the file
1992 descriptor was opened with O_SEARCH, the function shall not perform the check.

1993 to:

1994 If the access mode of the open file description associated with the file descriptor is not O_SEARCH, the
1995 function shall check whether directory searches are permitted using the current permissions of the directory
1996 underlying the file descriptor. If the access mode is O_SEARCH, the function shall not perform the check.

1997    *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

1998    **Change Number: XSH/TC2/D4/0060** [817]

1999    On Page: 656 Line: 22207 Section: chmod()
2000    (2013 edition Page: 661 Line: 22388)

2001    In the ERRORS section, for the [EACCES] error, change from:

2002    *fd* was not opened with O_SEARCH and ...

2003    to:

2004    The access mode of the open file description associated with *fd* is not O_SEARCH and ...

2005    *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

2006    **Change Number: XSH/TC2/D4/0061** [893]

2007    On Page: 657 Line: 22256 Section: chmod()
2008    (2013 edition Page: 662 Line: 22437)

2009    In the EXAMPLES section, change from:

2010
2011
```
chmod("home/cnd/mod1", S_IRWXU|S_IRWXG|S_IROTH|S_IWOTH);
status = stat("home/cnd/mod1", &buffer;);
```

2012    to:

2013
2014
```
chmod("/home/cnd/mod1", S_IRWXU|S_IRWXG|S_IROTH|S_IWOTH);
status = stat("/home/cnd/mod1", &buffer);
```

2015    *Rationale*: Austin Group Defect Report(s) applied: 893. See http://austingroupbugs.net/view.php?id=893.

2016    **Change Number: XSH/TC2/D4/0062** [873]

2017    On Page: 659 Line: 22310 Section: chown()
2018    (2013 edition Page: 664 Line: 22494)

2019    In the NAME section, delete:

2020    relative to directory file descriptor

2021    *Rationale*: Austin Group Defect Report(s) applied: 873. See http://austingroupbugs.net/view.php?id=873.

2022    **Change Number: XSH/TC2/D4/0063** [591]

2023    On Page: 659 Line: 22312 Section: chown()

2024    Before the fchownat SYNOPSIS line, insert a line with OH shading:

2025    `#include <fcntl.h>`

2026    *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

2027    **Change Number: XSH/TC2/D4/0064** [485]

2028    On Page: 659 Line: 22337 Section: chown()

2029    In the DESCRIPTION section, change from:

2030    If owner or group is specified as (**uid_t**)-1 or (**gid_t**)-1, respectively, the corresponding ID of the file shall
2031    not be changed. If both owner and group are -1, the times need not be updated.

2032    Upon successful completion, *chown*() shall mark for update the last file status change timestamp of the file.

2033    to:

2034    If owner or group is specified as (**uid_t**)-1 or (**gid_t**)-1, respectively, the corresponding ID of the file shall
2035    not be changed.

2036    Upon successful completion, *chown*() shall mark for update the last file status change timestamp of the file,
2037    except that if owner is (**uid_t**)-1 and group is (**gid_t**)-1, the file status change timestamp need not be
2038    marked for update.

2039    *Rationale*: Austin Group Defect Report(s) applied: 485. See http://austingroupbugs.net/view.php?id=485.
2040    The wording for chown when both arguments are -1 was difficult to follow.

2041    **Change Number: XSH/TC2/D4/0065** [817]

2042    On Page: 659 Line: 22343 Section: chown()
2043    (2013 edition Page: 664 Line: 22527)

2044    In the DESCRIPTION section, change from:

2045    If the file descriptor was opened without O_SEARCH, the function shall check whether directory searches
2046    are permitted using the current permissions of the directory underlying the file descriptor. If the file
2047    descriptor was opened with O_SEARCH, the function shall not perform the check.

2048    to:

2049    If the access mode of the open file description associated with the file descriptor is not O_SEARCH, the
2050    function shall check whether directory searches are permitted using the current permissions of the directory
2051    underlying the file descriptor. If the access mode is O_SEARCH, the function shall not perform the check.

2052    *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

2053    **Change Number: XSH/TC2/D4/0066** [817]

2054    On Page: 660 Line: 22376 Section: chown()
2055    (2013 edition Page: 665 Line: 22562)

2056    In the ERRORS section, for the [EACCES] error, change from:

2057    *fd* was not opened with O_SEARCH and ...

2058    to:

2059    The access mode of the open file description associated with *fd* is not O_SEARCH and ...

2060    *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

2061    **Change Number: XSH/TC2/D4/0067** [686]

2062    On Page: 665 Line: 22541-22552 Section: clock()

2063    In the APPLICATION USAGE section, on line 22541 insert a new first paragraph:

2064    In programming environments where **clock_t** is a 32-bit integer type and CLOCKS_PER_SEC is one
2065    million, *clock*() will start failing in less than 36 minutes of processor time for signed **clock_t**, or 72 minutes
2066    for unsigned **clock_t**. Applications intended to be portable to such environments should use *times*() instead
2067    (or *clock_gettime*() with CLOCK_PROCESS_CPUTIME_ID, if supported).

2068    In the APPLICATION USAGE section, on line 22545 delete:

2069    The value returned by *clock*() may wrap around on some implementations. For example, on a machine with
2070    32-bit values for **clock_t**, it wraps after 2147 seconds or 36 minutes.

2071    In the SEE ALSO section, on line 22552 add *clock_getres*() and *times*() to the SEE ALSO list.

2072    *Rationale*: Austin Group Defect Report(s) applied: 686. See http://austingroupbugs.net/view.php?id=686.

2073    **Change Number: XSH/TC2/D4/0068** [909]

2074    On Page: 671 Line: 22759 Section: clock_nanosleep()
2075    (2013 edition Page: 676 Line: 22954)

2076    In the RETURN VALUE section, change from:

2077    If the *rmtp* argument is NULL, the remaining time is not returned.

2078    to:

2079    The *rqtp* and *rmtp* arguments can point to the same object. If the *rmtp* argument is NULL, the remaining
2080    time is not returned.

2081    *Rationale*: Austin Group Defect Report(s) applied: 909. See http://austingroupbugs.net/view.php?id=909.

2082    **Change Number: XSH/TC2/D4/0069** [555]

2083    On Page: 678 Line: 22962 Section: close()

2084    In the APPLICATION USAGE section, add a new paragraph to the end of the section:

2085 Usage of *close*() on file descriptors STDIN_FILENO, STDOUT_FILENO or STDERR_FILENO should
2086 immediately be followed by an operation to reopen these file descriptors. Unexpected behavior will result if
2087 any of these file descriptors is left in a closed state (for example, an EBADF error from *perror*()) or if an
2088 unrelated *open*() or similar call later in the application accidentally allocates a file to one of these well-
2089 known file descriptors. Furthermore, a *close*() followed by a reopen operation (e.g. *open*(), *dup*() etc) is not
2090 atomic; *dup2*() should be used to change standard file descriptors.

2091 *Rationale*: Austin Group Defect Report(s) applied: 555. See http://austingroupbugs.net/view.php?id=555.

2092 **Change Number: XSH/TC2/D4/0070** [810]

2093 On Page: 687 Line: 23229 Section: confstr()

2094 In the DESCRIPTION section, change from:

2095 the string stored in *buf* will contain the <space>-separated list of variable=value environment variable pairs
2096 required by the implementation to create a conforming environment, as described in the implementations'
2097 conformance documentation.

2098 to:

2099 the string stored in *buf* shall contain a <space>-separated list of the variable=value environment variable
2100 pairs an implementation requires as part of specifying a conforming environment, as described in the
2101 implementations' conformance documentation

2102 *Rationale*: Austin Group Defect Report(s) applied: 810. See http://austingroupbugs.net/view.php?id=810.

2103 **Change Number: XSH/TC2/D4/0071** [911]

2104 On Page: 687 Line: 23234 Section: confstr()
2105 (2013 edition Page: 692 Line: 23446)

2106 In the DESCRIPTION section, change from:

2107 can be used as a value of the *PATH* environment variable that accesses all of the standard utilities of
2108 POSIX.1-2008

2109 to:

2110 can be used as a value of the *PATH* environment variable that accesses all of the standard utilities of
2111 POSIX.1-2008 that are provided in a manner accessible via the *exec* family of functions

2112 *Rationale*: Austin Group Defect Report(s) applied: 911. See http://austingroupbugs.net/view.php?id=911.

2113 **Change Number: XSH/TC2/D4/0072** [630]

2114 On Page: 696 Line: 23586 Section: cosh()

2115 In the APPLICATION USAGE section, delete:

2116 For IEEE Std 754-1985 **double**, $710.5 < |x|$ implies that *cosh*($x$) has overflowed.

2117    *Rationale*: Austin Group Defect Report(s) applied: 630. See http://austingroupbugs.net/view.php?id=630.

2118    **Change Number: XSH/TC2/D4/0073** [899]

2119    On Page: 705 Line: 23827 Section: crypt()
2120    (2013 edition Page: 710 Line: 24043)

2121    In the APPLICATION USAGE section, add a new paragraph:

2122    Several implementations offer extensions via characters outside of the set specified for the *salt* argument
2123    for specifying alternative algorithms; while not portable, these extensions may offer better security. The use
2124    of *crypt*() for anything other than password hashing is not recommended.

2125    *Rationale*: Austin Group Defect Report(s) applied: 899. See http://austingroupbugs.net/view.php?id=899.

2126    **Change Number: XSH/TC2/D4/0074** [656]

2127    On Page: 713 Line: 24015 Section: ctermid()

2128    In the RETURN VALUE section, change from:

2129    If *s* is a null pointer, the string shall be generated in an area that may be static (and therefore may be
2130    overwritten by each call), the address of which shall be returned. Otherwise, ...

2131    to:

2132    If *s* is a null pointer, the string shall be generated in an area that may be static, the address of which shall be
2133    returned. The application shall not modify the string returned. The returned pointer might be invalidated or
2134    the string content might be overwritten by a subsequent call to *ctermid*(). The returned pointer might also
2135    be invalidated if the calling thread is terminated. If *s* is not a null pointer, ...

2136    *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
2137    This item is a layered change on XSH/TC1/D5/0065 [75,428].

2138    The change is to add the following text to the end of the paragraph at 2013 edition P718, L24231-24234:

2139    The returned pointer might also be invalidated if the calling thread is terminated.

2140    **Change Number: XSH/TC2/D4/0075** [664]

2141    On Page: 715 Line: 24085 Section: ctime()

2142    In the DESCRIPTION section, change from:

2143    Unlike *ctime*(), the thread-safe version of *ctime_r*() is not required to set *tzname*.

2144    to:

2145    If *ctime_r*() sets *tzname*, it shall also set *daylight* and *timezone*. If *ctime_r*() does not set *tzname*, it shall not
2146    set *daylight* and shall not set *timezone*.

2147  *Rationale*: Austin Group Defect Report(s) applied: 664. See http://austingroupbugs.net/view.php?id=664.
2148  This change is layered upon XSH/TC1/D5/0066 [321,428]. The change replaces the last paragraph of the
2149  description in 2013 edition, page 720 lines 24308-24309. The change is made for consistent behavior.

2150  **Change Number: XSH/TC2/D4/0076** [572]

2151  On Page: 723 Line: 24333-24354 Section: dirfd()

2152  In the DESCRIPTION section, at line 24333 change from:

2153  and may set *errno*

2154  to:

2155  and shall set *errno*

2156  In the ERRORS section, at line 24388 delete the ENOTSUP error.

2157  In the RATIONALE section, at line 24354 delete:

2158  An implementation that does not support file descriptors referring to directories may fail with [ENOTSUP].

2159  *Rationale*: Austin Group Defect Report(s) applied: 572. See http://austingroupbugs.net/view.php?id=572.
2160  All implementations must support a file descriptor referring to a directory, even if that descriptor is not
2161  used by readdir(). Furthermore, failure of dirfd() without setting errno is not useful to applications.

2162  **Change Number: XSH/TC2/D4/0077** [830]

2163  On Page: 725 Line: 24372 Section: dirname()
2164  (2013 edition Page: 730 Line: 24593)

2165  In the DESCRIPTION section, after the text:

2166  ... return a pointer to a string that is a pathname of the parent directory of that file.

2167  add a sentence:

2168  The *dirname*() function shall not perform pathname resolution; the result shall not be affected by whether
2169  or not *path* exists or by its file type.

2170  *Rationale*: Austin Group Defect Report(s) applied: 830. See http://austingroupbugs.net/view.php?id=830.
2171  There is no requirement that the strings processed by basename() and dirname() refer to existing
2172  pathnames.

2173  **Change Number: XSH/TC2/D4/0078** [612]

2174  On Page: 725 Line: 24372,24375 Section: dirname()

2175  In the DESCRIPTION section, at line 24372 change from:

2176  Trailing '/' characters in the path are not counted as part of the path.

2177    to:

2178    Trailing '/' characters in the path that are not also leading '/' characters shall not be counted as part of the
2179    path.

2180    Add a new paragraph after line 24375 (after paragraph two):

2181    The *dirname*() function may modify the string pointed to by path, and may return a pointer to static storage
2182    that may then be overwritten by a subsequent call to *dirname*().

2183    *Rationale*: Austin Group Defect Report(s) applied: 612. See http://austingroupbugs.net/view.php?id=612.

2184    **Change Number: XSH/TC2/D4/0079** [830]

2185    On Page: 725 Line: 24378 Section: dirname()
2186    (2013 edition Page: 730 Line: 24599)

2187    In the RETURN VALUE section, change from:

2188    The *dirname*() function shall return a pointer to a string that is the parent directory of *path*. If *path* is a null
2189    pointer or points to an empty string, a pointer to a string "." is returned.

2190    to:

2191    The *dirname*() function shall return a pointer to a string as described above.

2192    *Rationale*: Austin Group Defect Report(s) applied: 830. See http://austingroupbugs.net/view.php?id=830.

2193    **Change Number: XSH/TC2/D4/0080** [656]

2194    On Page: 725 Line: 24380 Section: dirname()

2195    In the RETURN VALUE section, change from:

2196    The *dirname*() function may modify the string pointed to by *path*, and may return a pointer to static storage
2197    that may then be overwritten by subsequent calls to *dirname*().

2198    to:

2199    The *dirname*() function may modify the string pointed to by *path*, and may return a pointer to internal
2200    storage. The returned pointer might be invalidated or the storage might be overwritten by a subsequent call
2201    to *dirname*(). The returned pointer might also be invalidated if the calling thread is terminated.

2202    *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
2203    This item is a layered change on XSH/TC1/D5/0068 [75]

2204    The change is to add the following text to the end of the paragraph at 2013 edition P730, L24601-24603:

2205    The returned pointer might also be invalidated if the calling thread is terminated.

2206

2207    **Change Number: XSH/TC2/D4/0081** [612]

2208    On Page: 726 Line: 24404-24413 Section: dirname()

2209    In the EXAMPLES section, replace lines 24404-24413 with:

2210    The EXAMPLES section of the *basename*() function (see XREF basename() EXAMPLES section on page
2211    XXX) includes a table showing examples of the results of processing several sample pathnames by the
2212    *basename*() and *dirname*() functions and by the *basename* and *dirname* utilities.

2213    *Rationale*: Austin Group Defect Report(s) applied: 612. See http://austingroupbugs.net/view.php?id=612.

2214    **Change Number: XSH/TC2/D4/0082** [656]

2215    On Page: 730 Line: 24542 Section: dlerror()

2216    In the RETURN VALUE section, add a new paragraph at the end of the section:

2217    The application shall not modify the string returned. The returned pointer might be invalidated or the string
2218    content might be overwritten by a subsequent call to *dlerror*() in the same thread (if *dlerror*() is thread-
2219    safe) or in any thread (if *dlerror*() is not thread-safe). The returned pointer might also be invalidated if the
2220    calling thread is terminated.

2221    *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
2222    This item is a layered change on XSH/TC1/D5/0070 [75] impacting the first part of that change.

2223    The change is to add the following text to the end of the paragraph at 2013 edition P735, L24774-24776:

2224    The returned pointer might also be invalidated if the calling thread is terminated.

2225    Note that the deletion of text on L24555 in XSH/TC1/D5/0070 is not impacted by this change.

2226    **Change Number: XSH/TC2/D4/0083** [743]

2227    On Page: 739 Line: 24845 Section: drand48()
2228    (2013 edition Page: 744 Line: 25096)

2229    In the APPLICATION USAGE section, change from:

2230    None.

2231    to:

2232    These functions should be avoided whenever non-trivial requirements (including safety) have to be
2233    fulfilled.

2234    On Page: 739 Line: 24851 Section: drand48()
2235    (2013 edition Page: 744 Line: 25102)

2236    In the SEE ALSO section, add *random*().

2237     *Rationale*: Austin Group Defect Report(s) applied: 743. See http://austingroupbugs.net/view.php?id=743.

2238     **Change Number: XSH/TC2/D4/0084** [753]

2239     On Page: 743 Line: 24972 Section: duplocale()

2240     In the EXAMPLES section, change from:

2241     `return retval; }`

2242     to:

2243     `return retval;`

2244     *Rationale*: Austin Group Defect Report(s) applied: 753. See http://austingroupbugs.net/view.php?id=753.

2245     **Change Number: XSH/TC2/D4/0085** [899]

2246     On Page: 745 Line: 25023 Section: encrypt()
2247     (2013 edition Page: 750 Line: 25291)

2248     In the FUTURE DIRECTIONS section, change from:

2249     None.

2250     to:

2251     A future version of the standard may mark this interface as obsolete or remove it altogether.

2252     *Rationale*: Austin Group Defect Report(s) applied: 899. See http://austingroupbugs.net/view.php?id=899.

2253     **Change Number: XSH/TC2/D4/0086** [493]

2254     On Page: 747 Line: 25044-25057 Section: endgrent()

2255     In the DESCRIPTION section, at line 25044 change from:

2256     When first called, *getgrent*() shall return a pointer to a **group** structure containing the first entry in the
2257     group database.

2258     to:

2259     If the group database is not already open, *getgrent*() shall open it and return a pointer to a **group** structure
2260     containing the first entry in the database.

2261     In the DESCRIPTION section, at line 25053 change from:

2262     The *setgrent*() function shall rewind the group database to allow repeated searches.

2263     to:

2264 The *setgrent*() function shall rewind the group database so that the next *getgrent*() call returns the first
2265 entry, allowing repeated searches.

2266 In the DESCRIPTION section, at line 25054 change from:

2267 The *endgrent*() function may be called to close the group database when processing is complete.

2268 to:

2269 The *endgrent*() function shall close the group database.

2270 The *setgrent*() and *endgrent*() functions shall not change the setting of *errno* if successful.

2271 On error, the *setgrent*() and *endgrent*() functions shall set *errno* to indicate the error.

2272 Since no value is returned by the *setgrent*() and *endgrent*() functions, an application wishing to check for
2273 error situations should set *errno* to 0, then call the function, then check *errno*.

2274 In the RETURN VALUE section, at line 25057 change from:

2275 When first called, *getgrent*() shall return a pointer to the first **group** structure in the group database. Upon
2276 subsequent calls it shall return the next **group** structure in the group database. The *getgrent*() function shall
2277 return a null pointer on end-of-file or an error and *errno* may be set to indicate the error.

2278 to:

2279 On successful completion, *getgrent*() shall return a pointer to a **group** structure. On end-of-file, *getgrent*()
2280 shall return a null pointer and shall not change the setting of *errno*. On error, *getgrent*() shall return a null
2281 pointer and *errno* shall be set to indicate the error.

2282 *Rationale*: Austin Group Defect Report(s) applied: 493. See http://austingroupbugs.net/view.php?id=493.
2283 The changes are made for consistency.

2284 **Change Number: XSH/TC2/D4/0087** [656]

2285 On Page: 747 Line: 25061 Section: endgrent()

2286 In the RETURN VALUE section, change from:

2287 The return value may point to a static area which is overwritten by a subsequent call to *getgrgid*(),
2288 *getgrnam*(), or *getgrent*().

2289 to:

2290 The application shall not modify the structure to which the return value points, nor any storage areas
2291 pointed to by pointers within the structure. The returned pointer, and pointers within the structure, might be
2292 invalidated or the structure or the storage areas might be overwritten by a subsequent call to *getgrgid*(),
2293 *getgrnam*(), or *getgrent*(). The returned pointer, and pointers within the structure, might also be invalidated
2294 if the calling thread is terminated.

2295 *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.

2296     This item is a layered change on XSH/TC1/D5/0080 [75].

2297     The change is to add the following text to the end of the paragraph at 2013 edition P752 L25329-25332:

2298     The returned pointer, and pointers within the structure, might also be invalidated if the calling thread is
2299     terminated.

2300     **Change Number: XSH/TC2/D4/0088** [493]

2301     On Page: 747 Line: 25064 Section: endgrent()

2302     In the ERRORS section, change from:

2303     The *getgrent*() function may fail if:

2304     [EINTR] A signal was caught during the operation.

2305     [EIO] An I/O error has occurred.

2306     to:

2307     These functions may fail if:

2308     [EINTR] A signal was caught during the operation.

2309     [EIO] An I/O error has occurred.

2310     In addition, the *getgrent*() and *setgrent*() functions may fail if:

2311     *Rationale*: Austin Group Defect Report(s) applied: 493. See http://austingroupbugs.net/view.php?id=493.
2312     The changes are made for consistency.

2313     **Change Number: XSH/TC2/D4/0089** [656]

2314     On Page: 749 Line: 25121 Section: endhostent()

2315     In the RETURN VALUE section, add a new paragraph to the end of the section:

2316     The application shall not modify the structure to which the return value points, nor any storage areas
2317     pointed to by pointers within the structure. The returned pointer, and pointers within the structure, might be
2318     invalidated or the structure or the storage areas might be overwritten by a subsequent call to *gethostent*().
2319     The returned pointer, and pointers within the structure, might also be invalidated if the calling thread is
2320     terminated.

2321     *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
2322     This item is a layered change on XSH/TC1/D5/0081 [75,428].

2323     The change is to add the following text to the end of the paragraph at 2013 edition P754, L25393-25396:

2324     The returned pointer, and pointers within the structure, might also be invalidated if the calling thread is
2325     terminated.

2326    **Change Number: XSH/TC2/D4/0090** [656]

2327    On Page: 751 Line: 25175 Section: endnetent()

2328    In the RETURN VALUE section, add a new paragraph to the end of the section:

2329    The application shall not modify the structure to which the return value points, nor any storage areas
2330    pointed to by pointers within the structure. The returned pointer, and pointers within the structure, might be
2331    invalidated or the structure or the storage areas might be overwritten by a subsequent call to *getnetbyaddr*(),
2332    *getnetbyname*(), or *getnetent*(). The returned pointer, and pointers within the structure, might also be
2333    invalidated if the calling thread is terminated.

2334    *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
2335    This item is a layered change on XSH/TC1/D5/0083 [75].

2336    The change is to add the following text to the end of the paragraph at 2013 edition P756, L25452-25455:

2337    The returned pointer, and pointers within the structure, might also be invalidated if the calling thread is
2338    terminated.

2339    **Change Number: XSH/TC2/D4/0091** [656]

2340    On Page: 753 Line: 25230 Section: endprotoent()

2341    In the RETURN VALUE section, add a new paragraph to the end of the section:

2342    The application shall not modify the structure to which the return value points, nor any storage areas
2343    pointed to by pointers within the structure. The returned pointer, and pointers within the structure, might be
2344    invalidated or the structure or the storage areas might be overwritten by a subsequent call to
2345    *getprotobyname*(), *getprotobynumber*(), or *getprotoent*(). The returned pointer, and pointers within the
2346    structure, might also be invalidated if the calling thread is terminated.

2347    *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
2348    This item is a layered change on XSH/TC1/D5/0085 [75].

2349    The change is to add the following text to the end of the paragraph at 2013 edition P758, L25512-25515:

2350    The returned pointer, and pointers within the structure, might also be invalidated if the calling thread is
2351    terminated.

2352    **Change Number: XSH/TC2/D4/0092** [493]

2353    On Page: 755 Line: 25259-25271 Section: endpwent()

2354    In the DESCRIPTION section, at line 25259 change from:

2355    When first called, *getpwent*() shall return a pointer to a **passwd** structure containing the first entry in the
2356    user database.

2357    to:

2358 If the user database is not already open, *getpwent*() shall open it and return a pointer to a **passwd** structure
2359 containing the first entry in the database.

2360 In the DESCRIPTION section, at line 25267 change from:

2361 The *setpwent*() function effectively rewinds the user database to allow repeated searches.

2362 to:

2363 The *setpwent*() function shall rewind the user database so that the next *getpwent*() call returns the first
2364 entry, allowing repeated searches.

2365 In the DESCRIPTION section, at line 25268 change from:

2366 The *endpwent*() function may be called to close the user database when processing is complete.

2367 to:

2368 The *endpwent*() function shall close the user database.

2369 The *setpwent*() and *endpwent*() functions shall not change the setting of *errno* if successful.

2370 On error, the *setpwent*() and *endpwent*() functions shall set *errno* to indicate the error.

2371 Since no value is returned by the *setpwent*() and *endpwent*() functions, an application wishing to check for
2372 error situations should set *errno* to 0, then call the function, then check *errno*.

2373 In the RETURN VALUE section, at line 25271 change from:

2374 The *getpwent*() function shall return a null pointer on end-of-file or error.

2375 to:

2376 On successful completion, *getpwent*() shall return a pointer to a **passwd** structure. On end-of-file,
2377 *getpwent*() shall return a null pointer and shall not change the setting of *errno*. On error, *getpwent*() shall
2378 return a null pointer and *errno* shall be set to indicate the error.

2379 *Rationale*: Austin Group Defect Report(s) applied: 493. See http://austingroupbugs.net/view.php?id=493.
2380 The changes are made for consistency.

2381 **Change Number: XSH/TC2/D4/0093** [656]

2382 On Page: 755 Line: 25271 Section: endpwent()

2383 In the RETURN VALUE section, add a new paragraph to the end of the section:

2384 The application shall not modify the structure to which the return value points, nor any storage areas
2385 pointed to by pointers within the structure. The returned pointer, and pointers within the structure, might be
2386 invalidated or the structure or the storage areas might be overwritten by a subsequent call to *getpwuid*(),
2387 *getpwnam*(), or *getpwent*(). The returned pointer, and pointers within the structure, might also be
2388 invalidated if the calling thread is terminated.

2389 *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
2390 This item is a layered change on XSH/TC1/D5/0087 [75].

2391 The change is to add the following text to the end of the paragraph at 2013 edition P760, L25558-25561:

2392 The returned pointer, and pointers within the structure, might also be invalidated if the calling thread is
2393 terminated.

2394 Note that the deletion of text on L25278 in XSH/TC1/D5/0087 is not impacted by this change.

2395 **Change Number: XSH/TC2/D4/0094** [493]

2396 On Page: 755 Line: 25274 Section: endpwent()

2397 In the ERRORS section, insert before the EIO error:

2398 [EINTR] A signal was caught during the operation.

2399 *Rationale*: Austin Group Defect Report(s) applied: 493. See http://austingroupbugs.net/view.php?id=493.
2400 The changes are made for consistency.

2401 **Change Number: XSH/TC2/D4/0095** [656]

2402 On Page: 758 Line: 25362 Section: endservent()

2403 In the RETURN VALUE section, add a new paragraph to the end of the section:

2404 The application shall not modify the structure to which the return value points, nor any storage areas
2405 pointed to by pointers within the structure. The returned pointer, and pointers within the structure, might be
2406 invalidated or the structure or the storage areas might be overwritten by a subsequent call to
2407 *getservbyname*(), *getservbyport*(), or *getservent*(). The returned pointer, and pointers within the structure,
2408 might also be invalidated if the calling thread is terminated.

2409 *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
2410 This item is a layered change on XSH/TC1/D5/0088 [75].

2411 The change is to add the following text to the end of the paragraph at 2013 edition, P763, L25652-25655:

2412 The returned pointer, and pointers within the structure, might also be invalidated if the calling thread is
2413 terminated.

2414 **Change Number: XSH/TC2/D4/0096** [630]

2415 On Page: 767 Line: 25598 Section: erfc()

2416 In the APPLICATION USAGE section, delete:

2417 Note for IEEE Std 754-1985 **double**, $26.55 < x$ implies *erfc*($x$) has underflowed.

2418 *Rationale*: Austin Group Defect Report(s) applied: 630. See http://austingroupbugs.net/view.php?id=630.

2419 **Change Number: XSH/TC2/D4/0097** [584]

2420 On Page: 780 Line: 26023 Section: exec

2421 In the RATIONALE section, change from:

2422 <hyphen>

2423 to:

2424 <hyphen-minus>

2425 *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

2426 **Change Number: XSH/TC2/D4/0098** [898]

2427 On Page: 780 Line: 26024 Section: exec
2428 (2013 edition Page: 785 Line: 26351)

2429 In the RATIONALE section, add a new paragraph:

2430 Also, note that the *test* and *[* utilities require specific strings for the *argv[0]* argument to have deterministic
2431 behavior across all implementations.

2432 *Rationale*: Austin Group Defect Report(s) applied: 898. See http://austingroupbugs.net/view.php?id=898.

2433 **Change Number: XSH/TC2/D4/0099** [734]

2434 On Page: 782 Line: 26142 Section: exec
2435 (2013 edition Page: 788 Line: 26469)

2436 In the RATIONALE section, change from:

2437 Alternatively, an function like *openat*()

2438 to:

2439 Alternatively, a function like *openat*()

2440 *Rationale*: Austin Group Defect Report(s) applied: 734. See http://austingroupbugs.net/view.php?id=734.

2441 **Change Number: XSH/TC2/D4/0100** [594]

2442 On Page: 785 Line: 26213 Section: exit()

2443 In the DESCRIPTION section, change from:

2444 the least significant 8 bits (that is, *status* & 0377) shall be available to a waiting parent process

2445 to:

2446 the least significant 8 bits (that is, *status* & 0377) shall be available from *wait*() and *waitpid*(); the full value
2447 shall be available from *waitid*() and in the **siginfo_t** passed to a signal handler for SIGCHLD.

2448 *Rationale*: Austin Group Defect Report(s) applied: 594. See http://austingroupbugs.net/view.php?id=594.
2449 The standard is unclear about when si_status contains an exit status and when it contains a signal.

2450 **Change Number: XSH/TC2/D4/0101** [630]

2451 On Page: 787 Line: 26297 Section: exp()

2452 In the APPLICATION USAGE section, delete:

2453 Note that for IEEE Std 754-1985 **double**, 709.8 < *x* implies *exp*(*x*) has overflowed. The value *x*< -708.4
2454 implies *exp*(*x*) has underflowed.

2455 *Rationale*: Austin Group Defect Report(s) applied: 630. See http://austingroupbugs.net/view.php?id=630.

2456 **Change Number: XSH/TC2/D4/0102** [630]

2457 On Page: 789 Line: 26366 Section: exp2()

2458 In the APPLICATION USAGE section, delete:

2459 For IEEE Std 754-1985 **double**, 1024 <= *x* implies *exp2*(*x*) has overflowed. The value *x*< -1022 implies
2460 *exp*(*x*) has underflowed.

2461 *Rationale*: Austin Group Defect Report(s) applied: 630. See http://austingroupbugs.net/view.php?id=630.

2462 **Change Number: XSH/TC2/D4/0103** [630]

2463 On Page: 791 Line: 26426 Section: expm1()

2464 In the APPLICATION USAGE section, delete:

2465 For IEEE Std 754-1985 **double**, 709.8 < *x* implies *expm1*(*x*) has overflowed.

2466 *Rationale*: Austin Group Defect Report(s) applied: 630. See http://austingroupbugs.net/view.php?id=630.

2467 **Change Number: XSH/TC2/D4/0104** [555]

2468 On Page: 806 Line: 26839 Section: fclose()

2469 In the APPLICATION USAGE section, change from:

2470 None.

2471 to:

2472 Since after the call to *fclose*() any use of *stream* results in undefined behavior, *fclose*() should not be used
2473 on *stdin*, *stdout*, or *stderr* except immediately before process termination (see XBD 3.297 on page 81), so
2474 as to avoid triggering undefined behavior in other standard interfaces that rely on these streams. If there are

2475    any *atexit*() handlers registered by the application, such a call to *fclose*() should not occur until the last
2476    handler is finishing. Once *fclose*() has been used to close *stdin*, *stdout*, or *stderr*, there is no standard way to
2477    reopen any of these streams.

2478    Use of *freopen*() to change *stdin*, *stdout*, or *stderr* instead of closing them avoids the danger of a file
2479    unexpectedly being opened as one of the special file descriptors STDIN_FILENO, STDOUT_FILENO, or
2480    STDERR_FILENO at a later time in the application.

2481    *Rationale*: Austin Group Defect Report(s) applied: 555. See http://austingroupbugs.net/view.php?id=555.

2482    **Change Number: XSH/TC2/D4/0105** [835]

2483    On Page: 807 Line: 26877 Section: fcntl()
2484    (2013 edition Page: 813 Line: 27229)

2485    Change from:

2486    Return a new file descriptor which shall be the lowest numbered available (that is, not already open) file
2487    descriptor greater than or equal to the third argument, *arg*, taken as an integer of type **int**.

2488    to:

2489    Return a new file descriptor which shall be allocated as described in [xref to new section 2.14] except that
2490    it shall be the lowest numbered available file descriptor greater than or equal to the third argument, *arg*,
2491    taken as an integer of type **int**.

2492    *Rationale*: Austin Group Defect Report(s) applied: 835. See http://austingroupbugs.net/view.php?id=835.

2493    **Change Number: XSH/TC2/D4/0106** [677]

2494    On Page: 807 Line: 26911-26920 Section: fcntl()

2495    In the DESCRIPTION section, replace the F_GETOWN and F_SETOWN descriptions with:

2496    F_GETOWN
2497        If *fildes* refers to a socket, get the process ID or process group ID specified to receive SIGURG
2498        signals when out-of-band data is available. Positive values shall indicate a process ID; negative
2499        values, other than -1, shall indicate a process group ID; the value zero shall indicate that no
2500        SIGURG signals are to be sent. If *fildes* does not refer to a socket, the results are unspecified.

2501    F_SETOWN
2502        If *fildes* refers to a socket, set the process ID or process group ID specified to receive SIGURG
2503        signals when out-of-band data is available, using the value of the third argument, *arg*, taken as type
2504        **int**. Positive values shall indicate a process ID; negative values, other than -1, shall indicate a
2505        process group ID; the value zero shall indicate that no SIGURG signals are to be sent. Each time a
2506        SIGURG signal is sent to the specified process or process group, permission checks equivalent to
2507        those performed by *kill*() shall be performed, as if *kill*() were called by a process with the same real
2508        user ID, effective user ID, and privileges that the process calling *fcntl*() has at the time of the call; if
2509        the *kill*() call would fail, no signal shall be sent. These permission checks may also be performed by
2510        the *fcntl*() call. If the process specified by *arg* later terminates, or the process group specified by *arg*
2511        later becomes empty, while still being specified to receive SIGURG signals when out-of-band data
2512        is available from *fildes*, then no signals shall be sent to any subsequently created process that has the
2513        same process ID or process group ID, regardless of permission; it is unspecified whether this is

2514    achieved by the equivalent of an `fcntl(fildes, F_SETOWN, 0)` call at the time the process
2515    terminates or is waited for or the process group becomes empty, or by other means. If *fildes* does not
2516    refer to a socket, the results are unspecified.

2517    *Rationale*: Austin Group Defect Report(s) applied: 677. See http://austingroupbugs.net/view.php?id=677.

2518    **Change Number: XSH/TC2/D4/0107** [484]

2519    On Page: 808 Line: 26923 Section: fcntl()

2520    In the DESCRIPTION section, for F_GETLK change from:

2521    Get the first lock which blocks ...

2522    to:

2523    Get any lock which blocks ...

2524    *Rationale*: Austin Group Defect Report(s) applied: 484. See http://austingroupbugs.net/view.php?id=484.
2525    It was unclear whether "first lock" means a lock with the lowest start offset or a first acquired lock in a
2526    chronological order or even something completely different.

2527    **Change Number: XSH/TC2/D4/0108** [675]

2528    On Page: 810 Line: 27040 Section: fcntl()
2529    (2013 edition Page: 816 Line: 27394)

2530    In the ERRORS section add after the [EOVERFLOW] error:

2531    [ESRCH]
2532       The *cmd* argument is F_SETOWN and no process or process group can be found corresponding to
2533       that specified by *arg*.

2534    *Rationale*: Austin Group Defect Report(s) applied: 675. See http://austingroupbugs.net/view.php?id=675.

2535    **Change Number: XSH/TC2/D4/0109** [675,677]

2536    On Page: 811 Line: 27044 Section: fcntl()

2537    In the ERRORS section, add to the "may fail" errors:

2538    [EINVAL]
2539       The *cmd* argument is F_SETOWN and the value of the argument is not valid as a process or process
2540       group identifier.

2541    [EPERM]
2542       The *cmd* argument is F_SETOWN and the calling process does not have permission to send a
2543       SIGURG signal to any process specified by *arg*.

2544    On Page: 812 Line: 27107 Section: fcntl()

2545    In the APPLICATION USAGE section, add a new paragraph:

2546    On systems which do not perform permission checks at the time of an *fcntl*() call with F_SETOWN, if the
2547    permission checks performed at the time the signal is sent disallow sending the signal to any process, the
2548    process that called *fcntl*() has no way of discovering that this has happened. A call to *kill*() with signal 0 can
2549    be used as a prior check of permissions, although this is no guarantee that permission will be granted at the
2550    time a signal is sent, since the target process(es) could change user IDs or privileges in the meantime.

2551    On Page: 814 Line: 27172 Section: fcntl()

2552    In the SEE ALSO section, add *kill*().

2553    *Rationale*: Austin Group Defect Report(s) applied: 675,677. See
2554    http://austingroupbugs.net/view.php?id=675.
2555    See http://austingroupbugs.net/view.php?id=677.

2556    **Change Number: XSH/TC2/D4/0110** [501]

2557    On Page: 815 Line: 27225 Section: fdatasync()

2558    In the ERRORS section, change from:

2559    The *fildes* argument is not a valid file descriptor open for writing.

2560    to:

2561    The *fildes* argument is not a valid file descriptor.

2562    At line 27232 in the APPLICATION USAGE section, change from:

2563    None.

2564    to:

2565    Note that even if the file descriptor is not open for writing, if there are any pending write requests on the
2566    underlying file, then that I/O will be completed prior to the return of *fdatasync*().

2567    *Rationale*: Austin Group Defect Report(s) applied: 501. See http://austingroupbugs.net/view.php?id=501.
2568    The access mode of the file descriptor does not affect whether there are pending I/O operations on the
2569    underlying file.

2570    **Change Number: XSH/TC2/D4/0111** [543]

2571    On Page: 834 Line: 27835 Section: feraiseexcept()

2572    In the DESCRIPTION section, change from:

2573    The order in which these floating-point exceptions are raised is unspecified.

2574    to:

2575  The order in which these floating-point exceptions are raised is unspecified, [MX]except that if the *excepts*
2576  argument represents IEC 60559 valid coincident floating-point exceptions for atomic operations (namely
2577  overflow and inexact, or underflow and inexact), then overflow or underflow shall be raised before
2578  inexact.[/MX]

2579  *Rationale*: Austin Group Defect Report(s) applied: 543. See http://austingroupbugs.net/view.php?id=543.

2580  **Change Number: XSH/TC2/D4/0112** [816]

2581  On Page: 844 Line: 28021 Section: fflush()

2582  In the DESCRIPTION section, moves lines 28021-28022 to become the final paragraph:

2583  If *stream* is a null pointer, *fflush*() shall perform this flushing action on all streams for which the behavior is
2584  defined above.

2585  *Rationale*: Austin Group Defect Report(s) applied: 816. See http://austingroupbugs.net/view.php?id=816.
2586  This makes it clear that fflush(NULL) must affect underlying positions of seekable fds associated with read
2587  streams.

2588  **Change Number: XSH/TC2/D4/0113** [626]

2589  On Page: 844 Line: 28023 Section: fflush()

2590  In the DESCRIPTION section, change from:

2591  For a stream open for reading,

2592  to:

2593  For a stream open for reading with an underlying file description,

2594  *Rationale*: Austin Group Defect Report(s) applied: 626. See http://austingroupbugs.net/view.php?id=626.

2595  **Change Number: XSH/TC2/D4/0114** [468]

2596  On Page: 852 Line: 28283-28285 Section: fgets()

2597  In the DESCRIPTION section, change from:

2598  The *fgets*() function shall read bytes from *stream* into the array pointed to by *s*, until *n*-1 bytes are read, or a
2599  <newline> is read and transferred to *s*, or an end-of-file condition is encountered. The string is then
2600  terminated with a null byte.

2601  to:

2602  The *fgets*() function shall read bytes from *stream* into the array pointed to by *s* until *n*-1 bytes are read, or a
2603  <newline> is read and transferred to *s*, or an end-of-file condition is encountered. A null byte shall be
2604  written immediately after the last byte read into the array. If the end-of-file condition is encountered before
2605  any bytes are read, the contents of the array pointed to by *s* shall not be changed.

2606 *Rationale*: Austin Group Defect Report(s) applied: 468. See http://austingroupbugs.net/view.php?id=468.
2607 This is a conflict with the C99 standard. All current implementations are thought to implement this as C99
2608 requires.

2609 **Change Number: XSH/TC2/D4/0115** [589]

2610 On Page: 858 Line: 28462-28464 Section: fileno()

2611 In the ERRORS section, replace the entire section with:

2612 The *fileno*() function shall fail if:

2613 [EBADF]
2614     The stream is not associated with a file.

2615 The *fileno*() function may fail if:

2616 [EBADF]
2617     The file descriptor underlying *stream* is not a valid file descriptor.

2618 *Rationale*: Austin Group Defect Report(s) applied: 589. See http://austingroupbugs.net/view.php?id=589.

2619 **Change Number: XSH/TC2/D4/0116** [611]

2620 On Page: 859 Line: 28523 Section: flockfile()

2621 In the APPLICATION USAGE section, add a new paragraph to the end of the section:

2622 A call to *exit*() can block until locked streams are unlocked because a thread having ownership of a (**FILE**
2623 *) object blocks all function calls that reference that (**FILE** *) object (except those with names ending in
2624 _unlocked) from other threads, including calls to *exit*().

2625 *Rationale*: Austin Group Defect Report(s) applied: 611. See http://austingroupbugs.net/view.php?id=611.

2626 **Change Number: XSH/TC2/D4/0117** [587]

2627 On Page: 866 Line: 28763 Section: fmemopen()

2628 In the DESCRIPTION section, change from:

2629 for modes *a* and *a+* the initial size shall be either the position of the first null byte in the buffer or the value
2630 of the *size* argument if no null byte is found

2631 to:

2632 for modes *a* and *a+* the initial size shall be:

2633     • zero, if *buf* is a null pointer
2634     • the position of the first null byte in the buffer, if one is found
2635     • the value of the *size* argument, if *buf* is not a null pointer and no null byte is found

2636 *Rationale*: Austin Group Defect Report(s) applied: 587. See http://austingroupbugs.net/view.php?id=587.
2637 The standard does not speak to the null pointer case, but existing practice handles this case consistently.

2638 **Change Number: XSH/TC2/D4/0118** [586,818]

2639 On Page: 867 Line: 28786,28790 Section: fmemopen()

2640 In the ERRORS section, on line 28786 change from:

2641 [EINVAL]
2642     The *size* argument specifies a buffer size of zero.

2643 to:

2644 [EMFILE]
2645     {STREAM_MAX} streams are currently open in the calling process.

2646 On line 28790, add a new paragraph before the "may fail" ENOMEM error:

2647 [EINVAL]
2648     The *size* argument specifies a buffer size of zero and the implementation does not support this.

2649 *Rationale*: Austin Group Defect Report(s) applied: 586,818. See
2650 http://austingroupbugs.net/view.php?id=586.
2651 See http://austingroupbugs.net/view.php?id=818.

2652 **Change Number: XSH/TC2/D4/0119** [818]

2653 On Page: 868 Line: 28284 Section: fmemopen()

2654 In the FUTURE DIRECTIONS section, change from:

2655 None.

2656 to:

2657 A future revision of this standard may require support of zero length buffer streams explicitly.

2658 *Rationale*: Austin Group Defect Report(s) applied: 818. See http://austingroupbugs.net/view.php?id=818.

2659 **Change Number: XSH/TC2/D4/0120** [605]

2660 On Page: 870 Line: 28887 Section: fmod()

2661 In the RETURN VALUE section, change from:

2662 If *x* or *y* is NaN, a NaN shall be returned.

2663 to:

2664 If *x* or *y* is NaN, a NaN shall be returned, and none of the conditions below shall be considered.

2665     *Rationale*: Austin Group Defect Report(s) applied: 605. See http://austingroupbugs.net/view.php?id=605.

2666     **Change Number: XSH/TC2/D4/0121** [806]

2667     On Page: 875 Line: 29060 Section: fnmatch()

2668     In the DESCRIPTION section, change from:

2669     In particular, "\\" shall match a <backslash> in *string*.

2670     to:

2671     In particular, "\\" shall match a <backslash> in *string*. If *pattern* ends with an unescaped <backslash>,
2672     *fnmatch*() shall return a non-zero value (indicating either no match or an error).

2673     *Rationale*: Austin Group Defect Report(s) applied: 806. See http://austingroupbugs.net/view.php?id=806.
2674     Existing practice is for a pattern ending in an unescaped <backslash> not to match anything, but it would
2675     be useful to allow implementations to diagnose this as user error.

2676     **Change Number: XSH/TC2/D4/0122** [822]

2677     On Page: 878 Line: 29180 Section: fopen()

2678     In the ERRORS section, change from:

2679     [ENOENT]
2680        A component of *filename* does not name an existing file or *filename* is an empty string.

2681     to:

2682     [ENOENT]
2683        The *mode* string begins with `'r'` and a component of *pathname* does not name an existing file, or
2684        mode begins with `'w'` or `'a'` and a component of the path prefix of *pathname* does not name an
2685        existing file, or *pathname* is an empty string.

2686     [ENOENT] or [ENOTDIR]
2687        The *pathname* argument contains at least one non-<slash> character and ends with one or more
2688        trailing <slash> characters. If *pathname* without the trailing <slash> characters would name an
2689        existing file, an [ENOENT] error shall not occur.

2690     *Rationale*: Austin Group Defect Report(s) applied: 822. See http://austingroupbugs.net/view.php?id=822.
2691     This change layers upon XSH/TC1/D5/0157 [146,433] changing the last sentence of the change.

2692     **Change Number: XSH/TC2/D4/0123** [858]

2693     On Page: 882 Line: 29311 Section: fork()
2694     (2013 edition Page: 889 Line: 29741)

2695     In the DESCRIPTION section, delete:

2696     Fork handlers may be established by means of the *pthread_atfork*() function in order to maintain

2697    application invariants across *fork*() calls.

2698    *Rationale*: Austin Group Defect Report(s) applied: 858. See http://austingroupbugs.net/view.php?id=858.

2699    **Change Number: XSH/TC2/D4/0124** [651]

2700    On Page: 888 Line: 29550-29551 Section: fpathconf()

2701    In the ERRORS section, move the "shall fail" ELOOP error to the "may fail" part of the ERRORS section
2702    before the other ELOOP error at line 29558.

2703    *Rationale*: Austin Group Defect Report(s) applied: 651. See http://austingroupbugs.net/view.php?id=651.
2704    This was inconsistent with the requirements for other pathconf() error conditions.

2705    **Change Number: XSH/TC2/D4/0125** [651]

2706    On Page: 889 Line: 29612 Section: fpathconf()

2707    In the RATIONALE section, change from:

2708    ... not required to detect any of the errors except the meaning of [EINVAL] that indicates that the value of
2709    *name* is not valid for that variable.

2710    to:

2711    ... not required to detect any of the errors except the meaning of [EINVAL] that indicates that the value of
2712    *name* is not valid for that variable, and the [EOVERFLOW] error that indicates the value to be returned is
2713    larger than {LONG_MAX}.

2714    *Rationale*: Austin Group Defect Report(s) applied: 651. See http://austingroupbugs.net/view.php?id=651.

2715    **Change Number: XSH/TC2/D4/0126** [894]

2716    On Page: 895 Line: 29808 Section: fprintf()
2717    (2013 edition Page: 902 Line: 30242)

2718    In the DESCRIPTION section, change from:

2719    For o conversion, it increases the precision (if necessary) to force the first digit of the result to be zero.

2720    to:

2721    For o conversion, it shall increase the precision, if and only if necessary, to force the first digit of the result
2722    to be a zero (if the value and precision are both 0, a single 0 is printed).

2723    *Rationale*: Austin Group Defect Report(s) applied: 894. See http://austingroupbugs.net/view.php?id=894.

2724

2725 **Change Number: XSH/TC2/D4/0127** [557]

2726 On Page: 899 Line: 30005 Section: fprintf()

2727 In the ERRORS section, delete:

2728 In addition, all forms of *fprintf*() may fail if:

2729 [EINVAL] There are insufficient arguments.

2730 In the RATIONALE section, on page 904 line 30225 change from:

2731 None

2732 to:

2733 If an implementation detects that there are insufficient arguments for the format, it is recommended that the
2734 function should fail and report an [EINVAL] error.

2735 *Rationale*: Austin Group Defect Report(s) applied: 557. See http://austingroupbugs.net/view.php?id=557.
2736 The descriptions of fprintf() and fwprintf() say "The results are undefined if there are insufficient
2737 arguments for the format." However, the ERRORS section on each of those pages also specifies a "may
2738 fail" EINVAL error for this condition.

2739 **Change Number: XSH/TC2/D4/0128** [936]

2740 On Page: 904 Line: 30230 Section: fprintf()
2741 (2013 edition Page: 912 Line: 30677)

2742 In the SEE ALSO section, add **<inttypes.h>** to the list.

2743 *Rationale*: Austin Group Defect Report(s) applied: 936. See http://austingroupbugs.net/view.php?id=936.

2744 **Change Number: XSH/TC2/D4/0129** [926]

2745 On Page: 913 Line: 30537 Section: fread()
2746 (2013 edition Page: 921 Line: 31022)

2747 In the EXAMPLES section, change from:

2748 The following example reads a single element from the *fp* stream into the array pointed to by *buf*.

2749 to:

2750 The following example transfers a single 100-byte fixed length record from the *fp* stream into the array
2751 pointed to by *buf*.

2752 *Rationale*: Austin Group Defect Report(s) applied: 926. See http://austingroupbugs.net/view.php?id=926.

2753

2754    **Change Number: XSH/TC2/D4/0130** [939]

2755    On Page: 916 Line: 30649 Section: freeaddrinfo()
2756    (2013 edition Page: 924 Line: 31149)

2757    In the DESCRIPTION section, change from:

2758    In this *hints* structure every member other than *ai_flags*, *ai_family*, *ai_socktype*, and *ai_protocol* shall be
2759    set to zero or a null pointer.

2760    to:

2761    The application shall ensure that each of the *ai_addrlen*, *ai_addr*, *ai_canonname*, and *ai_next* members, as
2762    well as each of the non-standard additional members, if any, of this *hints* structure is initialized. If any of
2763    these members has a value other than the value that would result from default initialization, the behavior is
2764    implementation-defined.

2765    *Rationale*: Austin Group Defect Report(s) applied: 939. See http://austingroupbugs.net/view.php?id=939.

2766    **Change Number: XSH/TC2/D4/0131** [979]

2767    On Page: 917 Line: 30683 Section: freeaddrinfo()
2768    (2013 edition Page: 925 Line: 31183)

2769    In the DESCRIPTION section, change from:

2770    If the AI_V4MAPPED flag is specified along with an *ai_family* of AF_INET6 then *getaddrinfo*() shall
2771    return IPv4-mapped IPv6 addresses on finding no matching IPv6 addresses (*ai_addrlen* shall be 16). The
2772    AI_V4MAPPED flag shall be ignored unless *ai_family* equals AF_INET6. If the AI_ALL flag is used with
2773    the AI_V4MAPPED flag, then *getaddrinfo*() shall return all matching IPv6 and IPv4 addresses. The
2774    AI_ALL flag without the AI_V4MAPPED flag is ignored.

2775    to (keeping the IP6 shading):

2776    By default, with an *ai_family* of AF_INET6, *getaddrinfo*() shall return only IPv6 addresses. If the
2777    AI_V4MAPPED flag is specified along with an *ai_family* of AF_INET6, then *getaddrinfo*() shall return
2778    IPv4-mapped IPv6 addresses on finding no matching IPv6 addresses. The AI_V4MAPPED flag shall be
2779    ignored unless *ai_family* equals AF_INET6. If the AI_ALL flag is used with the AI_V4MAPPED flag,
2780    then *getaddrinfo*() shall return all matching IPv6 and IPv4 addresses. The AI_ALL flag without the
2781    AI_V4MAPPED flag shall be ignored.

2782    *Rationale*: Austin Group Defect Report(s) applied: 979. See http://austingroupbugs.net/view.php?id=979.

2783    **Change Number: XSH/TC2/D4/0132** [918]

2784    On Page: 919 Line: 30762 Section: freeaddrinfo()
2785    (2013 edition Page: 927 Line: 31262)

2786    In the EXAMPLES section, change from:

2787    `struct addrinfo hints = {};`

2788    to:

2789    `struct addrinfo hints = {0};`

2790    *Rationale*: Austin Group Defect Report(s) applied: 918. See http://austingroupbugs.net/view.php?id=918.

2791    **Change Number: XSH/TC2/D4/0133** [934]

2792    On Page: 920 Line: 30796 Section: freeaddrinfo()
2793    (2013 edition Page: 928 Line: 31296)

2794    In the APPLICATION USAGE section, add a new paragraph:

2795    Although it is common practice to initialize the *hints* structure using:

2796    `struct addrinfo hints;`
2797    `memset(&hints, 0, sizeof hints);`

2798    this method is not portable according to this standard, because the structure can contain pointer or floating
2799    point members that are not required to have an all-bits-zero representation after default initialization.
2800    Portable methods make use of default initialization, for example:

2801    `struct addrinfo hints = { 0 };`

2802    or

2803    `static struct addrinfo hints_init;`
2804    `struct addrinfo hints = hints_init;`

2805    A future version of this standard may require that a pointer object with an all-bits-zero representation is a
2806    null pointer, and that **addrinfo** does not have any floating-point members if a floating-point object with an
2807    all-bits-zero representation does not have the value 0.0.

2808    *Rationale*: Austin Group Defect Report(s) applied: 934. See http://austingroupbugs.net/view.php?id=934.

2809    **Change Number: XSH/TC2/D4/0134** [822]

2810    On Page: 924 Line: 30923 Section: freopen()

2811    In the ERRORS section, change from:

2812    [ENOENT]
2813         A component of filename does not name an existing file or filename is an empty string.

2814    to:

2815    [ENOENT]
2816         The *mode* string begins with `'r'` and a component of pathname does not name an existing file, or
2817         mode begins with `'w'` or `'a'` and a component of the path prefix of *pathname* does not name an
2818         existing file, or *pathname* is an empty string.

2819    [ENOENT] or [ENOTDIR]

2820  The pathname argument contains at least one non-<slash> character and ends with one or more
2821  trailing <slash> characters. If pathname without the trailing <slash> characters would name an
2822  existing file, an [ENOENT] error shall not occur.

2823  *Rationale*: Austin Group Defect Report(s) applied: 822. See http://austingroupbugs.net/view.php?id=822.
2824  This change layers upon XSH/TC1/D5/0182 [146,433], changing the last sentence of the change.

2825  **Change Number: XSH/TC2/D4/0135** [936]

2826  On Page: 935 Line: 31352 Section: fscanf()
2827  (2013 edition Page: 944 Line: 31867)

2828  In the SEE ALSO section, add **<inttypes.h>** to the list.

2829  *Rationale*: Austin Group Defect Report(s) applied: 936. See http://austingroupbugs.net/view.php?id=936.

2830  **Change Number: XSH/TC2/D4/0136** [591]

2831  On Page: 945 Line: 31644 Section: fstatat()

2832  Before the fstatat SYNOPSIS line, insert a line with OH shading:

2833  `#include <fcntl.h>`

2834  *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

2835  **Change Number: XSH/TC2/D4/0137** [817]

2836  On Page: 945 Line: 31686 Section: fstatat()
2837  (2013 edition Page: 954 Line: 32215)

2838  In the DESCRIPTION section, change from:

2839  If the file descriptor was opened without O_SEARCH, the function shall check whether directory searches
2840  are permitted using the current permissions of the directory underlying the file descriptor. If the file
2841  descriptor was opened with O_SEARCH, the function shall not perform the check.

2842  to:

2843  If the access mode of the open file description associated with the file descriptor is not O_SEARCH, the
2844  function shall check whether directory searches are permitted using the current permissions of the directory
2845  underlying the file descriptor. If the access mode is O_SEARCH, the function shall not perform the check.

2846  *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

2847  **Change Number: XSH/TC2/D4/0138** [817]

2848  On Page: 946 Line: 31717 Section: fstatat()
2849  (2013 edition Page: 955 Line: 32247)

2850  In the ERRORS section, for the [EACCES] error, change from:

2851    *fd* was not opened with O_SEARCH and ...

2852    to:

2853    The access mode of the open file description associated with *fd* is not O_SEARCH and ...

2854    *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

2855    **Change Number: XSH/TC2/D4/0139** [889]

2856    On Page: 948 Line: 31811 Section: fstatat()
2857    (2013 edition Page: 957 Line: 32341)

2858    In the RATIONALE section, delete the paragraph:

2859    The *lstat*() function is not required to update the time-related fields if the named file is not a symbolic link.
2860    While the *st_uid*, *st_gid*, *st_atim*, *st_mtim*, and *st_ctim* members of the **stat** structure may apply to a
2861    symbolic link, they are not required to do so. No functions in POSIX.1-2008 are required to maintain any
2862    of these time fields.

2863    *Rationale*: Austin Group Defect Report(s) applied: 889. See http://austingroupbugs.net/view.php?id=889.

2864    **Change Number: XSH/TC2/D4/0140** [591]

2865    On Page: 968 Line: 32362 Section: futimens()

2866    Before the utimensat SYNOPSIS line, insert a line with OH shading:

2867    #include <fcntl.h>

2868    *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

2869    **Change Number: XSH/TC2/D4/0141** [817]

2870    On Page: 968 Line: 32386 Section: futimens()
2871    (2013 edition Page: 976 Line: 32925)

2872    In the DESCRIPTION section, change from:

2873    If the file descriptor was opened without O_SEARCH, the function shall check whether directory searches
2874    are permitted using the current permissions of the directory underlying the file descriptor. If the file
2875    descriptor was opened with O_SEARCH, the function shall not perform the check.

2876    to:

2877    If the access mode of the open file description associated with the file descriptor is not O_SEARCH, the
2878    function shall check whether directory searches are permitted using the current permissions of the directory
2879    underlying the file descriptor. If the access mode is O_SEARCH, the function shall not perform the check.

2880    *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

2881     **Change Number: XSH/TC2/D4/0142** [485]

2882     On Page: 969 Line: 32407-32408 Section: futimens()

2883     In the DESCRIPTION section, change from:

2884     Upon completion, *futimens*() and *utimensat*() shall mark the last file status change timestamp for update.

2885     to:

2886     Upon successful completion, *futimens*() and *utimensat*() shall mark the last file status change timestamp for
2887     update, with the exception that if both *tv_nsec* fields are set to UTIME_OMIT, the file status change
2888     timestamp need not be marked for update.

2889     *Rationale*: Austin Group Defect Report(s) applied: 485. See http://austingroupbugs.net/view.php?id=485.
2890     The standard requires that timestamps be marked for update even when values being written are identical to
2891     what is already present. However, it is unclear whether utimensat is required to write anything when both
2892     arguments use UTIME_OMIT. The intent is that implementations may, but not must, optimize these two
2893     cases.

2894     **Change Number: XSH/TC2/D4/0143** [817]

2895     On Page: 969 Line: 32435 Section: futimens()
2896     (2013 edition Page: 977 Line: 32973)

2897     In the ERRORS section, for the [EACCES] error, change from:

2898     *fd* was not opened with O_SEARCH and ...

2899     to:

2900     The access mode of the open file description associated with *fd* is not O_SEARCH and ...

2901     *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

2902     **Change Number: XSH/TC2/D4/0144** [73]

2903     On Page: 973 Line: 32586 Section: fwprintf()

2904     In the DESCRIPTION section, change from:

2905     In format wide-character strings containing the % form of conversion specification, each argument in the
2906     argument list shall be used exactly once.

2907     to:

2908     In format wide-character strings containing the % form of conversion specification, each argument in the
2909     argument list shall be used exactly once. It is unspecified whether an encoding error occurs if the format
2910     string contains **wchar_t** values that do not correspond to members of the character set of the current locale
2911     and the specified semantics do not require that value to be processed by *wcrtomb*().

2912 *Rationale*: Austin Group Defect Report(s) applied: 73. See http://austingroupbugs.net/view.php?id=73.
2913
2914 A clarification has been made in the C11 standard.

2915 **Change Number: XSH/TC2/D4/0145** [894]

2916 On Page: 974 Line: 32634 Section: fwprintf()
2917 (2013 edition Page: 983 Line: 33180)

2918 In the DESCRIPTION section, change from:

2919 For o conversion, it increases the precision (if necessary) to force the first digit of the result to be zero.

2920 to:

2921 For o conversion, it shall increase the precision, if and only if necessary, to force the first digit of the result
2922 to be a zero (if the value and precision are both 0, a single 0 is printed).

2923 *Rationale*: Austin Group Defect Report(s) applied: 894. See http://austingroupbugs.net/view.php?id=894.

2924 **Change Number: XSH/TC2/D4/0146** [557]

2925 On Page: 979 Line: 32817,32838 Section: fwprintf()

2926 In the ERRORS section, on line 32817 delete:

2927 In addition, all forms of *fwprintf*() may fail if:

2928 [EINVAL] There are insufficient arguments.

2929 In the RATIONALE section, on line 32838 change from:

2930 None

2931 to:

2932 If an implementation detects that there are insufficient arguments for the format, it is recommended that the
2933 function should fail and report an [EINVAL] error.

2934 *Rationale*: Austin Group Defect Report(s) applied: 557. See http://austingroupbugs.net/view.php?id=557.
2935 The descriptions of fprintf() and fwprintf() say "The results are undefined if there are insufficient
2936 arguments for the format." However, the ERRORS section on each of those pages also specifies a "may
2937 fail" EINVAL error for this condition.

2938 **Change Number: XSH/TC2/D4/0147** [936]

2939 On Page: 979 Line: 32843 Section: fwprintf()
2940 (2013 edition Page: 988 Line: 33389)

2941 In the SEE ALSO section, add **<inttypes.h>** to the list.

2942    *Rationale*: Austin Group Defect Report(s) applied: 936. See http://austingroupbugs.net/view.php?id=936.

2943    **Change Number: XSH/TC2/D4/0148** [73]

2944    On Page: 983 Line: 32957 Section: fwscanf()

2945    In the DESCRIPTION section, change from:

2946    The format is a wide-character string composed of zero or more directives. Each directive is composed of
2947    one of the following: one or more white-space wide characters (<space>, <tab>, <newline>, <vertical-tab>,
2948    or <form-feed>); an ordinary wide character (neither '%' nor a white-space character); or a conversion
2949    specification.

2950    to:

2951    The format is a wide-character string composed of zero or more directives. Each directive is composed of
2952    one of the following: one or more white-space wide characters (<space>, <tab>, <newline>, <vertical-tab>,
2953    or <form-feed>); an ordinary wide character (neither '%' nor a white-space character); or a conversion
2954    specification. It is unspecified whether an encoding error occurs if the format string contains **wchar_t**
2955    values that do not correspond to members of the character set of the current locale and the specified
2956    semantics do not require that value to be processed by *wcrtomb*().

2957    *Rationale*: Austin Group Defect Report(s) applied: 73. See http://austingroupbugs.net/view.php?id=73.
2958    A clarification has been made in the C11 standard.

2959    **Change Number: XSH/TC2/D4/0149** [823]

2960    On Page: 988 Line: 33162 Section: fwscanf()
2961    (2013 edition Page: 997 Line: 33711)

2962    In the RETURN VALUE section, change from:

2963    If the input ends before the first matching failure or conversion, EOF shall be returned. If any error occurs,
2964    EOF shall be returned, [CX]and *errno* shall be set to indicate the error[/CX]. If a read error occurs, the
2965    error indicator for the stream shall be set.

2966    to:

2967    If the input ends before the first conversion (if any) has completed, and without a matching failure having
2968    occurred, EOF shall be returned. If an error occurs before the first conversion (if any) has completed, and
2969    without a matching failure having occurred, EOF shall be returned [CX]and *errno* shall be set to indicate
2970    the error[/CX]. If a read error occurs, the error indicator for the stream shall be set.

2971    *Rationale*: Austin Group Defect Report(s) applied: 823. See http://austingroupbugs.net/view.php?id=823.

2972    **Change Number: XSH/TC2/D4/0150** [936]

2973    On Page: 989 Line: 33200 Section: fwscanf()
2974    (2013 edition Page: 998 Line: 33749)

2975    In the SEE ALSO section, add **<inttypes.h>** to the list.

2976  *Rationale*: Austin Group Defect Report(s) applied: 936. See http://austingroupbugs.net/view.php?id=936.

2977  **Change Number: XSH/TC2/D4/0151** [826]

2978  On Page: 993 Line: 33318 Section: getc_unlocked()

2979  In the DESCRIPTION section change from:

2980  ... in a thread-safe manner. They may only safely be used within a scope protected by *flockfile*() (or
2981  *ftrylockfile*()) and *funlockfile*(). These functions may safely be used ...

2982  to:

2983  ... in a fully thread-safe manner. They shall be thread-safe when used within a scope protected by *flockfile*()
2984  (or *ftrylockfile*()) and *funlockfile*(). These functions can safely be used ...

2985  *Rationale*: Austin Group Defect Report(s) applied: 826. See http://austingroupbugs.net/view.php?id=826.
2986  The thread safety of these functions needs to be specified clearly.

2987  **Change Number: XSH/TC2/D4/0152** [796]

2988  On Page: 1003 Line: 33674 Section: getdate()
2989  (2013 edition Page: 1012 Line: 34234)

2990  Change from:

2991  is Mon Sep 22 12:19:47 EDT 1986 and the LC_TIME category is set to the default C locale:

2992  to:

2993  is Mon Sep 22 12:19:47 EDT 1986 and the LC_TIME category is set to the default C or POSIX locale:

2994  *Rationale*: Austin Group Defect Report(s) applied: 796. See http://austingroupbugs.net/view.php?id=796.

2995  **Change Number: XSH/TC2/D4/0153** [569]

2996  On Page: 1005 Line: 33740,33751 Section: getdelim()

2997  In the DESCRIPTION section, at line 33740 change from:

2998  The size of the object pointed to by *lineptr* shall be increased to fit the incoming line, if it isn't already
2999  large enough, including room for the delimiter and a terminating NUL. The characters read, including any
3000  delimiter, shall be stored in the string pointed to by the *lineptr* argument, and a terminating NUL added
3001  when the delimiter or end of file is encountered.

3002  to:

3003  If *lineptr* is a null pointer or if the object pointed to by *lineptr* is of insufficient size, an object shall be
3004  allocated as if by *malloc*() or the object shall be reallocated as if by *realloc*(), respectively, such that the
3005  object is large enough to hold the characters to be written to it, including the terminating NUL, and *n* shall
3006  be set to the new size. If the object was allocated, or if the reallocation operation moved the object, *lineptr*

3007  shall be updated to point to the new object or new location. The characters read, including any delimiter,
3008  shall be stored in the object, and a terminating NUL added when the delimiter or end of file is encountered.

3009  In the RETURN VALUE section, at line 33751 change from:

3010  shall return the number of characters written

3011  to:

3012  shall return the number of bytes written

3013  *Rationale*: Austin Group Defect Report(s) applied: 569. See http://austingroupbugs.net/view.php?id=569.
3014  The changes described here are made to match existing practice and describe what was originally intended.

3015  **Change Number: XSH/TC2/D4/0154** [571]

3016  On Page: 1005 Line: 33753 Section: getdelim()

3017  In the RETURN VALUE section, change from:

3018  If no characters were read, and the end-of-file indicator for the stream is set, or if the stream is at end-of-
3019  file, the end-of-file indicator for the stream shall be set and the function shall return -1.

3020  to:

3021  If the end-of-file indicator for the stream is set, or if no characters were read and the stream is at end-of-
3022  file, the end-of-file indicator for the stream shall be set and the function shall return -1.

3023  *Rationale*: Austin Group Defect Report(s) applied: 571. See http://austingroupbugs.net/view.php?id=571.
3024  The changes described here are made to match existing practice and describe what was originally intended.

3025  **Change Number: XSH/TC2/D4/0155** [570]

3026  On Page: 1005 Line: 33764 Section: getdelim()

3027  In the ERRORS section, replace the EOVERFLOW description with:

3028  The number of bytes to be written into the buffer, including the delimiter character (if encountered), would
3029  exceed {SSIZE_MAX}.

3030  *Rationale*: Austin Group Defect Report(s) applied: 570. See http://austingroupbugs.net/view.php?id=570.
3031  The changes described here are made to match existing practice and describe what was originally intended.

3032  **Change Number: XSH/TC2/D4/0156** [511]

3033  On Page: 1007 Line: 33813,33824 Section: getegid()

3034  In the DESCRIPTION section, on line 33813 add a sentence:

3035  The *getegid*() function shall not modify *errno*.

3036    In the RATIONALE section, on line 33824 change from:

3037    None.

3038    to:

3039    In a conforming environment, *getegid*() will always succeed. It is possible for implementations to provide
3040    an extension where a process in a non-conforming environment will not be associated with a user or group
3041    ID. It is recommended that such implementations return (**gid_t**)-1 and set *errno* to indicate such an
3042    environment; doing so does not violate this standard, since such an environment is already an extension.

3043    *Rationale*: Austin Group Defect Report(s) applied: 511. See http://austingroupbugs.net/view.php?id=511.

3044    **Change Number: XSH/TC2/D4/0157** [656]

3045    On Page: 1008 Line: 33853 Section: getenv()

3046    In the DESCRIPTION section, change from:

3047    The string pointed to may be overwritten by a subsequent call to *getenv*(), [CX]*setenv*(), *unsetenv*(),[/CX]
3048    [XSI]or *putenv*()[/XSI] but shall not be overwritten by a call to any other function in this volume of
3049    POSIX.1-200x.

3050    to:

3051    [CX]The returned string pointer might be invalidated or[/CX] the string content might be overwritten by a
3052    subsequent call to *getenv*(), [CX]*setenv*(), *unsetenv*(),[/CX] [XSI]or *putenv*()[/XSI] but they shall not be
3053    affected by a call to any other function in this volume of POSIX.1-2008. [CX]The returned string pointer
3054    might also be invalidated if the calling thread is terminated.[/CX]

3055    *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
3056    This item is a layered change on XSH/TC1/D5/0238 [75,428].

3057    The change is to add the following text to the end of the paragraph at 2013 edition P1017, L34414-34416:

3058    [CX]The returned string pointer might also be invalidated if the calling thread is terminated.[/CX]

3059    **Change Number: XSH/TC2/D4/0158** [511]

3060    On Page: 1011 Line: 33934,33945 Section: geteuid()

3061    In the DESCRIPTION section, on line 33934 add a sentence:

3062    The *geteuid*() function shall not modify *errno*.

3063    In the RATIONALE section, on line 33945 change from:

3064    None.

3065    to:

3066    In a conforming environment, *geteuid*() will always succeed. It is possible for implementations to provide
3067    an extension where a process in a non-conforming environment will not be associated with a user or group
3068    ID. It is recommended that such implementations return (**uid_t**)-1 and set *errno* to indicate such an
3069    environment; doing so does not violate this standard, since such an environment is already an extension.

3070    *Rationale*: Austin Group Defect Report(s) applied: 511. See http://austingroupbugs.net/view.php?id=511.

3071    **Change Number: XSH/TC2/D4/0159** [511]

3072    On Page: 1012 Line: 33966,33977 Section: getgid()

3073    In the DESCRIPTION section, on line 33966 add a sentence

3074    The *getgid*() function shall not modify *errno*.

3075    In the RATIONALE section, on line 33977 change from:

3076    None.

3077    to:

3078    In a conforming environment, *getgid*() will always succeed. It is possible for implementations to provide an
3079    extension where a process in a non-conforming environment will not be associated with a user or group ID.
3080    It is recommended that such implementations return (**gid_t**)-1 and set *errno* to indicate such an
3081    environment; doing so does not violate this standard, since such an environment is already an extension.

3082    *Rationale*: Austin Group Defect Report(s) applied: 511. See http://austingroupbugs.net/view.php?id=511.

3083    **Change Number: XSH/TC2/D4/0160** [808]

3084    On Page: 1014 Line: 34008 Section: getgrgid()

3085    In the DESCRIPTION add a new paragraph after the second paragraph:

3086    Applications wishing to check for error situations should set *errno* to 0 before calling *getgrgid*(). If
3087    *getgrgid*() returns a null pointer and *errno* is set to non-zero, an error occurred.

3088    *Rationale*: Austin Group Defect Report(s) applied: 808. See http://austingroupbugs.net/view.php?id=808.

3089    **Change Number: XSH/TC2/D4/0161** [808]

3090    On Page: 1014 Line: 34019 Section: getgrgid()

3091    In the RETURN VALUE section, change from:

3092    On error, *errno* shall be set to indicate the error.

3093    to:

3094    If the requested entry was not found, *errno* shall not be changed. On error, *errno* shall be set to indicate the
3095    error.

3096    *Rationale*: Austin Group Defect Report(s) applied: 808. See http://austingroupbugs.net/view.php?id=808.

3097    **Change Number: XSH/TC2/D4/0162** [656]

3098    On Page: 1014 Line: 34021 Section: getgrgid()

3099    In the RETURN VALUE section, change from:

3100    The return value may point to a static area which is overwritten by a subsequent call to *getgrent*(),
3101    *getgrgid*(), or *getgrnam*().

3102    to:

3103    The application shall not modify the structure to which the return value points, nor any storage areas
3104    pointed to by pointers within the structure. The returned pointer, and pointers within the structure, might be
3105    invalidated or the structure or the storage areas might be overwritten by a subsequent call to *getgrent*(),
3106    *getgrgid*(), or *getgrnam*(). The returned pointer, and pointers within the structure, might also be invalidated
3107    if the calling thread is terminated.

3108    *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
3109    This item is a layered change on XSH/TC1/D5/0241 [75].

3110    The change is to add the following text to the end of the paragraph at 2013 edition P1023, L34589-34592:

3111    The returned pointer, and pointers within the structure, might also be invalidated if the calling thread is
3112    terminated.

3113    **Change Number: XSH/TC2/D4/0163** [808]

3114    On Page: 1016 Line: 34082 Section: getgrgid()

3115    In the APPLICATION USAGE section, delete the first paragraph:

3116    Applications wishing to check for error situations should set *errno* to 0 before calling *getgrgid*(). If *errno* is
3117    set on return, an error occurred.

3118    *Rationale*: Austin Group Defect Report(s) applied: 808. See http://austingroupbugs.net/view.php?id=808.

3119    **Change Number: XSH/TC2/D4/0164** [808]

3120    On Page: 1018 Line: 34136 Section: getgrnam()

3121    In the DESCRIPTION section, add a new paragraph after the second paragraph:

3122    Applications wishing to check for error situations should set *errno* to 0 before calling *getgrnam*(). If
3123    *getgrnam*() returns a null pointer and *errno* is set to non-zero, an error occurred.

3124    *Rationale*: Austin Group Defect Report(s) applied: 808. See http://austingroupbugs.net/view.php?id=808.

3125

3126    **Change Number: XSH/TC2/D4/0165** [808]

3127    On Page: 1018 Line: 34147 Section: getgrnam()
3128    (2013 edition Page: 1027 Line: 34718)

3129    In the RETURN VALUE section, change from:

3130    On error, *errno* shall be set to indicate the error.

3131    to:

3132    If the requested entry was not found, *errno* shall not be changed. On error, *errno* shall be set to indicate the
3133    error.

3134    *Rationale*: Austin Group Defect Report(s) applied: 808. See http://austingroupbugs.net/view.php?id=808.

3135    **Change Number: XSH/TC2/D4/0166** [656]

3136    On Page: 1018 Line: 34149 Section: getgrnam()

3137    In the RETURN VALUE section, change from:

3138    The return value may point to a static area which is overwritten by a subsequent call to *getgrent*(),
3139    *getgrgid*(), or *getgrnam*().

3140    to:

3141    The application shall not modify the structure to which the return value points, nor any storage areas
3142    pointed to by pointers within the structure. The returned pointer, and pointers within the structure, might be
3143    invalidated or the structure or the storage areas might be overwritten by a subsequent call to *getgrent*(),
3144    *getgrgid*(), or *getgrnam*(). The returned pointer, and pointers within the structure, might also be invalidated
3145    if the calling thread is terminated.

3146    *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
3147    This item is a layered change on XSH/TC1/D5/0242 [75].

3148    The change is to add the following text to the end of the paragraph at 2013 edition, P1027, L34720-34723:

3149    The returned pointer, and pointers within the structure, might also be invalidated if the calling thread is
3150    terminated.

3151    **Change Number: XSH/TC2/D4/0167** [808]

3152    On Page: 1019 Line: 34196 Section: getgrnam()

3153    In the APPLICATION USAGE section, delete the first paragraph:

3154    Applications wishing to check for error situations should set *errno* to 0 before calling *getgrnam*(). If *errno*
3155    is set on return, an error occurred.

3156    *Rationale*: Austin Group Defect Report(s) applied: 808. See http://austingroupbugs.net/view.php?id=808.

3157 Application developers requiring to check for errors from these functions should set errno to zero before
3158 calling the function if they need to determine if an error occurred.

3159 **Change Number: XSH/TC2/D4/0168** [656]

3160 On Page: 1029 Line: 34469 Section: getlogin()

3161 In the RETURN VALUE section, change from:

3162 The return value from *getlogin*() may point to static data whose content is overwritten by each call.

3163 to:

3164 The application shall not modify the string returned. The returned pointer might be invalidated or the string
3165 content might be overwritten by a subsequent call to *getlogin*(). The returned pointer and the string content
3166 might also be invalidated if the calling thread is terminated.

3167 *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
3168 This item is a layered change on XSH/TC1/D5/0244 [75].

3169 The change is to add the following text to the end of the paragraph at 2013 edition, P1038, L35048-35049:

3170 The returned pointer and the string content might also be invalidated if the calling thread is terminated.

3171 **Change Number: XSH/TC2/D4/0169** [608]

3172 On Page: 1040 Line: 34848 Section: getopt()

3173 In the DESCRIPTION section change from:

3174 *getopt*() shall also print a diagnostic message to *stderr* in the format specified for the *getopts* utility.

3175 to:

3176 *getopt*() shall also print a diagnostic message to *stderr* in the format specified for the *getopts* utility, unless
3177 the *stderr* stream has wide orientation in which case the behavior is undefined.

3178 In the APPLICATION USAGE section, add a new paragraph after page 1043 line 34980:

3179 Applications which use wide character output functions with *stderr* should ensure that any calls to *getopt*()
3180 do not write to *stderr*, either by setting *opterr* to 0 or by ensuring the first character of *optstring* is always a
3181 <colon>.

3182 *Rationale*: Austin Group Defect Report(s) applied: 608. See http://austingroupbugs.net/view.php?id=608.

3183 **Change Number: XSH/TC2/D4/0170** [808]

3184 On Page: 1057 Line: 35318 Section: getpwnam()
3185 (2013 edition Page: 1065 Line: 35887)

3186 In the RETURN VALUE section, change from:

3187  On error, *errno* shall be set to indicate the error.

3188  to:

3189  If the requested entry was not found, *errno* shall not be changed. On error, *errno* shall be set to indicate the
3190  error.

3191  *Rationale*: Austin Group Defect Report(s) applied: 808. See http://austingroupbugs.net/view.php?id=808.

3192  **Change Number: XSH/TC2/D4/0171** [656]

3193  On Page: 1057 Line: 35319 Section: getpwnam()

3194  In the RETURN VALUE section, change from:

3195  The return value may point to a static area which is overwritten by a subsequent call to *getpwent*(),
3196  *getpwnam*(), or *getpwuid*().

3197  to:

3198  The application shall not modify the structure to which the return value points, nor any storage areas
3199  pointed to by pointers within the structure. The returned pointer, and pointers within the structure, might be
3200  invalidated or the structure or the storage areas might be overwritten by a subsequent call to *getpwent*(),
3201  *getpwnam*(), or *getpwuid*(). The returned pointer, and pointers within the structure, might also be
3202  invalidated if the calling thread is terminated.

3203  *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
3204  This item is a layered change on XSH/TC1/D5/0255 [75].

3205  The change is to add the following text to the end of the paragraph at 2013 edition, P1065, L35888-35891:

3206  The returned pointer, and pointers within the structure, might also be invalidated if the calling thread is
3207  terminated.

3208  **Change Number: XSH/TC2/D4/0172** [808]

3209  On Page: 1061 Line: 35451 Section: getpwuid()
3210  (2013 edition Page: 1069 Line: 36023)

3211  In the RETURN VALUE section, change from:

3212  On error, *errno* shall be set to indicate the error.

3213  to:

3214  If the requested entry was not found, *errno* shall not be changed. On error, *errno* shall be set to indicate the
3215  error.

3216  *Rationale*: Austin Group Defect Report(s) applied: 808. See http://austingroupbugs.net/view.php?id=808.

3217

3218    **Change Number: XSH/TC2/D4/0173** [656]

3219    On Page: 1061 Line: 35452 Section: getpwuid()

3220    In the RETURN VALUE section, change from:

3221    The return value may point to a static area which is overwritten by a subsequent call to *getpwent*(),
3222    *getpwnam*(), or *getpwuid*().

3223    to:

3224    The application shall not modify the structure to which the return value points, nor any storage areas
3225    pointed to by pointers within the structure. The returned pointer, and pointers within the structure, might be
3226    invalidated or the structure or the storage areas might be overwritten by a subsequent call to *getpwent*(),
3227    *getpwnam*(), or *getpwuid*(). The returned pointer, and pointers within the structure, might also be
3228    invalidated if the calling thread is terminated.

3229    *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
3230    This item is a layered change on XSH/TC1/D5/0256 [75].

3231    The change is to add the following text to the end of the paragraph at 2013 edition, P1069, L36024-36027:

3232    The returned pointer, and pointers within the structure, might also be invalidated if the calling thread is
3233    terminated.

3234    **Change Number: XSH/TC2/D4/0174** [791]

3235    On Page: 1078 Line: 35928 Section: getsubopt()

3236    In the SYNOPSIS section, add a CX margin marker and shading to all the synopsis.

3237    *Rationale*: Austin Group Defect Report(s) applied: 791. See http://austingroupbugs.net/view.php?id=791.
3238    This function in <stdlib.h> is an extension over the C standard contents for the header.

3239    **Change Number: XSH/TC2/D4/0175** [511]

3240    On Page: 1083 Line: 36116 Section: getuid()

3241    In the DESCRIPTION section add a sentence:

3242    The *getuid*() function shall not modify *errno*.

3243    In the RATIONALE section on line 36134, change from:

3244    None.

3245    to:

3246    In a conforming environment, *getuid*() will always succeed. It is possible for implementations to provide an
3247    extension where a process in a non-conforming environment will not be associated with a user or group ID.
3248    It is recommended that such implementations return (**uid_t**)-1 and set *errno* to indicate such an

3249    environment; doing so does not violate this standard, since such an environment is already an extension.

3250    *Rationale*: Austin Group Defect Report(s) applied: 511. See http://austingroupbugs.net/view.php?id=511.

3251    **Change Number: XSH/TC2/D4/0176** [897]

3252    On Page: 1083 Line: 36124 Section: getuid()
3253    (2013 edition Page: 1091 Line: 36709)

3254    In the EXAMPLES section, change from:

3255    The following example sets the effective user ID and the real user ID of the current process to the real user
3256    ID of the caller.

```
3257    #include <unistd.h>
3258    #include <sys/types.h>
3259    ...
3260    setreuid(getuid(), getuid());
```

3261   to:

3262   The following example sets the effective user ID of the calling process to the real user ID.

```
3263    #include <unistd.h>
3264    ...
3265    seteuid(getuid());
```

3266   *Rationale*: Austin Group Defect Report(s) applied: 897. See http://austingroupbugs.net/view.php?id=897.

3267   **Change Number: XSH/TC2/D4/0177** [506]

3268   On Page: 1093 Line: 36468 Section: grantpt()

3269   In the ERRORS section, move line 36472 prior to 36470 (sort [EACCES] before [EBADF]).

3270   *Rationale*: Austin Group Defect Report(s) applied: 506. See http://austingroupbugs.net/view.php?id=506.
3271   This is an editorial change.

3272   **Change Number: XSH/TC2/D4/0178** [777]

3273   On Page: 1116 Line: 37199 Section: inet_ntop()

3274   In the DESCRIPTION section, change from:

3275   The preferred form is "x:x:x:x:x:x:x:x", where the 'x's are the hexadecimal values of the eight 16-bit
3276   pieces of the address. Leading zeros in individual fields can be omitted, but there shall be at least one
3277   numeral in every field.

3278   to:

3279   The preferred form is "x:x:x:x:x:x:x:x", where the 'x's are the hexadecimal values of the eight 16-bit
3280   pieces of the address. Leading zeros in individual fields can be omitted, but there shall be one to four

3281   hexadecimal digits in every field.

3282   *Rationale*: Austin Group Defect Report(s) applied: 777. See http://austingroupbugs.net/view.php?id=777.

3283   **Change Number: XSH/TC2/D4/0179** [743]

3284   On Page: 1119 Line: 37298 Section: initstate()
3285   (2013 edition Page: 1128 Line: 37891)

3286   In the APPLICATION USAGE section, add a new paragraph to the end of the section:

3287   These functions should be avoided whenever non-trivial requirements (including safety) have to be
3288   fulfilled.

3289   *Rationale*: Austin Group Defect Report(s) applied: 743. See http://austingroupbugs.net/view.php?id=743.

3290   **Change Number: XSH/TC2/D4/0180** [685]

3291   On Page: 1169 Line: 38878 Section: iswalnum()

3292   In the DESCRIPTION section, change from:

3293   is a wide-character code corresponding to a valid character in the current locale

3294   to:

3295   is a wide-character code corresponding to a valid character in the locale used by the function

3296   *Rationale*: Austin Group Defect Report(s) applied: 685. See http://austingroupbugs.net/view.php?id=685.

3297   **Change Number: XSH/TC2/D4/0181** [685]

3298   On Page: 1171 Line: 38926 Section: iswalpha()

3299   In the DESCRIPTION section, change from:

3300   is a wide-character code corresponding to a valid character in the current locale

3301   to:

3302   is a wide-character code corresponding to a valid character in the locale used by the function

3303   *Rationale*: Austin Group Defect Report(s) applied: 685. See http://austingroupbugs.net/view.php?id=685.

3304   **Change Number: XSH/TC2/D4/0182** [685]

3305   On Page: 1173 Line: 38974 Section: iswblank()

3306   In the DESCRIPTION section, change from:

3307   is a wide-character code corresponding to a valid character in the current locale

3308   to:

3309   is a wide-character code corresponding to a valid character in the locale used by the function

3310   *Rationale*: Austin Group Defect Report(s) applied: 685. See http://austingroupbugs.net/view.php?id=685.

3311   **Change Number: XSH/TC2/D4/0183** [685]

3312   On Page: 1174 Line: 39015 Section: iswcntrl()

3313   In the DESCRIPTION section, change from:

3314   is a wide-character code corresponding to a valid character in the current locale

3315   to:

3316   is a wide-character code corresponding to a valid character in the locale used by the function

3317   *Rationale*: Austin Group Defect Report(s) applied: 685. See http://austingroupbugs.net/view.php?id=685.

3318   **Change Number: XSH/TC2/D4/0184** [799]

3319   On Page: 1176 Line: 39070 Section: iswctype()
3320   (2013 edition Page: 1188 Line: 39711)

3321   In the RETURN VALUE section, change from:

3322   If *charclass* is 0

3323   to:

3324   If *charclass* is (**wctype_t**)0

3325   *Rationale*: Austin Group Defect Report(s) applied: 799. See http://austingroupbugs.net/view.php?id=799.

3326   **Change Number: XSH/TC2/D4/0185** [799]

3327   On Page: 1177 Line: 39130 Section: iswctype()
3328   (2013 edition Page: 1189 Line: 39770)

3329   In the CHANGE HISTORY section, change from:

3330   The behavior of *n*=0 is now described.

3331   to:

3332   The behavior of *charclass* = (**wctype_t**)0 is now described.

3333   *Rationale*: Austin Group Defect Report(s) applied: 799. See http://austingroupbugs.net/view.php?id=799.

3334   **Change Number: XSH/TC2/D4/0186** [685]

3335   On Page: 1178 Line: 39149 Section: iswdigit()

3336   In the DESCRIPTION section, change from:

3337   is a wide-character code corresponding to a valid character in the current locale

3338   to:

3339   is a wide-character code corresponding to a valid character in the locale used by the function

3340   *Rationale*: Austin Group Defect Report(s) applied: 685. See http://austingroupbugs.net/view.php?id=685.

3341   **Change Number: XSH/TC2/D4/0187** [685]

3342   On Page: 1180 Line: 39197 Section: iswgraph()

3343   In the DESCRIPTION section, change from:

3344   is a wide-character code corresponding to a valid character in the current locale

3345   to:

3346   is a wide-character code corresponding to a valid character in the locale used by the function

3347   *Rationale*: Austin Group Defect Report(s) applied: 685. See http://austingroupbugs.net/view.php?id=685.

3348   **Change Number: XSH/TC2/D4/0188** [685]

3349   On Page: 1182 Line: 39245 Section: iswlower()

3350   In the DESCRIPTION section, change from:

3351   is a wide-character code corresponding to a valid character in the current locale

3352   to:

3353   is a wide-character code corresponding to a valid character in the locale used by the function

3354   *Rationale*: Austin Group Defect Report(s) applied: 685. See http://austingroupbugs.net/view.php?id=685.

3355   **Change Number: XSH/TC2/D4/0189** [685]

3356   On Page: 1184 Line: 39293 Section: iswprint()

3357   In the DESCRIPTION section, change from:

3358   is a wide-character code corresponding to a valid character in the current locale

3359   to:

3360   is a wide-character code corresponding to a valid character in the locale used by the function

3361   *Rationale*: Austin Group Defect Report(s) applied: 685. See http://austingroupbugs.net/view.php?id=685.

3362   **Change Number: XSH/TC2/D4/0190** [685]

3363   On Page: 1186 Line: 39341 Section: iswpunct()

3364   In the DESCRIPTION section, change from:

3365   is a wide-character code corresponding to a valid character in the current locale

3366   to:

3367   is a wide-character code corresponding to a valid character in the locale used by the function

3368   *Rationale*: Austin Group Defect Report(s) applied: 685. See http://austingroupbugs.net/view.php?id=685.

3369   **Change Number: XSH/TC2/D4/0191** [685]

3370   On Page: 1188 Line: 39389 Section: iswspace()

3371   In the DESCRIPTION section, change from:

3372   is a wide-character code corresponding to a valid character in the current locale

3373   to:

3374   is a wide-character code corresponding to a valid character in the locale used by the function

3375   *Rationale*: Austin Group Defect Report(s) applied: 685. See http://austingroupbugs.net/view.php?id=685.

3376   **Change Number: XSH/TC2/D4/0192** [685]

3377   On Page: 1190 Line: 39437 Section: iswupper()

3378   In the DESCRIPTION section, change from:

3379   is a wide-character code corresponding to a valid character in the current locale

3380   to:

3381   is a wide-character code corresponding to a valid character in the locale used by the function

3382   *Rationale*: Austin Group Defect Report(s) applied: 685. See http://austingroupbugs.net/view.php?id=685.

3383   **Change Number: XSH/TC2/D4/0193** [685]

3384   On Page: 1192 Line: 39485 Section: iswxdigit()

3385   In the DESCRIPTION section, change from:

3386   is a wide-character code corresponding to a valid character in the current locale

3387   to:

3388   is a wide-character code corresponding to a valid character in the locale used by the function

3389   *Rationale*: Austin Group Defect Report(s) applied: 685. See http://austingroupbugs.net/view.php?id=685.

3390   **Change Number: XSH/TC2/D4/0194** [765]

3391   On Page: 1201 Line: 39708 Section: kill()
3392   (2013 edition Page: 1213 Line: 40379)

3393   In the RATIONALE section, change from:

3394   Existing implementations vary on the result of a *kill*() with *pid* indicating an inactive process (a terminated
3395   process that has not been waited for by its parent). Some indicate success on such a call (subject to
3396   permission checking), while others give an error of [ESRCH]. Since the definition of process lifetime in
3397   this volume of POSIX.1-2008 covers inactive processes, the [ESRCH] error as described is inappropriate in
3398   this case. In particular, this means that an application cannot have a parent process check for termination of
3399   a particular child with *kill*(). (Usually this is done with the null signal; this can be done reliably with
3400   *waitpid*().)

3401   to:

3402   Historical implementations varied on the result of a *kill*() with *pid* indicating a zombie process. Some
3403   indicated success on such a call (subject to permission checking), while others gave an error of [ESRCH].
3404   Since the definition of process lifetime in this standard covers zombie processes, the [ESRCH] error as
3405   described is inappropriate in this case and implementations that give this error do not conform. This means
3406   that an application cannot have a parent process check for termination of a particular child by sending it the
3407   null signal with *kill*(), but must instead use *waitpid*() or *waitid*().

3408   *Rationale*: Austin Group Defect Report(s) applied: 765. See http://austingroupbugs.net/view.php?id=765.

3409   **Change Number: XSH/TC2/D4/0195** [873]

3410   On Page: 1216 Line: 40102 Section: link()
3411   (2013 edition Page: 1228 Line: 40780)

3412   In the NAME section, delete:

3413   relative to two directory file descriptors

3414   *Rationale*: Austin Group Defect Report(s) applied: 873. See http://austingroupbugs.net/view.php?id=873.

3415   **Change Number: XSH/TC2/D4/0196** [591]

3416   On Page: 1216 Line: 40106 Section: link()

3417   Before the linkat SYNOPSIS line, insert a line with OH shading:

3418   `#include <fcntl.h>`

3419   *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

3420   **Change Number: XSH/TC2/D4/0197** [817]

3421   On Page: 1216 Line: 40126 Section: link()
3422   (2013 edition Page: 1228 Line: 40805)

3423   In the DESCRIPTION section, change from:

3424   If the file descriptor was opened without O_SEARCH, the function shall check whether directory searches
3425   are permitted using the current permissions of the directory underlying the file descriptor. If the file
3426   descriptor was opened with O_SEARCH, the function shall not perform the check.

3427   to:

3428   If the access mode of the open file description associated with the file descriptor is not O_SEARCH, the
3429   function shall check whether directory searches are permitted using the current permissions of the directory
3430   underlying the file descriptor. If the access mode is O_SEARCH, the function shall not perform the check.

3431   *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

3432   **Change Number: XSH/TC2/D4/0198** [822]

3433   On Page: 1217 Line: 40156 Section: link()
3434   (2013 edition Page: 1229 Line: 40836)

3435   In the RETURN VALUE section, add after the [ENOENT] error:

3436   [ENOENT] or [ENOTDIR]
3437   The *path1* argument names an existing non-directory file, and the *path2* argument contains at least
3438   one non-<slash> character and ends with one or more trailing <slash> characters. If *path2* without
3439   the trailing <slash> characters would name an existing file, an [ENOENT] error shall not occur.

3440   *Rationale*: Austin Group Defect Report(s) applied: 822. See http://austingroupbugs.net/view.php?id=822.

3441   **Change Number: XSH/TC2/D4/0199** [817]

3442   On Page: 1217 Line: 40170 Section: link()
3443   (2013 edition Page: 1229 Line: 40853)

3444   In the ERRORS section, add:

3445   [EACCES]

3446   The access mode of the open file description associated with *fd1* or *fd2* is not O_SEARCH and the
3447   permissions of the directory underlying *fd1* or *fd2* respectively do not permit directory searches.

3448   *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

3449   **Change Number: XSH/TC2/D4/0200** [656]

3450   On Page: 1235 Line: 40719 Section: localeconv()

3451   In the RETURN VALUE section, change from:

3452   The application shall not modify the structure pointed to by the return value which may be overwritten by a
3453   subsequent call to *localeconv*(). In addition, calls to *setlocale*() with the categories LC_ALL,
3454   LC_MONETARY, or LC_NUMERIC or calls to *uselocale*() which change the categories
3455   LC_MONETARY or LC_NUMERIC may overwrite the contents of the structure.

3456   to:

3457   The application shall not modify the structure to which the return value points, [CX]nor any storage areas
3458   pointed to by pointers within the structure. The returned pointer, and pointers within the structure, might be
3459   invalidated or[/CX] the structure [CX]or the storage areas[/CX] might be overwritten by a subsequent call
3460   to *localeconv*(). In addition, [CX]the returned pointer, and pointers within the structure, might be
3461   invalidated or[/CX] the structure [CX]or the storage areas[/CX] might be overwritten by subsequent calls to
3462   *setlocale*() with the categories LC_ALL, LC_MONETARY, or LC_NUMERIC, [CX]or by calls to
3463   *uselocale*() which change the categories LC_MONETARY or LC_NUMERIC. The returned pointer,
3464   pointers within the structure, the structure, and the storage areas, might also be invalidated if the calling
3465   thread is terminated.[/CX]

3466   *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
3467   This item is a layered change on XSH/TC1/D5/0362 [75].

3468   The change is to add the following text to the end of the paragraph at 2013 edition P1247, L41402-41409:

3469   The returned pointer, pointers within the structure, the structure, and the storage areas, might also be
3470   invalidated if the calling thread is terminated.

3471   **Change Number: XSH/TC2/D4/0201** [664]

3472   On Page: 1238 Line: 40811 Section: localtime()

3473   In the DESCRIPTION section, change from:

3474   If *localtime_r*() does not set *tzname*, it shall not set *daylight* and shall not set *timezone*.

3475   to:

3476   If *localtime_r*() sets *tzname*, it shall also set *daylight* and *timezone*. If *localtime_r*() does not set *tzname*, it
3477   shall not set *daylight* and shall not set *timezone*.

3478   *Rationale*: Austin Group Defect Report(s) applied: 664. See http://austingroupbugs.net/view.php?id=664.
3479   The change is made for consistent behavior.

3480   **Change Number: XSH/TC2/D4/0202** [516]

3481   On Page: 1256 Line: 41378,41395 Section: longjmp()

3482   In the DESCRIPTION section, at line 41378 change from:

3483   As it bypasses the usual function call and return mechanisms, *longjmp*() shall execute correctly in contexts
3484   of interrupts, signals, and any of their associated functions. However, if *longjmp*() is invoked from a nested
3485   signal handler (that is, from a function invoked as a result of a signal raised during the handling of another
3486   signal), the behavior is undefined.

3487   to:

3488   Although *longjmp*() is an async-signal-safe function, if it is invoked from a signal handler which
3489   interrupted a non-async-signal-safe function or equivalent (such as the processing equivalent to *exit*()
3490   performed after a return from the initial call to *main*()), the behavior of any subsequent call to a non-async-
3491   signal-safe function or equivalent is undefined.

3492   In the APPLICATION USAGE section, at line 41395 add a new paragraph:

3493   It is recommended that applications do not call *longjmp*() or *siglongjmp*() from signal handlers. To avoid
3494   undefined behavior when calling these functions from a signal handler the application needs to ensure one
3495   of the following two things:

3496   1. After the call to *longjmp*() or *siglongjmp*() the process only calls async-signal-safe functions and
3497   does not return from the initial call to *main*().

3498   2. Any signal whose handler calls *longjmp*() or *siglongjmp*() is blocked during **every** call to a non-
3499   async-signal-safe function, and no such calls are made after returning from the initial call to
3500   *main*().

3501   *Rationale*: Austin Group Defect Report(s) applied: 516. See http://austingroupbugs.net/view.php?id=516.
3502   The restrictions on using longjmp() and siglongjmp() are more restrictive than they need to be on POSIX
3503   systems. The loosened restrictions presented here do not break existing implementations and make it easier
3504   for application writers to create portable applications.

3505   **Change Number: XSH/TC2/D4/0203** [526]

3506   On Page: 1268 Line: 41713,41718 Section: malloc()

3507   In the DESCRIPTION section, on line 41713 change from:

3508   If the size of the space requested is 0, the behavior is implementation-defined: the value returned shall be
3509   either a null pointer or a unique pointer.

3510   to:

3511   If the size of the space requested is 0, the behavior is implementation-defined: either a null pointer shall be
3512   returned, or the behavior shall be as if the size were some nonzero value, except that the behavior is
3513   undefined if the returned pointer is used to access an object.

3514   In the RETURN VALUE section, on line 41718 change from:

3515   either a null pointer or a unique pointer that can be successfully passed to *free*() shall be returned.

3516   to:

3517   either:

3518   • a null pointer shall be returned [CX]and *errno* may be set to an implementation-defined
3519   value[/CX], or
3520   • a pointer to the allocated space shall be returned. The application shall ensure that the pointer is
3521   not used to access an object.

3522   *Rationale*: Austin Group Defect Report(s) applied: 526. See http://austingroupbugs.net/view.php?id=526.

3523   **Change Number: XSH/TC2/D4/0204** [663,674]

3524   On Page: 1270 Line: 41775 Section: mblen()
3525   (2013 edition Page: 1282 Line: 42472)

3526   In the ERRORS section, change from:

3527   [EILSEQ]
3528   [XSI]An invalid character sequence is detected.[/XSI]

3529   to:

3530   [EILSEQ]
3531   [CX]An invalid character sequence is detected. In the POSIX locale an EILSEQ error cannot occur
3532   since all byte values are valid characters.[/CX]

3533   On Page: 1272 Line: 41825 Section: mbrlen()
3534   (2013 edition Page: 1284 Line: 42526)

3535   In the ERRORS section, change from:

3536   [EILSEQ]
3537   An invalid character sequence is detected.

3538   to:

3539   [EILSEQ]
3540   An invalid character sequence is detected. [CX]In the POSIX locale an EILSEQ error cannot occur
3541   since all byte values are valid characters.[/CX]

3542   On Page: 1275 Line: 41890 Section: mbrtowc()
3543   (2013 edition Page: 1287 Line: 42594)

3544   In the ERRORS section, change from:

3545   [EILSEQ]
3546   An invalid character sequence is detected.

3547   to:

3548   [EILSEQ]
3549   An invalid character sequence is detected. [CX]In the POSIX locale an EILSEQ error cannot
3550   occur since all byte values are valid characters.[/CX]

3551   *Rationale*: Austin Group Defect Report(s) applied: 663,674. See
3552   http://austingroupbugs.net/view.php?id=663.
3553   See http://austingroupbugs.net/view.php?id=674.

3554   **Change Number: XSH/TC2/D4/0205** [601]

3555   On Page: 1277 Line: 41984 Section: mbsrtowcs()

3556   In the DESCRIPTION section, change from:

3557   except that the conversion of characters pointed to by *src* is limited to at most *nmc* bytes (the size of the
3558   input buffer).

3559   to (all within the CX shading):

3560   except that the conversion of characters indirectly pointed to by *src* is limited to at most *nmc* bytes (the size
3561   of the input buffer), and under conditions where *mbsrtowcs*() would assign the address just past the last
3562   character converted (if any) to the pointer object pointed to by *src*, *mbsnrtowcs*() shall instead assign the
3563   address just past the last byte processed (if any) to that pointer object. If the input buffer ends with an
3564   incomplete character, it is unspecified whether conversion stops at the end of the previous character (if
3565   any), or at the end of the input buffer. In the latter case, a subsequent call to *mbsnrtowcs*() with an input
3566   buffer that starts with the remainder of the incomplete character shall correctly complete the conversion of
3567   that character.

3568   *Rationale*: Austin Group Defect Report(s) applied: 601. See http://austingroupbugs.net/view.php?id=601.

3569   **Change Number: XSH/TC2/D4/0206** [663]

3570   On Page: 1278 Line: 41998 Section: mbsrtowcs()
3571   (2013 edition Page: 1290 Line: 42706)

3572   In the ERRORS section, change from:

3573   [EILSEQ]
3574   An invalid character sequence is detected.

3575   to:

3576   [EILSEQ]
3577   An invalid character sequence is detected. [CX]In the POSIX locale an EILSEQ error cannot
3578   occur since all byte values are valid characters.[/CX]

3579   *Rationale*: Austin Group Defect Report(s) applied: 663. See http://austingroupbugs.net/view.php?id=663.

3580   **Change Number: XSH/TC2/D4/0207** [601]

3581   On Page: 1278 Line: 42008 Section: mbsrtowcs()

3582   In the FUTURE DIRECTIONS section, change from:

3583   None.

3584   to:

3585   A future version may require that when the input buffer ends with an incomplete character, conversion
3586   stops at the end of the input buffer.

3587   *Rationale*: Austin Group Defect Report(s) applied: 601. See http://austingroupbugs.net/view.php?id=601.

3588   **Change Number: XSH/TC2/D4/0208** [663,674]

3589   On Page: 1279 Line: 42051 Section: mbstowcs()
3590   (2013 edition Page: 1291 Line: 42760)

3591   In the ERRORS section, change from:

3592   [EILSEQ]
3593   [XSI]An invalid byte sequence is detected.[/XSI]

3594   to:

3595   [EILSEQ]
3596   [CX]An invalid character sequence is detected. In the POSIX locale an EILSEQ error cannot
3597   occur since all byte values are valid characters.[/CX]

3598   *Rationale*: Austin Group Defect Report(s) applied: 663,674. See
3599   http://austingroupbugs.net/view.php?id=663.
3600   See http://austingroupbugs.net/view.php?id=674.

3601   **Change Number: XSH/TC2/D4/0209** [663,674]

3602   On Page: 1281 Line: 42104 Section: mbtowc()
3603   (2013 edition Page: 1293 Line: 42815)

3604   In the ERRORS section, change from:

3605   [EILSEQ]
3606   [XSI]An invalid character sequence is detected.[/XSI]

3607   to:

3608   [EILSEQ]
3609   [CX]An invalid character sequence is detected. In the POSIX locale an EILSEQ error cannot
3610   occur since all byte values are valid characters.[/CX]

3611   *Rationale*: Austin Group Defect Report(s) applied: 663,674. See
3612   http://austingroupbugs.net/view.php?id=663.

3613   See http://austingroupbugs.net/view.php?id=674.

3614   **Change Number: XSH/TC2/D4/0210** [873]

3615   On Page: 1289 Line: 42299 Section: mkdir()
3616   (2013 edition Page: 1301 Line: 43016)

3617   In the NAME section, delete:

3618   relative to directory file descriptor

3619   *Rationale*: Austin Group Defect Report(s) applied: 873. See http://austingroupbugs.net/view.php?id=873.

3620   **Change Number: XSH/TC2/D4/0211** [591]

3621   On Page: 1289 Line: 42301 Section: mkdir()

3622   Before the mkdirat SYNOPSIS line, insert a line with OH shading:

3623   `#include <fcntl.h>`

3624   *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

3625   **Change Number: XSH/TC2/D4/0212** [817]

3626   On Page: 1289 Line: 42323 Section: mkdir()
3627   (2013 edition Page: 1301 Line: 43040)

3628   In the DESCRIPTION section, change from:

3629   If the file descriptor was opened without O_SEARCH, the function shall check whether directory searches
3630   are permitted using the current permissions of the directory underlying the file descriptor. If the file
3631   descriptor was opened with O_SEARCH, the function shall not perform the check.

3632   to:

3633   If the access mode of the open file description associated with the file descriptor is not O_SEARCH, the
3634   function shall check whether directory searches are permitted using the current permissions of the directory
3635   underlying the file descriptor. If the access mode is O_SEARCH, the function shall not perform the check.

3636   *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

3637   **Change Number: XSH/TC2/D4/0213** [817]

3638   On Page: 1290 Line: 42348 Section: mkdir()
3639   (2013 edition Page: 1302 Line: 43066)

3640   In the ERRORS section, add:

3641   [EACCES]
3642   The access mode of the open file description associated with *fd* is not O_SEARCH and the

3643   permissions of the directory underlying *fd* do not permit directory searches.

3644   *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

3645   **Change Number: XSH/TC2/D4/0214** [591]

3646   On Page: 1291 Line: 42393 Section: mkdir()

3647   Add a reference to <fcntl.h> to the SEE ALSO list.

3648   *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

3649   **Change Number: XSH/TC2/D4/0215** [567,669]

3650   On Page: 1292 Line: 42419-42424 Section: mkdtemp()

3651   Replace the entire DESCRIPTION section with:

3652   DESCRIPTION

3653   The *mkdtemp*() function shall create a directory with a unique name derived from *template*.
3654   The application shall ensure that the string provided in *template* is a pathname ending with at
3655   least six trailing 'X' characters. The *mkdtemp*() function shall modify the contents of *template*
3656   by replacing six or more 'X' characters at the end of the pathname with the same number of
3657   characters from the portable filename character set. The characters shall be chosen such that
3658   the resulting pathname does not duplicate the name of an existing file at the time of the call
3659   to *mkdtemp*(). The *mkdtemp*() function shall use the resulting pathname to create the new
3660   directory as if by a call to:
3661
3662   `mkdir(pathname, S_IRWXU)`
3663
3664   The *mkstemp*() function shall create a regular file with a unique name derived from *template*
3665   and return a file descriptor for the file open for reading and writing. The application shall
3666   ensure that the string provided in *template* is a pathname ending with at least six trailing 'X'
3667   characters. The *mkstemp*() function shall modify the contents of *template* by replacing six or
3668   more 'X' characters at the end of the pathname with the same number of characters from the
3669   portable filename character set. The characters shall be chosen such that the resulting
3670   pathname does not duplicate the name of an existing file at the time of the call to *mkstemp*().
3671   The *mkstemp*() function shall use the resulting pathname to create the file, and obtain a file
3672   descriptor for it, as if by a call to:
3673
3674   `open(filename, O_RDWR|O_CREAT|O_EXCL, S_IRUSR|S_IWUSR)`
3675
3676   By behaving as if the O_EXCL flag for *open*() is set, the function prevents any possible race
3677   condition between testing whether the file exists and opening it for use.

3678   In the RETURN VALUE section, at line 42435 change from:

3679   Upon successful completion, the *mkdtemp*() function shall return a pointer to the string containing the
3680   directory name if it was created.

3681   to:

3682   Upon successful completion, the *mkdtemp*() function shall return the value of *template*.

3683   In the RETURN VALUE section, at line 42439 change from:

3684   Otherwise, it shall return -1 if no suitable file could be created.

3685   to:

3686   Otherwise, it shall return -1 and shall set *errno* to indicate the error.

3687   In the APPLICATION USAGE section, at line 42476 change from:

3688   The *mkdtemp*() and *mkstemp*() functions need not check to determine whether the filename part of template
3689   exceeds the maximum allowable filename length.

3690   to:

3691   Portable applications should pass exactly six trailing 'X's in the template and no more; implementations
3692   may treat any additional trailing 'X's as either a fixed or replaceable part of the template. To be sure of only
3693   passing six, a fixed string of at least one non-'X' character should precede the six 'X's.
3694
3695   Since 'X' is in the portable filename character set, some of the replacement characters can be 'X's, leaving
3696   part (or even all) of the template effectively unchanged.

3697   *Rationale*: Austin Group Defect Report(s) applied: 567,669. See
3698   http://austingroupbugs.net/view.php?id=567.
3699   See http://austingroupbugs.net/view.php?id=669.

3700   **Change Number: XSH/TC2/D4/0216** [873]

3701   On Page: 1295 Line: 42496 Section: mkfifo()
3702   (2013 edition Page: 1307 Line: 43219)

3703   In the NAME section, delete:

3704   relative to directory file descriptor

3705   *Rationale*: Austin Group Defect Report(s) applied: 873. See http://austingroupbugs.net/view.php?id=873.

3706   **Change Number: XSH/TC2/D4/0217** [591]

3707   On Page: 1295 Line: 42498 Section: mkfifo()

3708   Before the mkfifoat SYNOPSIS line, insert a line with OH shading:

3709   #include <fcntl.h>

3710   *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

3711

3712 **Change Number: XSH/TC2/D4/0218** [817]

3713 On Page: 1295 Line: 42519 Section: mkfifo()
3714 (2013 edition Page: 1307 Line: 43242)

3715 In the DESCRIPTION section, change from:

3716 If the file descriptor was opened without O_SEARCH, the function shall check whether directory searches
3717 are permitted using the current permissions of the directory underlying the file descriptor. If the file
3718 descriptor was opened with O_SEARCH, the function shall not perform the check.

3719 to:

3720 If the access mode of the open file description associated with the file descriptor is not O_SEARCH, the
3721 function shall check whether directory searches are permitted using the current permissions of the directory
3722 underlying the file descriptor. If the access mode is O_SEARCH, the function shall not perform the check.

3723 *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

3724 **Change Number: XSH/TC2/D4/0219** [822]

3725 On Page: 1296 Line: 42537 Section: mkfifo()

3726 In the ERRORS section, change from:

3727 [ENOENT]
3728 A component of the path prefix specified by *path* does not name an existing directory or *path*
3729 is an empty string.

3730 to:

3731 [ENOENT]
3732 A component of the path prefix of *path* does not name an existing file or *path* is an empty
3733 string.

3734 [ENOENT] or [ENOTDIR]
3735 The *path* argument contains at least one non-<slash> character and ends with one or more
3736 trailing <slash> characters. If *path* without the trailing <slash> characters would name an
3737 existing file, an [ENOENT] error shall not occur.

3738 *Rationale*: Austin Group Defect Report(s) applied: 822. See http://austingroupbugs.net/view.php?id=822.
3739 This change is layered upon XSH/TC1/D5/0384 [146,435], changing the last sentence.

3740 **Change Number: XSH/TC2/D4/0220** [817]

3741 On Page: 1296 Line: 42544 Section: mkfifo()
3742 (2013 edition Page: 1308 Line: 43272)

3743 In the ERRORS section, for the [EACCES] error, change from:

3744 *fd* was not opened with O_SEARCH and ...

3745   to:

3746   The access mode of the open file description associated with *fd* is not O_SEARCH and ...

3747   *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

3748   **Change Number: XSH/TC2/D4/0221** [591]

3749   On Page: 1297 Line: 42594 Section: mkfifo()

3750   Add a reference to <fcntl.h> to the SEE ALSO list.

3751   *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

3752   **Change Number: XSH/TC2/D4/0222** [591]

3753   On Page: 1298 Line: 42617 Section: mknod()

3754   Before the mknodat SYNOPSIS line, insert a line with OH XSI shading:

3755   #include <fcntl.h>

3756   *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

3757   **Change Number: XSH/TC2/D4/0223** [817]

3758   On Page: 1299 Line: 42669 Section: mknod()
3759   (2013 edition Page: 1313 Line: 43434)

3760   In the DESCRIPTION section, change from:

3761   If the file descriptor was opened without O_SEARCH, the function shall check whether directory searches
3762   are permitted using the current permissions of the directory underlying the file descriptor. If the file
3763   descriptor was opened with O_SEARCH, the function shall not perform the check.

3764   to:

3765   If the access mode of the open file description associated with the file descriptor is not O_SEARCH, the
3766   function shall check whether directory searches are permitted using the current permissions of the directory
3767   underlying the file descriptor. If the access mode is O_SEARCH, the function shall not perform the check.

3768   *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

3769   **Change Number: XSH/TC2/D4/0224** [822]

3770   On Page: 1299 Line: 42689 Section: mknod()

3771   In the ERRORS section, change from:

3772   [ENOENT]
3773   A component of the path prefix specified by *path* does not name an existing directory or *path*

3774   is an empty string.

3775   to:

3776   [ENOENT]
3777   A component of the path prefix of *path* does not name an existing file or *path* is an empty
3778   string.

3779   [ENOENT] or [ENOTDIR]
3780   The path argument contains at least one non-<slash> character and ends with one or more
3781   trailing <slash> characters. If *path* without the trailing <slash> characters would name an
3782   existing file, an [ENOENT] error shall not occur.

3783   *Rationale*: Austin Group Defect Report(s) applied: 822. See http://austingroupbugs.net/view.php?id=822.
3784   This change is layered upon XSH/TC1/D5/0390 [146,435], changing the last sentence.

3785   **Change Number: XSH/TC2/D4/0225** [817]

3786   On Page: 1300 Line: 42699 Section: mknod()
3787   (2013 edition Page: 1312 Line: 43399)

3788   In the ERRORS section, for the [EACCES] error, change from:

3789   *fd* was not opened with O_SEARCH and ...

3790   to:

3791   The access mode of the open file description associated with *fd* is not O_SEARCH and ...

3792   *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

3793   **Change Number: XSH/TC2/D4/0226** [591]

3794   On Page: 1301 Line: 42745 Section: mknod()

3795   Add a reference to <fcntl.h> to the SEE ALSO list.

3796   *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

3797   **Change Number: XSH/TC2/D4/0227** [902]

3798   On Page: 1302 Line: 42761 Section: mkstemp()
3799   (2013 edition Page: 1315 Line: 43498)

3800   In the NAME section, change from:

3801   create a unique directory

3802   to:

3803   create a unique file

3804   *Rationale*: Austin Group Defect Report(s) applied: 902. See http://austingroupbugs.net/view.php?id=902.

3805   **Change Number: XSH/TC2/D4/0228** [724]

3806   On Page: 1303 Line: 42778-42792 Section: mktime()

3807   In the DESCRIPTION section, at line 42778 change from:

3808   The original values of the *tm_wday* and *tm_yday* components of the structure are ignored, and the original
3809   values of the other components are not restricted to the ranges described in <**time.h**>.

3810   to:

3811   The original values of the *tm_wday* and *tm_yday* components of the structure shall be ignored, and the
3812   original values of the other components shall not be restricted to the ranges described in <**time.h**>.

3813   At line 42789 change from:

3814   where the names in the structure and in the expression correspond

3815   to:

3816   where the names other than *tm_yday* in the structure and in the expression correspond, and the *tm_yday*
3817   value used in the expression is the day of the year from 0 to 365 inclusive, calculated from the other **tm**
3818   structure members specified in <**time.h**> (excluding *tm_wday*).

3819   At line 42792 change from:

3820   and the other components are set to represent the specified time

3821   to:

3822   and the other components shall be set to represent the specified time

3823   *Rationale*: Austin Group Defect Report(s) applied: 724. See http://austingroupbugs.net/view.php?id=724.

3824   **Change Number: XSH/TC2/D4/0229** [852]

3825   On Page: 1311 Line: 43068 Section: mmap()
3826   (2013 edition Page: 1324 Line: 43807)

3827   In the DESCRIPTION section, change from:

3828   If a MAP_FIXED request is successful, the mapping established by *mmap*() replaces any previous
3829   mappings for the pages in the range [*pa,pa+len*) of the process.

3830   to:

3831   If a MAP_FIXED request is successful, then any previous mappings [ML|MLR]or memory
3832   locks[/ML|MLR] for those whole pages containing any part of the address range [*pa,pa+len*) shall be
3833   removed, as if by an appropriate call to *munmap*(), before the new mapping is established.

3834 On Page: 1313 Line: 43189 Section: mmap()
3835 (2013 edition Page: 1326 Line: 43928)

3836 In the RATIONALE section, change from:

3837 If an application requests a mapping that would overlay existing mappings in the process, it might be
3838 desirable that an implementation detect this and inform the application. However, the default, portable (not
3839 MAP_FIXED) operation does not overlay existing mappings. On the other hand, if the program specifies a
3840 fixed address mapping (which requires some implementation knowledge to determine a suitable address, if
3841 the function is supported at all), then the program is presumed to be successfully managing its own address
3842 space and should be trusted when it asks to map over existing data structures. Furthermore, it is also
3843 desirable to make as few system calls as possible, and it might be considered onerous to require an
3844 *munmap*() before an *mmap*() to the same address range. This volume of POSIX.1-2008 specifies that the
3845 new mappings replace any existing mappings, following existing practice in this regard.

3846 to:

3847 If an application requests a mapping that overlaps existing mappings in the process, it might be desirable
3848 that an implementation detect this and inform the application. However, if the program specifies a fixed
3849 address mapping (which requires some implementation knowledge to determine a suitable address, if the
3850 function is supported at all), then the program is presumed to be successfully managing its own address
3851 space and should be trusted when it asks to map over existing data structures. Furthermore, it is also
3852 desirable to make as few system calls as possible, and it might be considered onerous to require an
3853 *munmap*() before an *mmap*() to the same address range. This volume of POSIX.1-2008 specifies that the
3854 new mapping replaces any existing mappings (implying an automatic *munmap*() on the address range),
3855 following existing practice in this regard. The standard developers also considered whether there should be
3856 a way for new mappings to overlay existing mappings, but found no existing practice for this.

3857 On Page: 1315 Line: 43244 Section: mmap()
3858 (2013 edition Page: 1328 Line: 43983)

3859 In the RATIONALE section, change from:

3860 and the MEMLOCK_FUTURE argument

3861 to:

3862 and the MCL_FUTURE argument

3863 *Rationale*: Austin Group Defect Report(s) applied: 852. See http://austingroupbugs.net/view.php?id=852.

3864 **Change Number: XSH/TC2/D4/0230** [504]

3865 On Page: 1339 Line: 44014 Section: mq_unlink()

3866 In the ERRORS section, after line 44014 (EACCES) add:

3867 [EINTR]
3868 The call to *mq_unlink*() blocked waiting for all references to the named message queue to be
3869 closed and a signal interrupted the call.

3870 *Rationale*: Austin Group Defect Report(s) applied: 504. See http://austingroupbugs.net/view.php?id=504.

3871   **Change Number: XSH/TC2/D4/0231** [909]

3872   On Page: 1360 Line: 44625 Section: nanosleep()
3873   (2013 edition Page: 1373 Line: 45379)

3874   In the RETURN VALUE section, change from:

3875   The *rqtp* and *rmtp* arguments may point to the same object.

3876   to:

3877   The *rqtp* and *rmtp* arguments can point to the same object.

3878   *Rationale*: Austin Group Defect Report(s) applied: 909. See http://austingroupbugs.net/view.php?id=909.

3879   **Change Number: XSH/TC2/D4/0232** [781]

3880   On Page: 1364 Line: 44728 Section: newlocale()
3881   (2013 edition Page: 1376 Line: 45474)

3882   In the DESCRIPTION section, change from:

3883   any of the other implementation-defined *LC_*_MASK* values defined in **<locale.h>**

3884   to:

3885   any of the implementation-defined mask values defined in **<locale.h>**

3886   *Rationale*: Austin Group Defect Report(s) applied: 781. See http://austingroupbugs.net/view.php?id=781.

3887   **Change Number: XSH/TC2/D4/0233** [673]

3888   On Page: 1365 Line: 44763 Section: newlocale()

3889   In the EXAMPLES section, change from:

3890   and the *LC_TIME* category data from a locale *tok2*

3891   to:

3892   and the *LC_TIME* category data from a locale *loc2*

3893   *Rationale*: Austin Group Defect Report(s) applied: 673. See http://austingroupbugs.net/view.php?id=673.

3894   **Change Number: XSH/TC2/D4/0234** [656]

3895   On Page: 1375 Line: 45109 Section: nl_langinfo()

3896   In the RETURN VALUE section, change from:

3897   This pointer may point to static data that may be overwritten on the next call to either function.

3898   to:

3899   The application shall not modify the string returned. The pointer returned by *nl_langinfo*() might be
3900   invalidated or the string content might be overwritten by a subsequent call to *nl_langinfo*() in any thread or
3901   to *nl_langinfo_l*() in the same thread or the initial thread, by subsequent calls to *setlocale*() with a category
3902   corresponding to the category of item (see <langinfo.h>) or the category LC_ALL, or by subsequent calls
3903   to *uselocale*() which change the category corresponding to the category of item. The pointer returned by
3904   *nl_langinfo_l*() might be invalidated or the string content might be overwritten by a subsequent call to
3905   *nl_langinfo_l*() in the same thread or to *nl_langinfo*() in any thread, or by subsequent calls to *freelocale*() or
3906   *newlocale*() which free or modify the locale object that was passed to *nl_langinfo_l*(). The returned pointer
3907   and the string content might also be invalidated if the calling thread is terminated.

3908   *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
3909   This item is a layered change on XSH/TC1/D5/0415 [75,402].

3910   The change is to add the following text to the end of the paragraph at 2013 edition P1387, L45872-45880:

3911   The returned pointer and the string content might also be invalidated if the calling thread is terminated.

3912   **Change Number: XSH/TC2/D4/0235** [873]

3913   On Page: 1379 Line: 45158 Section: open()
3914   (2013 edition Page: 1391 Line: 49540)

3915   In the NAME section, delete:

3916   relative to directory file descriptor

3917   *Rationale*: Austin Group Defect Report(s) applied: 873. See http://austingroupbugs.net/view.php?id=873.

3918   **Change Number: XSH/TC2/D4/0236** [835]

3919   On Page: 1379 Line: 45169 Section: open()
3920   (2013 edition Page: 1391 Line: 45951)

3921   In the DESCRIPTION section, change from:

3922   ... return a file descriptor for the named file that is the lowest file descriptor not currently open for that
3923   process.

3924   to:

3925   ... return a file descriptor for the named file, allocated as described in [xref to new section 2.14].

3926   *Rationale*: Austin Group Defect Report(s) applied: 835. See http://austingroupbugs.net/view.php?id=835.

3927

3928   **Change Number: XSH/TC2/D4/0237** [847]

3929   On Page: 1379 Line: 45193 Section: open()
3930   (2013 edition Page: 1391 Line: 45975)

3931   In the DESCRIPTION section, change from:

3932   Otherwise, the file shall be created; ...

3933   to:

3934   Otherwise, if O_DIRECTORY is not set the file shall be created as a regular file; ...

3935   On Page: 1381 Line: 45268 Section: open()
3936   (2013 edition Page: 1393 Line: 46052)

3937   In the DESCRIPTION section, insert a new paragraph:

3938   If O_CREAT and O_DIRECTORY are set and the requested access mode is neither O_WRONLY nor
3939   O_RDWR, the result is unspecified.

3940   *Rationale*: Austin Group Defect Report(s) applied: 847. See http://austingroupbugs.net/view.php?id=847.
3941   The standard does not specify the behavior when open() is called with O_CREAT|O_RDONLY (or
3942   O_CREAT|O_SEARCH) on an existing directory. Additionally, some systems want to allow creation of
3943   directories using the open() function. This should be an allowed, but not required, extension.

3944   **Change Number: XSH/TC2/D4/0238** [817]

3945   On Page: 1381 Line: 45290 Section: open()
3946   (2013 edition Page: 1394 Line: 46074)

3947   In the DESCRIPTION section, change from:

3948   If the file descriptor was opened without O_SEARCH, the function shall check whether directory searches
3949   are permitted using the current permissions of the directory underlying the file descriptor. If the file
3950   descriptor was opened with O_SEARCH, the function shall not perform the check.

3951   to:

3952   If the access mode of the open file description associated with the file descriptor is not O_SEARCH, the
3953   function shall check whether directory searches are permitted using the current permissions of the directory
3954   underlying the file descriptor. If the access mode is O_SEARCH, the function shall not perform the check.

3955   *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

3956   **Change Number: XSH/TC2/D4/0239** [835]

3957   On Page: 1382 Line: 45300 Section: open()
3958   (2013 edition Page: 1394 Line: 46084)

3959   In the RETURN VALUE section, change from:

3960   representing the lowest numbered unused file descriptor

3961   to:

3962   representing the file descriptor

3963   *Rationale*: Austin Group Defect Report(s) applied: 835. See http://austingroupbugs.net/view.php?id=835.

3964   **Change Number: XSH/TC2/D4/0240** [847]

3965   On Page: 1382 Line: 45314 Section: open()
3966   (2013 edition Page: 1394 Line: 46098)

3967   In the ERRORS section, for the [EISDIR] error, change from:

3968   The named file is a directory and *oflag* includes O_WRONLY or O_RDWR.

3969   to:

3970   The named file is a directory and *oflag* includes O_WRONLY or O_RDWR, or includes O_CREAT
3971   without O_DIRECTORY.

3972   *Rationale*: Austin Group Defect Report(s) applied: 847. See http://austingroupbugs.net/view.php?id=847.
3973   The standard does not specify the behavior when open() is called with O_CREAT|O_RDONLY (or
3974   O_CREAT|O_SEARCH) on an existing directory. Additionally, some systems want to allow creation of
3975   directories using the open() function. This should be an allowed, but not required, extension.

3976   **Change Number: XSH/TC2/D4/0241** [822]

3977   On Page: 1382 Line: 45322 Section: open()

3978   In the ERRORS section, change from:

3979   [ENOENT]
3980   O_CREAT is not set and the named file does not exist; or O_CREAT is set and either the
3981   path prefix does not exist or the *path* argument points to an empty string.

3982   to:

3983   [ENOENT]
3984   O_CREAT is not set and a component of path does not name an existing file, or O_CREAT
3985   is set and a component of the path prefix of *path* does not name an existing file, or *path*
3986   points to an empty string.

3987   [ENOENT] or [ENOTDIR]
3988   O_CREAT is set, and the path argument contains at least one non-<slash> character and ends
3989   with one or more trailing <slash> characters. If *path* without the trailing <slash> characters
3990   would name an existing file, an [ENOENT] error shall not occur.

3991   *Rationale*: Austin Group Defect Report(s) applied: 822. See http://austingroupbugs.net/view.php?id=822.
3992   This change is layered upon XSH/TC1/D5/0422 [146], changing the last sentence.

3993   **Change Number: XSH/TC2/D4/0242** [817]

3994   On Page: 1383 Line: 45345 Section: open()
3995   (2013 edition Page: 1395 Line: 46134)

3996   In the ERRORS section, for the [EACCES] error, change from:

3997   *fd* was not opened with O_SEARCH and ...

3998   to:

3999   The access mode of the open file description associated with *fd* is not O_SEARCH and ...

4000   *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

4001   **Change Number: XSH/TC2/D4/0243** [943]

4002   On Page: 1383 Line: 45361 Section: open()
4003   (2013 edition Page: 1395 Line: 46152)

4004   In the ERRORS section, before the [ETXTBSY] error, add:

4005   [EOPNOTSUPP] The *path* argument names a socket.

4006   *Rationale*: Austin Group Defect Report(s) applied: 943. See http://austingroupbugs.net/view.php?id=943.

4007   **Change Number: XSH/TC2/D4/0244** [588]

4008   On Page: 1388 Line: 45564 Section: open_memstream()

4009   In the DESCRIPTION section, add a new paragraph at the end of the section:

4010   After a successful *fclose*(), the pointer referenced by *bufp* can be passed to *free*().

4011   *Rationale*: Austin Group Defect Report(s) applied: 588. See http://austingroupbugs.net/view.php?id=588.

4012   **Change Number: XSH/TC2/D4/0245** [586]

4013   On Page: 1388 Line: 45569 Section: open_memstream()

4014   At the start of ERRORS section, insert:

4015   These functions shall fail if:

4016   [EMFILE]
4017   {STREAM_MAX} streams are currently open in the calling process.

4018   *Rationale*: Austin Group Defect Report(s) applied: 586. See http://austingroupbugs.net/view.php?id=586.

4019

4020 **Change Number: XSH/TC2/D4/0246** [632]

4021 On Page: 1396 Line: 45712 Section: pclose()

4022 At the end of the DESCRIPTION section, add a new paragraph:

4023 If a thread is canceled during execution of *pclose*(), the behavior is undefined.

4024 *Rationale*: Austin Group Defect Report(s) applied: 632. See http://austingroupbugs.net/view.php?id=632.

4025 **Change Number: XSH/TC2/D4/0247** [835]

4026 On Page: 1400 Line: 45837 Section: pipe()
4027 (2013 edition Page: 1413 Line: 46643)

4028 Change from:

4029 Their integer values shall be the two lowest available at the time of the *pipe*() call.

4030 to:

4031 The file descriptors shall be allocated as described in [xref to new section 2.14].

4032 *Rationale*: Austin Group Defect Report(s) applied: 835. See http://austingroupbugs.net/view.php?id=835.

4033 **Change Number: XSH/TC2/D4/0248** [467,835]

4034 On Page: 1400 Line: 45851 Section: pipe()
4035 (2013 edition Page: 1413 Line: 46657)

4036 Change from:

4037 ... otherwise, -1 shall be returned and *errno* set to indicate the error.

4038 to:

4039 ... otherwise, -1 shall be returned and *errno* set to indicate the error, no file descriptors shall be allocated
4040 and the contents of *fildes* shall be left unmodified.

4041 *Rationale*: Austin Group Defect Report(s) applied: 467,835. See
4042 http://austingroupbugs.net/view.php?id=467.
4043 See http://austingroupbugs.net/view.php?id=835.

4044 **Change Number: XSH/TC2/D4/0249** [623]

4045 On Page: 1404 Line: 45985 Section: poll()

4046 In the DESCRIPTION section, add a new paragraph to the end of the section:

4047 Provided the application does not perform any action that results in unspecified or undefined behavior, the
4048 value of the *fd* and *events* members of each element of *fds*[] shall not be modified by *poll*().

4049   *Rationale*: Austin Group Defect Report(s) applied: 623. See http://austingroupbugs.net/view.php?id=623.

4050   **Change Number: XSH/TC2/D4/0250** [683]

4051   On Page: 1404 Line: 45987 Section: poll()
4052   (2013 edition Page: 1417 Line: 46793)

4053   In the RETURN VALUE section, change from:

4054   Upon successful completion, *poll*() shall return a non-negative value. A positive value indicates the total
4055   number of file descriptors that have been selected (that is, file descriptors for which the *revents* member is
4056   non-zero).

4057   to:

4058   Upon successful completion, *poll*() shall return a non-negative value. A positive value indicates the total
4059   number of **pollfd** structures that have selected events (that is, those for which the *revents* member is non-
4060   zero).

4061   *Rationale*: Austin Group Defect Report(s) applied: 683. See http://austingroupbugs.net/view.php?id=683.

4062   **Change Number: XSH/TC2/D4/0251** [526]

4063   On Page: 1418 Line: 46423 Section: posix_memalign()

4064   In the DESCRIPTION section change from:

4065   If the size of the space requested is 0, the behavior is implementation-defined; the value returned in *memptr*
4066   shall be either a null pointer or a unique pointer.

4067   to:

4068   If the size of the space requested is 0, the behavior is implementation-defined: either a null pointer shall be
4069   returned in *memptr*, or the behavior shall be as if the size were some nonzero value, except that the
4070   behavior is undefined if the the value returned in *memptr* is used to access an object.

4071   *Rationale*: Austin Group Defect Report(s) applied: 526. See http://austingroupbugs.net/view.php?id=526.

4072   **Change Number: XSH/TC2/D4/0252** [520,526]

4073   On Page: 1418 Line: 46428,46436 Section: posix_memalign()

4074   In the RETURN VALUE section, on line 46428 change from:

4075   otherwise, an error number shall be returned to indicate the error.

4076   to:

4077   otherwise, an error number shall be returned to indicate the error and the contents of *memptr* shall either be
4078   left unmodified or be set to a null pointer.

4079   If *size* is 0, either:

4080   • *posix_memalign*() shall not attempt to allocate any space, in which case either an implementation-
4081   defined error number shall be returned, or zero shall be returned with a null pointer returned in
4082   *memptr*
4083   • *posix_memalign*() shall attempt to allocate some space and if the allocation succeeds, zero shall be
4084   returned and a pointer to the allocated space shall be returned in *memptr*. The application shall
4085   ensure that the pointer is not used to access an object.

4086   In the EXAMPLES section, on line 46436 change from:

4087   None

4088   to:

4089   The following example shows how applications can obtain consistent behavior on error by setting **memptr*
4090   to be a null pointer before calling *posix_memalign*().

```
4091    void *ptr = NULL;
4092    ...
4093    //do some work, which might goto error
4094    if (posix_memalign(&ptr, align, size))
4095      goto error;
4096
4097    //do some more work, which might goto error
4098    ...
4099    error:
4100      free(ptr);
4101      //more cleanup;
```

4102   *Rationale*: Austin Group Defect Report(s) applied: 520,526. See
4103   http://austingroupbugs.net/view.php?id=520.
4104   See http://austingroupbugs.net/view.php?id=526.

4105   **Change Number: XSH/TC2/D4/0253** [835]

4106   On Page: 1420 Line: 46464 Section: posix_openpt()
4107   (2013 edition Page: 1433 Line: 47270)

4108   Change from:

4109   The file descriptor is used by other I/O functions that refer to that pseudo-terminal.

4110   to:

4111   The file descriptor shall be allocated as described in [xref to new section 2.14] and can be used by other I/O
4112   functions that refer to that pseudo-terminal.

4113   *Rationale*: Austin Group Defect Report(s) applied: 835. See http://austingroupbugs.net/view.php?id=835.

4114

4115 **Change Number: XSH/TC2/D4/0254** [835]

4116 On Page: 1420 Line: 46474 Section: posix_openpt()
4117 (2013 edition Page: 1433 Line: 47281)

4118 Change from:

4119 ... shall open a master pseudo-terminal device and return a non-negative integer representing the lowest
4120 numbered unused file descriptor.

4121 to:

4122 ... shall open a file descriptor for a master pseudo-terminal device and return a non-negative integer
4123 representing the file descriptor.

4124 *Rationale*: Austin Group Defect Report(s) applied: 835. See http://austingroupbugs.net/view.php?id=835.

4125 **Change Number: XSH/TC2/D4/0255** [824]

4126 On Page: 1423 Line: 46571,46578 Section: posix_spawn()

4127 In the DESCRIPTION section, at line 46571 change from:

4128 For those file descriptors that remain open, all attributes of the corresponding open file descriptions,
4129 including file locks (see *fcntl*()), shall remain unchanged.

4130 to:

4131 For those file descriptors that remain open, the child process shall not inherit any file locks, but all
4132 remaining attributes of the open file descriptions (see *fcntl*()) shall remain unchanged.

4133 At line 46578 (the second sentence in item 1 in the list), change from:

4134 All attributes of the corresponding open file descriptions, including file locks (see *fcntl*()), shall remain
4135 unchanged.

4136 to:

4137 The child process shall not inherit any file locks, but all remaining attributes of the corresponding open file
4138 descriptions (see *fcntl*()) shall remain unchanged.

4139 *Rationale*: Austin Group Defect Report(s) applied: 824. See http://austingroupbugs.net/view.php?id=824.
4140 The behavior seen when creating a child using posix_spawn() and when using fork()/exec() should be the
4141 same.

4142 **Change Number: XSH/TC2/D4/0256** [835]

4143 On Page: 1515 Line: 48880 Section: posix_typed_mem_open()
4144 (2013 edition Page: 1528 Line: 49729)

4145 Change from:

4146   The file descriptor is used by other functions to refer to that typed memory object.

4147   to:

4148   The file descriptor shall be allocated as described in [xref to new section 2.14] and can be used by other
4149   functions to refer to that typed memory object.

4150   *Rationale*: Austin Group Defect Report(s) applied: 835. See http://austingroupbugs.net/view.php?id=835.

4151   **Change Number: XSH/TC2/D4/0257** [835]

4152   On Page: 1516 Line 48924 Section: posix_typed_mem_open()
4153   (2013 edition Page: 1529 Line: 49773)

4154   Change from:

4155   ... return a file descriptor for the typed memory object that is the lowest numbered file descriptor not
4156   currently open for that process.

4157   to:

4158   ... return a file descriptor for the typed memory object.

4159   *Rationale*: Austin Group Defect Report(s) applied: 835. See http://austingroupbugs.net/view.php?id=835.

4160   **Change Number: XSH/TC2/D4/0258** [835]

4161   On Page: 1516 Line: 48939 Section: posix_typed_mem_open()
4162   (2013 edition Page: 1529 Line: 49788)

4163   Change from:

4164   ... return a non-negative integer representing the lowest numbered unused file descriptor.

4165   to:

4166   ... return a non-negative integer representing the file descriptor.

4167   *Rationale*: Austin Group Defect Report(s) applied: 835. See http://austingroupbugs.net/view.php?id=835.

4168   **Change Number: XSH/TC2/D4/0259** [680]

4169   On Page: 1526 Line: 49239 Section: pselect()
4170   (2013 edition Page: 1539 Line: 50094)

4171   In the ERRORS section, change from:

4172   [EINTR]
4173   The function was interrupted before any of the selected events occurred and before the
4174   timeout interval expired.

4175   to:

4176   [EINTR]
4177   The function was interrupted while blocked waiting for any of the selected descriptors to
4178   become ready and before the timeout interval expired.

4179   *Rationale*: Austin Group Defect Report(s) applied: 680. See http://austingroupbugs.net/view.php?id=680.

4180   **Change Number: XSH/TC2/D4/0260** [629]

4181   On Page: 1528 Line: 49313,49319 Section: psiginfo()

4182   In the NAME section, change from:

4183   print signal information to standard error

4184   to:

4185   write signal information to standard error

4186   In the DESCRIPTION section, at line 49319 change from:

4187   The *psiginfo*() and *psignal*() functions shall print a message out on *stderr* associated with a signal number.
4188   If message is not null and is not the empty string, then the string pointed to by the *message* argument shall
4189   be printed first, followed by a <colon>, a <space>, and the signal description string indicated by *signum*, or
4190   by the signal associated with *pinfo*. If the *message* argument is null or points to an empty string, then only
4191   the signal description shall be printed. For *psiginfo*(), the argument *pinfo* references a valid **siginfo_t**
4192   structure. For *psignal*(), if *signum* is not a valid signal number, the behavior is implementation-defined.

4193   to:

4194   The *psiginfo*() and *psignal*() functions shall write a language-dependent message associated with a signal
4195   number to the standard error stream as follows:

4196   •   First, if *message* is not a null pointer and is not the empty string, the string pointed to by the
4197   *message* argument shall be written, followed by a <colon> and a <space>.

4198   •   Then the signal description string associated with *signum* or with the signal indicated by *pinfo*
4199   shall be written, followed by a <newline>.

4200   For *psiginfo*(), the application shall ensure that the argument *pinfo* references a valid **siginfo_t** structure.
4201   For *psignal*(), if *signum* is not a valid signal number, the behavior is implementation-defined.

4202   *Rationale*: Austin Group Defect Report(s) applied: 629. See http://austingroupbugs.net/view.php?id=629.

4203   **Change Number: XSH/TC2/D4/0261** [858]

4204   On Page: 1529 Line: 49363 Section: pthread_atfork()
4205   (2013 edition Page: 1543 Line: 50230)

4206   In the DESCRIPTION section, add a new paragraph:

4207   If a *fork*() call in a multi-threaded process leads to a *child* fork handler calling any function that is not
4208   async-signal-safe, the behavior is undefined.

4209   On Page: 1529 Line: 49377 Section: pthread_atfork()
4210   (2013 edition Page: 1543 Line: 50244)

4211   In the APPLICATION USAGE section, change from:

4212   None.

4213   to:

4214   The original usage pattern envisaged for *pthread_atfork*() was for the *prepare* fork handler to lock mutexes
4215   and other locks, and for the *parent* and *child* handlers to unlock them. However, since all of the relevant
4216   unlocking functions, except *sem_post*(), are not async-signal-safe this usage results in undefined behavior
4217   in the child process unless the only such unlocking function it calls is *sem_post*().

4218   On Page: 1531 Line: 49441 Section: pthread_atfork()
4219   (2013 edition Page: 1545 Line: 50308)

4220   In the FUTURE DIRECTIONS section, change from:

4221   None.

4222   to:

4223   The *pthread_atfork*() function may be formally deprecated (for example by shading it OB) in a future
4224   revision of this standard.

4225   *Rationale*: Austin Group Defect Report(s) applied: 858. See http://austingroupbugs.net/view.php?id=858.

4226   **Change Number: XSH/TC2/D4/0262** [757]

4227   On Page: 1541 Line: 49831 Section: pthread_attr_getinheritsched()
4228   (2013 edition Page: 1555 Line: 50699)

4229   In the CHANGE HISTORY section for Issue 7, change from:

4230   The *pthread_attr_getinheritsched*() and *pthread_attr_setinheritsched*() functions are moved from the
4231   Threads option.

4232   to:

4233   The *pthread_attr_getinheritsched*() and *pthread_attr_setinheritsched*() functions are marked only as part of
4234   the Thread Execution Scheduling option as the Threads option is now part of the Base.

4235   *Rationale*: Austin Group Defect Report(s) applied: 757. See http://austingroupbugs.net/view.php?id=757.

4236

4237   **Change Number: XSH/TC2/D4/0263** [757]

4238   On Page: 1545 Line: 49961 Section: pthread_attr_getschedpolicy()
4239   (2013 edition Page: 1559 Line: 50833)

4240   In the CHANGE HISTORY section for Issue 7, change from:

4241   The *pthread_attr_getschedpolicy*() and *pthread_attr_setschedpolicy*() functions are moved from the
4242   Threads option.

4243   to:

4244   The *pthread_attr_getschedpolicy*() and *pthread_attr_setschedpolicy*() functions are marked only as part
4245   the Thread Execution Scheduling option as the Threads option is now part of the Base.

4246   *Rationale*: Austin Group Defect Report(s) applied: 757. See http://austingroupbugs.net/view.php?id=757.

4247   **Change Number: XSH/TC2/D4/0264** [757]

4248   On Page: 1547 Line: 50023 Section: pthread_attr_getscope()
4249   (2013 edition Page: 1561 Line: 50897)

4250   In the CHANGE HISTORY section for Issue 7, change from:

4251   The *pthread_attr_getscope*() and *pthread_attr_setscope*() functions are moved from the Threads option.

4252   to:

4253   The *pthread_attr_getscope*() and *pthread_attr_setscope*() functions are marked only as part of the Thread
4254   Execution Scheduling option as the Threads option is now part of the Base.

4255   *Rationale*: Austin Group Defect Report(s) applied: 757. See http://austingroupbugs.net/view.php?id=757.

4256   **Change Number: XSH/TC2/D4/0265** [757]

4257   On Page: 1552 Line: 50161 Section: pthread_attr_getstacksize()
4258   (2013 edition Page: 1566 Line: 51036)

4259   In the CHANGE HISTORY section for Issue 7, change from:

4260   The *pthread_attr_getstacksize*() and *pthread_attr_setstacksize*() functions are moved from the Threads
4261   option.

4262   to:

4263   The *pthread_attr_getstacksize*() and *pthread_attr_setstacksize*() functions are marked only as part of the
4264   Thread Stack Size Attribute option as the Threads option is now part of the Base.

4265   *Rationale*: Austin Group Defect Report(s) applied: 757. See http://austingroupbugs.net/view.php?id=757.

4266

4267   **Change Number: XSH/TC2/D4/0266** [972]

4268   On Page: 1562 Line: 50259-50261 Section: pthread_barrier_destroy()
4269   (2013 edition Page: 1576 Line: 51134-51136)

4270   In the DESCRIPTION section, change from:

4271   Only the object referenced by *barrier* may be used for performing synchronization. The result of referring
4272   to copies of that object in calls to *pthread_barrier_destroy*() or *pthread_barrier_wait*() is undefined.

4273   to:

4274   See [xref to section 2.9.9] for further requirements.

4275   On Page: 1568 Line: 50418-50421 Section: pthread_barrierattr_getpshared()
4276   (2013 edition Page: 1582 Line: 51293-51296)

4277   In the DESCRIPTION section, change from:

4278   If the *process-shared* attribute is PTHREAD_PROCESS_PRIVATE, the barrier shall only be operated
4279   upon by threads created within the same process as the thread that initialized the barrier; if threads of
4280   different processes attempt to operate on such a barrier, the behavior is undefined.

4281   to:

4282   See [xref to section 2.9.9] for further requirements.

4283   *Rationale*: Austin Group Defect Report(s) applied: 972. See http://austingroupbugs.net/view.php?id=972.

4284   **Change Number: XSH/TC2/D4/0267** [757]

4285   On Page: 1569 Line: 50460 Section: pthread_barrierattr_getpshared()
4286   (2013 edition Page: 1583 Line: 51335)

4287   In the CHANGE HISTORY section for Issue 7, change from:

4288   The *pthread_barrierattr_getpshared*() and *pthread_barrierattr_setpshared*() functions are moved from the
4289   Barriers option.

4290   to:

4291   The *pthread_barrierattr_getpshared*() and *pthread_barrierattr_setpshared*() functions are marked only as
4292   part of the Thread Process-Shared Synchronization option as the Threads option is now part of the Base.

4293   *Rationale*: Austin Group Defect Report(s) applied: 757. See http://austingroupbugs.net/view.php?id=757.

4294   **Change Number: XSH/TC2/D4/0268** [624]

4295   On Page: 1574 Line: 50552 Section: pthread_cleanup_pop()

4296   In the DESCRIPTION section, change from:

4297   These functions may be implemented as macros.

4298   to:

4299   It is unspecified whether *pthread_cleanup_push* and *pthread_cleanup_pop* are macros or functions. If a
4300   macro definition is suppressed in order to access an actual function, or a program defines an external
4301   identifier with any of these names the behavior is undefined.

4302   *Rationale*: Austin Group Defect Report(s) applied: 624. See http://austingroupbugs.net/view.php?id=624.

4303   **Change Number: XSH/TC2/D4/0269** [972]

4304   On Page: 1582 Line: 50872-50874 Section: pthread_cond_destroy()
4305   (2013 edition Page: 1596 Line: 51751-51753)

4306   In the DESCRIPTION section, change from:

4307   Only *cond* itself may be used for performing synchronization. The result of referring to copies of *cond* in
4308   calls to *pthread_cond_wait*(), *pthread_cond_timedwait*(), *pthread_cond_signal*(),
4309   *pthread_cond_broadcast*(), and *pthread_cond_destroy*() is undefined.

4310   to:

4311   See [xref to section 2.9.9] for further requirements.

4312   *Rationale*: Austin Group Defect Report(s) applied: 972. See http://austingroupbugs.net/view.php?id=972.

4313   **Change Number: XSH/TC2/D4/0270** [910]

4314   On Page: 1583 Line: 50927 Section: pthread_cond_destroy()
4315   (2013 edition Page: 1597 Line: 51806)

4316   In the EXAMPLES section, change from:

4317   `rp->notbusy`

4318   to:

4319   `ep->notbusy`

4320   *Rationale*: Austin Group Defect Report(s) applied: 910. See http://austingroupbugs.net/view.php?id=910.

4321   **Change Number: XSH/TC2/D4/0271** [749]

4322   On Page: 1587 Line: 51042 Section: pthread_cond_timedwait()

4323   In the RETURN VALUE section, change from:

4324   Except in the case of [ETIMEDOUT],

4325   to:

4326   Except for [ETIMEDOUT], [ENOTRECOVERABLE], and [EOWNERDEAD],

4327   *Rationale*: Austin Group Defect Report(s) applied: 749. See http://austingroupbugs.net/view.php?id=749.

4328   **Change Number: XSH/TC2/D4/0272** [972]

4329   On Page: 1596 Line: 51368-51371 Section: pthread_condattr_getpshared()
4330   (2013 edition Page: 1611 Line: 52252-52255)

4331   In the DESCRIPTION section, change from:

4332   If the *process-shared* attribute is PTHREAD_PROCESS_PRIVATE, the condition variable shall only be
4333   operated upon by threads created within the same process as the thread that initialized the condition
4334   variable; if threads of differing processes attempt to operate on such a condition variable, the behavior is
4335   undefined.

4336   to:

4337   See [xref to section 2.9.9] for further requirements.

4338   *Rationale*: Austin Group Defect Report(s) applied: 972. See http://austingroupbugs.net/view.php?id=972.

4339   **Change Number: XSH/TC2/D4/0273** [757]

4340   On Page: 1597 Line: 51409 Section: pthread_condattr_getpshared()
4341   (2013 edition Page: 1612 Line: 52293)

4342   In the CHANGE HISTORY section for Issue 7, change from:

4343   The *pthread_condattr_getpshared*() and *pthread_condattr_setpshared*() functions are moved from the
4344   Threads option.

4345   to:

4346   The *pthread_condattr_getpshared*() and *pthread_condattr_setpshared*() functions are marked only as part
4347   of the Thread Process-Shared Synchronization option as the Threads option is now part of the Base.

4348   *Rationale*: Austin Group Defect Report(s) applied: 757. See http://austingroupbugs.net/view.php?id=757.

4349   **Change Number: XSH/TC2/D4/0274** [849]

4350   On Page: 1602 Line: 51480 Section: pthread_create()

4351   In the APPLICATION USAGE section, change from:

4352   through the return value of the *pthread_create*() function

4353   to:

4354   through the *thread* argument of the *pthread_create*() function

4355   *Rationale*: Austin Group Defect Report(s) applied: 849. See http://austingroupbugs.net/view.php?id=849.

4356   **Change Number: XSH/TC2/D4/0275** [757]

4357   On Page: 1611 Line: 51797 Section: pthread_getcpuclockid()
4358   (2013 edition Page: 1626 Line: 52682)

4359   In the CHANGE HISTORY section for Issue 7, change from:

4360   The *pthread_getcpuclockid*() function is moved from the Threads option.

4361   to:

4362   The *pthread_getcpuclockid*() function is marked only as part of the Thread CPU-Time Clocks option as the
4363   Threads option is now part of the Base.

4364   *Rationale*: Austin Group Defect Report(s) applied: 757. See http://austingroupbugs.net/view.php?id=757.

4365   **Change Number: XSH/TC2/D4/0276** [757]

4366   On Page: 1614 Line: 51885 Section: pthread_getschedparam()
4367   (2013 edition Page: 1629 Line: 52771)

4368   In the CHANGE HISTORY section for Issue 7, change from:

4369   The *pthread_getschedparam*() and *pthread_setschedparam*() functions are moved from the Threads option.

4370   to:

4371   The *pthread_getschedparam*() and *pthread_setschedparam*() functions are marked only as part of the
4372   Thread Execution Scheduling option as the Threads option is now part of the Base.

4373   *Rationale*: Austin Group Defect Report(s) applied: 757. See http://austingroupbugs.net/view.php?id=757.

4374   **Change Number: XSH/TC2/D4/0277** [765]

4375   On Page: 1625 Line: 52287 Section: pthread_kill()
4376   (2013 edition Page: 1640 Line: 53174)

4377   In the RATIONALE section, add a paragraph:

4378   Existing implementations vary on the result of a *pthread_kill*() with a thread ID indicating an inactive
4379   thread (a terminated thread that has not been detached or joined). Some indicate success on such a call,
4380   while others give an error of [ESRCH]. Since the definition of thread lifetime in this volume of POSIX.1-
4381   2008 covers inactive threads, the [ESRCH] error as described is inappropriate in this case. In particular, this
4382   means that an application cannot have one thread check for termination of another with *pthread_kill*().

4383   On Page: 1625 Line: 52289 Section: pthread_kill()
4384   (2013 edition Page: 1640 Line: 53176)

4385   In the FUTURE DIRECTIONS section, change from:

4386   None.

4387   to:

4388   A future version of this standard may require that *pthread_kill*() not fail with ESRCH in the case of sending
4389   signals to an inactive thread (a terminated thread not yet detached or joined), even though no signal will be
4390   delivered because the thread is no longer running.

4391   *Rationale*: Austin Group Defect Report(s) applied: 765. See http://austingroupbugs.net/view.php?id=765.

4392   **Change Number: XSH/TC2/D4/0278** [811]

4393   On Page: 1628 Line: 52362 Section: pthread_mutex_destroy()
4394   (2013 edition Page: 1643 Line: 53249)

4395   In the DESCRIPTION section, change from:

4396   Attempting to destroy a locked mutex or a mutex that is referenced (for example, while being used in a
4397   *pthread_cond_timedwait*() or *pthread_cond_wait*()) by another thread results in undefined behavior.

4398   to:

4399   Attempting to destroy a locked mutex, or a mutex that another thread is attempting to lock, or a mutex that
4400   is being used in a *pthread_cond_timedwait*() or *pthread_cond_wait*() call by another thread, results in
4401   undefined behavior.

4402   *Rationale*: Austin Group Defect Report(s) applied: 811. See http://austingroupbugs.net/view.php?id=811.

4403   **Change Number: XSH/TC2/D4/0279** [972]

4404   On Page: 1628 Line: 52369-52371 Section: pthread_mutex_destroy()
4405   (2013 edition Page: 1643 Line: 53256-53258)

4406   In the DESCRIPTION section, change from:

4407   Only *mutex* itself may be used for performing synchronization. The result of referring to copies of *mutex* in
4408   calls to *pthread_mutex_lock*(), *pthread_mutex_trylock*(), *pthread_mutex_unlock*(), and
4409   *pthread_mutex_destroy*() is undefined.

4410   to:

4411   See [xref to section 2.9.9] for further requirements.

4412   *Rationale*: Austin Group Defect Report(s) applied: 972. See http://austingroupbugs.net/view.php?id=972.

4413   **Change Number: XSH/TC2/D4/0280** [811]

4414   On Page: 1632 Line: 52537-52557 Section: pthread_mutex_destroy()
4415   (2013 edition Page: 1647 Line: 53424-53444)

4416   In the RATIONALE section, change from:

4417 A mutex can be destroyed immediately after it is unlocked. For example, consider the following code:

```
4418   struct obj {
4419   pthread_mutex_t om;
4420       int refcnt;
4421       ...
4422   };
4423   obj_done(struct obj *op)
4424   {
4425       pthread_mutex_lock(&op->om);
4426       if (--op->refcnt == 0) {
4427           pthread_mutex_unlock(&op->om);
4428   (A)     pthread_mutex_destroy(&op->om);
4429   (B)     free(op);
4430       } else
4431   (C)     pthread_mutex_unlock(&op->om);
4432   }
```

4433 In this case *obj* is reference counted and *obj_done*() is called whenever a reference to the object is dropped.
4434 Implementations are required to allow an object to be destroyed and freed and potentially unmapped (for
4435 example, lines A and B) immediately after the object is unlocked (line C).

4436 to:

4437 A mutex can be destroyed immediately after it is unlocked. However, since attempting to destroy a locked
4438 mutex, or a mutex that another thread is attempting to lock, or a mutex that is being used in a
4439 *pthread_cond_timedwait*() or *pthread_cond_wait*() call by another thread, results in undefined behavior,
4440 care must be taken to ensure that no other thread may be referencing the mutex.

4441 *Rationale*: Austin Group Defect Report(s) applied: 811. See http://austingroupbugs.net/view.php?id=811.

4442 **Change Number: XSH/TC2/D4/0281** [972]

4443 On Page: 1657 Line: 53355-53358 Section: pthread_mutexattr_getpshared()
4444 (2013 edition Page: 1672 Line: 54249-54252)

4445 In the DESCRIPTION section, change from:

4446 If the *process-shared* attribute is PTHREAD_PROCESS_PRIVATE, the mutex shall only be operated upon
4447 by threads created within the same process as the thread that initialized the mutex; if threads of differing
4448 processes attempt to operate on such a mutex, the behavior is undefined.

4449 to:

4450 See [xref to section 2.9.9] for further requirements.

4451 *Rationale*: Austin Group Defect Report(s) applied: 972. See http://austingroupbugs.net/view.php?id=972.

4452 **Change Number: XSH/TC2/D4/0282** [757]

4453 On Page: 1658 Line: 53396 Section: pthread_mutexattr_getpshared()
4454 (2013 edition Page: 1673 Line: 54290)

4455 In the CHANGE HISTORY section for Issue 7, change from:

4456 The *pthread_mutexattr_getpshared*() and *pthread_mutexattr_setpshared*() functions are moved from the
4457 Threads option.

4458 to:

4459 The *pthread_mutexattr_getpshared*() and *pthread_mutexattr_setpshared*() functions are marked only as
4460 part of the Thread Process-Shared Synchronization option as the Threads option is now part of the Base.

4461 *Rationale*: Austin Group Defect Report(s) applied: 757. See http://austingroupbugs.net/view.php?id=757.

4462 **Change Number: XSH/TC2/D4/0283** [748]

4463 On Page: 1659 Line: 53421 Section: pthread_mutexattr_getrobust()
4464 (2013 edition Page: 1744 Line: 54315)

4465 In the DESCRIPTION section, change from:

4466 ... the next thread that acquires the mutex may be notified about the termination by the return value
4467 [EOWNERDEAD]. The notified thread can then attempt to mark the state protected by the mutex as
4468 consistent again by a call to *pthread_mutex_consistent*().

4469 to:

4470 ... the next thread that attempts to acquire the mutex may be notified about the termination by the return
4471 value [EOWNERDEAD]. The notified thread can then attempt to make the state protected by the mutex
4472 consistent again, and if successful can mark the mutex state as consistent by calling
4473 *pthread_mutex_consistent*().

4474 *Rationale*: Austin Group Defect Report(s) applied: 748. See http://austingroupbugs.net/view.php?id=748.

4475 **Change Number: XSH/TC2/D4/0284** [863]

4476 On Page: 1669 Line: 53609 Section: pthread_once()
4477 (2013 edition Page: 1684 Line: 54487)

4478 In the DESCRIPTION section, add new paragraph:

4479 If the call to *init_routine* is terminated by a call to *longjmp*(), *_longjmp*(), or *siglongjmp*(), the behavior is
4480 undefined.

4481 On Page: 1669 Line: 53621 Section: pthread_once()
4482 (2013 edition Page: 1684 Line: 54499)

4483 In the APPLICATION USAGE section, change from:

4484 None.

4485 to:

4486 If *init_routine* recursively calls *pthread_once*() with the same *once_control*, the recursive call will not call
4487 the specified *init_routine*, and thus the specified *init_routine* will not complete, and thus the recursive call

4488   to *pthread_once*() will not return. Use of *longjmp*(), *_longjmp*(), or *siglongjmp*() within an *init_routine* to
4489   jump to a point outside of *init_routine* prevents *init_routine* from returning.

4490   *Rationale*: Austin Group Defect Report(s) applied: 863. See http://austingroupbugs.net/view.php?id=863.

4491   **Change Number: XSH/TC2/D4/0285** [874]

4492   On Page: 1669 Line: 53628 Section: pthread_once()
4493   (2013 edition Page: 1684 Line: 54506)

4494   In the RATIONALE section, change from:

4495   `extern int initialize_random();`

4496   to:

4497   `extern void initialize_random(void);`

4498   *Rationale*: Austin Group Defect Report(s) applied: 874. See http://austingroupbugs.net/view.php?id=874.

4499   **Change Number: XSH/TC2/D4/0286** [874]

4500   On Page: 1670 Line: 53640 Section: pthread_once()
4501   (2013 edition Page: 1685 Line: 54518)

4502   In the RATIONALE section, change from:

4503   For dynamic library initialization in a multi-threaded process, a simple initialization flag is not sufficient;
4504   the flag needs to be protected against modification by multiple threads simultaneously calling into the
4505   library. Protecting the flag requires the use of a mutex; however, mutexes have to be initialized before they
4506   are used. Ensuring that the mutex is only initialized once requires a recursive solution to this problem.

4507   The use of *pthread_once*() not only supplies an implementation-guaranteed means of dynamic
4508   initialization, it provides an aid to the reliable construction of multi-threaded and realtime systems. The
4509   preceding example then becomes:

4510   to:

4511   For dynamic library initialization in a multi-threaded process, if an initialization flag is used the flag needs
4512   to be protected against modification by multiple threads simultaneously calling into the library. This can be
4513   done by using a mutex (initialized by assigning PTHREAD_MUTEX_INITIALIZER). However, the better
4514   solution is to use *pthread_once*(), which is designed for exactly this purpose, as follows:

4515   On Page: 1670 Line: 53650 Section: pthread_once()
4516   (2013 edition Page: 1685 Line: 54528)

4517   In the RATIONALE section, change from:

4518   `extern int initialize_random();`

4519   to:

4520   `extern void initialize_random(void);`

4521   *Rationale*: Austin Group Defect Report(s) applied: 874. See http://austingroupbugs.net/view.php?id=874.

4522   **Change Number: XSH/TC2/D4/0287** [747]

4523   On Page: 1670 Line: 53656 Section: pthread_once()

4524   In the RATIONALE section, remove the text:

4525   Note that a **pthread_once_t** cannot be an array because some compilers do not accept the construct
4526   &<**array_name**>.

4527   *Rationale*: Austin Group Defect Report(s) applied: 747. See http://austingroupbugs.net/view.php?id=747.

4528   **Change Number: XSH/TC2/D4/0288** [972]

4529   On Page: 1671 Line: 53698-53701 Section: pthread_rwlock_destroy()
4530   (2013 edition Page: 1686 Line: 54576-54579)

4531   In the DESCRIPTION section, change from:

4532   Only the object referenced by *rwlock* may be used for performing synchronization. The result of referring
4533   to copies of that object in calls to *pthread_rwlock_destroy*(), *pthread_rwlock_rdlock*(),
4534   *pthread_rwlock_timedrdlock*(), *pthread_rwlock_timedwrlock*(), *pthread_rwlock_tryrdlock*(),
4535   *pthread_rwlock_trywrlock*(), *pthread_rwlock_unlock*(), or *pthread_rwlock_wrlock*() is undefined.

4536   to:

4537   See [xref to section 2.9.9] for further requirements.

4538   *Rationale*: Austin Group Defect Report(s) applied: 972. See http://austingroupbugs.net/view.php?id=972.

4539   **Change Number: XSH/TC2/D4/0289** [758]

4540   On Page: 1672 Line: 53728 Section: pthread_rwlock_destroy()
4541   (2013 edition Page: 1687 Line: 54606)

4542   In the RATIONALE section, change from:

4543   *pthread_rwlockr_init*()

4544   to:

4545   *pthread_rwlock_init*()

4546   *Rationale*: Austin Group Defect Report(s) applied: 758. See http://austingroupbugs.net/view.php?id=758.

4547

4548   **Change Number: XSH/TC2/D4/0290** [720]

4549   On Page: 1682 Line: 54002 Section: pthread_rwlock_trywrlock()

4550   In the DESCRIPTION section, change from:

4551   The calling thread acquires the write lock if no other thread (reader or writer) holds the read-write lock
4552   *rwlock*. Otherwise, the thread shall block until it can acquire the lock. The calling thread may deadlock if at
4553   the time the call is made it holds the read-write lock (whether a read or write lock).

4554   to:

4555   The calling thread shall acquire the write lock if no thread (reader or writer) holds the read-write lock
4556   *rwlock*. Otherwise, if another thread holds the read-write lock *rwlock*, the calling thread shall block until it
4557   can acquire the lock. If a deadlock condition occurs or the calling thread already owns the read-write lock
4558   for writing or reading, the call shall either deadlock or return EDEADLK.

4559   *Rationale*: Austin Group Defect Report(s) applied: 720. See http://austingroupbugs.net/view.php?id=720.
4560   It is clear from the description of pthread_rwlock_[try]rdlock() and pthread_rwlock_unlock() that read
4561   locks are recursive. It is clear from the description of pthread_rwlock_trywrlock() and
4562   pthread_rwlock_unlock() that write locks are not recursive. The intention is that pthread_rwlock_wrlock()
4563   either deadlocks or returns EDEADLK if the caller already holds a write lock, but this is written as two
4564   separate "may" clauses (one in the DESCRIPTION and one in the ERRORS section), which creates a
4565   loophole that allows pthread_rwlock_wrlock() to succeed (as a no-op). However, this behavior would be of
4566   no use to applications. In particular, if an application tried to make matching pthread_rwlock_unlock() calls
4567   for two successful pthread_rwlock_wrlock() calls, the first unlock call would set the state to unlocked and
4568   the second unlock call would result in undefined behavior.

4569   **Change Number: XSH/TC2/D4/0291** [722]

4570   On Page: 1682 Line: 54006 Section: pthread_rwlock_trywrlock()
4571   (2013 edition Page: 1697 Line: 54885)

4572   In the DESCRIPTION section, remove the line:

4573   Implementations may favor writers over readers to avoid writer starvation.

4574   *Rationale*: Austin Group Defect Report(s) applied: 722. See http://austingroupbugs.net/view.php?id=722.
4575   Changes were made to the read locks in Issue 6, that should also be represented in the write lock
4576   specification regarding read/write precedence.

4577   **Change Number: XSH/TC2/D4/0292** [972]

4578   On Page: 1689 Line: 54196-54199 Section: pthread_rwlockattr_getpshared()
4579   (2013 edition Page: 1704 Line: 55075-55078)

4580   In the DESCRIPTION section, change from:

4581   If the *process-shared* attribute is PTHREAD_PROCESS_PRIVATE, the read-write lock shall only be
4582   operated upon by threads created within the same process as the thread that initialized the read-write lock;
4583   if threads of differing processes attempt to operate on such a read-write lock, the behavior is undefined.

4584   to:

4585   See [xref to section 2.9.9] for further requirements.

4586   *Rationale*: Austin Group Defect Report(s) applied: 972. See http://austingroupbugs.net/view.php?id=972.

4587   **Change Number: XSH/TC2/D4/0293** [757]

4588   On Page: 1690 Line: 54240 Section: pthread_rwlockattr_getpshared()
4589   (2013 edition Page: 1705 Line: 55119)

4590   In the CHANGE HISTORY section for Issue 7, change from:

4591   The *pthread_rwlockattr_getpshared*() and *pthread_rwlockattr_setpshared*() functions are moved from the
4592   Threads option.

4593   to:

4594   The *pthread_rwlockattr_getpshared*() and *pthread_rwlockattr_setpshared*() functions are marked only as
4595   part of the Thread Process-Shared Synchronization option as the Threads option is now part of the Base.

4596   *Rationale*: Austin Group Defect Report(s) applied: 757. See http://austingroupbugs.net/view.php?id=757.

4597   **Change Number: XSH/TC2/D4/0294** [622]

4598   On Page: 1694 Line: 54327 Section: pthread_setcancelstate()

4599   In the APPLICATION USAGE section, change from:

4600   None.

4601   to:

4602   In order to write a signal handler for an asynchronous signal which can run safely in a cancellable thread,
4603   *pthread_setcancelstate*() must be used to disable cancellation for the duration of any calls that the signal
4604   handler makes which are cancellation points. However, the standard does not permit strictly conforming
4605   applications to call *pthread_setcancelstate*() from a signal handler since it is not currently required to be
4606   async-signal-safe. On implementations where *pthread_setcancelstate*() is not async-signal-safe, alternatives
4607   are to ensure either that the corresponding signals are blocked during execution of functions that are not
4608   async-cancel-safe or that cancellation is disabled during times when those signals could be delivered.
4609   Implementations are strongly encouraged to make *pthread_setcancelstate*() async-signal-safe.

4610   *Rationale*: Austin Group Defect Report(s) applied: 622. See http://austingroupbugs.net/view.php?id=622.

4611   **Change Number: XSH/TC2/D4/0295** [615]

4612   On Page: 1695 Line: 54349 Section: pthread_setcancelstate()

4613   In the FUTURE DIRECTIONS section, change from:

4614   None.

4615   to:

4616   The *pthread_setcancelstate*() function may be added to the table of async-signal-safe functions in section
4617   2.4.3 on page 489.

4618   *Rationale*: Austin Group Defect Report(s) applied: 615. See http://austingroupbugs.net/view.php?id=615.
4619   In order to write a signal handler for an asynchronous signal which can run safely in a cancellable thread,
4620   pthread_setcancelstate() must be used to disable cancellation for the duration of any calls that the signal
4621   handler makes which are cancellation points. However, the standard does not currently permit strictly
4622   conforming applications to do this since pthread_setcancelstate() is not required to be async-signal-safe.

4623   **Change Number: XSH/TC2/D4/0296** [757]

4624   On Page: 1699 Line: 54427 Section: pthread_setschedprio()
4625   (2013 edition Page: 1714 Line: 55305)

4626   In the CHANGE HISTORY section for Issue 7, change from:

4627   The *pthread_setschedprio*() function is moved from the Threads option.

4628   to:

4629   The *pthread_setschedprio*() function is marked only as part of the Thread Execution Scheduling option as
4630   the Threads option is now part of the Base.

4631   *Rationale*: Austin Group Defect Report(s) applied: 757. See http://austingroupbugs.net/view.php?id=757.

4632   **Change Number: XSH/TC2/D4/0297** [972]

4633   On Page: 1705 Line: 54589-54593 Section: pthread_spin_destroy()
4634   (2013 edition Page: 1720 Line: 55469-55473)

4635   In the DESCRIPTION section, change from:

4636   [TSH]If the Thread Process-Shared Synchronization option is supported and the value of *pshared* is
4637   PTHREAD_PROCESS_PRIVATE,[/TSH] or if the option is not supported, the spin lock shall only be
4638   operated upon by threads created within the same process as the thread that initialized the spin lock. If
4639   threads of differing processes attempt to operate on such a spin lock, the behavior is undefined.

4640   to:

4641   See [xref to section 2.9.9] for further requirements.

4642   *Rationale*: Austin Group Defect Report(s) applied: 972. See http://austingroupbugs.net/view.php?id=972.

4643   **Change Number: XSH/TC2/D4/0298** [503]

4644   On Page: 1712 Line: 54750 Section: ptsname()

4645   In the RETURN VALUE section, change from:

4646   Upon failure *ptsname*() shall return a null pointer.

4647   to:

4648   Upon failure *ptsname*() shall return a null pointer and may set *errno*.

4649   *Rationale*: Austin Group Defect Report(s) applied: 503. See http://austingroupbugs.net/view.php?id=503.

4650   **Change Number: XSH/TC2/D4/0299** [656]

4651   On Page: 1712 Line: 54752 Section: ptsname()

4652   In the RETURN VALUE section, add a new paragraph at the end of the section:

4653   The application shall not modify the string returned. The returned pointer might be invalidated or the string
4654   content might be overwritten by a subsequent call to *ptsname*(). The returned pointer and the string content
4655   might also be invalidated if the calling thread is terminated.

4656   *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
4657   This item is a layered change on XSH/TC1/D5/0468 [75].

4658   The change is to add the following text to the end of the paragraph at 2013 edition P1727, L55633-55634:

4659   The returned pointer and the string content might also be invalidated if the calling thread is terminated.

4660   Note that the other change in XSH/TC1/D5/0468 [75] to the APPLICATION USAGE section is not
4661   impacted.

4662   **Change Number: XSH/TC2/D4/0300** [503]

4663   On Page: 1712 Line: 54754 Section: ptsname()

4664   In the ERRORS section, change from:

4665   No errors are defined.

4666   to:

4667   The *ptsname*() function may fail if:

4668   [EBADF]
4669   The *fildes* argument is not a valid file descriptor.

4670   [ENOTTY]
4671   The file associated with the *fildes* argument is not a master pseudo-terminal device.

4672   *Rationale*: Austin Group Defect Report(s) applied: 503. See http://austingroupbugs.net/view.php?id=503.

4673

4674 **Change Number: XSH/TC2/D4/0301** [743]

4675 On Page: 1734 Line: 55339 Section: rand()
4676 (2013 edition Page: 1749 Line: 56250)

4677 In the APPLICATION USAGE section, change from:

4678 The *drand48*() function provides a much more elaborate random number generator.

4679 to:

4680 The *drand48*() and *random*() functions provide much more elaborate pseudo-random number generators.

4681 On Page: 1734 Line: 55342-55343 Section: rand()
4682 (2013 edition Page: 1749 Line: 56253-56254)

4683 In the APPLICATION USAGE section, change from:

4684 Therefore this function should be avoided whenever non-trivial requirements (including safety) have to be
4685 fulfilled.

4686 to a new paragraph:

4687 These functions should be avoided whenever non-trivial requirements (including safety) have to be
4688 fulfilled.

4689 On Page: 1735 Line: 55362 Section: rand()
4690 (2013 edition Page: 1750 Line: 56273)

4691 In the SEE ALSO section, add *initstate*().

4692 *Rationale*: Austin Group Defect Report(s) applied: 743. See http://austingroupbugs.net/view.php?id=743.

4693 **Change Number: XSH/TC2/D4/0302** [710]

4694 On Page: 1739 Line: 55477 Section: read()

4695 In the DESCRIPTION section, change from:

4696 The *pread*() function shall be equivalent to *read*(), except that it shall read from a given position in the file
4697 without changing the file pointer.

4698 to:

4699 The *pread*() function shall be equivalent to *read*(), except that it shall read from a given position in the file
4700 without changing the file offset.

4701 *Rationale*: Austin Group Defect Report(s) applied: 710. See http://austingroupbugs.net/view.php?id=710.

4702

4703   **Change Number: XSH/TC2/D4/0303** [676,710]

4704   On Page: 1739 Line: 55506 Section: read()
4705   (2013 edition Page: 1754 Line: 56422)

4706   In the ERRORS section, before "The *read*() function shall fail if" insert:

4707   The *pread*() function shall fail if:

4708   [EINVAL]
4709   The file is a regular file or block special file, and the offset argument is negative. The file
4710   offset shall remain unchanged.

4711   [ESPIPE]
4712   The file is incapable of seeking.

4713   On Page: 1740 Line: 55520 Section: read()

4714   In the ERRORS section, delete lines 55520-55525 (the pread() "shall fail" errors).

4715   *Rationale*: Austin Group Defect Report(s) applied: 676,710. See
4716   http://austingroupbugs.net/view.php?id=676.
4717   See http://austingroupbugs.net/view.php?id=710.
4718   This is a layered change on XSH/TC1/D5/0484 [218] and XSH/TC1/D5/0482 [218].

4719   **Change Number: XSH/TC2/D4/0304** [656]

4720   On Page: 1744 Line: 55685 Section: readdir()

4721   In the DESCRIPTION section, change from:

4722   The pointer returned by *readdir*() points to data which may be overwritten by another call to *readdir*() on
4723   the same directory stream. This data is not overwritten by another call to *readdir*() on a different directory
4724   stream.

4725   to:

4726   The application shall not modify the structure to which the return value of *readdir*() points, nor any storage
4727   areas pointed to by pointers within the structure. The returned pointer, and pointers within the structure,
4728   might be invalidated or the structure or the storage areas might be overwritten by a subsequent call to
4729   *readdir*() on the same directory stream. They shall not be affected by a call to *readdir*() on a different
4730   directory stream. The returned pointer, and pointers within the structure, might also be invalidated if the
4731   calling thread is terminated.

4732   *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
4733   This item is a layered change on XSH/TC1/D5/0486 [75].

4734   The change is to add the following text to the end of the paragraph at 2013 edition P1759, L56601-56605:

4735   The returned pointer, and pointers within the structure, might also be invalidated if the calling thread is
4736   terminated.

4737 **Change Number: XSH/TC2/D4/0305** [591]

4738 On Page: 1749 Line: 55846 Section: readlink()

4739 Before the readlinkat SYNOPSIS line, insert a line with OH shading:

4740 `#include <fcntl.h>`

4741 *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

4742 **Change Number: XSH/TC2/D4/0306** [817]

4743 On Page: 1749 Line: 55858 Section: readlink()
4744 (2013 edition Page: 1764 Line: 56779)

4745 In the DESCRIPTION section, change from:

4746 If the file descriptor was opened without O_SEARCH, the function shall check whether directory searches
4747 are permitted using the current permissions of the directory underlying the file descriptor. If the file
4748 descriptor was opened with O_SEARCH, the function shall not perform the check.

4749 to:

4750 If the access mode of the open file description associated with the file descriptor is not O_SEARCH, the
4751 function shall check whether directory searches are permitted using the current permissions of the directory
4752 underlying the file descriptor. If the access mode is O_SEARCH, the function shall not perform the check.

4753 *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

4754 **Change Number: XSH/TC2/D4/0307** [817]

4755 On Page: 1750 Line: 55885 Section: readlink()
4756 (2013 edition Page: 1765 Line: 56805)

4757 In the ERRORS section, for the [EACCES] error, change from:

4758 *fd* was not opened with O_SEARCH and ...

4759 to:

4760 The access mode of the open file description associated with *fd* is not O_SEARCH and ...

4761 *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

4762 **Change Number: XSH/TC2/D4/0308** [591]

4763 On Page: 1751 Line: 55930 Section: readlink()

4764 Add a reference to <fcntl.h> to the SEE ALSO list.

4765 *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

4766   **Change Number: XSH/TC2/D4/0309** [526]

4767   On Page: 1754 Line: 56030 Section: realloc()

4768   In the DESCRIPTION section, change from:

4769   The *realloc*() function shall change the size of the memory object pointed to by *ptr* to the size specified by
4770   *size*. The contents of the object shall remain unchanged up to the lesser of the new and old sizes. If the new
4771   size of the memory object would require movement of the object, the space for the previous instantiation of
4772   the object is freed. If the new size is larger, the contents of the newly allocated portion of the object are
4773   unspecified. If *size* is 0 and *ptr* is not a null pointer, the object pointed to is freed.

4774   to:

4775   The *realloc*() function shall deallocate the old object pointed to by *ptr* and return a pointer to a new object
4776   that has the size specified by *size*. The contents of the new object shall be the same as that of the old object
4777   prior to deallocation, up to the lesser of the new and old sizes. Any bytes in the new object beyond the size
4778   of the old object have indeterminate values. If the size of the space requested is zero, the behavior shall be
4779   implementation-defined: either a null pointer is returned, or the behavior shall be as if the size were some
4780   nonzero value, except that the behavior is undefined if the returned pointer is used to access an object.

4781   *Rationale*: Austin Group Defect Report(s) applied: 526. See http://austingroupbugs.net/view.php?id=526.
4782
4783   This change is layered on XSH/TC1/D5/0495 applied in TC1, the difference being that bug report 526
4784   changes from:
4785   except that the returned pointer shall not be used to access an object.
4786   to:
4787   except that the behavior is undefined if the returned pointer is used to access an object.

4788   **Change Number: XSH/TC2/D4/0310** [526,688]

4789   On Page: 1754 Line: 56046 Section: realloc()

4790   In the RETURN VALUE section, change from:

4791   Upon successful completion with a size not equal to 0, *realloc*() shall return a pointer to the (possibly
4792   moved) allocated space. If *size* is 0, either a null pointer or a unique pointer that can be successfully passed
4793   to *free*() shall be returned. If there is not enough available memory, *realloc*() shall return a null pointer
4794   [CX]and set *errno* to [ENOMEM].[/CX]

4795   to:

4796   Upon successful completion, *realloc*() shall return a pointer to the (possibly moved) allocated space. If *size*
4797   is 0, either:

4798   •   A null pointer shall be returned [CX]and, if *ptr* is not a null pointer, *errno* shall be set to an
4799   implementation defined value[/CX].
4800   •   A pointer to the allocated space shall be returned, and the memory object pointed to by *ptr* shall be
4801   freed. The application shall ensure that the pointer is not used to access an object.

4802   If there is not enough available memory, *realloc*() shall return a null pointer [CX]and set *errno* to
4803   [ENOMEM][/CX]. If *realloc*() returns a null pointer [CX]and *errno* has been set to a ENOMEM[/CX], the

4804   memory referenced by *ptr* shall not be changed.

4805   *Rationale*: Austin Group Defect Report(s) applied: 526,688. See
4806   http://austingroupbugs.net/view.php?id=526.
4807   See http://austingroupbugs.net/view.php?id=688.
4808   This change is layered on XSH/TC1/D5/0496 [400] applied in TC1, the difference being that bug report
4809   526 changes from:
4810   A unique pointer that can be successfully passed to *free*() shall be returned
4811   to:
4812   A pointer to the allocated space shall be returned

4813   This is also a layered change on XSH/TC1/D5/0496 [400] as a result of bug report 688. The difference
4814   being that the wording is changed from:
4815   A null pointer shall be returned [CX]and *errno* set to an implementation-defined value[/CX].
4816   to:
4817   A null pointer shall be returned [CX]and, if *ptr* is not a null pointer, *errno* shall set to an implementation-
4818   defined value[/CX].

4819   **Change Number: XSH/TC2/D4/0311** [873]

4820   On Page: 1781 Line: 56918 Section: rename()
4821   (2013 edition Page: 1797 Line: 57881)

4822   In the NAME section, delete:

4823   relative to directory file descriptor

4824   *Rationale*: Austin Group Defect Report(s) applied: 873. See http://austingroupbugs.net/view.php?id=873.

4825   **Change Number: XSH/TC2/D4/0312** [591]

4826   On Page: 1781 Line: 56922 Section: rename()

4827   Before the renameat SYNOPSIS line, insert a line with OH CX shading:

4828   `#include <fcntl.h>`

4829   *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

4830   **Change Number: XSH/TC2/D4/0313** [716]

4831   On Page: 1781 Line: 56939 Section: rename()

4832   In the DESCRIPTION section, change from:

4833   In this case, a link named *new* shall remain visible to other processes throughout the renaming operation

4834   to:

4835   In this case, a link named *new* shall remain visible to other threads throughout the renaming operation

4836   *Rationale*: Austin Group Defect Report(s) applied: 716. See http://austingroupbugs.net/view.php?id=716.
4837

4838   **Change Number: XSH/TC2/D4/0314** [817]

4839   On Page: 1782 Line: 56969 Section: rename()
4840   (2013 edition Page: 1798 Line: 57932)

4841   In the DESCRIPTION section, change from:

4842   If the file descriptor was opened without O_SEARCH, the function shall check whether directory searches
4843   are permitted using the current permissions of the directory underlying the file descriptor. If the file
4844   descriptor was opened with O_SEARCH, the function shall not perform the check.

4845   to:

4846   If the access mode of the open file description associated with the file descriptor is not O_SEARCH, the
4847   function shall check whether directory searches are permitted using the current permissions of the directory
4848   underlying the file descriptor. If the access mode is O_SEARCH, the function shall not perform the check.

4849   *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

4850   **Change Number: XSH/TC2/D4/0315** [817]

4851   On Page: 1783 Line: 57023 Section: rename()
4852   (2013 edition Page: 1799 Line: 57990)

4853   In the ERRORS section, for the [EACCES] error, change from:

4854   *oldfd* or *newfd* was not opened with O_SEARCH and ...

4855   to:

4856   The access mode of the open file description associated with *oldfd* or *newfd* is not O_SEARCH and ...

4857   *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

4858   **Change Number: XSH/TC2/D4/0316** [591]

4859   On Page: 1784 Line: 57083 Section: rename()

4860   Add a reference to <fcntl.h> to the SEE ALSO list.

4861   *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

4862   **Change Number: XSH/TC2/D4/0317** [870]

4863   On Page: 1812 Line: 57894 Section: sem_close()
4864   (2013 edition Page: 1827 Line: 58865)

4865   In the DESCRIPTION section, change from:

4866   The effect of subsequent use of the semaphore indicated by *sem* by this process is undefined.

4867   to:

4868   The effect of subsequent use of the semaphore indicated by *sem* by this process is undefined. If any threads
4869   in the calling process are currently blocked on the semaphore, the behavior is undefined.

4870   *Rationale*: Austin Group Defect Report(s) applied: 870. See http://austingroupbugs.net/view.php?id=870.
4871   There are current implementations which return *mmap*()ed memory and therefore a *sem_close*() in this
4872   situation on such implementations will result in undefined behavior.

4873   **Change Number: XSH/TC2/D4/0318** [972]

4874   On Page: 1818 Line: 58029-58031 Section: sem_init()
4875   (2013 edition Page: 1832 Line: 59000-59002)

4876   In the DESCRIPTION section, delete:

4877   Only sem itself may be used for performing synchronization. The result of referring to copies of sem in
4878   calls to *sem_wait*(), *sem_timedwait*(), *sem_trywait*(), *sem_post*(), and *sem_destroy*() is undefined.

4879   On Page: 1818 Line: 58034-58035 Section: sem_init()
4880   (2013 edition Page: 1832 Line: 59005-59006)

4881   In the DESCRIPTION section, change from:

4882   The use of the semaphore by threads other than those created in the same process is undefined.

4883   to (as a new paragraph):

4884   See [xref to section 2.9.9] for further requirements.

4885   *Rationale*: Austin Group Defect Report(s) applied: 972. See http://austingroupbugs.net/view.php?id=972.

4886   **Change Number: XSH/TC2/D4/0319** [532]

4887   On Page: 1833 Line: 58506 Section: semctl()

4888   In the DESCRIPTION section add the following new paragraph after the union semun definition:

4889   Each operation shall be performed atomically.

4890   *Rationale*: Austin Group Defect Report(s) applied: 532. See http://austingroupbugs.net/view.php?id=532.

4891   **Change Number: XSH/TC2/D4/0320** [899]

4892   On Page: 1867 Line: 59571 Section: setkey()
4893   (2013 edition Page: 1882 Line: 60535)

4894   In the FUTURE DIRECTIONS section, change from:

4895   None.

4896   to:

4897   A future version of the standard may mark this interface as obsolete or remove it altogether.

4898   *Rationale*: Austin Group Defect Report(s) applied: 899. See http://austingroupbugs.net/view.php?id=899.

Change Number: XSH/TC2/D4/0321 [826]

4900   On Page: 1869 Line: 59629 Section: setlocale()
4901   (2013 edition Page: 1884 Line: 60595)

4902   In the DESCRIPTION section, add a new paragraph to the end of the section:

4903   [CX]The *setlocale*() function need not be thread-safe.[/CX]

4904   *Rationale*: Austin Group Defect Report(s) applied: 826. See http://austingroupbugs.net/view.php?id=826.

Change Number: XSH/TC2/D4/0322 [826]

4906   On Page: 1869 Line: 59637 Section: setlocale()
4907   (2013 edition Page: 1884 Line: 60604)

4908   In the RETURN VALUE section, change from:

4909   The application shall not modify the string returned which may be overwritten by a subsequent call to
4910   setlocale().

4911   to:

4912   The application shall not modify the string returned. [CX]The returned string pointer might be invalidated
4913   or[/CX] the string content might be overwritten by a subsequent call to setlocale(). [CX]The returned
4914   pointer might also be invalidated if the calling thread is terminated.[/CX]

4915   *Rationale*: Austin Group Defect Report(s) applied: 826. See http://austingroupbugs.net/view.php?id=826.
4916   This is a layered change, building upon XSH/TC1/D5/0567 [288], the difference being the addition of:
4917   [CX]The returned pointer might also be invalidated if the calling thread is terminated.[/CX]

Change Number: XSH/TC2/D4/0323 [596]

4919   On Page: 1871 Line: 59720 Section: setlocale()

4920   In the SEE ALSO section, remove the setlocale() entry.

4921   *Rationale*: Austin Group Defect Report(s) applied: 596. See http://austingroupbugs.net/view.php?id=596.

Change Number: XSH/TC2/D4/0324 [835]

4923   On Page: 1898 Line: 60324 Section: shm_open()
4924   (2013 edition Page: 1913 Line: 61308)

4925   Change from:

4926   The file descriptor is used by other functions to refer to that shared memory object.

4927   to:

4928   The file descriptor shall be allocated as described in [xref to new section 2.14] and can be used by other
4929   functions to refer to that shared memory object.

4930   *Rationale*: Austin Group Defect Report(s) applied: 835. See http://austingroupbugs.net/view.php?id=835.

4931   **Change Number: XSH/TC2/D4/0325** [835]

4932   On Page: 1898 Line: 60335 Section: shm_open()
4933   (2013 edition Page: 1913 Line: 61319)

4934   Change from:

4935   ... return a file descriptor for the shared memory object that is the lowest numbered file descriptor not
4936   currently open for that process.

4937   to:

4938   ... return a file descriptor for the shared memory object.

4939   *Rationale*: Austin Group Defect Report(s) applied: 835. See http://austingroupbugs.net/view.php?id=835.

4940   **Change Number: XSH/TC2/D4/0326** [835]

4941   On Page: 1899 Line: 60375 Section: shm_open()
4942   (2013 edition Page: 1914 Line: 61358)

4943   Change from:

4944   ... return a non-negative integer representing the lowest numbered unused file descriptor.

4945   to:

4946   ... return a non-negative integer representing the file descriptor.

4947   *Rationale*: Austin Group Defect Report(s) applied: 835. See http://austingroupbugs.net/view.php?id=835.

4948   **Change Number: XSH/TC2/D4/0327** [522]

4949   On Page: 1905 Line: 60591 Section: shmat()

4950   In the RETURN VALUE section, change from:

4951   *shmat*() shall return -1

4952   to:

4953   *shmat*() shall return (**void***)-1

4954   *Rationale*: Austin Group Defect Report(s) applied: 522. See http://austingroupbugs.net/view.php?id=522.

4955   **Change Number: XSH/TC2/D4/0328** [640]

4956   On Page: 1912 Line: 60779-60780 Section: shmget()

4957   In the ERRORS section, change from:

4958   A shared memory identifier and associated shared memory segment shall be created, but the amount of
4959   available physical memory is not sufficient to fill the request.

4960   to:

4961   A shared memory identifier and associated shared memory segment are to be created, but the amount of
4962   available physical memory is not sufficient to fill the request.

4963   *Rationale*: Austin Group Defect Report(s) applied: 640. See http://austingroupbugs.net/view.php?id=640.

4964   **Change Number: XSH/TC2/D4/0329** [690]

4965   On Page: 1917 Line: 60935 Section: sigaction()
4966   (2013 edition Page: 1932 Line: 61931)

4967   In the DESCRIPTION section change from:

4968   SA_NOCLDWAIT: If set, and sig equals SIGCHLD, child processes of the calling processes shall not be
4969   transformed into zombie processes when they terminate. If the calling process subsequently waits for its
4970   children, and the process has no unwaited-for children that were transformed into zombie processes, it shall
4971   block until all of its children terminate, and *wait*(), *waitid*(), and *waitpid*() shall fail and set *errno* to
4972   [ECHILD]. Otherwise, terminating child processes shall be transformed into zombie processes, unless
4973   SIGCHLD is set to SIG_IGN.

4974   to:

4975   [XSI]SA_NOCLDWAIT: If sig does not equal SIGCHLD, the behavior is unspecified. Otherwise, the
4976   behavior of the SA_NOCLDWAIT flag is as specified under "Consequences of Process Termination" in the
4977   description of the *_Exit*() function on page 549.[/XSI]

4978   (Note the addition of XSI shading.)

4979   *Rationale*: Austin Group Defect Report(s) applied: 690. See http://austingroupbugs.net/view.php?id=690.

4980   **Change Number: XSH/TC2/D4/0330** [491]

4981   On Page: 1918 Line: 60981 Section: sigaction()

4982   In the ERRORS section, delete the [ENOTSUP] error:

4983   [ENOTSUP]

4984   The SA_SIGINFO bit flag is set in the *sa_flags* field of the **sigaction** structure.

4985   On Page: 1918 Line: 60985 Section: sigaction()
4986

4987   In the ERRORS section, change from:
4988

4989   In addition, the *sigaction*() function may fail if the SA_SIGINFO flag is set ...
4990

4991   to:
4992

4993   In addition, on systems that do not support the XSI option, the *sigaction*() function may fail if the
4994   SA_SIGINFO flag is set ...

4995   *Rationale*: Austin Group Defect Report(s) applied: 491. See http://austingroupbugs.net/view.php?id=491.

4996   **Change Number: XSH/TC2/D4/0331** [785]

4997   On Page: 1937 Line: 61615 Section: signal()

4998   In the DESCRIPTION section, delete the paragraph:

4999   Use of this function is unspecified in a multi-threaded process.

5000   *Rationale*: Austin Group Defect Report(s) applied: 785. See http://austingroupbugs.net/view.php?id=785.

5001   **Change Number: XSH/TC2/D4/0332** [844]

5002   On Page: 1944 Line: 61771 Section: sigqueue()
5003   (2013 edition Page: 1959 Line: 62775)

5004   In the SYNOPSIS section, change from:

5005   `const union sigval value`

5006   to:

5007   `union sigval value`

5008   *Rationale*: Austin Group Defect Report(s) applied: 844. See http://austingroupbugs.net/view.php?id=844.

5009   **Change Number: XSH/TC2/D4/0333** [815]

5010   On Page: 1951 Line: 61997 Section: sigtimedwait()

5011   In the DESCRIPTION section, change from:

5012   The *sigwaitinfo*() function shall be equivalent to the *sigwait*() function if the *info* argument is NULL. If the
5013   *info* argument is non-NULL, the *sigwaitinfo*() function shall be equivalent to *sigwait*(), except that the
5014   selected signal number ...

5015   to:

5016 The *sigwaitinfo*() function shall be equivalent to the *sigwait*() function, except that the return value and the
5017 error reporting method are different (see RETURN VALUE), and that if the *info* argument is non-NULL,
5018 the selected signal number ...

5019 *Rationale*: Austin Group Defect Report(s) applied: 815. See http://austingroupbugs.net/view.php?id=815.

5020 **Change Number: XSH/TC2/D4/0334** [625]

5021 On Page: 1963 Line: 62339 Section: sleep()

5022 In the DESCRIPTION section, add a new paragraph after the first paragraph:

5023 In single-threaded programs, *sleep*() may make use of SIGALRM. In multi-threaded programs, *sleep*() shall
5024 not make use of SIGALRM and the remainder of this DESCRIPTION does not apply.

5025 In the RATIONALE section on page 1963 line 62369 change from:

5026 This volume of POSIX.1-2008 permits either approach.

5027 to:

5028 This volume of POSIX.1-2008 permits either approach in single-threaded programs, but the simple
5029 alarm/suspend implementation is not appropriate for multi-threaded programs.

5030 On Page: 1964 Line: 62406 Section: sleep()

5031 In the FUTURE DIRECTIONS section, change from:

5032 None.

5033 to:

5034 A future version of this standard may require that *sleep*() does not make use of SIGALRM in all programs,
5035 not just multi-threaded programs.

5036 *Rationale*: Austin Group Defect Report(s) applied: 625. See http://austingroupbugs.net/view.php?id=625.

5037 **Change Number: XSH/TC2/D4/0335** [835]

5038 On Page: 1968 Line: 62491 Section: socket()
5039 (2013 edition Page: 1983 Line: 63518)

5040 After the text:

5041 ... return a file descriptor that can be used in later function calls that operate on sockets.

5042 add:

5043 The file descriptor shall be allocated as described in [xref to new section 2.14].

5044 *Rationale*: Austin Group Defect Report(s) applied: 835. See http://austingroupbugs.net/view.php?id=835.

5045   **Change Number: XSH/TC2/D4/0336** [835]

5046   On Page: 1970 Line: 62565 Section: socketpair()
5047   (2013 edition Page: 1985 Line: 63592)

5048   After the text:

5049   The file descriptors used in referencing the created sockets shall be returned in *socket_vector*[0] and
5050   *socket_vector*[1].

5051   add:

5052   The file descriptors shall be allocated as described in [xref to new section 2.14].

5053   *Rationale*: Austin Group Defect Report(s) applied: 835. See http://austingroupbugs.net/view.php?id=835.

5054   **Change Number: XSH/TC2/D4/0337** [483,835]

5055   On Page: 1970 Line: 62593 Section: socketpair()
5056   (2013 edition Page: 1985 Line: 63619)

5057   Change from:

5058   ... otherwise, -1 shall be returned and *errno* set to indicate the error.

5059   to:

5060   ... otherwise, -1 shall be returned and *errno* set to indicate the error, no file descriptors shall be allocated
5061   and the contents of *socket_vector* shall be left unmodified.

5062   *Rationale*: Austin Group Defect Report(s) applied: 483,835. See
5063   http://austingroupbugs.net/view.php?id=483.
5064   See http://austingroupbugs.net/view.php?id=835.

5065   **Change Number: XSH/TC2/D4/0338** [738]

5066   On Page: 1997 Line: 63203 Section: strdup()
5067   (2013 edition Page: 2012 Line: 64235)

5068   In the APPLICATION USAGE section, add a new paragraph at the end of the section:

5069   Implementations are free to *malloc*() a buffer containing either (*size* + 1) bytes or (*strlen*(*s*, *size*) + 1)
5070   bytes. Applications should not assume that *strndup*() will allocate (*size* + 1) bytes when *strlen*(*s*) is smaller
5071   than *size*.

5072   *Rationale*: Austin Group Defect Report(s) applied: 738. See http://austingroupbugs.net/view.php?id=738.

5073   **Change Number: XSH/TC2/D4/0339** [656]

5074   On Page: 1999 Line: 63237 Section: strerror()

5075   In the DESCRIPTION section, change from:

5076   The string pointed to shall not be modified by the application. The string may be overwritten by a
5077   subsequent call to *strerror*(). [CX]The string may be overwritten by a subsequent call to *strerror_l*() in the
5078   same thread.[/CX]

5079   to:

5080   The application shall not modify the string returned. [CX]The returned string pointer might be invalidated
5081   or[/CX] the string content might be overwritten by a subsequent call to *strerror*(), [CX]or by a subsequent
5082   call to *strerror_l*() in the same thread. The returned pointer and the string content might also be invalidated
5083   if the calling thread is terminated.[/CX]

5084   *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
5085   This item is a layered change on XSH/TC1/D5/0595 [75].

5086   The change is to add the following text to the end of the paragraph at 2013 edition P2014, L64269-64271:

5087   The returned pointer and the string content might also be invalidated if the calling thread is terminated.

5088   **Change Number: XSH/TC2/D4/0340** [584]

5089   On Page: 2007 Line: 63525 Section: strftime()

5090   In the DESCRIPTION section, change from:

5091   minus-sign character ('-')

5092   to:

5093   <hyphen-minus> character ('-')

5094   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

5095   **Change Number: XSH/TC2/D4/0341** [796]

5096   On Page: 2012 Line: 63745 Section: strftime()
5097   (2013 edition Page: 2027 Line: 64791)

5098   In the APPLICATION USAGE section, change from:

5099   In the C locale, the E and O modifiers are ignored and the replacement strings for the following

5100   to:

5101   In the C or POSIX locale, the E and O modifiers are ignored and the replacement strings for the following

5102   *Rationale*: Austin Group Defect Report(s) applied: 796. See http://austingroupbugs.net/view.php?id=796.

5103   **Change Number: XSH/TC2/D4/0342** [584]

5104   On Page: 2014 Line: 63807 Section: strftime()

5105   In the RATIONALE section, change from:

5106   leading minus-sign for %F,

5107   to:

5108   leading <hyphen-minus> for %F,

5109   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

5110   **Change Number: XSH/TC2/D4/0343** [584]

5111   On Page: 2014 Line: 63815 Section: strftime()

5112   In the RATIONALE section, change from:

5113   leading minus-sign ('-') when using %Y

5114   to:

5115   leading <hyphen-minus> ('-') when using %Y

5116   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

5117   **Change Number: XSH/TC2/D4/0344** [560]

5118   On Page: 2016 Line: 63886 Section: strlen()

5119   In the DESCRIPTION section, change from:

5120   the terminating NUL character

5121   to:

5122   any terminating NUL character

5123   On Page: 2016 Line: 63891 Section: strlen()

5124   In the RETURN VALUE section, change from:

5125   The *strnlen*() function shall return an integer containing the smaller of either the length of the string pointed
5126   to by *s* or *maxlen*.

5127   to:

5128   The *strnlen*() function shall return the number of bytes preceding the first null byte in the array to which *s*
5129   points, if *s* contains a null byte within the first *maxlen* bytes; otherwise, it shall return *maxlen*.

5130   *Rationale*: Austin Group Defect Report(s) applied: 560. See http://austingroupbugs.net/view.php?id=560.

5131   **Change Number: XSH/TC2/D4/0345** [920]

5132   On Page: 2026 Line: 64133 Section: strptime()
5133   (2013 edition Page: 2041 Line: 65181)

5134   In the DESCRIPTION section, change from:

5135   ... conversion specifier other than C, F, or Y.

5136   to:

5137   ... conversion specifier other than C or Y.

5138   *Rationale*: Austin Group Defect Report(s) applied: 920. See http://austingroupbugs.net/view.php?id=920.
5139   The standard states that the behavior of field widths is unspecified for conversions other than C, F, or Y,
5140   but does not specify an F conversion.

5141   **Change Number: XSH/TC2/D4/0346** [919]

5142   On Page: 2029 Line: 64233 Section: strptime()
5143   (2013 edition Page: 2044 Line: 65281)

5144   In the EXAMPLES section, change from:

5145   **Data-Plus-Time**

5146   to:

5147   **Date-Plus-Time**

5148   *Rationale*: Austin Group Defect Report(s) applied: 919. See http://austingroupbugs.net/view.php?id=919.

5149   **Change Number: XSH/TC2/D4/0347** [656]

5150   On Page: 2032 Line: 64344 Section: strsignal()

5151   In the DESCRIPTION section, change from:

5152   The string pointed to shall not be modified by the application, but may be overwritten by a subsequent call
5153   to *strsignal*() or *setlocale*().

5154   to:

5155   The application shall not modify the string returned. The returned pointer might be invalidated or the string
5156   content might be overwritten by a subsequent call to *strsignal*() or *setlocale*(). The returned pointer might
5157   also be invalidated if the calling thread is terminated.

5158   *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
5159   This item is a layered change on XSH/TC1/D5/0609 [75].

5160   The change is to add the following text to the end of the paragraph at 2013 edition P2047, L65392-65393:

5161   The returned pointer might also be invalidated if the calling thread is terminated.

5162   **Change Number: XSH/TC2/D4/0348** [584]

5163   On Page: 2036 Line: 64482 Section: strtod()

5164   In the DESCRIPTION section, change from:

5165   If the subject sequence begins with a minus-sign,

5166   to:

5167   If the subject sequence begins with a <hyphen-minus>,

5168   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

5169   **Change Number: XSH/TC2/D4/0349** [796]

5170   On Page: 2036 Line: 64495 Section: strtod()
5171   (2013 edition Page: 2051 Line: 65544)

5172   Change from:

5173   In other than the C [CX]or POSIX[/CX] locale[CX]s[/CX], other implementation-defined subject
5174   sequences may be

5175   to:

5176   In other than the C [CX]or POSIX[/CX] locale, additional locale-specific subject sequence forms may be

5177   *Rationale*: Austin Group Defect Report(s) applied: 796. See http://austingroupbugs.net/view.php?id=796.

5178   **Change Number: XSH/TC2/D4/0350** [878]

5179   On Page: 2040 Line: 64631-64633 Section: strtok()
5180   (2013 edition Page: 2056 Line: 65689-65691)

5181   In the SYNOPSIS section, change from:

```
5182   char *strtok(char *restrict s1, const char *restrict s2);
5183   char *strtok_r(char *restrict s, const char *restrict sep,
5184       char **restrict lasts);
```

5185   to:

```
5186   char *strtok(char *restrict s, const char *restrict sep);
5187   char *strtok_r(char *restrict s, const char *restrict sep,
5188       char **restrict state);
```

5189   On Page: 2040 Line: 64638-64650 Section: strtok()
5190   (2013 edition Page: 2056 Line: 65696-65708)

5191   In the second, third and fourth paragraphs of the DESCRIPTION section, replace all instances of *s1* with *s*
5192   and *s2* with *sep*.

5193   On Page: 2040 Line: 64656-64667 Section: strtok()
5194   (2013 edition Page: 2056 Line: 65714-65725)

5195   In the DESCRIPTION section, change from:

5196   The *strtok_r*() function considers the null-terminated string *s* as a sequence of zero or more text tokens
5197   separated by spans of one or more characters from the separator string *sep*. The argument *lasts* points to a
5198   user-provided pointer which points to stored information necessary for *strtok_r*() to continue scanning the
5199   same string.

5200   In the first call to *strtok_r*(), *s* points to a null-terminated string, *sep* to a null-terminated string of separator
5201   characters, and the value pointed to by *lasts* is ignored. The *strtok_r*() function shall return a pointer to the
5202   first character of the first token, write a null character into *s* immediately following the returned token, and
5203   update the pointer to which *lasts* points.

5204   In subsequent calls, *s* is a null pointer and *lasts* shall be unchanged from the previous call so that
5205   subsequent calls shall move through the string *s*, returning successive tokens until no tokens remain. The
5206   separator string *sep* may be different from call to call. When no token remains in *s*, a null pointer shall be
5207   returned.

5208   to:

5209   The *strtok_r*() function shall be equivalent to *strtok*(), except that *strtok_r*() shall be thread-safe and the
5210   argument *state* points to a user-provided pointer that allows *strtok_r*() to maintain state between calls which
5211   scan the same string. The application shall ensure that the pointer pointed to by *state* is unique for each
5212   string (*s*) being processed concurrently by *strtok_r*() calls. The application need not initialize the pointer
5213   pointed to by *state* to any particular value. The implementation shall not update the pointer pointed to by
5214   *state* to point (directly or indirectly) to resources, other than within the string *s*, that need to be freed or
5215   released by the caller.

5216   On Page: 2041 Line: 64704 Section: strtok()
5217   (2013 edition Page: 2057 Line: 65766)

5218   In the APPLICATION USAGE section, insert a new paragraph:

5219   Note that if *sep* is the empty string, *strtok*() and *strtok_r*() return a pointer to the remainder of the string
5220   being tokenized.

5221   *Rationale*: Austin Group Defect Report(s) applied: 878. See http://austingroupbugs.net/view.php?id=878.
5222   The behavior of *strtok_r*() with an empty *sep* is unclear.

5223   **Change Number: XSH/TC2/D4/0351** [892]

5224   On Page: 2043 Line: 64737 Section: strtol()
5225   (2013 edition Page: 2059 Line: 65800)

5226   In the SYNOPSIS section, change from:

```
5227    long strtol(const char *restrict str, char **restrict endptr, int base);
5228    long long strtoll(const char *restrict str, char **restrict endptr,
5229        int base)
```

5230   to:

```
5231    long strtol(const char *restrict nptr, char **restrict endptr, int base);
5232    long long strtoll(const char *restrict nptr, char **restrict endptr,
5233        int base)
```

5234

5235   On Page: 2043 Line: 64744 Section: strtol()
5236   (2013 edition Page: 2059 Line: 65807)

5237   In the DESCRIPTION section, change from:

5238   These functions shall convert the initial portion of the string pointed to by *str* ...

5239   to:

5240   These functions shall convert the initial portion of the string pointed to by *nptr* ...

5241   *Rationale*: Austin Group Defect Report(s) applied: 892. See http://austingroupbugs.net/view.php?id=892.

5242   **Change Number: XSH/TC2/D4/0352** [584]

5243   On Page: 2043 Line: 64772 Section: strtol()

5244   In the DESCRIPTION section, change from:

5245   begins with a minus-sign,

5246   to:

5247   begins with a <hyphen-minus>,

5248   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

5249   **Change Number: XSH/TC2/D4/0353** [796]

5250   On Page: 2043 Line: 64775 Section: strtol()
5251   (2013 edition Page: 2059 Line: 65838)

5252   In the DESCRIPTION section, change from:

5253   In other than the C [CX]or POSIX[/CX] locale[CX]s[/CX], other implementation-defined subject
5254   sequences may be

5255   to:

5256   In other than the C [CX]or POSIX[/CX] locale, additional locale-specific subject sequence forms may be

5257   *Rationale*: Austin Group Defect Report(s) applied: 796. See http://austingroupbugs.net/view.php?id=796.

5258   **Change Number: XSH/TC2/D4/0354** [892]

5259   On Page: 2044 Line: 64778 Section: strtol()
5260   (2013 edition Page: 2060 Line: 65841)

5261   In the DESCRIPTION section, change from:

5262 ... the value of *str* is stored ...

5263 to:

5264 ... the value of *nptr* shall be stored ...

5265 *Rationale*: Austin Group Defect Report(s) applied: 892. See http://austingroupbugs.net/view.php?id=892.
5266 This item is a layered change on XSH/TC1/D5/0616 [453].

5267 **Change Number: XSH/TC2/D4/0355** [584]

5268 On Page: 2048 Line: 64876 Section: strtoul()

5269 In the DESCRIPTION section, change from:

5270 begins with a minus-sign,

5271 to:

5272 begins with a <hyphen-minus>,

5273 *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

5274 **Change Number: XSH/TC2/D4/0356** [796]

5275 On Page: 2049 Line: 64879 Section: strtoul()
5276 (2013 edition Page: 2065 Line: 65950)

5277 In the DESCRIPTION section, change from:

5278 In other than the C [CX]or POSIX[/CX] locale[CX]s[/CX], other implementation-defined subject
5279 sequences may be

5280 to:

5281 In other than the C [CX]or POSIX[/CX] locale, additional locale-specific subject sequence forms may be

5282 *Rationale*: Austin Group Defect Report(s) applied: 796. See http://austingroupbugs.net/view.php?id=796.

5283 **Change Number: XSH/TC2/D4/0357** [873]

5284 On Page: 2057 Line: 65044 Section: symlink()
5285 (2013 edition Page: 2073 Line: 66122)

5286 In the NAME section, delete:

5287 relative to directory file descriptor

5288 *Rationale*: Austin Group Defect Report(s) applied: 873. See http://austingroupbugs.net/view.php?id=873.

5289

5290   **Change Number: XSH/TC2/D4/0358** [591]

5291   On Page: 2057 Line: 65048 Section: symlink()

5292   Before the symlinkat SYNOPSIS line, insert a line with OH shading:

5293   `#include <fcntl.h>`

5294   *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

5295   **Change Number: XSH/TC2/D4/0359** [641]

5296   On Page: 2057 Line: 65053 Section: symlink()

5297   In the DESCRIPTION section, change from:

5298   The string pointed to by *path1* shall be treated only as a character string and shall not be validated as a
5299   pathname.

5300   to:

5301   The string pointed to by *path1* shall be treated only as a string and shall not be validated as a pathname.

5302   *Rationale*: Austin Group Defect Report(s) applied: 641. See http://austingroupbugs.net/view.php?id=641.

5303   **Change Number: XSH/TC2/D4/0360** [817]

5304   On Page: 2057 Line: 65073 Section: symlink()
5305   (2013 edition Page: 2073 Line: 66152)

5306   In the DESCRIPTION section, change from:

5307   If the file descriptor was opened without O_SEARCH, the function shall check whether directory searches
5308   are permitted using the current permissions of the directory underlying the file descriptor. If the file
5309   descriptor was opened with O_SEARCH, the function shall not perform the check.

5310   to:

5311   If the access mode of the open file description associated with the file descriptor is not O_SEARCH, the
5312   function shall check whether directory searches are permitted using the current permissions of the directory
5313   underlying the file descriptor. If the access mode is O_SEARCH, the function shall not perform the check.

5314   *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

5315   **Change Number: XSH/TC2/D4/0361** [822]

5316   On Page: 2058 Line: 65096 Section: symlink()

5317   In the RETURN VALUE section, add after the [ENOENT] error:

5318   [ENOENT] or [ENOTDIR]

5319   The *path2* argument contains at least one non-<slash> character and ends with one or more
5320   trailing <slash> characters. If *path2* without the trailing <slash> characters would name an
5321   existing file, an [ENOENT] error shall not occur.

5322   *Rationale*: Austin Group Defect Report(s) applied: 822. See http://austingroupbugs.net/view.php?id=822.

5323   **Change Number: XSH/TC2/D4/0362** [817]

5324   On Page: 2058 Line: 65105 Section: symlink()
5325   (2013 edition Page: 2074 Line: 66185)

5326   In the ERRORS section, for the [EACCES] error, change from:

5327   *fd* was not opened with O_SEARCH and ...

5328   to:

5329   The access mode of the open file description associated with *fd* is not O_SEARCH and ...

5330   *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

5331   **Change Number: XSH/TC2/D4/0363** [591]

5332   On Page: 2059 Line: 65140 Section: symlink()

5333   Add a reference to <fcntl.h> to the SEE ALSO list.

5334   *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

5335   **Change Number: XSH/TC2/D4/0364** [752]

5336   On Page: 2063 Line: 65302-65317 Section: sysconf()

5337   In the DESCRIPTION section, move lines 65302-65317 (_SC_PAGE_SIZE to _SC_TZNAME_MAX) to
5338   before line 65224 (_SC_ADVISORY_INFO).

5339   *Rationale*: Austin Group Defect Report(s) applied: 752. See http://austingroupbugs.net/view.php?id=752.
5340   By moving these lines the table will have a block of variables with no underscore, a block of _POSIX_*
5341   variables, a block of _POSIX2_* variables, and a block of _XOPEN_* variables, with each block sorted by
5342   the _SC_* names.

5343   **Change Number: XSH/TC2/D4/0365** [627]

5344   On Page: 2072 Line: 65661 Section: system()

5345   In the RATIONALE section, add a new paragraph:

5346   Note also that the above example implementation is not thread-safe. Implementations can provide a thread-
5347   safe *system*() function, but doing so involves complications such as how to restore the signal dispositions
5348   for SIGINT and SIGQUIT correctly if there are overlapping calls, and how to deal with cancellation. The
5349   example above would not restore the signal dispositions and would leak a process ID if cancelled. This

5350   does not matter for a non-thread-safe implementation since cancelling a non-thread-safe function results in
5351   undefined behavior (see [xref to 2.9.5.2]). To avoid leaking a process ID, a thread-safe implementation
5352   would need to terminate the child process when acting on a cancellation.

5353   *Rationale*: Austin Group Defect Report(s) applied: 627. See http://austingroupbugs.net/view.php?id=627.
5354   The system() function is not required to be thread-safe, yet the standard requires a cancellation point to
5355   occur when executing it.

5356   **Change Number: XSH/TC2/D4/0366** [551]

5357   On Page: 2097 Line: 66353 Section: tdelete()

5358   In the DESCRIPTION section, after the sentence:

5359   The variable pointed to by *rootp* shall be changed if the deleted node was the root of the tree.

5360   add a new sentence:

5361   If the deleted node was the root of the tree and had no children, the variable pointed to by *rootp* shall be set
5362   to a null pointer.

5363   On Page: 2098 Line: 66392-66446 Section: tdelete()

5364   In the EXAMPLES section, replace the example program with:

```
5365    #include <limits.h>
5366    #include <search.h>
5367    #include <stdlib.h>
5368    #include <string.h>
5369    #include <stdio.h>
5370
5371    struct element {        /* Pointers to these are stored in the tree. */
5372        int     count;
5373        char    string[];
5374    };
5375
5376    void  *root = NULL;          /* This points to the root. */
5377
5378    int main(void)
5379    {
5380        char    str[_POSIX2_LINE_MAX+1];
5381        int     length = 0;
5382        struct element *elementptr;
5383        void    *node;
5384        void    print_node(const void *, VISIT, int);
5385        int     node_compare(const void *, const void *),
5386                delete_root(const void *, const void *);
5387
5388        while (fgets(str, sizeof(str), stdin))  {
5389            /* Set element. */
5390            length = strlen(str);
5391            if (str[length-1] == '\n')
5392                str[--length] = '\0';
5393            elementptr = malloc(sizeof(struct element) + length + 1);
5394            strcpy(elementptr->string, str);
5395            elementptr->count = 1;
5396            /* Put element into the tree. */
```

```
5397            node = tsearch((void *)elementptr, &root, node_compare);
5398            if (node == NULL) {
5399                fprintf(stderr,
5400                        "tsearch: Not enough space available\n");
5401                exit(EXIT_FAILURE);
5402            }
5403            else if (*(struct element **)node != elementptr) {
5404                /* A node containing the element already exists */
5405                (*(struct element **)node)->count++;
5406                free(elementptr);
5407            }
5408        }
5409        twalk(root, print_node);
5410
5411        /* Delete all nodes in the tree */
5412        while (root != NULL) {
5413            elementptr = *(struct element **)root;
5414            printf("deleting node: string = %s,  count = %d\n",
5415                    elementptr->string,
5416                    elementptr->count);
5417            tdelete((void *)elementptr, &root, delete_root);
5418            free(elementptr);
5419        }
5420
5421        return 0;
5422    }
5423
5424    /*
5425     *  This routine compares two nodes, based on an
5426     *  alphabetical ordering of the string field.
5427     */
5428    int
5429    node_compare(const void *node1, const void *node2)
5430    {
5431        return strcmp(((const struct element *) node1)->string,
5432            ((const struct element *) node2)->string);
5433    }
5434
5435    /*
5436     *  This comparison routine can be used with tdelete()
5437     *  when explicitly deleting a root node, as no comparison
5438     *  is necessary.
5439     */
5440    int
5441    delete_root(const void *node1, const void *node2)
5442    {
5443        return 0;
5444    }
5445
5446    /*
5447     *  This routine prints out a node, the second time
5448     *  twalk encounters it or if it is a leaf.
5449     */
5450    void
5451    print_node(const void *ptr, VISIT order, int level)
5452    {
5453        const struct element *p = *(const struct element **) ptr;
5454
5455        if (order == postorder || order == leaf)  {
5456            (void) printf("string = %s,  count = %d\n",
5457                p->string, p->count);
5458        }
```

5459   }

5460   On Page: 2099 Line: 66450 Section: tdelete()

5461   In the APPLICATION USAGE section, change from:

5462   The *tsearch*() function uses

5463   to:

5464   The *twalk*() function uses

5465   *Rationale*: Austin Group Defect Report(s) applied: 551. See http://austingroupbugs.net/view.php?id=551.

5466   **Change Number: XSH/TC2/D4/0367** [604]

5467   On Page: 2105 Line: 66587-66604 Section: tgamma()

5468   In the DESCRIPTION section, at line 66587 change from:

5469   These functions shall compute the *gamma*() function of *x*.

5470   to:

5471   These functions shall compute $\Gamma(x)$ where $\Gamma(x)$ is defined as $\int_{0}^{\infty} e^{-t} t^{x-1} dt$.

5472   In the RETURN VALUE section, at line 66593 change from:

5473   shall return *Gamma*(*x*).

5474   to:

5475   shall return the gamma of *x*.

5476   Before line 66604 insert a new paragraph, shaded MXX:

5477   If *x* is subnormal and $1/x$ is representable, $1/x$ should be returned.

5478   *Rationale*: Austin Group Defect Report(s) applied: 604. See http://austingroupbugs.net/view.php?id=604.

5479   **Change Number: XSH/TC2/D4/0368** [630]

5480   On Page: 2106 Line: 66639 Section: tgamma()

5481   In the APPLICATION USAGE section, delete:

5482   For IEEE Std 754-1985 **double**, overflow happens when $0 < x < 1/DBL\_MAX$, and $171.7 < x$.

5483   *Rationale*: Austin Group Defect Report(s) applied: 630. See http://austingroupbugs.net/view.php?id=630.

IEEE Std 1003.1™-2008/Cor 2-2016
IEEE Standard for Information Technology—Portable Operating System Interface (POSIX®)
Base Specifications, Issue 7—Technical Corrigendum 2

5484   **Change Number: XSH/TC2/D4/0369** [659]

5485   On Page: 2113 Line: 66876 Section: timer_delete()

5486   In the DESCRIPTION section, add a new paragraph to the end of the section:

5487   The behavior is undefined if the value specified by the *timerid* argument does not correspond to a timer ID
5488   returned by *timer_create*() but not yet deleted by *timer_delete*().

5489   On Page: 2113 Line: 66881-66882 Section: timer_delete()

5490   In the ERRORS section, replace the entire section with:

5491   No errors are defined.

5492   On Page: 2113 Line: 66888 Section: timer_delete()

5493   In the RATIONALE section, change from:

5494   None.

5495   to:

5496   If an implementation detects that the value specified by the *timerid* argument to *timer_delete*() does not
5497   correspond to a timer ID returned by *timer_create*() but not yet deleted by *timer_delete*(), it is
5498   recommended that the function should fail and report an [EINVAL] error.

5499   *Rationale*: Austin Group Defect Report(s) applied: 659. See http://austingroupbugs.net/view.php?id=659.

5500   **Change Number: XSH/TC2/D4/0370** [659]

5501   On Page: 2115 Line: 66956 Section: timer_getoverrun()

5502   In the DESCRIPTION section, add a new paragraph to the end of the section:

5503   The behavior is undefined if the value specified by the *timerid* argument to *timer_getoverrun*(),
5504   *timer_gettime*(), or *timer_settime*() does not correspond to a timer ID returned by *timer_create*() but not yet
5505   deleted by *timer_delete*().

5506   On Page: 2115 Line: 66968-66970 Section: timer_getoverrun()

5507   In the ERRORS section, delete:

5508   These functions may fail if:

5509   [EINVAL] The *timerid* argument does not correspond to an ID returned by *timer_create*() but not yet
5510   deleted by *timer_delete*().

5511   On Page: 2116 Line: 66997 Section: timer_getoverrun()

5512   In the RATIONALE section, add a new paragraph to the end of the section:

5513 If an implementation detects that the value specified by the *timerid* argument to *timer_getoverrun*(),
5514 *timer_gettime*(), or *timer_settime*() does not correspond to a timer ID returned by *timer_create*() but not yet
5515 deleted by *timer_delete*(), it is recommended that the function should fail and report an [EINVAL] error.

5516 *Rationale*: Austin Group Defect Report(s) applied: 659. See http://austingroupbugs.net/view.php?id=659.

5517 **Change Number: XSH/TC2/D4/0371** [644]

5518 On Page: 2117 Line: 67056 Section: times()

5519 In the ERRORS section, change from:

5520 No errors are defined.

5521 to:

5522 The *times*() function shall fail if:

5523 [EOVERFLOW] The return value would overflow the range of **clock_t**.

5524 *Rationale*: Austin Group Defect Report(s) applied: 644. See http://austingroupbugs.net/view.php?id=644.

5525 **Change Number: XSH/TC2/D4/0372** [678]

5526 On Page: 2121 Line: 67134 Section: tmpfile()

5527 In the DESCRIPTION section, change from:

5528 The *tmpfile*() function shall create a temporary file and open a corresponding stream. The file shall be
5529 automatically deleted when all references to the file are closed. The file is opened as in *fopen*() for update
5530 (*w+*), except that implementations may restrict the permissions, either by clearing the file mode bits or
5531 setting them to the value S_IRUSR | S_IWUSR.

5532 to:

5533 The *tmpfile*() function shall create a temporary file and open a corresponding stream. The file shall be
5534 automatically deleted when all references to the file are closed. The file shall be opened as in *fopen*() for
5535 update (*wb+*), except that implementations may restrict the permissions, either by clearing the file mode
5536 bits or setting them to the value S_IRUSR | S_IWUSR.

5537 *Rationale*: Austin Group Defect Report(s) applied: 678. See http://austingroupbugs.net/view.php?id=678.

5538 **Change Number: XSH/TC2/D4/0373** [685]

5539 On Page: 2131 Line: 67438 Section: towlower()

5540 In the DESCRIPTION section, change from:

5541 a wide-character code corresponding to a valid character in the current locale

5542 to:

5543   a wide-character code corresponding to a valid character in the locale used by the function

5544   *Rationale*: Austin Group Defect Report(s) applied: 685. See http://austingroupbugs.net/view.php?id=685.

5545   **Change Number: XSH/TC2/D4/0374** [685]

5546   On Page: 2133 Line: 67487 Section: towupper()

5547   In the DESCRIPTION section, change from:

5548   a wide-character code corresponding to a valid character in the current locale

5549   to:

5550   a wide-character code corresponding to a valid character in the locale used by the function

5551   *Rationale*: Austin Group Defect Report(s) applied: 685. See http://austingroupbugs.net/view.php?id=685.

5552   **Change Number: XSH/TC2/D4/0375** [489]

5553   On Page: 2136 Line: 67570 Section: truncate()

5554   In the DESCRIPTION, change from:

5555   Upon successful completion, if the file size is changed, *truncate*() shall mark for update the last data
5556   modification and last file status change timestamps of the file, and the S_ISUID and S_ISGID bits of the
5557   file mode may be cleared.

5558   to:

5559   Upon successful completion, *truncate*() shall mark for update the last data modification and last file status
5560   change timestamps of the file, and the S_ISUID and S_ISGID bits of the file mode may be cleared.

5561   *Rationale*: Austin Group Defect Report(s) applied: 489. See http://austingroupbugs.net/view.php?id=489.

5562   **Change Number: XSH/TC2/D4/0376** [656]

5563   On Page: 2140 Line: 67654 Section: ttyname()

5564   In the DESCRIPTION section, change from:

5565   The return value may point to static data whose content is overwritten by each call.

5566   to:

5567   The application shall not modify the string returned. The returned pointer might be invalidated or the string
5568   content might be overwritten by a subsequent call to *ttyname*(). The returned pointer and the string content
5569   might also be invalidated if the calling thread is terminated.

5570   *Rationale*: Austin Group Defect Report(s) applied: 656. See http://austingroupbugs.net/view.php?id=656.
5571   This item is a layered change on XSH/TC1/D5/0065 [75,428].

5572   The change is to add the following text to the end of the paragraph at 2013 edition P2159, L68808-68810:

5573   The returned pointer and the string content might also be invalidated if the calling thread is terminated.

5574   **Change Number: XSH/TC2/D4/0377** [880]

5575   On Page: 2143 Line: 67732 Section: tzset()
5576   (2013 edition Page: 2162 Line: 68888)

5577   In the DESCRIPTION section, add a new paragraph to the end of the section:

5578   If a thread accesses *tzname*, [XSI]*daylight*, or *timezone*[/XSI] directly while another thread is in a call to
5579   *tzset*(), or to any function that is required or allowed to set timezone information as if by calling *tzset*(), the
5580   behavior is undefined.

5581   On Page: 2143 Line: 67747 Section: tzset()
5582   (2013 edition Page: 2162 Line: 68903)

5583   In the APPLICATION USAGE section, change from:

5584   None.

5585   to:

5586   Since the *ctime*(), *localtime*(), *mktime*(), *strftime*() and *strftime_l*() functions are required to set timezone
5587   information as if by calling *tzset*(), there is no need for an explicit *tzset*() call before using these functions.
5588   However, portable applications should call *tzset*() explicitly before using *ctime_r*() or *localtime_r*() because
5589   setting timezone information is optional for those functions.

5590   *Rationale*: Austin Group Defect Report(s) applied: 880. See http://austingroupbugs.net/view.php?id=880.

5591   **Change Number: XSH/TC2/D4/0378** [873]

5592   On Page: 2154 Line: 68001 Section: unlink()
5593   (2013 edition Page: 2174 Line: 69164)

5594   In the NAME section, delete:

5595   relative to directory file descriptor

5596   *Rationale*: Austin Group Defect Report(s) applied: 873. See http://austingroupbugs.net/view.php?id=873.

5597   **Change Number: XSH/TC2/D4/0379** [591]

5598   On Page: 2154 Line: 68005 Section: unlink()

5599   Before the unlinkat SYNOPSIS line, insert a line with OH shading:

5600   #include <fcntl.h>

5601   *Rationale*: Austin Group Defect Report(s) applied: 591. See http://austingroupbugs.net/view.php?id=591.

5602   **Change Number: XSH/TC2/D4/0380** [817]

5603   On Page: 2154 Line: 68023 Section: unlink()
5604   (2013 edition Page: 2174 Line: 69186)

5605   In the DESCRIPTION section, change from:

5606   If the file descriptor was opened without O_SEARCH, the function shall check whether directory searches
5607   are permitted using the current permissions of the directory underlying the file descriptor. If the file
5608   descriptor was opened with O_SEARCH, the function shall not perform the check.

5609   to:

5610   If the access mode of the open file description associated with the file descriptor is not O_SEARCH, the
5611   function shall check whether directory searches are permitted using the current permissions of the directory
5612   underlying the file descriptor. If the access mode is O_SEARCH, the function shall not perform the check.

5613   *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

5614   **Change Number: XSH/TC2/D4/0381** [817]

5615   On Page: 2155 Line: 68063 Section: unlink()
5616   (2013 edition Page: 2175 Line: 69227)

5617   In the ERRORS section, for the [EACCES] error, change from:

5618   *fd* was not opened with O_SEARCH and ...

5619   to:

5620   The access mode of the open file description associated with *fd* is not O_SEARCH and ...

5621   *Rationale*: Austin Group Defect Report(s) applied: 817. See http://austingroupbugs.net/view.php?id=817.

5622   **Change Number: XSH/TC2/D4/0382** [582]

5623   On Page: 2162 Line: 68286 Section: uselocale()

5624   Replace the DESCRIPTION, RETURN VALUE, and ERRORS sections with:

5625   **DESCRIPTION**

5626   The *uselocale*() function shall set or query the current locale for the calling thread.

5627   The value for the *newloc* argument shall be one of the following:

5628   1. A value returned by the *newlocale*() or *duplocale*() functions
5629   2. The special locale object descriptor LC_GLOBAL_LOCALE
5630   3. (**locale_t**)0

5631   If the *newloc* argument is (**locale_t**)0, the current locale shall not be changed; this value can

5632   be used to query the current locale setting. If the *newloc* argument is
5633   LC_GLOBAL_LOCALE, any thread- local locale for the calling thread shall be uninstalled;
5634   the thread shall again use the global locale as the current locale, and changes to the global
5635   locale shall affect the thread. Otherwise, the locale represented by *newloc* shall be installed as
5636   a thread-local locale to be used as the current locale for the calling thread.

5637   Once the *uselocale*() function has been called to install a thread-local locale, the behavior of
5638   every interface using data from the current locale shall be affected for the calling thread. The
5639   current locale for other threads shall remain unchanged.

5640   **RETURN VALUE**

5641   Upon successful completion, the *uselocale*() function shall return a handle for the thread-
5642   local locale that was in use as the current locale for the calling thread on entry to the function,
5643   or LC_GLOBAL_LOCALE if no thread-local locale was in use. Otherwise, *uselocale*() shall
5644   return (**locale_t**)0 and set *errno* to indicate the error.

5645   **ERRORS**

5646   The *uselocale*() function may fail if:

5647   [EINVAL]
5648   *newloc* is not a valid locale object and is not (**locale_t**)0.

5649   *Rationale*: Austin Group Defect Report(s) applied: 582. See http://austingroupbugs.net/view.php?id=582.

5650   **Change Number: XSH/TC2/D4/0383** [873]

5651   On Page: 2166 Line: 68405 Section: utimensat()
5652   (2013 edition Page: 2187 Line: 69579)

5653   In the NAME section, delete:

5654   relative to directory file descriptor

5655   *Rationale*: Austin Group Defect Report(s) applied: 873. See http://austingroupbugs.net/view.php?id=873.

5656   **Change Number: XSH/TC2/D4/0384** [690]

5657   On Page: 2181 Line: 68666 Section: wait()
5658   (2013 edition Page: 2203 Line: 69847)

5659   In the DESCRIPTION section change from:

5660   The *wait*() and *waitpid*() functions shall obtain status information pertaining to one of the caller's child
5661   processes. Various options permit status information to be obtained for child processes that have terminated
5662   or stopped. If status information is available for two or more child processes, the order in which their status
5663   is reported is unspecified.
5664
5665   The *wait*() function shall suspend execution of the calling thread until status information for one of the
5666   terminated child processes of the calling process is available, or until delivery of a signal whose action is
5667   either to execute a signal-catching function or to terminate the process. If more than one thread is

5668 suspended in *wait*() or *waitpid*() awaiting termination of the same process, exactly one thread shall return
5669 the process status at the time of the target process termination. If status information is available prior to the
5670 call to *wait*(), return shall be immediate.

5671 to:

5672 The *wait*() and *waitpid*() functions shall obtain status information (see XSH Section 2.13) pertaining to one
5673 of the caller's child processes. The *wait*() function obtains status information for process termination from
5674 any child process. The *waitpid*() function obtains status information for process termination, and optionally
5675 process stop and/or continue, from a specified subset of the child processes.
5676
5677 The *wait*() function shall cause the calling thread to become blocked until status information generated by
5678 child process termination is made available to the thread, or until delivery of a signal whose action is either
5679 to execute a signal-catching function or to terminate the process, or an error occurs. If termination status
5680 information is available prior to the call to *wait*(), return shall be immediate. If termination status
5681 information is available for two or more child processes, the order in which their status is reported is
5682 unspecified.
5683
5684 As described in XSH Section 2.13, the *wait*() and *waitpid*() functions consume the status information they
5685 obtain.
5686
5687 The behavior when multiple threads are blocked in *wait*(), *waitid*(), or *waitpid*() is described in XSH
5688 Section 2.13.

5689 On Page: 2181 Line: 68700-68703 Section: wait()
5690 (2013 edition Page: 2203 Line: 69881-69884)

5691 In the DESCRIPTION section, delete:

5692 [XSI]If the calling process has SA_NOCLDWAIT set or has SIGCHLD set to SIG_IGN, and the process
5693 has no unwaited-for children that were transformed into zombie processes, the calling thread shall block
5694 until all of the children of the process containing the calling thread terminate, and *wait*() and *waitpid*() shall
5695 fail and set *errno* to [ECHILD].[/XSI]

5696 *Rationale*: Austin Group Defect Report(s) applied: 690. See http://austingroupbugs.net/view.php?id=690.

5697 **Change Number: XSH/TC2/D4/0385** [691]

5698 On Page: 2183 Line: 68748-68751,68755-68758 Section: wait()
5699 (2013 Edition Page: 2205 Line: 69929-69932,69936-69939)

5700 In the DESCRIPTION section, change the XSI shading on the first and third paragraphs on the page to
5701 completely enclose those paragraphs.

5702 Remove the reference to wait() in the third paragraph, changing it to:

5703 If the information pointed to by *stat_loc* was stored by a call to *waitpid*() that did not specify the
5704 WUNTRACED flag and specified the WCONTINUED flag, exactly one of the macros
5705 WIFEXITED(*stat_loc*), WIFSIGNALED(*stat_loc*), and WIFCONTINUED(*stat_loc*) shall evaluate to a
5706 non-zero value.

5707 *Rationale*: Austin Group Defect Report(s) applied: 691. See http://austingroupbugs.net/view.php?id=691.

5708   **Change Number: XSH/TC2/D4/0386** [690]

5709   On Page: 2186 Line: 68926 Section: wait()

5710   In the APPLICATION USAGE section, add a new paragraph at the end of the section:

5711   [XSI]As specified under "Consequences of Process Termination" in the description of the *_Exit*() function
5712   on page 549, if the calling process has SA_NOCLDWAIT set or has SIGCHLD set to SIG_IGN, then the
5713   termination of a child process will not cause status information to become available to a thread blocked in
5714   *wait*(), *waitid*(), or *waitpid*(). Thus, a thread blocked in one of the wait functions will remain blocked unless
5715   some other condition causes the thread to resume execution (such as an [ECHILD] failure due to no
5716   remaining children in the set of waited-for children).[/XSI]

5717   *Rationale*: Austin Group Defect Report(s) applied: 690. See http://austingroupbugs.net/view.php?id=690.

5718   **Change Number: XSH/TC2/D4/0387** [690]

5719   On Page: 2190 Line: 69058 Section: waitid()
5720   (2013 edition Page: 2212 Line: 70244)

5721   In the DESCRIPTION section, change from:

5722   The *waitid*() function shall suspend the calling thread until one child of the process containing the calling
5723   thread changes state. It records the current state of a child in the structure pointed to by infop. The fields of
5724   the structure pointed to by infop are filled in as described for the SIGCHLD signal in <signal.h>. If a child
5725   process changed state prior to the call to *waitid*(), *waitid*() shall return immediately. If more than one thread
5726   is suspended in *wait*(), *waitid*(), or *waitpid*() waiting for termination of the same process, exactly one thread
5727   shall return the process status at the time of the target process termination.

5728   to:

5729   The *waitid*() function shall obtain status information (see XSH Section 2.13) pertaining to termination,
5730   stop, and/or continue events in one of the caller's child processes.
5731
5732   The *waitid*() function shall cause the calling thread to become blocked until an error occurs or status
5733   information becomes available to the calling thread that satisfies all of the following properties ("matching
5734   status information"):

5735   • The status information is from one of the child processes in the set of child processes specified by
5736   the idtype and id arguments.
5737   • The state change in the status information matches one of the state change flags set in the options
5738   argument.
5739   If matching status information is available prior to the call to *waitid*(), return shall be immediate. If
5740   matching status information is available for two or more child processes, the order in which their status is
5741   reported is unspecified.
5742
5743   As described in XSH Section 2.13, the *waitid*() function consumes the status information it obtains unless
5744   the WNOWAIT flag is set in the options argument.
5745
5746   The behavior when multiple threads are blocked in *wait*(), *waitid*(), or *waitpid*() is described in XSH
5747   Section 2.13.
5748
5749   The *waitid*() function shall record the obtained status information in the structure pointed to by infop. The

5750 fields of the structure pointed to by infop shall be filled in as described under "Pointer to a Function" in
5751 Section 2.4.3 on page 492.

5752 On Page: 2191 Line: 69101 Section: waitid()

5753 In the APPLICATION USAGE section, add a new paragraph at the end of the section:

5754 [XSI]As specified under "Consequences of Process Termination" in the description of the _Exit() function
5755 on page 549, if the calling process has SA_NOCLDWAIT set or has SIGCHLD set to SIG_IGN, then the
5756 termination of a child process will not cause status information to become available to a thread blocked in
5757 *wait*(), *waitid*(), or *waitpid*(). Thus, a thread blocked in one of the wait functions will remain blocked unless
5758 some other condition causes the thread to resume execution (such as an [ECHILD] failure due to no
5759 remaining children in the set of waited-for children).[/XSI]

5760 *Rationale*: Austin Group Defect Report(s) applied: 690. See http://austingroupbugs.net/view.php?id=690.

5761 **Change Number: XSH/TC2/D4/0388** [73]

5762 On Page: 2207 Line: 69521 Section: wcsftime()

5763 In the DESCRIPTION section, change from:

5764 • The argument format is a wide-character string and the conversion specifications are replaced by
5765 corresponding sequences of wide characters.

5766 to:

5767 • The argument format is a wide-character string and the conversion specifications are replaced by
5768 corresponding sequences of wide characters. It is unspecified whether an encoding error occurs if
5769 the format string contains **wchar_t** values that do not correspond to members of the character set
5770 of the current locale.

5771 *Rationale*: Austin Group Defect Report(s) applied: 73. See http://austingroupbugs.net/view.php?id=73.
5772
5773 A clarification has been made in the C11 standard.

5774 **Change Number: XSH/TC2/D4/0389** [740]

5775 On Page: 2207 Line: 69521 Section: wcsftime()
5776 (2013 edition Page: 2229 Line: 70726)

5777 In the DESCRIPTION section, add a new bullet item before the final bullet item:

5778 [CX]Field widths specify the number of wide characters instead of the number of bytes.[/CX]

5779 *Rationale*: Austin Group Defect Report(s) applied: 740. See http://austingroupbugs.net/view.php?id=740.

5780

5781   **Change Number: XSH/TC2/D4/0390** [560]

5782   On Page: 2209 Line: 69562-69569 Section: wcslen()

5783   In the DESCRIPTION section, on lines 69562 and 69565 change from:

5784   string

5785   to:

5786   array

5787   On line 69563 change from:

5788   the terminating null wide-character code

5789   to:

5790   any terminating null wide-character code.

5791   In the RETURN VALUE section, on line 69568 change from:

5792   The *wcsnlen*() function shall return an integer containing the smaller of either the length of the wide-
5793   character string pointed to by *ws* or *maxlen*.

5794   to:

5795   The *wcsnlen*() function shall return the number of wide characters preceding the first null wide character
5796   code in the array to which *ws* points, if *ws* contains a null wide character code within the first *maxlen* wide
5797   characters; otherwise, it shall return *maxlen*.

5798   *Rationale*: Austin Group Defect Report(s) applied: 560. See http://austingroupbugs.net/view.php?id=560.

5799   **Change Number: XSH/TC2/D4/0391** [584]

5800   On Page: 2224 Line: 69979 Section: wcstod()

5801   In the DESCRIPTION section, change from:

5802   minus-sign, the sequence shall be interpreted as negated.

5803   to:

5804   <hyphen-minus>, the sequence shall be interpreted as negated.

5805   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

5806

5807 **Change Number: XSH/TC2/D4/0392** [796]

5808 On Page: 2224 Line: 69991 Section: wcstod()
5809 (2013 edition Page: 2246 Line: 71199)

5810 Change from:

5811 In other than the C [CX]or POSIX[/CX] locale[CX]s[/CX], other implementation-defined subject
5812 sequences may be

5813 to:

5814 In other than the C [CX]or POSIX[/CX] locale, additional locale-specific subject sequence forms may be

5815 *Rationale*: Austin Group Defect Report(s) applied: 796. See http://austingroupbugs.net/view.php?id=796.

5816 **Change Number: XSH/TC2/D4/0393** [584]

5817 On Page: 2230 Line: 70196 Section: wcstol()

5818 In the DESCRIPTION section, change from:

5819 minus-sign, the sequence shall be interpreted as negated.

5820 to:

5821 <hyphen-minus>, the sequence shall be interpreted as negated.

5822 *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

5823 **Change Number: XSH/TC2/D4/0394** [796]

5824 On Page: 2231 Line: 70199 Section: wcstol()
5825 (2013 edition Page: 2253 Line: 71409)

5826 Change from:

5827 In other than the C [CX]or POSIX[/CX] locale[CX]s[/CX], other implementation-defined subject
5828 sequences may be

5829 to:

5830 In other than the C [CX]or POSIX[/CX] locale, additional locale-specific subject sequence forms may be

5831 *Rationale*: Austin Group Defect Report(s) applied: 796. See http://austingroupbugs.net/view.php?id=796.

5832 **Change Number: XSH/TC2/D4/0395** [584]

5833 On Page: 2237 Line: 70357 Section: wcstoul()

5834   In the DESCRIPTION section, change from:

5835   minus-sign, the sequence shall be interpreted as negated.

5836   to:

5837   <hyphen-minus>, the sequence shall be interpreted as negated.

5838   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

5839   **Change Number: XSH/TC2/D4/0396** [796]

5840   On Page: 2238 Line: 70360 Section: wcstoul()
5841   (2013 edition Page: 2260 Line: 71571)

5842   Change from:

5843   In other than the C [CX]or POSIX[/CX] locale[CX]s[/CX], other implementation-defined subject
5844   sequences may be

5845   to:

5846   In other than the C [CX]or POSIX[/CX] locale, additional locale-specific subject sequence forms may be

5847   *Rationale*: Austin Group Defect Report(s) applied: 796. See http://austingroupbugs.net/view.php?id=796.

5848   **Change Number: XSH/TC2/D4/0397** [608]

5849   On Page: 2258 Line: 71006 Section: wordexp()

5850   In the DESCRIPTION section, change from:

5851   *wordexp*() may write messages to *stderr* if syntax errors are detected while expanding words.

5852   to:

5853   *wordexp*() may write messages to *stderr* if syntax errors are detected while expanding words, unless the
5854   *stderr* stream has wide orientation in which case the behavior is undefined.

5855   *Rationale*: Austin Group Defect Report(s) applied: 608. See http://austingroupbugs.net/view.php?id=608.

5856   **Change Number: XSH/TC2/D4/0398** [704]

5857   On Page: 2258 Line: 71009 Section: wordexp()
5858   (2013 edition Page: 2280 Line: 72230)

5859   In the DESCRIPTION section, add a new paragraph:

5860   The results are unspecified if WRDE_APPEND and WRDE_REUSE are both specified.

5861 *Rationale*: Austin Group Defect Report(s) applied: 704. See http://austingroupbugs.net/view.php?id=704.
5862 The standard is clear that wordfree() can be called after any wordexp() call, not just successful ones (the
5863 text in the fifth paragraph of the DESCRIPTION does not contain the word "successful"). However, the last
5864 sentence of the first paragraph of the RETURN VALUES section states: "In other cases, they shall not be
5865 modified.", but it is not clear whether "other cases" here refers to all cases other than when wordexp()
5866 returns WRDE_NOSPACE (including success), or just to error cases other than WRDE_NOSPACE. And,
5867 neither of these possibilities matches the intended behavior.

5868 **Change Number: XSH/TC2/D4/0399** [704]

5869 On Page: 2259 Line: 71022 Section: wordexp()
5870 (2013 edition Page: 2281 Line: 72243)

5871 In the RETURN VALUE section, change from:

5872 In other cases, they shall not be modified.

5873 to:

5874 In other error cases, if the WRDE_APPEND flag was specified, *pwordexp->we_wordc* and *pwordexp-*
5875 *>we_wordv* shall not be modified.

5876 *Rationale*: Austin Group Defect Report(s) applied: 704. See http://austingroupbugs.net/view.php?id=704.

5877 **Change Number: XSH/TC2/D4/0400** [608]

5878 On Page: 2259 Line: 71038 Section: wordexp()

5879 In the APPLICATION USAGE section, add a new paragraph:

5880 Applications which use wide character output functions with *stderr* should ensure that any calls to
5881 *wordexp*() do not write to *stderr*, by avoiding use of the WRDE_SHOWERR flag.

5882 *Rationale*: Austin Group Defect Report(s) applied: 608. See http://austingroupbugs.net/view.php?id=608.

5883 **Change Number: XSH/TC2/D4/0401** [676,710]

5884 On Page: 2266 Line: 71250 Section: write()
5885 (2013 edition Page: 2288 Line: 72480)

5886 In the ERRORS section, before "The *write*() function shall fail if" insert:

5887 The *pwrite*() function shall fail if:

5888   [EINVAL]
5889   The file is a regular file or block special file, and the offset argument is negative. The file
5890   offset shall remain unchanged.

5891   [ESPIPE]
5892   The file is incapable of seeking.

5893   On Page: 2266 Line: 71275 Section: write()

5894   In the ERRORS section, delete lines 71275-71277 (the pwrite() "shall fail" errors).

5895   *Rationale*: Austin Group Defect Report(s) applied: 676,710. See
5896   http://austingroupbugs.net/view.php?id=676.
5897   See http://austingroupbugs.net/view.php?id=710.
5898   This is a layered change on XSH/TC1/D5/0743 [215].

5899   **Change Number: XSH/TC2/D4/0402** [966]

5900   On Page: 2269 Line: 71387 Section: write()
5901   (2013 edition Page: 2291 Line: 72619)

5902   In the RATIONALE section, change from:

5903   This volume of POSIX.1-2008 does not specify behavior of concurrent writes to a file from multiple
5904   processes.

5905   to:

5906   This volume of POSIX.1-2008 does not specify the behavior of concurrent writes to a regular file from
5907   multiple threads, except that each write is atomic (see [xref to 2.9.7]).

5908   *Rationale*: Austin Group Defect Report(s) applied: 966. See http://austingroupbugs.net/view.php?id=966.

5909

4. Changes to Shell and Utilities

5910

5911 This section contains the set of changes to the text of the Shell and Utilities.

5912 [*Note to reviewers: References to defect reports are provided to aid reviewers.*]

5913 **Change Number: XCU/TC2/D4/0001** [666]

5914 On Page: 2285 Line: 71853 Section: 1.2 Utility Limits

5915 In the Name column of Table 1-3, change from:

5916 {_POSIX2_RE_DUP_MAX}

5917 to:

5918 {_POSIX_RE_DUP_MAX}

5919 In the Description column of Table 1-3, change from:

5920 The maximum number of repeated occurrences of a BRE permitted when using the interval notation
5921 \{m,n\}; see XBD Section 9.3.6 (on page 186).

5922 to:

5923 Maximum number of repeated occurrences of a BRE or ERE interval expression; see XBD Section 9.3.6
5924 (on page 186) and XBD Section 9.4.6 (on page 189).

5925 On Page: 2287 Line: 71911 Section: 1.2 Utility Limits

5926 In the Description column of Table 1-4, change from:

5927 The maximum number of repeated occurrences of a BRE permitted when using the interval notation
5928 \{m,n\}; see XBD Section 9.3.6 (on page 186).

5929 to:

5930 Maximum number of repeated occurrences of a BRE or ERE interval expression; see XBD Section 9.3.6
5931 (on page 186) and XBD Section 9.4.6 (on page 189).

5932 In the Minimum Value column of Table 1-4, change from:

5933 {_POSIX2_RE_DUP_MAX}

5934 to:

5935 {_POSIX_RE_DUP_MAX}

5936 *Rationale*: Austin Group Defect Report(s) applied: 666. See http://austingroupbugs.net/view.php?id=666.

5937   **Change Number: XCU/TC2/D4/0002** [584]

5938   On Page: 2289 Line: 71989 Section: 1.4 Utility Description Defaults

5939   Change from:

5940   <hyphen>

5941   to:

5942   <hyphen-minus>

5943   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

5944   **Change Number: XCU/TC2/D4/0003** [913]

5945   On Page: 2293 Line: 72201 Section: 1.4 Utility Description Defaults
5946   (2013 edition Page: 2315 Line: 73439)

5947   Change from:

5948   Utilities may terminate prematurely if they encounter: invalid usage of options, arguments, or environment
5949   variables; invalid usage of the complex syntaxes expressed in EXTENDED DESCRIPTION sections;
5950   difficulties accessing, creating, reading, or writing files; or difficulties associated with the privileges of the
5951   process.

5952   to:

5953   Utilities may terminate prematurely if they encounter: invalid usage of options, arguments, or environment
5954   variables; invalid usage of the complex syntaxes expressed in EXTENDED DESCRIPTION sections;
5955   resource exhaustion; difficulties accessing, creating, reading, or writing files; or difficulties associated with
5956   the privileges of the process.

5957   *Rationale*: Austin Group Defect Report(s) applied: 913. See http://austingroupbugs.net/view.php?id=913.

5958   **Change Number: XCU/TC2/D4/0004** [705]

5959   On Page: 2296 Line: 72310 Section: 1.6 Built-In Utilities
5960   (2013 edition Page: 2318 Line: 73457)

5961   In Table 1-5 Regular Built-In Utilities, add *hash*, *type* and *ulimit* to the table.

5962   *Rationale*: Austin Group Defect Report(s) applied: 705. See http://austingroupbugs.net/view.php?id=705.

5963   **Change Number: XCU/TC2/D4/0005** [718]

5964   On Page: 2299 Line: 72403 Section: 2.3 Token Recognition

5965   Change from:

5966   The shell shall read its input in terms of lines from a file, from a terminal in the case of an interactive shell,

5967   or from a string in the case of *sh* **-c** or *system*().

5968   to:

5969   The shell shall read its input in terms of lines. (For details about how the shell reads its input, see the
5970   description of the *sh* utility on page xxx.)

5971   *Rationale*: Austin Group Defect Report(s) applied: 718. See http://austingroupbugs.net/view.php?id=718.

5972   **Change Number: XCU/TC2/D4/0006** [647]

5973   On Page: 2299 Line: 72417 Section: 2.3 Token Recognition

5974   In rule 1, change from:

5975   1. If the end of input is recognized, the current token shall be delimited. If there is no current token, the
5976   end-of-input indicator shall be returned as the token.

5977   to:

5978   1. If the end of input is recognized, the current token (if any) shall be delimited.

5979   *Rationale*: Austin Group Defect Report(s) applied: 647. See http://austingroupbugs.net/view.php?id=647.

5980   **Change Number: XCU/TC2/D4/0007** [568]

5981   On Page: 2299 Line: 72419-72424 Section: 2.3 Token Recognition

5982   In rule 2, on line 72420 change from:

5983   current characters

5984   to:

5985   previous characters

5986   In rule 3, on line 72423 change from:

5987   current characters

5988   to:

5989   previous characters

5990   *Rationale*: Austin Group Defect Report(s) applied: 568. See http://austingroupbugs.net/view.php?id=568.

5991

5992   **Change Number: XCU/TC2/D4/0008** [648]

5993   On Page: 2300 Line: 72448 Section: 2.3 Token Recognition

5994   Delete rule 7:

5995   7. If the current character is an unquoted <newline>, the current token shall be delimited.

5996   *Rationale*: Austin Group Defect Report(s) applied: 648. See http://austingroupbugs.net/view.php?id=648.

5997   **Change Number: XCU/TC2/D4/0009** [888]

5998   On Page: 2302 Line: 72511-72523 Section: 2.5.2 Special Parameters
5999   (2013 edition Page: 2324 Line: 73742-73754)

6000   Replace the descriptions of the '@' and '*' special parameters with:

6001   @
6002   Expands to the positional parameters, starting from one, initially producing one field for each
6003   positional parameter that is set. When the expansion occurs in a context where field splitting will be
6004   performed, any empty fields may be discarded and each of the non-empty fields shall be further split
6005   as described in [xref to 2.6.5 Field Splitting]. When the expansion occurs within double-quotes, the
6006   behavior is unspecified unless one of the following is true:

6007   • Field splitting as described in [xref to 2.6.5 Field Splitting] would be performed if the
6008   expansion were not within double-quotes (regardless of whether field splitting would have
6009   any effect, for example if IFS is null).

6010   • The double-quotes are within the *word* of a ${*parameter*:-*word*} or a ${*parameter*:+*word*}
6011   expansion (with or without the <colon>; see [xref to 2.6.2 Parameter Expansion]) which
6012   would have been subject to field splitting if *parameter* had been expanded instead of *word*.

6013   If one of these conditions is true, the initial fields shall be retained as separate fields except that, if
6014   the parameter being expanded was embedded within a word, the first field shall be joined with the
6015   beginning part of the original word and the last field shall be joined with the end part of the original
6016   word. In all other contexts the results of the expansion are unspecified. If there are no positional
6017   parameters, the expansion of '@' shall generate zero fields, even when '@' is within double-quotes;
6018   however, if the expansion is embedded within a word which contains one or more other parts that
6019   expand to a quoted null string, these null string(s) shall still produce an empty field, except that if
6020   the other parts are all within the same double-quotes as the '@', it is unspecified whether the result is
6021   zero fields or one empty field.

6022   *
6023   Expands to the positional parameters, starting from one, initially producing one field for each
6024   positional parameter that is set. When the expansion occurs in a context where field splitting will be
6025   performed, any empty fields may be discarded and each of the non-empty fields shall be further split
6026   as described in [xref to 2.6.5 Field Splitting]. When the expansion occurs in a context where field
6027   splitting will not be performed, the initial fields shall be joined to form a single field with the value
6028   of each parameter separated by the first character of the IFS variable if IFS contains at least one
6029   character, or separated by a <space> if IFS is unset, or with no separation if IFS is set to a null
6030   string.

6031   *Rationale*: Austin Group Defect Report(s) applied: 888. See http://austingroupbugs.net/view.php?id=888.

6032   **Change Number: XCU/TC2/D4/0010** [888]

6033   On Page: 2303 Line: 72562 Section: 2.5.3 Shell Variables
6034   (2013 edition Page: 2325 Line: 73791)

6035   In the description of IFS, change from:

6036   A string treated as a list of characters that is used for field splitting and to split lines into fields with the
6037   *read* command.

6038   If *IFS* is not set, it shall behave as normal for an unset variable, except that field splitting by the shell and
6039   line splitting by the *read* command shall ...

6040   to:

6041   A string treated as a list of characters that is used for field splitting, expansion of the '*' special parameter,
6042   and to split lines into fields with the *read* utility. If the value of *IFS* includes any bytes that do not form part
6043   of a valid character, the results of field splitting, expansion of '*', and use of the *read* utility are unspecified.

6044   If *IFS* is not set, it shall behave as normal for an unset variable, except that field splitting by the shell and
6045   line splitting by the *read* utility shall ...

6046   *Rationale*: Austin Group Defect Report(s) applied: 888. See http://austingroupbugs.net/view.php?id=888.

6047   **Change Number: XCU/TC2/D4/0011** [884]

6048   On Page: 2303 Line: 72568 Section: 2.5.3 Shell Variables
6049   (2013 edition Page: 2325 Line: 73796)

6050   In the description of IFS, change from:

6051   Implementations may ignore the value of *IFS* in the environment, or the absence of *IFS* from the
6052   environment, at the time the shell is invoked, in which case the shell shall set *IFS* to
6053   <space><tab><newline> when it is invoked.

6054   to:

6055   The shell shall set *IFS* to <space><tab><newline> when it is invoked.

6056   *Rationale*: Austin Group Defect Report(s) applied: 884. See http://austingroupbugs.net/view.php?id=884.
6057   Some old shells did inherit IFS from the environment, but since most shell scripts do not set IFS as one of
6058   the steps in their initialization, this creates a security hole. Most, if not all, recent shells initialize IFS when
6059   the shell is invoked and do not change IFS in a subshell environment. This is the desired behavior.

6060   **Change Number: XCU/TC2/D4/0012** [494]

6061   On Page: 2304 Line: 72602 Section: 2.5.3 Shell Variables

6062   Delete the following from the description of the PPID shell variable:

6063   This volume of POSIX.1-2008 specifies the effects of the variable only for systems supporting the User

6064   Portability Utilities option.

6065   *Rationale*: Austin Group Defect Report(s) applied: 494. See http://austingroupbugs.net/view.php?id=494.

6066   **Change Number: XCU/TC2/D4/0013** [888]

6067   On Page: 2306 Line: 72709 Section: 2.6.2 Parameter Expansion
6068   (2013 edition Page: 2328 Line: 73940)

6069   Change from:

6070   Field splitting shall not be performed on the results of the expansion, with the exception of '@'; see [xref to
6071   2.5.2].

6072   to:

6073   Field splitting shall not be performed on the results of the expansion.

6074   *Rationale*: Austin Group Defect Report(s) applied: 888. See http://austingroupbugs.net/view.php?id=888.

6075   **Change Number: XCU/TC2/D4/0014** [867]

6076   On Page: 2306 Line: 72716 Section: 2.6.2 Parameter Expansion
6077   (2013 edition Page: 2328 Line: 73947)

6078   Delete the sentence:

6079   (For example, ${**foo-bar**}**xyz}** would result in the expansion of **foo** followed by the string **xyz}** if **foo** is
6080   set, else the string `"barxyz}"`).

6081   On Page: 2308 Line: 72769 Section: 2.6.2 Parameter Expansion
6082   (2013 edition Page: 2330 Line: 74014)

6083   Insert the following before the ${*parameter*:-*word*} example:

6084 ${*parameter-word*}

6085   This example demonstrates the difference between unset and set to the empty string, as well
6086   as the rules for finding the delimiting close brace.

```
6087        foo=asdf
6088        echo ${foo-bar}xyz}
6089        asdfxyz}
6090        foo=
6091        echo ${foo-bar}xyz}
6092        xyz}
6093        unset foo
6094        echo ${foo-bar}xyz}
6095        barxyz}
```

6096   *Rationale*: Austin Group Defect Report(s) applied: 867. See http://austingroupbugs.net/view.php?id=867.

6097   **Change Number: XCU/TC2/D4/0015** [584]

6098   On Page: 2310 Line: 72861 Section: Section 2.6.4 Arithmetic Expansion
6099   (2013 edition Page: 2332 Line: 74115)

6100   Change from:

6101   If the shell variable *x* contains a value that forms a valid integer constant, then ...

6102   to:

6103   If the shell variable *x* contains a value that forms a valid integer constant, optionally including a leading
6104   <plus-sign> or <hyphen-minus>, then ...

6105   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.
6106   This item is a layered change on XCU/TC1/D5/0020 [50] applied in TC1, the difference being a change
6107   from:
6108   leading plus or minus sign
6109   to:
6110   leading <plus-sign> or <hyphen-minus>

6111   **Change Number: XCU/TC2/D4/0016** [832]

6112   On Page: 2311 Line: 72882 Section: Section 2.6.5 Field Splitting
6113   (2013 edition Page: 2333 Line: 74136)

6114   Change from:

6115   The shell shall treat each character of the *IFS* as a delimiter and use the delimiters as field terminators to
6116   split the results of parameter expansion and command substitution into fields.

6117   to:

6118   The shell shall treat each character of the *IFS* as a delimiter and use the delimiters as field terminators to
6119   split the results of parameter expansion, command substitution, and arithmetic expansion into fields.

6120   *Rationale*: Austin Group Defect Report(s) applied: 832. See http://austingroupbugs.net/view.php?id=832.
6121   Section 2.6.5 doesn't mention arithmetic expansion (which specifies when field splitting is done), but
6122   section 2.6 (where it talks about the order of word expansions) does require field splitting after arithmetic
6123   expansions.

6124   **Change Number: XCU/TC2/D4/0017** [890]

6125   On Page: 2313 Line: 72971 Section: 2.7.4 Here-Document
6126   (2013 edition Page: 2335 Line: 74224)

6127   Change from:

6128   The redirection operators "<<" and "<<-" both allow redirection of lines contained in a shell input file,
6129   known as a "here-document", to the input of a command.

6130   to:

6131 The redirection operators "<<" and "<<-" both allow redirection of subsequent lines read by the shell to the
6132 input of a command. The redirected lines are known as a "here-document".

6133 On Page: 2313 Line: 72981 Section: 2.7.4 Here-Document
6134 (2013 edition Page: 2335 Line: 74234)

6135 After:

6136 where the optional *n* represents the file descriptor number. If the number is omitted, the here-document
6137 refers to standard input (file descriptor 0).

6138 add a new sentence:

6139 It is unspecified whether the file descriptor is opened as a regular file, a special file, or a pipe. Portable
6140 applications cannot rely on the file descriptor being seekable (see [xref to XSH lseek()]).

6141 *Rationale*: Austin Group Defect Report(s) applied: 890. See http://austingroupbugs.net/view.php?id=890.

6142 **Change Number: XCU/TC2/D4/0018** [583]

6143 On Page: 2313 Line: 72982,72985 Section: 2.7.4 Here-Document

6144 On line 72982 change from:

6145 If any character in *word*

6146 to:

6147 If any part of *word*

6148 On line 72985 change from:

6149 If no characters in *word* are

6150 to:

6151 If no part of *word* is

6152 *Rationale*: Austin Group Defect Report(s) applied: 583. See http://austingroupbugs.net/view.php?id=583.

6153 **Change Number: XCU/TC2/D4/0019** [580]

6154 On Page: 2314 Line: 72990 Section: 2.7.4 Here-Document

6155 Change from:

6156 redirection symbol

6157 to:

6158   redirection operator

6159   *Rationale*: Austin Group Defect Report(s) applied: 580. See http://austingroupbugs.net/view.php?id=580.

6160   **Change Number: XCU/TC2/D4/0020** [882]

6161   On Page: 2315 Line: 73032-73042 Section: 2.8.1 Consequences of Shell Errors
6162   (2013 edition Page: 2337 Line: 74285-74295)

6163   Change from:

6164   For a non-interactive shell, an error condition encountered by a special built-in (see Section 2.14) or other
6165   type of utility shall cause the shell to write a diagnostic message to standard error and exit as shown in the
6166   following table:

Error	Special Built-In	Other Utilities
Shell language syntax error	Shall exit	Shall exit
Utility syntax error (option or operand error)	Shall exit	Shall not exit
Redirection error	Shall exit	Shall not exit
Variable assignment error	Shall exit	Shall not exit
Expansion error	Shall exit	Shall exit
Command not found	N/A	May exit
Dot script not found	Shall exit	N/A

6167

6168   to:

6169   Certain errors shall cause the shell to write a diagnostic message to standard error and exit as shown in the
6170   following table:

Error	Non-Interactive Shell	Interactive Shell	Shell Diagnostic Message Required
Shell language syntax error	shall exit	shall not exit	yes
Special built-in utility error	shall exit	shall not exit	no[1]
Other utility (not a special built-in) error	shall not exit	shall not exit	no[2]

Redirection error with special built-in utilities	shall exit	shall not exit	yes
Redirection error with compound commands	may exit[3]	shall not exit	yes
Redirection error with function execution	may exit[3]	shall not exit	yes
Redirection error with other utilities (not special built-ins)	shall not exit	shall not exit	yes
Variable assignment error	shall exit	shall not exit	yes
Expansion error	shall exit	shall not exit	yes
Command not found	may exit	shall not exit	yes

6171

6172   Notes:

6173   1. Although special built-ins are part of the shell, a diagnostic message written by a special built-in is
6174   not considered to be a shell diagnostic message, and can be redirected like any other utility.
6175   2. The shell is not required to write a diagnostic message, but the utility itself shall write a diagnostic
6176   message if required to do so.
6177   *3.* A future version of this standard may require the shell to not exit in this condition.

6178   *Rationale*: Austin Group Defect Report(s) applied: 882. See http://austingroupbugs.net/view.php?id=882.
6179   The standard is unclear on what constitutes a "Shell Error".

6180   **Change Number: XCU/TC2/D4/0021** [717,882]

6181   On Page: 2315 Line: 73047-73051 Section: 2.8.1 Consequences of Shell Errors
6182   (2013 edition Page: 2337 Line: 74300-74304)

6183   Change from:

6184   If any of the errors shown as "shall exit" or "(may) exit" occur in a subshell, the subshell shall (respectively
6185   may) exit with a non-zero status, but the script containing the subshell shall not exit because of the error.

6186   In all of the cases shown in the table, an interactive shell shall write a diagnostic message to standard error
6187   without exiting.

6188   to:

6189   If any of the errors shown as "shall exit" or "may exit" occur in a subshell environment, the shell shall
6190   (respectively may) exit from the subshell environment with a non-zero status and continue in the
6191   environment from which that subshell environment was invoked.

6192 In all of the cases shown in the table where an interactive shell is required not to exit, the shell shall not
6193 perform any further processing of the command in which the error occurred.

6194 *Rationale*: Austin Group Defect Report(s) applied: 717,882. See
6195 http://austingroupbugs.net/view.php?id=717.
6196 See http://austingroupbugs.net/view.php?id=882.
6197 The changes made here make the standard reflect existing practice.

6198 **Change Number: XCU/TC2/D4/0022** [717]

6199 On Page: 2315 Line: 73059 Section: 2.8.2 Exit Status for Commands

6200 Change from:

6201 If a command fails during word expansion or redirection, its exit status shall be greater than zero.

6202 to:

6203 If a command fails during word expansion or redirection, its exit status shall be between 1 and 125
6204 inclusive.

6205 *Rationale*: Austin Group Defect Report(s) applied: 717. See http://austingroupbugs.net/view.php?id=717.
6206 The changes made here make the standard reflect existing practice.

6207 **Change Number: XCU/TC2/D4/0023** [473]

6208 On Page: 2316 Line: 73070 Section: 2.9 Shell Commands

6209 Change from:

6210 ... represent the syntax.

6211 to:

6212 ... represent the syntax. In particular the representations include spacing between tokens in some places
6213 where blanks would not be necessary (when one of the tokens is an operator).

6214 *Rationale*: Austin Group Defect Report(s) applied: 473. See http://austingroupbugs.net/view.php?id=473.

6215 **Change Number: XCU/TC2/D4/0024** [654]

6216 On Page: 2317 Line: 73101 Section: 2.9.1 Simple Commands

6217 Change from:

6218 If no command name results, variable assignments shall affect the current execution environment.
6219 Otherwise, the variable assignments shall be exported for the execution environment of the command and
6220 shall not affect the current execution environment (except for special built-ins). If any of the variable
6221 assignments attempt to assign a value to a read-only variable, a variable assignment error shall occur.

6222 to:

6223   Variable assignments shall be performed as follows:

6224   • If no command name results, variable assignments shall affect the current execution environment.

6225   • If the command name is not a special built-in utility or function, the variable assignments shall be
6226   exported for the execution environment of the command and shall not affect the current execution
6227   environment except as a side-effect of the expansions performed in step 4. In this case it is
6228   unspecified:

6229   — Whether or not the assignments are visible for subsequent expansions in step 4

6230   — Whether variable assignments made as side-effects of these expansions are visible for
6231   subsequent expansions in step 4, or in the current shell execution environment, or both

6232   • If the command name is a standard utility implemented as a function (see XBD Section 4.21), the
6233   effect of variable assignments shall be as if the utility was not implemented as a function.

6234   • If the command name is a special built-in utility, variable assignments shall affect the current
6235   execution environment. Unless the *set* -**a** option is on (see the *set* special built-in utility in Section
6236   2.14), it is unspecified:

6237   — Whether or not the variables gain the *export* attribute during the execution of the special
6238   built-in utility

6239   — Whether or not *export* attributes gained as a result of the variable assignments persist after
6240   the completion of the special built-in utility

6241   • If the command name is a function that is not a standard utility implemented as a function, variable
6242   assignments shall affect the current execution environment during the execution of the function. It
6243   is unspecified:

6244   — Whether or not the variable assignments persist after the completion of the function

6245   — Whether or not the variables gain the *export* attribute during the execution of the function

6246   — Whether or not *export* attributes gained as a result of the variable assignments persist after
6247   the completion of the function (if variable assignments persist after the completion of the
6248   function)

6249   If any of the variable assignments attempt to assign a value to a variable for which the *readonly* attribute is
6250   set in the current shell environment (regardless of whether the assignment is made in that environment), a
6251   variable assignment error shall occur. See [xref to 2.8.1] for the consequences of these errors.

6252   *Rationale*: Austin Group Defect Report(s) applied: 654. See http://austingroupbugs.net/view.php?id=654.
6253   This change is layered on Change Number XCU/TC1/D5/0021 [255] in TC1.

6254   **Change Number: XCU/TC2/D4/0025** [935]

6255   On Page: 2317 Line: 73124 Section: 2.9.1.1 Command Search and Execution
6256   (2013 edition Page: 2339 Line: 74383)

6257   In list item 1. insert a new nested item:

6258   b. If the command name matches the name of a utility listed in the following table, the results are
6259   unspecified:

6260   *alloc*
6261   *autoload*
6262   *bind*
6263   *bindkey*
6264   *builtin*
6265   *bye*
6266   *caller*
6267   *cap*
6268   *chdir*
6269   *clone*
6270   *comparguments*
6271   *compcall*
6272   *compctl*
6273   *compdescribe*
6274   *compfiles*
6275   *compgen*
6276   *compgroups*
6277   *complete*
6278   *compquote*
6279   *comptags*
6280   *comptry*
6281   *compvalues*
6282   *declare*
6283   *dirs*
6284   *disable*
6285   *disown*
6286   *dosh*
6287   *echotc*
6288   *echoti*
6289   *help*
6290   *history*
6291   *hist*
6292   *let*
6293   *local*
6294   *login*
6295   *logout*
6296   *map*
6297   *mapfile*
6298   *popd*
6299   *print*
6300   *pushd*
6301   *readarray*
6302   *repeat*
6303   *savehistory*
6304   *source*
6305   *shopt*
6306   *stop*
6307   *suspend*
6308   *typeset*
6309   *whence*

6310   and renumber 1.b, c, and d to 1.c, d, and e.

6311   *Rationale*: Austin Group Defect Report(s) applied: 935. See http://austingroupbugs.net/view.php?id=935.

6312   **Change Number: XCU/TC2/D4/0026** [705]

6313   On Page: 2317 Line: 73130 Section: 2.9.1.1 Command Search and Execution
6314   (2013 edition Page: 2339 Line: 74388)

6315   In item 1.c, change from:

6316   If the command name matches the name of a utility listed in the following table, that utility shall be
6317   invoked.

6318   to:

6319   If the command name matches the name [XSI]of the *type* or *ulimit* utility, or[/XSI] of a utility listed in the
6320   following table, that utility shall be invoked.

6321   and add *hash* to the table.

6322   *Rationale*: Austin Group Defect Report(s) applied: 705. See http://austingroupbugs.net/view.php?id=705.

6323   **Change Number: XCU/TC2/D4/0027** [521]

6324   On Page: 2318 Line: 73179 Section: 2.9.2 Pipelines

6325   After:

6326   [!] *command1* [| *command2* ...]

6327   add a new paragraph:

6328   If the pipeline begins with the reserved word ! and *command1* is a subshell command, the application shall
6329   ensure that the (operator at the beginning of *command1* is separated from the ! by one or more <blank>
6330   characters. The behavior of the reserved word ! immediately followed by the (operator is unspecified.

6331   *Rationale*: Austin Group Defect Report(s) applied: 521. See http://austingroupbugs.net/view.php?id=521.
6332   Requiring a negated subshell conflicts with shells that provide an extension of negated pathname
6333   expansion.

6334   **Change Number: XCU/TC2/D4/0028** [760]

6335   On Page: 2320 Line: 73226 Section: 2.9.3.1 Asynchronous Lists

6336   Change from:

6337   The standard input for an asynchronous list, before any explicit redirections are performed, shall be
6338   considered to be assigned to a file that has the same properties as **/dev/null**. If it is an interactive shell, this
6339   need not happen.

6340   to:

6341　If job control is disabled (see *set* -**m**), the standard input for an asynchronous list, before any explicit
6342　redirections are performed, shall be considered to be assigned to a file that has the same properties as
6343　**/dev/null**. This shall not happen if job control is enabled.

6344　*Rationale*: Austin Group Defect Report(s) applied: 760. See http://austingroupbugs.net/view.php?id=760.

6345　**Change Number: XCU/TC2/D4/0029** [473]

6346　On Page: 2321 Line: 73274 Section: 2.9.1.4 Grouping Commands

6347　Change from:

6348　(*compound-list*)

6349　to:

6350　(*compound-list*)

6351　On Page: 2321 Line: 73277 Section: 2.9.4.1 Grouping Commands

6352　Change from:

6353　{ *compound-list*;}

6354　to:

6355　{ *compound-list* ; }

6356　On Page: 2322 Line: 73312 Section: 2.9.4.3 Case Conditional Construct

6357　Change from:

6358　case *word* in
6359　**[(]***pattern1*) *compound-list*;;
6360　**[[(]***pattern***[** | *pattern***]** ...) *compound-list*;;**]** ...
6361　**[[(]***pattern***[** | *pattern***]** ...) *compound-list***]**
6362　esac

6363　to:

6364　case *word* in
6365　**[(]** *pattern1*) *compound-list* ;;
6366　**[[(]** *pattern***[** | *pattern***]** ...) *compound-list* ;;**]** ...
6367　**[[(]** *pattern***[** | *pattern***]** ...) *compound-list***]**
6368　esac

6369　On Page: 2324 Line: 73379 Section: 2.9.5 Function Definition Command

6370　Change from:

6371　*fname*() *compound-command***[***io-redirect* ...**]**

6372   to:

6373   *fname* ( ) *compound-command* [*io-redirect* ...]

6374   *Rationale*: Austin Group Defect Report(s) applied: 473. See http://austingroupbugs.net/view.php?id=473.

6375   **Change Number: XCU/TC2/D4/0030** [654]

6376   On Page: 2324 Line: 73391 Section: 2.9.5 Function Definition Command
6377   (2013 edition Page: 2347 Line: 74675-74676)

6378   Change from:

6379   When a function is executed, it shall have the syntax-error and variable-assignment properties described for
6380   special built-in utilities in the enumerated list at the beginning of Section 2.14.

6381   to:

6382   When a function is executed, it shall have the syntax-error properties described for special built-in utilities
6383   in the first item in the enumerated list at the beginning of Section 2.14.

6384   *Rationale*: Austin Group Defect Report(s) applied: 654. See http://austingroupbugs.net/view.php?id=654.

6385   **Change Number: XCU/TC2/D4/0031** [648]

6386   On Page: 2325 Line: 73415 Section: 2.10.1 Shell Grammar Lexical Conventions

6387   Delete rule 1:

6388   1. A <newline> shall be returned as the token identifier NEWLINE.

6389   *Rationale*: Austin Group Defect Report(s) applied: 648. See http://austingroupbugs.net/view.php?id=648.

6390   **Change Number: XCU/TC2/D4/0032** [574,646]

6391   On Page: 2325 Line: 73421 Section: 2.10.1 Shell Grammar Lexical Conventions

6392   Change from:

6393   **ASSIGNMENT**

6394   to:

6395   **ASSIGNMENT_WORD**

6396   *Rationale*: Austin Group Defect Report(s) applied: 574,646. See
6397   http://austingroupbugs.net/view.php?id=574.
6398   See http://austingroupbugs.net/view.php?id=646.

6399

6400   **Change Number: XCU/TC2/D4/0033** [643,839]

6401   On Page: 2326 Line: 73475-73481 Section: 2.10.2 Shell Grammar Rules
6402   (2013 edition Page: 2349 Line: 74755-74761)

6403   Change rule 7.b from:

6404   If the **TOKEN** contains the <equals-sign> character:

6405   • If it begins with '=', the token **WORD** shall be returned.

6406   • If all the characters preceding '=' form a valid name (see XBD Section 3.230, on page 70), the
6407   token **ASSIGNMENT_WORD** shall be returned. (Quoted characters cannot participate in
6408   forming a valid name.)

6409   • Otherwise, it is unspecified whether it is **ASSIGNMENT_WORD** or **WORD** that is returned.

6410   to:

6411   If the **TOKEN** contains an unquoted (as determined while applying rule #4 from section 2.3) <equals-
6412   sign> character that is not part of an embedded parameter expansion, command substitution, or arithmetic
6413   expansion construct (as determined while applying rule #5 from section 2.3):

6414   • If the **TOKEN** begins with '=', then rule 1 shall be applied.

6415   • If all the characters in the **TOKEN** preceding the first such <equals-sign> form a valid name (see
6416   XBD Section 3.230, on page 70), the token **ASSIGNMENT_WORD** shall be returned.

6417   • Otherwise, it is unspecified whether rule 1 is applied or **ASSIGNMENT_WORD** is returned.

6418   Otherwise, rule 1 shall be applied.

6419   *Rationale*: Austin Group Defect Report(s) applied: 643,839. See
6420   http://austingroupbugs.net/view.php?id=643.
6421   See http://austingroupbugs.net/view.php?id=839.

6422   **Change Number: XCU/TC2/D4/0034** [643]

6423   On Page: 2326 Line: 73482 Section: 2.10.2 Shell Grammar Rules

6424   In rule 7, change from:

6425   Assignment to the **NAME** shall occur ...

6426   to:

6427   Assignment to the name within a returned **ASSIGNMENT_WORD** token shall occur ...

6428   *Rationale*: Austin Group Defect Report(s) applied: 643. See http://austingroupbugs.net/view.php?id=643.

6429

6430   **Change Number: XCU/TC2/D4/0035** [648]

6431   On Page: 2327 Line: 73500 Section: 2.10.2 Shell Grammar Rules

6432   In the shell grammar, change from:

6433   `/* The following are the operators mentioned above */`

6434   to:

6435   `/* The following are the operators (see XBD 3.255) containing more`
6436   `than one character */`

6437   *Rationale*: Austin Group Defect Report(s) applied: 648. See http://austingroupbugs.net/view.php?id=648.

6438   **Change Number: XCU/TC2/D4/0036** [736]

6439   On Page: 2327 Line: 73521 Section: 2.10.2 Shell Grammar Rules
6440   (2013 edition Page: 2350 Line: 74801-74808)

6441   In the shell grammar, change from:

```
6442  %start  complete_command
6443  %%
6444  complete_command : list separator
6445                   | list
6446                   ;
```

6447   to:

```
6448  %start program
6449  %%
6450  program          : linebreak complete_commands linebreak
6451                   | linebreak
6452                   ;
6453  complete_commands: complete_commands newline_list complete_command
6454                   |                              complete_command
6455                   ;
6456  complete_command : list separator_op
6457                   | list
6458                   ;
```

6459   *Rationale*: Austin Group Defect Report(s) applied: 736. See http://austingroupbugs.net/view.php?id=736.

6460   **Change Number: XCU/TC2/D4/0037** [737]

6461   On Page: 2328 Line: 73554 Section: 2.10.2 Shell Grammar Rules
6462   (2013 edition Page: 2350 Line: 74834-74838)

6463   In the shell grammar, change from:

```
6464  compound_list    :                  term
6465                   | newline_list term
6466                   |                  term separator
```

```
6467                     | newline_list term separator
6468                     ;
```

6469   to:

```
6470    compound_list   : linebreak term
6471                    | linebreak term separator
6472                    ;
```

6473   *Rationale*: Austin Group Defect Report(s) applied: 737. See http://austingroupbugs.net/view.php?id=737.

6474   **Change Number: XCU/TC2/D4/0038** [581]

6475   On Page: 2328 Line: 73562-73564 Section: 2.10.2 Shell Grammar Rules

6476   In the shell grammar, change from:

```
6477    for_clause      : For name linebreak                         do_group
6478                    | For name linebreak in sequential_sep       do_group
6479                    | For name linebreak in wordlist sequential_sep do_group
6480                    ;
```

6481   to:

```
6482    for_clause      : For name                                  do_group
6483                    | For name sequential_sep                    do_group
6484                    | For name linebreak in sequential_sep       do_group
6485                    | For name linebreak in wordlist sequential_sep do_group
6486                    ;
```

6487   *Rationale*: Austin Group Defect Report(s) applied: 581. See http://austingroupbugs.net/view.php?id=581.

6488   **Change Number: XCU/TC2/D4/0039** [735]

6489   On Page: 2328 Line: 73583 Section: 2.10.2 Shell Grammar Rules
6490   (2013 edition Page: 2351 Line: 74863-74866)

6491   In the shell grammar, change from:

```
6492    case_item_ns    :     pattern ')'                linebreak
6493                    |     pattern ')' compound_list linebreak
6494                    | '(' pattern ')'                linebreak
6495                    | '(' pattern ')' compound_list linebreak
6496                    ;
```

6497   to:

```
6498    case_item_ns    :     pattern ')' linebreak
6499                    |     pattern ')' compound_list
6500                    | '(' pattern ')' linebreak
6501                    | '(' pattern ')' compound_list
6502                    ;
```

6503   *Rationale*: Austin Group Defect Report(s) applied: 735. See http://austingroupbugs.net/view.php?id=735.

6504   **Change Number: XCU/TC2/D4/0040** [750]

6505   On Page: 2330 Line: 73676 Section: 2.11 Signals and Error Handling
6506   (2013 edition Page: 2353 Line: 74957)

6507   Change from:

6508   When a command is in an asynchronous list, it shall inherit from the shell a signal action of ignored
6509   (SIG_IGN) for the SIGQUIT and SIGINT signals, and may inherit a signal mask in which SIGQUIT and
6510   SIGINT are blocked. Otherwise, the signal actions and signal mask inherited by the command shall be the
6511   same as ...

6512   to:

6513   If job control is disabled (see the description of *set* -**m**) when the shell executes an asynchronous list, the
6514   commands in the list shall inherit from the shell a signal action of ignored (SIG_IGN) for the SIGINT and
6515   SIGQUIT signals. In all other cases, commands executed by the shell shall inherit the same signal actions
6516   as ...

6517   *Rationale*: Austin Group Defect Report(s) applied: 750. See http://austingroupbugs.net/view.php?id=750.

6518   **Change Number: XCU/TC2/D4/0041** [706]

6519   On Page: 2331 Line: 73693 Section: 2.12 Shell Execution Environment
6520   (2013 edition Page: 2353 Line: 74974)

6521   In the shell execution environment list, add a new entry with XSI shading:

6522   • File size limit as set by *ulimit*.

6523   *Rationale*: Austin Group Defect Report(s) applied: 706. See http://austingroupbugs.net/view.php?id=706.

6524   **Change Number: XCU/TC2/D4/0042** [806]

6525   On Page: 2332 Line: 73736 Section: 2.13.1 Patterns Matching a Single Character
6526   (2013 edition Page: 2354 Line: 75017)

6527   Change from:

6528   The escaping <backslash> shall be discarded.

6529   to:

6530   The escaping <backslash> shall be discarded. If a pattern ends with an unescaped <backslash>, it is
6531   unspecified whether the pattern does not match anything or the pattern is treated as invalid.

6532   *Rationale*: Austin Group Defect Report(s) applied: 806. See http://austingroupbugs.net/view.php?id=806.
6533   Existing practice is for a pattern ending in an unescaped <backslash> not to match anything, but it would
6534   be useful to allow implementations to diagnose this as user error.

6535

6536 **Change Number: XCU/TC2/D4/0043** [963]

6537 On Page: 2333 Line: 73803 Section: 2.13.3 Patterns Used for Filename Expansion
6538 (2013 edition Page: 2356 Line: 75082)

6539 Change from:

6540 ... sorted according to the collating sequence in effect in the current locale.

6541 to:

6542 ... sorted according to the collating sequence in effect in the current locale. If this collating sequence does
6543 not have a total ordering of all characters (see [xref to XBD 7.3.2]), any filenames or pathnames that collate
6544 equally should be further compared byte-by-byte using the collating sequence for the POSIX locale.

6545 <small>Note: a future version of this standard may require the byte-by-byte further comparison described
6546 above.</small>

6547 *Rationale*: Austin Group Defect Report(s) applied: 963. See http://austingroupbugs.net/view.php?id=963.

6548 **Change Number: XCU/TC2/D4/0044** [882]

6549 On Page: 2334 Line: 73821 Section: 2.14 Special Built-In Utilities
6550 (2013 edition Page: 2356 Line: 75100)

6551 In list item 1, change from:

6552 A syntax error in a special built-in utility may cause a shell executing that utility to abort, while a syntax
6553 error in a regular built-in utility shall not cause a shell executing that utility to abort. (See Section 2.8.1 for
6554 the consequences of errors on interactive and non-interactive shells.) If a special built-in utility
6555 encountering a syntax error does not abort the shell, its exit value shall be non-zero.

6556 to:

6557 An error in a special built-in utility may cause a shell executing that utility to abort, while an error in a
6558 regular built-in utility shall not cause a shell executing that utility to abort. (See Section 2.8.1 for the
6559 consequences of errors on interactive and non-interactive shells.) If a special built-in utility encountering an
6560 error does not abort the shell, its exit value shall be non-zero.

6561 *Rationale*: Austin Group Defect Report(s) applied: 882. See http://austingroupbugs.net/view.php?id=882.

6562 **Change Number: XCU/TC2/D4/0045** [654]

6563 On Page: 2334 Line: 73826 Section: 2.14 Special Built-In Utilities
6564 (2013 edition Page: 2356 Line: 75105)

6565 In list item 2, change from:

6566 Variable assignments specified with special built-in utilities remain in effect after the built-in completes;
6567 this shall not be the case with a regular built-in or other utility.

6568   to:

6569   As described in Section 2.9.1, variable assignments preceding the invocation of a special built-in utility
6570   remain in effect after the built-in completes; this shall not be the case with a regular built-in or other utility.

6571   *Rationale*: Austin Group Defect Report(s) applied: 654. See http://austingroupbugs.net/view.php?id=654.

6572   **Change Number: XCU/TC2/D4/0046** [842]

6573   On Page: 2335 Line: 73839 Section: 2.14 break
6574   (2013 edition Page: 2358 Line: 75117)

6575   Change the DESCRIPTION section from:

6576   The *break* utility shall exit from the smallest enclosing **for**, **while**, or **until** loop, if any; or from the *n*th
6577   enclosing loop if *n* is specified. The value of *n* is an unsigned decimal integer greater than or equal to 1.
6578   The default shall be equivalent to *n*=1. If *n* is greater than the number of enclosing loops, the outermost
6579   enclosing loop shall be exited. Execution shall continue with the command immediately following the loop.

6580   to:

6581   If *n* is specified, the *break* utility shall exit from the *n*th enclosing **for**, **while**, or **until** loop. If *n* is not
6582   specified, *break* shall behave as if *n* was specified as 1. Execution shall continue with the command
6583   immediately following the exited loop. The value of *n* is a positive decimal integer. If *n* is greater than the
6584   number of enclosing loops, the outermost enclosing loop shall be exited. If there is no enclosing loop, the
6585   behavior is unspecified.

6586   A loop shall enclose a *break* or *continue* command if the loop lexically encloses the command. A loop
6587   lexically encloses a *break* or *continue* command if the command is:

6588   • executing in the same execution environment (see section 2.12) as the compound-list of the loop's
6589   do-group (see section 2.10.2), and
6590   • contained in a compound-list associated with the loop (either in the compound-list of the loop's do-
6591   group or, if the loop is a **while** or **until** loop, in the compound-list following the **while** or **until**
6592   reserved word), and
6593   • not in the body of a function whose function definition command (see section 2.9.5) is contained
6594   in a compound-list associated with the loop.

6595   If *n* is greater than the number of lexically enclosing loops and there is a non-lexically enclosing loop in
6596   progress in the same execution environment as the *break* or *continue* command, it is unspecified whether
6597   that loop encloses the command.

6598   On Page: 2336 Line: 73877 Section: 2.14 break
6599   (2013 edition Page: 2359 Line: 75155)

6600   In the EXAMPLES section, add to the end of the section:

6601   The results of running the following example are unspecified: There are two loops in progress when the
6602   *break* command is executed, and they are in the same execution environment, but neither loop is lexically
6603   enclosing the *break* command. (There are no loops lexically enclosing the *continue* commands, either.)

6604   ```
foo() {
```

```
6605        for j in 1 2; do
6606            echo 'break 2' >/tmp/do_break
6607            echo "  sourcing /tmp/do_break ($j)..."
6608            # the behavior of the break from running the following command
6609            # results in unspecified behavior:
6610            . /tmp/do_break
6611
6612            do_continue() { continue 2; }
6613            echo "  running do_continue ($j)..."
6614            # the behavior of the continue in the following function call
6615            # results in unspecified behavior (if execution reaches this
6616            # point):
6617            do_continue
6618
6619            trap 'continue 2' USR1
6620            echo "  sending SIGUSR1 to self ($j)..."
6621            # the behavior of the continue in the trap invoked from the
6622            # following signal results in unspecified behavior (if
6623            # execution reaches this point):
6624            kill -USR1 $$
6625            sleep 1
6626        done
6627    }
6628    for i in 1 2; do
6629        echo "running foo ($i)..."
6630        foo
6631    done
```

6632   On Page: 2339 Line: 73966 Section: 2.14 continue

6633   (2013 edition Page: 2362 Line: 75244)

6634   Change the DESCRIPTION section from:

6635   The *continue* utility shall return to the top of the smallest enclosing **for**, **while**, or **until** loop, or to the top
6636   of the *n*th enclosing loop, if *n* is specified. This involves repeating the condition list of a **while** or **until** loop
6637   or performing the next assignment of a **for** loop, and re-executing the loop if appropriate.

6638   The value of *n* is a decimal integer greater than or equal to 1. The default shall be equivalent to *n*=1. If *n* is
6639   greater than the number of enclosing loops, the outermost enclosing loop shall be used.

6640   to:

6641   If *n* is specified, the *continue* utility shall return to the top of the *n*th enclosing **for**, **while**, or **until** loop. If *n*
6642   is not specified, *continue* shall behave as if *n* was specified as 1. Returning to the top of the loop involves
6643   repeating the condition list of a **while** or **until** loop or performing the next assignment of a **for** loop, and re-
6644   executing the loop if appropriate. The value of *n* is a positive decimal integer. If *n* is greater than the
6645   number of enclosing loops, the outermost enclosing loop shall be used. If there is no enclosing loop, the
6646   behavior is unspecified.

6647   The meaning of "enclosing" shall be as specified in the description of the *break* utility.

6648   *Rationale*: Austin Group Defect Report(s) applied: 842. See http://austingroupbugs.net/view.php?id=842.

6649

6650 **Change Number: XCU/TC2/D4/0047** [717]

6651 On Page: 2347 Line: 74214 Section: 2.14 exit
6652 (2013 edition Page: 2370 Line: 75508)

6653 In the DESCRIPTION section, change from:

6654 The *exit* utility shall cause the shell to exit with the exit status specified by the unsigned decimal integer *n*.

6655 to:

6656 The *exit* utility shall cause the shell to exit from its current execution environment with the exit status
6657 specified by the unsigned decimal integer *n*. If the current execution environment is a subshell
6658 environment, the shell shall exit from the subshell environment with the specified exit status and continue
6659 in the environment from which that subshell environment was invoked, otherwise the shell utility shall
6660 terminate with the specified exit status.

6661 *Rationale*: Austin Group Defect Report(s) applied: 717. See http://austingroupbugs.net/view.php?id=717.
6662 The changes made here make the standard reflect existing practice.

6663 **Change Number: XCU/TC2/D4/0048** [960]

6664 On Page: 2347 Line: 74240 Section: 2.14 exit
6665 (2013 edition Page: 2370 Line: 75534)

6666 In the EXIT STATUS section, change from:

6667 The exit status shall be *n*, if specified.

6668 to:

6669 The exit status shall be *n*, if specified, except that the behavior is unspecified if *n* is not an unsigned
6670 decimal integer or is greater than 255.

6671 *Rationale*: Austin Group Defect Report(s) applied: 960. See http://austingroupbugs.net/view.php?id=960.

6672 **Change Number: XCU/TC2/D4/0049** [717]

6673 On Page: 2348 Line: 74252 Section: 2.14 exit
6674 (2013 edition Page: 2371 Line: 75546)

6675 In the EXAMPLES section, add at the end of the section:

6676 Propagate error handling from within a subshell:

```
6677     (
6678         command1 || exit 1
6679         command2 || exit 1
6680         exec command3
6681     ) > outputfile || exit 1
6682     echo "outputfile created successfully"
```

6683 *Rationale*: Austin Group Defect Report(s) applied: 717. See http://austingroupbugs.net/view.php?id=717.

6684 **Change Number: XCU/TC2/D4/0050** [960]

6685 On Page: 2348 Line: 74258 Section: 2.14 exit
6686 (2013 edition Page: 2371 Line: 75552)

6687 In the RATIONALE section, add a new paragraph:

6688 The behavior of *exit* when given an invalid argument or unknown option is unspecified, because of
6689 differing practices in the various historical implementations. A value larger than 255 might be truncated by
6690 the shell, and be unavailable even to a parent process that uses *waitid*() to get the full exit value. It is
6691 recommended that implementations that detect any usage error should cause a non-zero exit status (or, if
6692 the shell is interactive and the error does not cause the shell to abort, store a non-zero value in $?), but even
6693 this was not done historically in all shells.

6694 *Rationale*: Austin Group Defect Report(s) applied: 960. See http://austingroupbugs.net/view.php?id=960.

6695 **Change Number: XCU/TC2/D4/0051** [654]

6696 On Page: 2349 Line: 74290 Section: 2.14 export
6697 (2013 edition Page: 2372 Line: 75584)

6698 No change required to POSIX.1-2008.

6699 Revert Change Number XCU/TC1/D5/0043 from TC1, removing the text added:

6700 If a variable assignment precedes the command name of *export* but that variable is not also listed as an
6701 operand of *export*, then that variable shall be set in the current shell execution environment after the
6702 completion of the *export* command, but it is unspecified whether that variable is marked for export.

6703 *Rationale*: Austin Group Defect Report(s) applied: 654. See http://austingroupbugs.net/view.php?id=654.
6704 This change is layered on top of Change Number: XCU/TC1/D5/0043 from TC1. Earlier changes in section
6705 2.9.1 now mean that the change in TC1 is not required.

6706 **Change Number: XCU/TC2/D4/0052** [960]

6707 On Page: 2350 Line: 74312 Section: 2.14 export
6708 (2013 edition Page: 2373 Line: 75609)

6709 In the EXIT STATUS section, change from:

6710 Zero.

6711 to:

   0   All *name* operands were successfully exported.

   >0   At least one *name* could not be exported, or the **-p** option was specified and an error occurred.

6712
6713

6714 On Page: 2350 Line: 74316 Section: 2.14 export
6715 (2013 edition Page: 2373 Line: 75613)

6716 In the APPLICATION USAGE section, change from:

6717 None.

6718 to:

6719 Note that, unless X was previously marked readonly, the value of $? after

6720 ```
export X=$(false)
```

6721 will be 0 (because *export* successfully set X to the empty string) and that execution continues, even if *set* **-e**
6722 is in effect. In order to detect command substitution failures, a user must separate the assignment from the
6723 export, as in

6724 ```
X=$(false)
```
6725 ```
export X
```

6726 On Page: 2353 Line: 74396 Section: 2.14 readonly
6727 (2013 edition Page: 2376 Line: 75695)

6728 In the EXIT STATUS section, change from:

6729 Zero.

6730 to:

 0  All *name* operands were successfully marked readonly.

 >0  At least one *name* could not be marked readonly, or the **-p** option was specified and an error occurred.

6731 On Page: 2355 Line: 74460 Section: 2.14 return
6732 (2013 edition Page: 2378 Line: 25759)

6733 In the EXIT STATUS section, change from:

6734 If the value of *n* is greater than 255, the results are undefined.

6735 to:

6736 If *n* is not an unsigned decimal integer, or is greater than 255, the results are unspecified.

6737 *Rationale*: Austin Group Defect Report(s) applied: 960. See http://austingroupbugs.net/view.php?id=960.
6738 The standard was unclear whether certain shell special builtins must have exit status of 0, or whether the
6739 overall rule for non-zero status after error detection applied. Existing shells have non-zero status after
6740 errors.

6741

6742 **Change Number: XCU/TC2/D4/0053** [584]

6743 On Page: 2357 Line: 74508, 74510 Section: 2.14 set

6744 In the DESCRIPTION section, change from:

6745 <hyphen>

6746 to:

6747 <hyphen-minus>

6748 *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

6749 **Change Number: XCU/TC2/D4/0054** [717]

6750 On Page: 2358 Line: 74545 Section: 2.14 set
6751 (2013 edition Page: 2381 Line: 75845)

6752 In the DESCRIPTION section, replace the description of -**e** with:

6753 When this option is on, when any command fails (for any of the reasons listed in Section 2.8.1 (on page
6754 xxx) or by returning an exit status greater than zero) the shell immediately shall exit, as if by executing the
6755 *exit* special built-in utility with no arguments, with the following exceptions:

6756     1. The failure of any individual command in a multi-command pipeline shall not cause the shell to
6757        exit. Only the failure of the pipeline itself shall be considered.

6758     2. The -**e** setting shall be ignored when executing the compound list following the **while**, **until**, **if**, or
6759        **elif** reserved word, a pipeline beginning with the ! reserved word, or any command of an AND-OR
6760        list other than the last.

6761     3. If the exit status of a compound command other than a subshell command was the result of a
6762        failure while -**e** was being ignored, then -**e** shall not apply to this command.

6763 This requirement applies to the shell environment and each subshell environment separately. For example,
6764 in:

6765 `set -e; (false; echo one) | cat; echo two`

6766 the *false* command causes the subshell to exit without executing `echo one`; however, `echo two` is
6767 executed because the exit status of the pipeline `(false; echo one) | cat` is zero.

6768 *Rationale*: Austin Group Defect Report(s) applied: 717. See http://austingroupbugs.net/view.php?id=717.

6769 This is layered change on XCU/TC1/D5/0046 [52]. The change over the 2013 edition is to change from:
6770 the shell immediately shall exit with the following exceptions
6771 to:
6772 the shell immediately shall exit, as if by executing the exit special built-in utility with no arguments, with
6773 the following exceptions

6774 **Change Number: XCU/TC2/D4/0055** [717]

6775 On Page: 2359 Line: 74590 Section: 2.14 set

6776 In the DESCRIPTION section, change the description of -**u** from:

6777 The shell shall write a message to standard error when it tries to expand a variable that is not set and
6778 immediately exit. An interactive shell shall not exit.

6779 to:

6780 When the shell tries to expand an unset parameter other than the '@' and '*' special parameters, it shall write
6781 a message to standard error and the expansion shall fail with the consequences specified in 2.8.1
6782 Consequences of Shell Errors (on page xxx).

6783 *Rationale*: Austin Group Defect Report(s) applied: 717. See http://austingroupbugs.net/view.php?id=717.
6784 This is a layered change on XCU/TC1/D5/0047 [155,280]. This change replaces the previous revised text
6785 for the -u option.

6786 **Change Number: XCU/TC2/D4/0056** [960]

6787 On Page: 2360 Line: 74627 Section: 2.14 set
6788 (2013 edition Page: 2383 Line: 75944)

6789 In the EXIT STATUS section, change from:

6790 Zero.

6791 to:

    0    Successful completion.

    >0  An invalid option was specified, or an error occurred.

6792 On Page: 2366 Line: 74829 Section: 2.14 times
6793 (2013 edition Page: 2389 Line: 76171)

6794 In the EXIT STATUS section, change from:

6795 Zero.

6796 to:

    0    Successful completion.

    >0  An error occurred.

6797 *Rationale*: Austin Group Defect Report(s) applied: 960. See http://austingroupbugs.net/view.php?id=960.
6798 The standard was unclear whether certain shell special builtins must have exit status of 0, or whether the
6799 overall rule for non-zero status after error detection applied. Existing shells have non-zero status after

6800    errors.

6801    **Change Number: XCU/TC2/D4/0057** [584]

6802    On Page: 2415 Line: 76517, 76518 Section: ar

6803    In the RATIONALE section, change from:

6804    <hyphen>

6805    to:

6806    <hyphen-minus>

6807    *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

6808    **Change Number: XCU/TC2/D4/0058** [584]

6809    On Page: 2434 Line: 77280 Section: awk

6810    In the EXTENDED DESCRIPTION section, change from:

6811    sequence begins with a minus-sign,

6812    to:

6813    sequence begins with a <hyphen-minus>,

6814    *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

6815    **Change Number: XCU/TC2/D4/0059** [963]

6816    On Page: 2437 Line: 77382 Section: awk
6817    (2013 edition Page: 2459 Line: 78745)

6818    In the EXTENDED DESCRIPTION section, change from:

6819    operands shall be converted to strings as required and a string comparison shall be made using the locale-
6820    specific collation sequence. The value of the comparison expression shall be 1 if the relation is true, or 0 if
6821    the relation is false.

6822    to:

6823    operands shall be converted to strings as required and a string comparison shall be made as follows:

6824    • For the "!=" and "==" operators, the strings should be compared to check if they are identical but
6825      may be compared using the locale-specific collation sequence to check if they collate equally.
6826    • For the other operators, the strings shall be compared using the locale-specific collation sequence.

6827    The value of the comparison expression shall be 1 if the relation is true, or 0 if the relation is false.

6828    *Rationale*: Austin Group Defect Report(s) applied: 963. See http://austingroupbugs.net/view.php?id=963.

6829    **Change Number: XCU/TC2/D4/0060** [226]

6830    On Page: 2447 Line: 77855 Section: awk
6831    (2013 edition Page: 2470 Line: 79219)

6832    In the EXTENDED DESCRIPTION section, apply the following *diff* to the grammar:

```
6833     program           : item_list
6834    -                  | actionless_item_list
6835    +                  | item_list item
6836                       ;
6837
6838
6839    -item_list          : newline_opt
6840    -                  | actionless_item_list item terminator
6841    -                  | item_list            item terminator
6842    -                  | item_list           action terminator
6843    +item_list          : /* empty */
6844    +                  | item_list item terminator
6845                       ;
6846
6847
6848    -actionless_item_list : item_list              pattern terminator
6849    -                  | actionless_item_list pattern terminator
6850    -                  ;
6851    -
6852    -
6853    -item              : pattern action
6854    +item              : action
6855    +                  | pattern action
6856    +                  | normal_pattern
6857                       | Function NAME      '(' param_list_opt ')'
6858                            newline_opt action
6859                       | Function FUNC_NAME '(' param_list_opt ')'
```

6860   On Page: 2448 Line: 77878 Section: awk
6861   (2013 edition Page: 2471 Line: 79242)

6862   In the EXTENDED DESCRIPTION section, apply the following *diff* to the grammar:

```
6863    -pattern            : Begin
6864    -                  | End
6865    -                  | expr
6866    +pattern            : normal_pattern
6867    +                  | special_pattern
6868    +                  ;
6869    +
6870    +normal_pattern     : expr
6871                       | expr ',' newline_opt expr
6872                       ;
6873
6874
6875    +special_pattern    : Begin
6876    +                  | End
6877    +                  ;
6878    +
6879    +
```

```
6880    action              : '{' newline_opt                           '}'
6881                        | '{' newline_opt terminated_statement_list   '}'
6882                        | '{' newline_opt unterminated_statement_list '}'
6883                        ;
6884
6885
6886   -terminator          : terminator ';'
6887   -                    | terminator NEWLINE
6888   +terminator          : terminator NEWLINE
6889                        |           ';'
6890                        |           NEWLINE
6891                        ;
```

6892   *Rationale*: Austin Group Defect Report(s) applied: 226. See http://austingroupbugs.net/view.php?id=226.
6893   The standard does not require support for awk '/foo/; {print}', but this was unintentional.

6894   awk BEGIN (with no action) and awk END (with no action) are allowed by the grammar but forbidden by
6895   the EXTENDED DESCRIPTION section on Special Patterns (see Issue 7, P2440, L77545 and in Issue 7,
6896   2013 Edition, P2463, L78909).

6897   The standard requires support for awk '{print};;{print}', but this is not historic practice and is considered to
6898   be a poor programming practice.

6899   **Change Number: XCU/TC2/D4/0061** [663]

6900   On Page: 2455 Line: 78223 Section: awk
6901   (2013 edition Page: 2478 Line: 79587)

6902   In the APPLICATION USAGE section, add a new paragraph:

6903   When using *awk* to process pathnames, it is recommended that LC_ALL, or at least LC_CTYPE and
6904   LC_COLLATE, are set to POSIX or C in the environment, since pathnames can contain byte sequences
6905   that do not form valid characters in some locales, in which case the utility's behavior would be undefined.
6906   In the POSIX locale each byte is a valid single-byte character, and therefore this problem is avoided.

6907   *Rationale*: Austin Group Defect Report(s) applied: 663. See http://austingroupbugs.net/view.php?id=663.

6908   **Change Number: XCU/TC2/D4/0062** [963]

6909   On Page: 2455 Line: 78223 Section: awk
6910   (2013 edition Page: 2478 Line: 79587)

6911   In the APPLICATION USAGE section, add two new paragraphs:

6912   On implementations where the "==" operator checks if strings collate equally, applications needing to
6913   check whether strings are identical can use:

6914   `length(a) == length(b) && index(a,b) == 1`

6915   On implementations where the "==" operator checks if strings are identical, applications needing to check
6916   whether strings collate equally can use:

6917   `a <= b && a >= b`

6918   *Rationale*: Austin Group Defect Report(s) applied: 963. See http://austingroupbugs.net/view.php?id=963.

6919   **Change Number: XCU/TC2/D4/0063** [226]

6920   On Page: 2458 Line: 78313 Section: awk
6921   (2013 edition Page: 2481 Line: 79677)

6922   In the RATIONALE section, add a new paragraph:

6923   Earlier versions of this standard required implementations to support multiple adjacent <semicolon>s, lines
6924   with one or more <semicolon>s before a rule ("pattern {action}" pairs), and lines with only
6925   <semicolon>(s). These are not required by this standard and are considered poor programming practice, but
6926   can be accepted by an implementation of awk as an extension.

6927   *Rationale*: Austin Group Defect Report(s) applied: 226. See http://austingroupbugs.net/view.php?id=226.

6928   **Change Number: XCU/TC2/D4/0064** [963]

6929   On Page: 2463 Line: 78550 Section: awk
6930   (2013 edition Page: 2486 Line: 79914)

6931   In the FUTURE DIRECTIONS section, change from:

6932   None.

6933   to:

6934   A future version of this standard may require the "!=" and "==" operators to perform string comparisons by
6935   checking if the strings are identical (and not by checking if they collate equally).

6936   *Rationale*: Austin Group Defect Report(s) applied: 963. See http://austingroupbugs.net/view.php?id=963.

6937   **Change Number: XCU/TC2/D4/0065** [612]

6938   On Page: 2465 Line: 78660 Section: basename

6939   Add a new paragraph at the end of the EXAMPLES section :

6940   The EXAMPLES section of the *basename*() function (see XREF to XSH basename() EXAMPLES section)
6941   includes a table showing examples of the results of processing several sample pathnames by the
6942   *basename*() and *dirname*() functions and by the *basename* and *dirname* utilities.

6943   On Page: 2466 Line: 78676 Section: basename

6944   In the SEE ALSO section, add a new paragraph at the end:

6945   XSH *basename*(),

6946   *Rationale*: Austin Group Defect Report(s) applied: 612. See http://austingroupbugs.net/view.php?id=612.

6947

6948 **Change Number: XCU/TC2/D4/0066** [584]

6949 On Page: 2476 Line: 79064 Section: bc

6950 In the EXTENDED DESCRIPTION section, change from:

6951 <hyphen>

6952 to:

6953 <hyphen-minus>

6954 *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

6955 **Change Number: XCU/TC2/D4/0067** [679]

6956 On Page: 2480 Line: 79259 Section: bc
6957 (2013 edition Page: 2503 Line: 80630)

6958 In the EXTENDED DESCRIPTION section, change from:

6959 **j**(*expression*, *expression*)
6960   Bessel function of integer order.

6961 to:

6962 **j**(*expression1*, *expression2*)
6963   Bessel function of *expression2* of the first kind of integer order *expression1*.

6964 *Rationale*: Austin Group Defect Report(s) applied: 679. See http://austingroupbugs.net/view.php?id=679.

6965 **Change Number: XCU/TC2/D4/0068** [650]

6966 On Page: 2489 Line: 79568 Section: c99

6967 In the OPTIONS section, in the -E description change from:

6968 expanding all preprocessor directives

6969 to:

6970 executing all preprocessor directives

6971 *Rationale*: Austin Group Defect Report(s) applied: 650. See http://austingroupbugs.net/view.php?id=650.

6972 **Change Number: XCU/TC2/D4/0069** [670]

6973 On Page: 2491 Line: 79683,79696 Section: c99

6974 In the EXTENDED DESCRIPTION section, at line 79683 (**-l c**), change from:

6975   beginning with the prefix clock_ or time_

6976   to:

6977   beginning with the prefix clock_ or timer_

6978   At line 79696 (-**l rt**), change from:

6979   interfaces beginning with the prefix clock_ and time_

6980   to:

6981   interfaces beginning with the prefix clock_ and timer_

6982   *Rationale*: Austin Group Defect Report(s) applied: 670. See http://austingroupbugs.net/view.php?id=670.

6983   **Change Number: XCU/TC2/D4/0070** [638]

6984   On Page: 2494 Line: 79799 Section: c99

6985   In the CONSEQUENCES OF ERRORS section, change from:

6986   it shall not perform the link phase and return a non-zero exit status

6987   to:

6988   it shall not perform the link phase and it shall return a non-zero exit status

6989   *Rationale*: Austin Group Defect Report(s) applied: 638. See http://austingroupbugs.net/view.php?id=638.

6990   **Change Number: XCU/TC2/D4/0071** [650]

6991   On Page: 2497 Line: 79928 Section: c99

6992   In the RATIONALE section, add a new paragraph to the end of the section:

6993   When the -**E** option is used, execution of some **#pragma** preprocessor directives may simply result in a
6994   copy of the directive being included in the output as part of the allowed extra information used by
6995   subsequent compilation passes (see STDOUT).

6996   *Rationale*: Austin Group Defect Report(s) applied: 650. See http://austingroupbugs.net/view.php?id=650.

6997   **Change Number: XCU/TC2/D4/0072** [784]

6998   On Page: 2497 Line: 79930 Section: c99
6999   (2013 edition Page: 2520 Line: 81307)

7000   In the FUTURE DIRECTIONS section, change from:

7001   None.

7002   to:

7003   Unlike all of the other non-OB-shaded utilities in this standard, a utility by this name probably will not
7004   appear in the next revision of this standard. This utility's name is tied to the current revision of the C
7005   Standard at the time this standard is approved. Since the C Standard and this standard are maintained by
7006   different organizations on different schedules, we cannot predict what the compiler will be named in the
7007   next revision of the standard.

7008   *Rationale*: Austin Group Defect Report(s) applied: 784. See http://austingroupbugs.net/view.php?id=784.

7009   **Change Number: XCU/TC2/D4/0073** [876]

7010   On Page: 2502 Line: 80083 Section: cat
7011   (2013 edition Page: 2526 Line: 81474)

7012   In the STDOUT section, add a new sentence:

7013   If the standard output is a regular file, and is the same file as any of the input file operands, the
7014   implementation may treat this as an error.

7015   On Page: 2502 Line: 80115-80118 Section: cat
7016   (2013 edition Page: 2526 Line: 81506-81509)

7017   In the EXAMPLES section, change from:

7018   Because of the shell language mechanism used to perform output redirection, a command such as this:

7019   `cat doc doc.end > doc`

7020   causes the original data in doc to be lost.

7021   to:

7022   Because of the shell language mechanism used to perform output redirection, a command such as this:

7023   `cat doc doc.end > doc`

7024   causes the original data in **doc** to be lost before *cat* even begins execution. This is true whether the *cat*
7025   command fails with an error or silently succeeds (the specification allows both behaviors). In order to
7026   append the contents of **doc.end** without losing the original contents of **doc**, this command should be used
7027   instead:

7028   `cat doc.end >> doc`

7029   *Rationale*: Austin Group Defect Report(s) applied: 876. See http://austingroupbugs.net/view.php?id=876.
7030   A cat command which redirects its standard output to a file that is also named as a file operand is likely to
7031   run until the output file reaches the maximum output file size allowed for that process or the underlying
7032   filesystem runs out of space. This is a common application error that accidentally consumes a lot of space
7033   needed by other users on the system. Therefore, many implementations of the cat utility check for this
7034   condition and, when it is found, print a diagnostic message and exit with a non-zero exit status. This
7035   behavior is not currently allowed by the standard, but should be.

7036 **Change Number: XCU/TC2/D4/0074** [584]

7037 On Page: 2507 Line: 80264 Section: cd

7038 In the OPERANDS section, change from:

7039 <hyphen>

7040 to:

7041 <hyphen-minus>

7042 *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7043 **Change Number: XCU/TC2/D4/0075** [478]

7044 On Page: 2532 Line: 81246 Section: cmp

7045 In the OPTIONS section, change the -**s** description from:

7046 Write nothing for differing files; return exit status only.

7047 to:

7048 Write nothing to standard output or standard error when files differ; indicate differing files through exit
7049 status only. It is unspecified whether a diagnostic message is written to standard error when an error is
7050 encountered; if a message is not written, the error is indicated through exit status only.

7051 On Page: 2533 Line: 81295 Section: cmp

7052 In the STDERR section, add a new paragraph to the end of the section:

7053 If the -**s** option is used and an error occurs, it is unspecified whether a diagnostic message is written to
7054 standard error.

7055 On Page: 2534 Line: 81314 Section: cmp

7056 In the APPLICATION USAGE section, add two new paragraphs to the end of the section:

7057 Since the behavior of -**s** differs between implementations as to whether error messages are written, the only
7058 way to ensure consistent behavior of cmp when -**s** is used is to redirect standard error to /dev/null.

7059 If error messages are wanted, instead of using -**s** standard output should be redirected to /dev/null, and
7060 anything written to standard error should be discarded if the exit status is 1. For example:

```
7061        silent_cmp() {
7062            # compare files with no output except error messages
7063            message=$(cmp "$@" 2>&1 >/dev/null)
7064            status=$?
7065            case $status in
7066            (0|1) ;;
7067            (*) printf '%s\n' "$message" ;;
```

```
7068            esac
7069            return $status
7070        }
```

7071   On Page: 2534 Line: 81336 Section: cmp

7072   In the FUTURE DIRECTIONS section, change from:

7073   None.

7074   to:

7075   Future versions of this standard may require that diagnostic messages are written to standard error when the
7076   -**s** option is specified.

7077   *Rationale*: Austin Group Defect Report(s) applied: 478. See http://austingroupbugs.net/view.php?id=478.
7078   Existing implementations have adopted both possible interpretations of the current wording.

7079   **Change Number: XCU/TC2/D4/0076** [963]

7080   On Page: 2535 Line: 81354 Section: comm
7081   (2013 edition Page: 2559 Line: 82755)

7082   In the DESCRIPTION section, add a new paragraph:

7083   If the collating sequence of the current locale does not have a total ordering of all characters (see [xref to
7084   XBD 7.3.2]) and any lines from the input files collate equally but are not identical, *comm* should treat them
7085   as different lines but may treat them as being the same. If it treats them as different, *comm* should expect
7086   them to be ordered according to a further byte-by-byte comparison using the collating sequence for the
7087   POSIX locale and if they are not ordered in this way, the output of *comm* can identify such lines as being
7088   both unique to *file1* and unique to *file2* instead of being in both files.

7089   On Page: 2536 Line: 81409 Section: comm
7090   (2013 edition 2560 Line: 82810)

7091   In the STDOUT section, change from:

7092   If the input files were ordered according to the collating sequence of the current locale, the lines written
7093   shall be in the collating sequence of the original lines.

7094   to:

7095   If the input files were ordered according to the collating sequence of the current locale, the lines written
7096   shall be in the collating sequence of the current locale. If the input files contained any lines that collated
7097   equally but were not identical and within each file those lines were ordered according to a further byte-
7098   byte comparison using the collating sequence for the POSIX locale, and *comm* treated them as different
7099   lines, then lines written that collate equally but are not identical should be ordered according to a further
7100   byte-by-byte comparison using the collating sequence for the POSIX locale.

7101   *Rationale*: Austin Group Defect Report(s) applied: 963. See http://austingroupbugs.net/view.php?id=963.

7102

7103 **Change Number: XCU/TC2/D4/0077** [663]

7104 On Page: 2537 Line: 81424 Section: comm
7105 (2013 edition Page: 2561 Line: 82825)

7106 In the APPLICATION USAGE section, add a new paragraph:

7107 When using *comm* to process pathnames, it is recommended that LC_ALL, or at least LC_CTYPE and
7108 LC_COLLATE, are set to POSIX or C in the environment, since pathnames can contain byte sequences
7109 that do not form valid characters in some locales, in which case the utility's behavior would be undefined.
7110 In the POSIX locale each byte is a valid single-byte character, and therefore this problem is avoided.

7111 *Rationale*: Austin Group Defect Report(s) applied: 663. See http://austingroupbugs.net/view.php?id=663.

7112 **Change Number: XCU/TC2/D4/0078** [963]

7113 On Page: 2537 Line: 81424 Section: comm
7114 (2013 edition Page: 2561 Line: 82825)

7115 In the APPLICATION USAGE section, add the following new paragraphs:

7116 If the collating sequence of the current locale does not have a total ordering of all characters, this can affect
7117 the behaviour of *comm* in the following ways:

7118 • If *comm* treats lines as being the same only if they are identical, some lines can be misleadingly
7119 identified as being both unique to *file1* and unique to *file2*.
7120 • If *comm* treats lines as being the same if they collate equally and a line from *file1* collates equally
7121 with a line from *file2* but is not identical to it, one of the lines is misleadingly identified as being in
7122 both files and the other is not written to the output at all.

7123 Such problems can be avoided by forcing the use of the POSIX locale, for example the following identifies
7124 lines in both *file1* and *file2*:

```
7125 LC_ALL=POSIX sort file1 > file1.posix
7126 LC_ALL=POSIX sort file2 > file2.posix
7127 LC_ALL=POSIX comm -12 file1.posix file2.posix | sort
```

7128 The final *sort* re-sorts the output of *comm* according to the collating sequence of the original locale. Doing
7129 this might be difficult if more than one column is output and leading blanks cannot be ignored.

7130 On Page: 2537 Line: 81441 Section: comm
7131 (2013 edition Page: 2561 Line: 82842)

7132 In the FUTURE DIRECTIONS section, change from:

7133 None.

7134 to:

7135 A future version of this standard may require that if any lines from the input files collate equally but are not
7136 identical, then *comm* treats them as different lines and expects them to be ordered according to a further
7137 byte-by-byte comparison using the collating sequence for the POSIX locale.

7138 A future version of this standard may require that if the input files contained any lines that collated equally
7139 but were not identical and within each file those lines were ordered according to a further byte-by-byte
7140 comparison using the collating sequence for the POSIX locale, then lines written that collate equally but are
7141 not identical are ordered according to a further byte-by-byte comparison using the collating sequence for
7142 the POSIX locale.

7143 *Rationale*: Austin Group Defect Report(s) applied: 963. See http://austingroupbugs.net/view.php?id=963.

7144 **Change Number: XCU/TC2/D4/0079** [584]

7145 On Page: 2556 Line: 82163 Section: crontab

7146 In the INPUT FILES section, change from:

7147 <hyphen>

7148 to:

7149 <hyphen-minus>

7150 *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7151 **Change Number: XCU/TC2/D4/0080** [584]

7152 On Page: 2568 Line: 82614, 82616, 82617, 82634 Section: cut

7153 In the OPTIONS section, change from:

7154 <hyphen>

7155 to:

7156 <hyphen-minus>

7157 *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7158 **Change Number: XCU/TC2/D4/0081** [907]

7159 On Page: 2583 Line: 83203 Section: dd
7160 (2013 edition Page: 2607 Line: 84604)

7161 In the OPERANDS section, change from:

7162 **count**=*n*   Copy only *n* input blocks.

7163 to:

7164 **count**=*n*   Copy only *n* input blocks. If *n* is zero, it is unspecified whether no blocks or all blocks are
7165 copied.

7166 *Rationale*: Austin Group Defect Report(s) applied: 907. See http://austingroupbugs.net/view.php?id=907.

7167   There are two existing implementation behaviors and the standard only allows one of them.

7168   **Change Number: XCU/TC2/D4/0082** [584]

7169   On Page: 2601 Line: 83825 Section: diff

7170   In the STDOUT section, change from:

7171   <hyphen>

7172   to:

7173   <hyphen-minus>

7174   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7175   **Change Number: XCU/TC2/D4/0083** [950]

7176   On Page: 2603 Line: 83888,83889 Section: diff
7177   (2013 edition Page: 2627 Line: 85290,85291)

7178   In the STDOUT section, change from:

7179   `"---Δ%s%s%sΔ%s0, file1, …`
7180   `"+++Δ%s%s%sΔ%s0, file2, …`

7181   to:

7182   `"---Δ%s\t%s%sΔ%s\n", file1, …`
7183   `"+++Δ%s\t%s%sΔ%s\n", file2, …`

7184   *Rationale*: Austin Group Defect Report(s) applied: 950. See http://austingroupbugs.net/view.php?id=950.

7185   **Change Number: XCU/TC2/D4/0084** [969]

7186   On Page: 2604 Line: 83911 Section: diff
7187   (2013 edition Page: 2628 Line: 85313)

7188   In the STDOUT section, change from:

7189   Each *<range>* field shall be of the form:

7190   `"%1d", <beginning line number>`

7191   if the range contains exactly one line

7192   to:

7193   Each *<range>* field shall be of the form:

7194   `"%1d", <beginning line number>`

7195 or:

7196 `"%1d,1", <beginning line number>`

7197 if the range contains exactly one line

7198 *Rationale*: Austin Group Defect Report(s) applied: 969. See http://austingroupbugs.net/view.php?id=969.
7199 The standard only allows one form for specifying single line changes in unified diff output, but existing
7200 practice uses two forms.

7201 **Change Number: XCU/TC2/D4/0085** [929]

7202 On Page: 2604 Line: 83929 Section: diff
7203 (2013 edition Page: 2628 Line: 85331)

7204 In the STDOUT section, change from:

7205 shall contain no more than *n* consecutive unaffected lines

7206 to:

7207 shall contain no more than 2*n* consecutive unaffected lines

7208 *Rationale*: Austin Group Defect Report(s) applied: 929. See http://austingroupbugs.net/view.php?id=929.

7209 **Change Number: XCU/TC2/D4/0086** [612]

7210 On Page: 2609 Line: 84125-84135 Section: dirname

7211 Change the table in the EXAMPLES section to:

7212 The EXAMPLES section of the *basename*() function (see XREF to XSH basename() EXAMPLES section)
7213 includes a table showing examples of the results of processing several sample pathnames by the
7214 *basename*() and *dirname*() functions and by the *basename* and *dirname* utilities.

7215 *Rationale*: Austin Group Defect Report(s) applied: 612. See http://austingroupbugs.net/view.php?id=612.

7216 **Change Number: XCU/TC2/D4/0087** [620]

7217 On Page: 2609 Line: 84137-84139 Section: dirname

7218 In the RATIONALE section, delete:

7219 The *dirname* utility originated in System III. It has evolved through the System V releases to a version that
7220 matches the requirements specified in this description in System V Release 3. 4.3 BSD and earlier versions
7221 did not include *dirname*.

7222 *Rationale*: Austin Group Defect Report(s) applied: 620. See http://austingroupbugs.net/view.php?id=620.

7223

7224 **Change Number: XCU/TC2/D4/0088** [612]

7225 On Page: 2610 Line: 84154 Section: dirname

7226 In the SEE ALSO section, add a new paragraph:

7227 XSH *dirname*()

7228 *Rationale*: Austin Group Defect Report(s) applied: 612. See http://austingroupbugs.net/view.php?id=612.

7229 **Change Number: XCU/TC2/D4/0089** [527]

7230 On Page: 2611 Line: 84170 Section: du

7231 In the DESCRIPTION section, change from:

7232 Files with multiple links shall be counted and written for only one entry.

7233 to:

7234 A file that occurs multiple times under one file operand and that has a link count greater than 1 shall be
7235 counted and written for only one entry. It is implementation-defined whether a file that has a link count no
7236 greater than 1 is counted and written just once, or is counted and written for each occurrence. It is
7237 implementation-defined whether a file that occurs under one file operand is counted for other file operands.

7238 On Page: 2611 Line: 84177 Section: du

7239 In the OPTIONS section, for the -a option change from:

7240 Regardless of the presence of the -a option, non-directories given as file operands shall always be listed.

7241 to:

7242 The -**a** option shall not affect whether non-directories given as file operands are listed.

7243 On Page: 2613 Line: 84274 Section: du

7244 In the FUTURE DIRECTIONS section, change from:

7245 None.

7246 to:

7247 A future version of this standard may require that a file that occurs multiple times shall be counted and
7248 written for only one entry, even if the occurrences are under different file operands.

7249 *Rationale*: Austin Group Defect Report(s) applied: 527. See http://austingroupbugs.net/view.php?id=527.
7250 Existing practice is varied in how du counts files.

7251

7252   **Change Number: XCU/TC2/D4/0090** [584]

7253   On Page: 2620 Line: 84532,84533 Section: ed

7254   In the EXTENDED DESCRIPTION section, change from:

7255   <hyphen>

7256   to:

7257   <hyphen-minus>

7258   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7259   **Change Number: XCU/TC2/D4/0091** [584]

7260   On Page: 2621 Line: 84537,84539 Section: ed

7261   In the EXTENDED DESCRIPTION section, change from:

7262   <hyphen>

7263   to:

7264   <hyphen-minus>

7265   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7266   **Change Number: XCU/TC2/D4/0092** [584]

7267   On Page: 2632 Line: 85026 Section: ed

7268   In the RATIONALE section, change from:

7269   <hyphen>

7270   to:

7271   <hyphen-minus>

7272   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7273   **Change Number: XCU/TC2/D4/0093** [584]

7274   On Page: 2645 Line: 85512 Section: ex

7275   In the EXTENDED DESCRIPTION section, change from:

7276   A <plus-sign> ('+') or a minus-sign ('-')

7277   to:

7278   A <plus-sign> ('+') or a <hyphen-minus> ('-')

7279   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7280   **Change Number: XCU/TC2/D4/0094** [942]

7281   On Page: 2715 Line: 88231 Section: expr
7282   (2013 edition Page: 2739 Line: 89637)

7283   In the EXTENDED DESCRIPTION section, change from:

7284   The expressions are listed in order of increasing precedence

7285   to:

7286   The expressions are listed in order of decreasing precedence

7287   On Page: 2715 Line: 88234-88264 Section: expr
7288   (2013 edition Page: 2739 Line: 89640-89670)

7289   In the EXTENDED DESCRIPTION section, rearrange the lines of the table into the following order (still
7290   with each group of lines forming a row of the table):

table header	line 88234 (2013 edition line 89640)
integer, string	line 88262-88264 (2013 edition line 89668-89760)
parentheses	line 88259-88261 (2013 edition line 89665-89667)
:	line 88258 (2013 edition line 89664)
*, /, %	line 88253-88257 (2013 edition line 98659-89663)
+, -	line 88251-88252 (2013 edition line 89657-89658)
=, >, >=, <, <=, !=	line 88240-88250 (2013 edition line 89646-89656)
&	line 88238-88239 (2013 edition line 89644-89645)
|	line 88235-88237 (2013 edition line 89641-89643)

7291   *Rationale*: Austin Group Defect Report(s) applied: 942. See http://austingroupbugs.net/view.php?id=942.

7292

7293   **Change Number: XCU/TC2/D4/0095** [709]

7294   On Page: 2716 Line: 88276 Section: expr

7295   In the EXTENDED DESCRIPTION section, change from:

7296   **String Operand**

7297   A string argument is an argument that cannot be identified as an integer argument or as one of the
7298   expression operator symbols shown in the OPERANDS section.

7299   to:

7300   **Identification as Integer or String**

7301   An argument or the value of a subexpression that consists only of an optional unary minus followed by
7302   digits is a candidate for treatment as an integer if it is used as the left argument to the | operator or as either
7303   argument to any of the following operators: & = > >= < <= != + - * / %. Otherwise, the argument or
7304   subexpression value shall be treated as a string.

7305   *Rationale*: Austin Group Defect Report(s) applied: 709. See http://austingroupbugs.net/view.php?id=709.

7306   **Change Number: XCU/TC2/D4/0096** [942]

7307   On Page: 2716 Line: 88291 Section: expr
7308   (2013 edition Page: 2740 Line: 89697)

7309   In the APPLICATION USAGE section, change from:

7310   ```
expr $a = '='
```

7311   to:

7312   ```
expr "$a" = '='
```

7313    On Page: 2716 Line: 88296 Section: expr
7314    (2013 edition Page: 2740 Line: 89702)

7315    In the APPLICATION USAGE section, change from:

7316    ```
expr X$a = X=
```

7317   to:

7318   ```
expr "X$a" = X=
```

7319    *Rationale*: Austin Group Defect Report(s) applied: 942. See http://austingroupbugs.net/view.php?id=942.

7320

7321 **Change Number: XCU/TC2/D4/0097** [963]

7322 On Page: 2716 Line: 88302 Section: expr
7323 (2013 edition Page: 2740 Line: 89708)

7324 In the APPLICATION USAGE section, add a new paragraph:

7325 For testing string equality the *test* utility is preferred over *expr*, as it is usually implemented as a shell built-
7326 in. However, the functionality is not quite the same because the *expr* '=' and "!=" operators check whether
7327 strings collate equally, whereas *test* checks whether they are identical. Therefore, they can produce
7328 different results in locales where the collation sequence does not have a total ordering of all characters (see
7329 [xref to XBD 7.3.2]).

7330 *Rationale*: Austin Group Defect Report(s) applied: 963. See http://austingroupbugs.net/view.php?id=963.

7331 **Change Number: XCU/TC2/D4/0098** [942]

7332 On Page: 2717 Line: 88304 Section: expr
7333 (2013 edition Page: 2741 Line: 89710)

7334 Move lines 88304-88316 (2013 edition lines 89710-89722) from the EXAMPLES section to the start of the
7335 APPLICATION USAGE section before line 88289 (2013 edition line 89695).

7336 On Page: 2717 Line: 88318 Section: expr
7337 (2013 edition Page: 2741 Line: 89724)

7338 In the EXAMPLES section, change from:

7339 `a=$(expr $a + 1)`

7340 to:

7341 `a=$(expr "$a" + 1)`

7342 On Page: 2717 Line: 88331 Section: expr
7343 (2013 edition Page: 2741 Line: 89737)

7344 In the EXAMPLES section, change from:

7345 `expr "$VAR" : '.*'`

7346 to:

7347 `expr "X$VAR" : '.*' - 1`

7348 *Rationale*: Austin Group Defect Report(s) applied: 942. See http://austingroupbugs.net/view.php?id=942.

7349

7350    **Change Number: XCU/TC2/D4/0099** [584]

7351    On Page: 2738 Line: 89085 Section: find

7352    In the OPERANDS section, change from:

7353    preceded by a plus ('+') or minus-sign ('-') sign

7354    to:

7355    preceded by a <plus-sign> ('+') or <hyphen-minus> ('-')

7356    *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7357    **Change Number: XCU/TC2/D4/0100** [584]

7358    On Page: 2738 Line: 89122, 89124, 89126 Section: find

7359    In the OPERANDS section, change from:

7360    <hyphen>

7361    to:

7362    <hyphen-minus>

7363    *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7364    **Change Number: XCU/TC2/D4/0101** [584]

7365    On Page: 2739 Line: 89129, 89131 Section: find

7366    In the OPERANDS section, change from:

7367    <hyphen>

7368    to:

7369    <hyphen-minus>

7370    *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7371    **Change Number: XCU/TC2/D4/0102** [546]

7372    On Page: 2751 Line: 89574 Section: fort77

7373    In the SYNOPSIS section, change the shading from FD to OB FD.

7374    *Rationale*: Austin Group Defect Report(s) applied: 546. See http://austingroupbugs.net/view.php?id=546.

7375 **Change Number: XCU/TC2/D4/0103** [546]

7376 On Page: 2756 Line: 89793 Section: fort77

7377 In the FUTURE DIRECTIONS section, replace the existing text with:

7378 Future versions of this standard may withdraw this utility. There are implementations of compilers that
7379 conform to much more recent versions of the Fortran programming language. Since there is no active
7380 Fortran binding to POSIX-2008, this standard does not need to specify any compiler.

7381 *Rationale*: Austin Group Defect Report(s) applied: 546. See http://austingroupbugs.net/view.php?id=546.

7382 **Change Number: XCU/TC2/D4/0104** [584]

7383 On Page: 2767 Line: 90181 Section: get

7384 In the OUTPUT FILES section, change from:

7385 <hyphen>

7386 to:

7387 <hyphen-minus>

7388 *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7389 **Change Number: XCU/TC2/D4/0105** [584]

7390 On Page: 2786 Line: 90876 Section: grep

7391 In the APPLICATION USAGE section, change from:

7392 <hyphen>

7393 to:

7394 <hyphen-minus>

7395 *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7396 **Change Number: XCU/TC2/D4/0106** [663]

7397 On Page: 2786 Line: 90886 Section: grep
7398 (2013 edition Page: 2810 Line: 92292)

7399 In the APPLICATION USAGE section, add a new paragraph:

7400 When using *grep* to process pathnames, it is recommended that LC_ALL, or at least LC_CTYPE and
7401 LC_COLLATE, are set to POSIX or C in the environment, since pathnames can contain byte sequences
7402 that do not form valid characters in some locales, in which case the utility's behavior would be undefined.
7403 In the POSIX locale each byte is a valid single-byte character, and therefore this problem is avoided.

7404    *Rationale*: Austin Group Defect Report(s) applied: 663. See http://austingroupbugs.net/view.php?id=663.

7405    **Change Number: XCU/TC2/D4/0107** [663]

7406    On Page: 2792 Line: 91089 Section: head
7407    (2013 edition Page: 2816 Line: 92496)

7408    In the APPLICATION USAGE section, change from:

7409    None.

7410    to:

7411    When using *head* to process pathnames, it is recommended that LC_ALL, or at least LC_CTYPE and
7412    LC_COLLATE, are set to POSIX or C in the environment, since pathnames can contain byte sequences
7413    that do not form valid characters in some locales, in which case the utility's behavior would be undefined.
7414    In the POSIX locale each byte is a valid single-byte character, and therefore this problem is avoided.

7415    *Rationale*: Austin Group Defect Report(s) applied: 663. See http://austingroupbugs.net/view.php?id=663.

7416    **Change Number: XCU/TC2/D4/0108** [584]

7417    On Page: 2806 Line: 91568 Section: ipcs

7418    In the STDOUT section, change from:

7419    a minus-sign ('-').

7420    to:

7421    a <hyphen-minus> ('-').

7422    *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7423    **Change Number: XCU/TC2/D4/0109** [963]

7424    On Page: 2815 Line: 91866 Section: join
7425    (2013 edition Page: 2839 Line: 93278)

7426    In the DESCRIPTION section, change from:

7427    that have identical join fields

7428    to:

7429    that have join fields that collate equally

7430    On Page: 2817 Line: 91965 Section: join
7431    (2013 edition Page: 2841 Line: 93377)

7432    In the APPLICATION USAGE section, add a new paragraph:

7433 If the collating sequence of the current locale does not have a total ordering of all characters (see [xref to
7434 XBD 7.3.2]), *join* treats fields that collate equally but are not identical as being the same. If this behavior is
7435 not desired, it can be avoided by forcing the use of the POSIX locale (although this means re-sorting the
7436 input files into the POSIX locale collating sequence.)

7437 *Rationale*: Austin Group Defect Report(s) applied: 963. See http://austingroupbugs.net/view.php?id=963.

7438 **Change Number: XCU/TC2/D4/0110** [663]

7439 On Page: 2817 Line: 91965 Section: join
7440 (2013 edition Page: 2841 Line: 93377)

7441 In the APPLICATION USAGE section, add a new paragraph:

7442 When using *join* to process pathnames, it is recommended that LC_ALL, or at least LC_CTYPE and
7443 LC_COLLATE, are set to POSIX or C in the environment, since pathnames can contain byte sequences
7444 that do not form valid characters in some locales, in which case the utility's behavior would be undefined.
7445 In the POSIX locale each byte is a valid single-byte character, and therefore this problem is avoided.

7446 *Rationale*: Austin Group Defect Report(s) applied: 663. See http://austingroupbugs.net/view.php?id=663.

7447 **Change Number: XCU/TC2/D4/0111** [971]

7448 On Page: 2817 Line: 91980 Section: join
7449 (2013 edition Page: 2841 Line: 93392)

7450 In the EXAMPLES section, change from:

7451 would produce

7452 to:

7453 (where <tab> is a literal <tab> character) would produce

7454 *Rationale*: Austin Group Defect Report(s) applied: 971. See http://austingroupbugs.net/view.php?id=971.

7455 **Change Number: XCU/TC2/D4/0112** [885]

7456 On Page: 2818 Line: 92018 Section: join
7457 (2013 edition Page: 2842 Line: 93430)

7458 In the RATIONALE section, change from:

7459 objections that the *join* in the base documents does not support

7460 to:

7461 objections that the *join* in the base documents for POSIX.2-1992 did not support

7462

7463   On Page: 2818 Line: 92023 Section: join
7464   (2013 edition Page: 2842 Line: 93435)

7465   In the RATIONALE section, change from:

7466   base documents

7467   to:

7468   base documents for POSIX.2-1992

7469   *Rationale*: Austin Group Defect Report(s) applied: 885. See http://austingroupbugs.net/view.php?id=885.

7470   **Change Number: XCU/TC2/D4/0113** [930]

7471   On Page: 2839 Line: 92843,92847 Section: ln
7472   (2013 edition Page: 2863 Line: 94255,94259)

7473   In the DESCRIPTION section, for list items 1.b and 1.c change from:

7474   *destination*

7475   to:

7476   the destination path

7477   *Rationale*: Austin Group Defect Report(s) applied: 930. See http://austingroupbugs.net/view.php?id=930.

7478   **Change Number: XCU/TC2/D4/0114** [941]

7479   On Page: 2848 Line: 93158 Section: locale
7480   (2013 edition Page: 2872 Line: 94572)

7481   In the EXAMPLES section, change from:

7482   ```
if printf "%s\n" "$response" | grep -Eq "$(locale yesexpr)"
```

7483   to:

7484   ```
printf 'Prompt for response: '
```
7485   ```
read response
```
7486   ```
if printf "%s\n" "$response" | grep -Eq -- "$(locale yesexpr)"
```

7487   *Rationale*: Austin Group Defect Report(s) applied: 941. See http://austingroupbugs.net/view.php?id=941.

7488   **Change Number: XCU/TC2/D4/0115** [963]

7489   On Page: 2864 Line: 93739 Section: ls
7490   (2013 edition Page: 2888 Line: 95164)

7491   In the DESCRIPTION section, add a new paragraph:

7492 Whenever *ls* sorts filenames or pathnames according to the collating sequence in the current locale, if this
7493 collating sequence does not have a total ordering of all characters (see [xref to XBD 7.3.2]), then any
7494 filenames or pathnames that collate equally should be further compared byte-by-byte using the collating
7495 sequence for the POSIX locale.

7496 *Rationale*: Austin Group Defect Report(s) applied: 963. See http://austingroupbugs.net/view.php?id=963.

7497 **Change Number: XCU/TC2/D4/0116** [963]

7498 On Page: 2872 Line: 94057 Section: ls
7499 (2013 edition Page: 2896 Line: 95520)

7500 In the FUTURE DIRECTIONS section, change from:

7501 None.

7502 to:

7503 Allowing **-f** to ignore the **-A**, **-g**, **-l**, **-n**, **-o**, and **-s** options may be removed in a future version.

7504 A future version of this standard may require that if the collating sequence for the current locale does not
7505 have a total ordering of all characters, any filenames or pathnames that collate equally are further compared
7506 byte-by-byte using the collating sequence for the POSIX locale.

7507 *Rationale*: Austin Group Defect Report(s) applied: 963. See http://austingroupbugs.net/view.php?id=963.
7508 This is a layered change on XCU/TC1/D5/0116 [424]. The change over the 2013 edition is the addition of
7509 the second paragraph.

7510 **Change Number: XCU/TC2/D4/0117** [964]

7511 On Page: 2877 Line: 94286 Section: m4
7512 (2013 edition Page: 2902 Line: 95756)

7513 In the EXTENDED DESCRIPTION section, for m4exit change from:

7514 Exit from the *m4* utility. If the first argument is specified, it is the exit code. The default is zero. It shall be
7515 an error to specify an argument containing any non-numeric characters.

7516 to:

7517 Exit from the *m4* utility. If the first argument is specified, it shall be the exit code. If no argument is
7518 specified, the exit code shall be zero. It shall be an error to specify an argument containing any non-
7519 numeric characters. If the first argument is zero or no argument is specified, and an error has previously
7520 occurred (for example, a *file* operand that could not be opened), it is unspecified whether the exit status is
7521 zero or non-zero.

7522 *Rationale*: Austin Group Defect Report(s) applied: 964. See http://austingroupbugs.net/view.php?id=964.

7523

7524    **Change Number: XCU/TC2/D4/0118** [970]

7525    On Page: 2877 Line: 94296 Section: m4
7526    (2013 edition Page: 2902 Line: 95766)

7527    In the EXTENDED DESCRIPTION section, for mkstemp change from:

7528    The first argument shall be taken as a template for creating an empty file, with trailing `'X'` characters
7529    replaced with characters from the portable filename character set. The behavior is unspecified if the first
7530    argument does not end in at least six `'X'` characters. If a temporary file is successfully created, then the
7531    defining text of the macro shall be the name of the new file. The user ID of the file shall be set to the
7532    effective user ID of the process. The group ID of the file shall be set to the group ID of the file's parent
7533    directory or to the effective group ID of the process. The file access permission bits are set such that only
7534    the owner can both read and write the file, regardless of the current *umask* of the process.

7535    to:

7536    The defining text shall be as if it were the resulting pathname after a successful call to the *mkstemp*()
7537    function defined in the System Interfaces volume of POSIX.1-2008 called with the first argument to the
7538    macro invocation. If a file is created, that file shall be closed.

7539    *Rationale*: Austin Group Defect Report(s) applied: 970. See http://austingroupbugs.net/view.php?id=970.
7540    The current standard does not match any existing practice. The m4 utility uses the mkstemp() function and
7541    does not modify the umask nor call chmod() after creating the file.

7542    **Change Number: XCU/TC2/D4/0119** [964]

7543    On Page: 2877 Line: 94304 Section: m4
7544    (2013 edition Page: 2902 Line: 95774)

7545    In the EXTENDED DESCRIPTION section, for mkstemp change from:

7546    If a file could not be created, the defining text of the macro shall be the empty string.

7547    to:

7548    If a file could not be created, the *m4* utility shall write a diagnostic message to standard error and shall
7549    continue processing input but its final exit status shall be non-zero; the defining text of the macro shall be
7550    the empty string.

7551    *Rationale*: Austin Group Defect Report(s) applied: 964. See http://austingroupbugs.net/view.php?id=964.

7552    **Change Number: XCU/TC2/D4/0120** [855]

7553    On Page: 2884 Line: 94599 Section: mailx
7554    (2013 edition Page: 2910 Line: 96076)

7555    In the ENVIRONMENT VARIABLES section, for MAILRC change from:

7556    Determine the pathname of the start-up file.

7557    to:

7558    Determine the pathname of the user start-up file.

7559    On Page: 2889 Line: 94801 Section: mailx
7560    (2013 edition Page: 2915 Line: 96278)

7561    In the EXTENDED DESCRIPTION section, change from:

7562    5. Process the start-up file of *mailx* commands named in the user *MAILRC* variable.

7563    to:

7564    5. Process the user start-up file of *mailx* commands named in the *MAILRC* variable.

7565    On Page: 2889 Line: 94803 Section: mailx
7566    (2013 edition Page: 2915 Line: 96280)

7567    In the EXTENDED DESCRIPTION section, change from:

7568    The following commands shall be invalid in the start-up file: **!**, **edit**, **hold**, **mail**, **preserve**, **reply**, **Reply**,
7569    **shell**, **visual**, **Copy**, **followup**, and **Followup**. Any errors in the start-up file shall either cause *mailx* to
7570    terminate with a diagnostic message and a non-zero status or to continue after writing a diagnostic message,
7571    ignoring the remainder of the lines in the start-up file.

7572    to:

7573    The following commands shall be invalid in a start-up file: **!**, **edit**, **hold**, **mail**, **preserve**, **reply**, **Reply**,
7574    **shell**, **visual**, **Copy**, **followup**, and **Followup**. Any errors in a start-up file shall either cause *mailx* to
7575    terminate with a diagnostic message and a non-zero status or to continue after writing a diagnostic message,
7576    ignoring the remainder of the lines in the file.

7577    *Rationale*: Austin Group Defect Report(s) applied: 855. See http://austingroupbugs.net/view.php?id=855.

7578    **Change Number: XCU/TC2/D4/0121** [619]

7579    On Page: 2904 Line: 95360-95362 Section: mailx

7580    In the RATIONALE section, change from:

7581    Implementations are encouraged to conform to the various delivery mechanisms described in the CCITT
7582    X.400 standards or to the equivalent Internet standards, described in Internet Request for Comment (RFC)
7583    documents RFC 819, RFC 822, RFC 920, RFC 921, and RFC 1123.

7584    to:

7585    Implementations are encouraged to conform to the various delivery mechanisms described in the CCITT
7586    X.400 standards or to the equivalent Internet standards, described in Internet Request for Comment (RFC)
7587    documents RFC 819, RFC 920, RFC 921, RFC 1123, and RFC 5322 (which succeeded RFC 822).

7588    *Rationale*: Austin Group Defect Report(s) applied: 619. See http://austingroupbugs.net/view.php?id=619.

7589

7590  **Change Number: XCU/TC2/D4/0122** [509]

7591  On Page: 2909 Line: 95561-95562 Section: make

7592  In the INPUT FILES section, change from:

7593  and comments

7594  to:

7595  include lines, and comments

7596  *Rationale*: Austin Group Defect Report(s) applied: 509. See http://austingroupbugs.net/view.php?id=509.

7597  **Change Number: XCU/TC2/D4/0123** [584]

7598  On Page: 2910 Line: 95580, 95583 Section: make

7599  In the ENVIRONMENT VARIABLES section, change from:

7600  <hyphen>

7601  to:

7602  <hyphen-minus>

7603  *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7604  **Change Number: XCU/TC2/D4/0124** [857]

7605  On Page: 2911 Line: 95629 Section: make
7606  (2013 edition Page: 2937 Line: 97106)

7607  In the EXTENDED DESCRIPTION section, change from:

7608  A target is considered out-of-date if it is older than any of its prerequisites or if it does not exist.

7609  to:

7610  A target shall be considered up-to-date if it exists and is newer than all of its dependencies, or if it has
7611  already been made up-to-date by the current invocation of *make* (regardless of the target's existence or age).
7612  A target may also be considered up-to-date if it exists, is the same age as one or more of its prerequisites,
7613  and is newer than the remaining prerequisites (if any).

7614  On Page: 2911 Line: 95634 Section: make
7615  (2013 edition Page: 2937 Line: 97111)

7616  In the EXTENDED DESCRIPTION section, change from:

7617  After *make* has ensured that all of the prerequisites of a target are up-to-date and if the target is out-of-date,
7618  the commands associated with the target entry shall be executed. If there are no commands listed for the

7619     target, the target shall be treated as up-to-date.

7620     to:

7621     To ensure that a target is up-to-date, *make* shall ensure that all of the prerequisites of a target are up-to-date,
7622     then check to see if the target itself is up-to-date. If the target is not up-to-date, the target shall be made up-
7623     to-date by executing the rule's commands (if any). If the target does not exist after the target has been
7624     successfully made up-to-date, the target shall be treated as being newer than any target for which it is a
7625     prerequisite.

7626     If a target exists and there is neither a target rule nor an inference rule for the target, the target shall be
7627     considered up-to-date. It shall be an error if *make* attempts to ensure that a target is up-to-date but the target
7628     does not exist and there is neither a target rule nor an inference rule for the target.

7629     *Rationale*: Austin Group Defect Report(s) applied: 857. See http://austingroupbugs.net/view.php?id=857.

7630     **Change Number: XCU/TC2/D4/0125** [505]

7631     On Page: 2911 Line: 95644,95656 Section: make

7632     In the EXTENDED DESCRIPTION section, change from:

7633     Comments start with a <number-sign> ('#') and continue until an unescaped <newline> is reached.

7634     to:

7635     There are three kinds of comments: blank lines, empty lines, and a <number-sign> ('#') and all following
7636     characters up to the first unescaped <newline> character. Blank lines, empty lines, and lines with <number-
7637     sign> ('#') as the first character on the line are also known as comment lines.

7638     On line 95656 change from:

7639     empty lines, and comments

7640     to:

7641     and comments

7642     On Page: 2912 Line: 95671 Section: make

7643     In the EXTENDED DESCRIPTION section, change from:

7644     The trailing <newline> and any comment shall be discarded.

7645     to:

7646     The trailing <newline>, any <blank> characters immediately preceeding a comment, and any comment
7647     shall be discarded.

7648     *Rationale*: Austin Group Defect Report(s) applied: 505. See http://austingroupbugs.net/view.php?id=505.
7649     The standard as currently written does not allow blank lines and empty lines in places where all known

7650 implementations have allowed them to appear. These changes more accurately reflect existing practice.

7651 **Change Number: XCU/TC2/D4/0126** [584]

7652 On Page: 2912 Line: 95691, 95694 Section: make

7653 In the EXTENDED DESCRIPTION section, change from:

7654 <hyphen>

7655 to:

7656 <hyphen-minus>

7657 *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7658 **Change Number: XCU/TC2/D4/0127** [505]

7659 On Page: 2913 Line: 95722 Section: make

7660 In the EXTENDED DESCRIPTION section, change from:

7661 An empty or blank line, or a line beginning with '#', may begin a new entry.

7662 to:

7663 Any comment line may begin a new entry.

7664 *Rationale*: Austin Group Defect Report(s) applied: 505. See http://austingroupbugs.net/view.php?id=505.
7665 The standard as currently written does not allow blank lines and empty lines in places where all known
7666 implementations have allowed them to appear. These changes more accurately reflect existing practice.

7667 **Change Number: XCU/TC2/D4/0128** [865]

7668 On Page: 2915 Line: 95807 Section: make
7669 (2013 edition Page: 2941 Line: 97280)

7670 In the EXTENDED DESCRIPTION section, change from:

7671 If *string1* in a macro expansion contains a macro expansion, the results are unspecified.

7672 to:

7673 If *string1* in a macro expansion contains a macro expansion, the results are unspecified. If a <percent-sign>
7674 character appears as part of *subst1* or *subst2* after any macros have been recursively expanded, the results
7675 are unspecified.

7676 *Rationale*: Austin Group Defect Report(s) applied: 865. See http://austingroupbugs.net/view.php?id=865.
7677 Long standing existing practice is to treat a % in macro substitution as special (to perform pattern
7678 expansions).

7679    **Change Number: XCU/TC2/D4/0129** [693]

7680    On Page: 2916 Line: 95840 Section: make
7681    (2013 edition Page: 2942 Line: 97319)

7682    In the EXTENDED DESCRIPTION section, after the existing paragraph:

7683    Before the makefile(s) are read, all of the *make* utility command line macro definitions (except the
7684    *MAKEFLAGS* macro or the *SHELL* macro) shall be added to the environment of *make*. Other
7685    implementation-defined variables may also be added to the environment of *make*.

7686    append:

7687    Macros defined by the *MAKEFLAGS* environment variable and macros defined in the makefile(s) shall not
7688    be added to the environment of *make* if they are not already in its environment. With the exception of
7689    *SHELL* (see below), it is unspecified whether macros defined in these ways update the value of an
7690    environment variable that already exists in the environment of *make*.

7691    *Rationale*: Austin Group Defect Report(s) applied: 693. See http://austingroupbugs.net/view.php?id=693.

7692    **Change Number: XCU/TC2/D4/0130** [602]

7693    On Page: 2917 Line: 95916 Section: make

7694    In the EXTENDED DESCRIPTION section, change from:

7695    Its prerequisites in turn shall be processed recursively until a target is found that has no prerequisites, at
7696    which point the recursion stops.

7697    to:

7698    Its prerequisites in turn shall be processed recursively until a target is found that has no prerequisites, or
7699    further recursion would require applying two inference rules one immediately after the other, at which
7700    point the recursion shall stop. As an extension, implementations may continue recursion when two or more
7701    successive inference rules need to be applied; however, if there are multiple different chains of such rules
7702    that could be used to create the target, it is unspecified which chain is used.

7703    *Rationale*: Austin Group Defect Report(s) applied: 602. See http://austingroupbugs.net/view.php?id=602.

7704    **Change Number: XCU/TC2/D4/0131** [848]

7705    On Page: 2919 Line: 95986 Section: make
7706    (2013 edition Page: 2945 Line: 97465)

7707    In the EXTENDED DESCRIPTION section, change from:

7708    `CFLAGS=-O`

7709    to:

7710    `CFLAGS=-O 1`

7711 *Rationale*: Austin Group Defect Report(s) applied: 848. See http://austingroupbugs.net/view.php?id=848.
7712 The specification for the c99 utility does not support -O without an option-argument. In addition, if a
7713 subsequent argument is provided, the argument will be (erroneously) interpreted as an optimization level.

7714 **Change Number: XCU/TC2/D4/0132** [763]

7715 On Page: 2922 Line: 96124 Section: make
7716 (2013 edition Page: 2948 Line: 97603)

7717 In the APPLICATION USAGE section, add a new paragraph to the end of the section:

7718 As a consequence of the general rules for target updating, a useful special case is that if a target has no
7719 prerequisites and no commands, and the target of the rule is a nonexistent file, then make acts as if this
7720 target has been updated whenever its rule is run. (Note: This implies that all targets depending on this one
7721 will always have their commands run.)

7722 *Rationale*: Austin Group Defect Report(s) applied: 763. See http://austingroupbugs.net/view.php?id=763.

7723 **Change Number: XCU/TC2/D4/0133** [857]

7724 On Page: 2922 Line: 96124 Section: make
7725 (2013 edition Page: 2948 Line: 97603)

7726 In the APPLICATION USAGE section, add a new paragraph to the end of the section:

7727 Shell command sequences like `make; cp original copy; make` may have problems on filesystems
7728 where the timestamp resolution is the minimum (1 second) required by the standard and where *make*
7729 considers identical timestamps to be up to date. Conversely, rules like `copy: original; cp -p`
7730 `original copy` will result in redundant work on *make* implementations that consider identical
7731 timestamps to be out of date.

7732 *Rationale*: Austin Group Defect Report(s) applied: 857. See http://austingroupbugs.net/view.php?id=857.

7733 **Change Number: XCU/TC2/D4/0134** [866]

7734 On Page: 2922 Line: 96124 Section: make
7735 (2013 edition Page: 2948 Line: 97603)

7736 In the APPLICATION USAGE section, add the following to the end of the section:

7737 This standard does not specify precedence between macro definition and include directives. Thus the
7738 behavior of

7739 ```
include =foo.mk
```

7740 is unspecified. To define a variable named include, either the whitespace before the <equal-sign> should be
7741 removed, or another macro should be used, as in

7742 ```
INCLUDE_NAME = include
7743 $(INCLUDE_NAME) =foo.mk
```

7744 On the other hand, if the intent is to include a file which starts with an <equal-sign>, either the filename

7745    should be changed to `./=foo.mk`, or the makefile should be written as

```
7746            INCLUDE_FILE = =foo.mk
7747            include $(INCLUDE_FILE)
```

7748   *Rationale*: Austin Group Defect Report(s) applied: 866. See http://austingroupbugs.net/view.php?id=866.

7749   **Change Number: XCU/TC2/D4/0135** [525]

7750   On Page: 2923 Line: 96134 Section: make

7751   In the EXAMPLES section, change from:

```
7752    pgm: a.o b.o
```

7753   to:

```
7754    .POSIX:
7755    pgm: a.o b.o
```

7756   *Rationale*: Austin Group Defect Report(s) applied: 525. See http://austingroupbugs.net/view.php?id=525.
7757
7758   The standard requires that a portable makefile start with the special target .POSIX, then proceeds to give an
7759   example makefile that does not use that target. The remaining examples only claim to be a portion of a
7760   makefile, rather than an entire makefile.

7761   **Change Number: XCU/TC2/D4/0136** [848]

7762   On Page: 2923 Line: 96141 Section: make
7763   (2013 edition Page: 2949 Line: 97620)

7764   In the EXAMPLES section, change from:

```
7765    .c.o:
7766        c99 -c -O $*.c
```

7767   or:

```
7768    .c.o:
7769        c99 -c -O $<
```

7770   to:

```
7771    .c.o:
7772        c99 -c -O 1 $*.c
```

7773   or:

```
7774    .c.o:
7775        c99 -c -O 1 $<
```

7776   *Rationale*: Austin Group Defect Report(s) applied: 848. See http://austingroupbugs.net/view.php?id=848.
7777   The specification for the c99 utility does not support -O without an option-argument. In addition, if a

7778   subsequent argument is provided, the argument will be (erroneously) interpreted as an optimization level.

7779   **Change Number: XCU/TC2/D4/0137** [769]

7780   On Page: 2924 Line: 96189 Section: make
7781   (2013 edition Page: 2950 Line: 97668)

7782   In the RATIONALE section, insert a new bullet item:

7783   •   Specifying an alternate shell to use to process commands.

7784   *Rationale*: Austin Group Defect Report(s) applied: 769. See http://austingroupbugs.net/view.php?id=769.

7785   **Change Number: XCU/TC2/D4/0138** [525]

7786   On Page: 2926 Line: 96267-96271 Section: make

7787   In the RATIONALE section, delete:

7788   The best way to provide portable makefiles is to include all of the rules needed in the makefile itself. The
7789   rules provided use only features provided by other parts of this volume of POSIX.1-2008. The default rules
7790   include rules for optional commands in this volume of POSIX.1-2008. Only rules pertaining to commands
7791   that are provided are needed in an implementation's default set.

7792   *Rationale*: Austin Group Defect Report(s) applied: 525. See http://austingroupbugs.net/view.php?id=525.

7793   This text is duplicated in the APPLICATION USAGE section (lines 96098-96102).

7794   **Change Number: XCU/TC2/D4/0139** [769]

7795   On Page: 2926 Line: 96276-96279 Section: make
7796   (2013 edition Page: 2952 Line: 97755-97758)

7797   In the RATIONALE section, change from:

7798   The historical *MAKESHELL* feature was omitted. In some implementations it is used to let a user override
7799   the shell to be used to run *make* commands. This was confusing; for a portable *make*, the shell should be
7800   chosen by the makefile writer or specified on the *make* command line and not by a user running *make*.

7801   to:

7802   The historical *MAKESHELL* feature, and related features provided by other *make* implementations, were
7803   omitted. In some implementations it is used to let a user override the shell to be used to run *make*
7804   commands. This was confusing; for a portable *make*, the shell should be chosen by the makefile writer.
7805   Further, a makefile writer cannot require an alternate shell to be used and still consider the makefile
7806   portable. While it would be possible to standardize a mechanism for specifying an alternate shell, existing
7807   implementations do not agree on such a mechanism, and makefile writers can already invoke an alternate
7808   shell by specifying the shell name in the rule for a target (e.g., `python -c "foo"`).

7809   *Rationale*: Austin Group Defect Report(s) applied: 769. See http://austingroupbugs.net/view.php?id=769.

7810   **Change Number: XCU/TC2/D4/0140** [505]

7811   On Page: 2926 Line: 96289-96293 Section: make

7812   In the RATIONALE section, change from:

7813   The algorithm for determining a new entry for target rules is partially unspecified. Some historical *make*s
7814   allow blank, empty, or comment lines within the collection of commands marked by leading <tab>
7815   characters. A conforming makefile must ensure that each command starts with a <tab>, but
7816   implementations are free to ignore blank, empty, and comment lines without triggering the start of a new
7817   entry.

7818   to:

7819   The algorithm for determining a new entry for target rules is partially unspecified. Some historical *make*s
7820   allow comment lines (including blank and empty lines) within the collection of commands marked by
7821   leading <tab> characters. A conforming makefile must ensure that each command starts with a <tab>, but
7822   implementations are free to ignore comments without triggering the start of a new entry.

7823   *Rationale*: Austin Group Defect Report(s) applied: 505. See http://austingroupbugs.net/view.php?id=505.
7824   The standard as currently written does not allow blank lines and empty lines in places where all known
7825   implementations have allowed them to appear. These changes more accurately reflect existing practice.

7826   **Change Number: XCU/TC2/D4/0141** [693]

7827   On Page: 2927 Line: 96309 Section: make
7828   (2013 edition Page: 2953 Line: 97788)

7829   In the RATIONALE section, change from:

7830   The environment is the same as the environment to *make* except that *MAKEFLAGS* and macros defined on
7831   the *make* command line are added.

7832   to:

7833   The environment is the same as the environment to *make* except that *MAKEFLAGS* and macros defined on
7834   the *make* command line are added, and except that macros defined by the *MAKEFLAGS* environment
7835   variable and macros defined in the makefile(s) may update the value of an existing environment variable
7836   (other than *SHELL*).

7837   *Rationale*: Austin Group Defect Report(s) applied: 693. See http://austingroupbugs.net/view.php?id=693.

7838   **Change Number: XCU/TC2/D4/0142** [505]

7839   On Page: 2928 Line: 96368 Section: make

7840   In the RATIONALE section, add a new paragraph to the end of the section:

7841   Earlier versions of this standard defined comment lines only as lines with '#' as the first character. Many
7842   places then talked about comments, blank lines, and empty lines; but some places inadvertently only
7843   mentioned comments when blank lines and empty lines had also been accepted in all known
7844   implementations. The standard now defines comment lines to be blank lines, empty lines, and lines starting

7845 with a '#' character and explictily lists cases where blank lines and empty lines are not acceptable.

7846 *Rationale*: Austin Group Defect Report(s) applied: 505. See http://austingroupbugs.net/view.php?id=505.
7847 The standard as currently written does not allow blank lines and empty lines in places where all known
7848 implementations have allowed them to appear. These changes more accurately reflect existing practice.

7849 **Change Number: XCU/TC2/D4/0143** [857]

7850 On Page: 2928 Line: 96368 Section: make
7851 (2013 edition Page: 2954 Line: 97847)

7852 In the RATIONALE section, add a new paragraph to the end of the section:

7853 On most historic systems, the *make* utility considered a target with a prerequisite that had an identical
7854 timestamp as up-to-date. The HP-UX implementation of *make* treated it as out-of-date. The standard now
7855 allows either behavior, but implementations are encouraged to follow the example set by HP-UX. This is
7856 especially important on filesystems where the timestamp resolution is the minimum (1 second) required by
7857 the standard. All implementations of *make* should make full use of the finest timestamp resolution available
7858 on the filesystems holding targets and prerequisites to ensure that targets are up-to-date even for
7859 prerequisite files with timestamps that were updated within the same second. However, if the timestamp
7860 resolutions of the filesystems containing a target and a prerequisite are different, the timestamp with the
7861 more precise resolution should be rounded down to the resolution of the less precise timestamp for the
7862 comparison.

7863 *Rationale*: Austin Group Defect Report(s) applied: 857. See http://austingroupbugs.net/view.php?id=857.

7864 **Change Number: XCU/TC2/D4/0144** [693,865]

7865 On Page: 2928 Line: 96370 Section: make
7866 (2013 edition Page: 2954 Line: 97849)

7867 In the FUTURE DIRECTIONS section, change from:

7868 None.

7869 to:

7870 Some implementations of *make* include an "export" directive to add specified *make* variables to the
7871 environment. This may be considered for standardization in a future revision.

7872 A future version of this standard may require that macro expansions using the forms
7873 $(string1:[op]%[os]=[np][%][ns]) or ${string1:[op]%[os]=[np][%][ns]} are treated as pattern macro
7874 expansions.

7875 *Rationale*: Austin Group Defect Report(s) applied: 693,865. See
7876 http://austingroupbugs.net/view.php?id=693.
7877 See http://austingroupbugs.net/view.php?id=865.

7878

7879 **Change Number: XCU/TC2/D4/0145** [843]

7880 On Page: 2938 Line: 96682 Section: mkdir
7881 (2013 edition Page: 2964 Line: 98169)

7882 In the EXIT STATUS section, change from:

7883 All the specified directories were created successfully or the **-p** option was specified and all the specified
7884 directories now exist.

7885 to:

7886 All the specified directories were created successfully, or the **-p** option was specified and all the specified
7887 directories either already existed or were created successfully.

7888 *Rationale*: Austin Group Defect Report(s) applied: 843. See http://austingroupbugs.net/view.php?id=843.

7889 **Change Number: XCU/TC2/D4/0146** [584]

7890 On Page: 2945 Line: 96927 Section: more

7891 In the ENVIRONMENT VARIABLES section, change from:

7892 <hyphen>

7893 to:

7894 <hyphen-minus>

7895 *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7896 **Change Number: XCU/TC2/D4/0147** [534]

7897 On Page: 2955 Line: 97307 Section: mv

7898 In the DESCRIPTION section, change from:

7899 name the same existing file

7900 to:

7901 resolve to either the same existing directory entry or different directory entries for the same existing file

7902 *Rationale*: Austin Group Defect Report(s) applied: 534. See http://austingroupbugs.net/view.php?id=534.

7903 **Change Number: XCU/TC2/D4/0148** [744]

7904 On Page: 2973 Line: 97928 Section: nm

7905 In the DESCRIPTION section, change from:

7906   On XSI-conformant systems, it shall be decimal.

7907   to:

7908   On XSI-conformant systems, it shall be decimal if the -**P** option is not specified.

7909   On Page: 2973 Line: 97942-97944 Section: nm

7910   In the OPTIONS section, change from:

7911   d The offset is written in decimal [XSI](default)[/XSI].

7912   o The offset is written in octal.

7913   x The offset is written in hexadecimal.

7914   to:

7915   d decimal [XSI](default if -**P** is not specified)[/XSI].

7916   o octal.

7917   x hexadecimal (default if -**P** is specified).

7918   *Rationale*: Austin Group Defect Report(s) applied: 744. See http://austingroupbugs.net/view.php?id=744.
7919   The changes remove the ambiguity in the specification.

7920   **Change Number: XCU/TC2/D4/0149** [973]

7921   On Page: 2990 Line: 98598 Section: paste
7922   (2013 edition Page: 3016 Line: 100085)

7923   In the OPTIONS section, for the -s option change from:

7924   Concatenate all of the lines of each separate input file in command line order. The <newline> of every line
7925   except the last line in each input file shall be replaced with the <tab>, unless otherwise specified by the **-d**
7926   option.

7927   to:

7928   Concatenate all of the lines from each input file into one line of output per file, in command line order. The
7929   <newline> of every line except the last line in each input file shall be replaced with a <tab>, unless
7930   otherwise specified by the **-d** option. If an input file is empty, the output line corresponding to that file shall
7931   consist of only a <newline> character.

7932   *Rationale*: Austin Group Defect Report(s) applied: 973. See http://austingroupbugs.net/view.php?id=973.
7933   The description of paste -s does not say what happens if an input file is empty. Existing practice is to write
7934   an empty line for that file.

7935   **Change Number: XCU/TC2/D4/0150** [584]

7936   On Page: 3001 Line: 99000 Section: pathchk

7937   In the OPTIONS section, change from:

7938   <hyphen>

7939   to:

7940   <hyphen-minus>

7941   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7942   **Change Number: XCU/TC2/D4/0151** [584]

7943   On Page: 3004 Line: 99135 Section: pathchk

7944   In the RATIONALE section, change from:

7945   <hyphen>

7946   to:

7947   <hyphen-minus>

7948   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

7949   **Change Number: XCU/TC2/D4/0152** [886]

7950   On Page: 3006 Line: 99191 Section: pax
7951   (2013 edition Page: 3032 Line: 100678)

7952   In the DESCRIPTION section, change from:

7953   ... except that there may be hard links between the original and the copied files.

7954   to:

7955   ... except that copying of sockets may be supported even if archiving them in write mode is not supported,
7956   and that there may be hard links between the original and the copied files.

7957   *Rationale*: Austin Group Defect Report(s) applied: 886. See http://austingroupbugs.net/view.php?id=886.

7958   **Change Number: XCU/TC2/D4/0153** [814]

7959   On Page: 3012 Line: 99444 Section: pax

7960   In the OPTIONS section, add the following text:

7961   If the -**o delete**=*pattern*, -**o keyword**=*value*, or -**o keyword**:=*value* options are used to override or remove
7962   any extended header data needed to find files in an archive (e.g., `-o delete=size` for a file whose size

7963 cannot be represented in a **ustar** header or `-o size=100` for a file whose size is not 100 bytes), the
7964 behavior is undefined.

7965 *Rationale*: Austin Group Defect Report(s) applied: 814. See http://austingroupbugs.net/view.php?id=814.
7966 If a user overrides data needed to determine where a file is in an archive, the results are undefined.

7967 **Change Number: XCU/TC2/D4/0154** [886]

7968 On Page: 3026 Line: 100038 Section: pax
7969 (2013 edition Page: 3052 Line: 101525)

7970 In the EXTENDED DESCRIPTION section, change from:

7971 Attempts to archive a socket using **ustar** interchange format shall produce a diagnostic message.

7972 to:

7973 Attempts to archive a socket shall produce a diagnostic message when **ustar** interchange format is used, but
7974 may be allowed when **pax** interchange format is used.

7975 *Rationale*: Austin Group Defect Report(s) applied: 886. See http://austingroupbugs.net/view.php?id=886.

7976 **Change Number: XCU/TC2/D4/0155** [707]

7977 On Page: 3041 Line: 100701 Section: pax
7978 (2013 edition Page: 3068 Line: 102203)

7979 Add <tar.h> to the XBD part of the SEE ALSO list.

7980 *Rationale*: Austin Group Defect Report(s) applied: 707. See http://austingroupbugs.net/view.php?id=707.

7981 **Change Number: XCU/TC2/D4/0156** [727]

7982 On Page: 3050 Line: 101034 Section: printf
7983 (2013 edition Page: 3076 Line: 102538)

7984 In the EXTENDED DESCRIPTION section, in item 7 change from:

7985 a string that may contain

7986 to:

7987 a string that can contain

7988 *Rationale*: Austin Group Defect Report(s) applied: 727. See http://austingroupbugs.net/view.php?id=727.

7989

7990   **Change Number: XCU/TC2/D4/0157** [727,932]

7991   On Page: 3050 Line: 101054 Section: printf
7992   (2013 edition Page: 3076 Line: 102558)

7993   In the EXTENDED DESCRIPTION section, in item 9 change from:

7994   Any extra `c` or `s` conversion

7995   to:

7996   Any extra `b`, `c`, or `s` conversion

7997   *Rationale*: Austin Group Defect Report(s) applied: 727,932. See
7998   http://austingroupbugs.net/view.php?id=727.
7999   See http://austingroupbugs.net/view.php?id=932.
8000   This appears to be an oversight in the standard. All known implementations are believed to already behave
8001   as per this change.

8002   **Change Number: XCU/TC2/D4/0158** [584]

8003   On Page: 3051 Line: 101068 Section: printf

8004   In the EXTENDED DESCRIPTION section, change from:

8005   A leading <plus-sign> or minus-sign shall be allowed.

8006   to:

8007   A leading <plus-sign> or <hyphen-minus> shall be allowed.

8008   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

8009   **Change Number: XCU/TC2/D4/0159** [727]

8010   On Page: 3051 Line: 101078 Section: printf
8011   (2013 edition Page: 3077 Line: 102582)

8012   In the EXTENDED DESCRIPTION section, change from:

8013   completely used for a `c` or `s` conversion

8014   to:

8015   completely used for a `b`, `c`, or `s` conversion

8016   *Rationale*: Austin Group Defect Report(s) applied: 727. See http://austingroupbugs.net/view.php?id=727.

8017

8018   **Change Number: XCU/TC2/D4/0160** [584]

8019   On Page: 3063 Line: 101564 Section: ps

8020   In the STDOUT section, change from:

8021   <hyphen>

8022   to:

8023   <hyphen-minus>

8024   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

8025   **Change Number: XCU/TC2/D4/0161** [471]

8026   On Page: 3067 Line: 101688 Section: pwd

8027   In the OPTIONS section, change from:

8028   If the *PWD* environment variable contains an absolute pathname of the current directory that does not
8029   contain the filenames dot or dot-dot, *pwd* shall write this pathname to standard output. Otherwise, if the
8030   *PWD* environment variable contains a pathname of the current directory that is longer than {PATH_MAX}
8031   bytes including the terminating null, and the pathname does not contain any components that are dot or dot-
8032   dot, it is unspecified ...

8033   to:

8034   If the *PWD* environment variable contains an absolute pathname of the current directory and the pathname
8035   does not contain any components that are dot or dot-dot, *pwd* shall write this pathname to standard output,
8036   except that if the *PWD* environment variable is longer than {PATH_MAX} bytes including the terminating
8037   null, it is unspecified ...

8038   *Rationale*: Austin Group Defect Report(s) applied: 471. See http://austingroupbugs.net/view.php?id=471.

8039   **Change Number: XCU/TC2/D4/0162** [958]

8040   On Page: 3128 Line: 103902 Section: read
8041   (2013 edition Page: 3154 Line: 105406)

8042   In the NAME section, change from:

8043   read a line from standard input

8044   to:

8045   read from standard input into shell variables

8046

8047   On Page: 3128 Line: 103906 Section: read

8048   (2013 edition Page: 3154 Line: 105410)

8049   In the DESCRIPTION section, change from:

8050   The *read* utility shall read a single line from standard input.

8051   to:

8052   The *read* utility shall read a single logical line from standard input into one or more shell variables.

8053   *Rationale*: Austin Group Defect Report(s) applied: 958. See http://austingroupbugs.net/view.php?id=958.

8054   **Change Number: XCU/TC2/D4/0163** [542]

8055   On Page: 3135 Line: 104163 Section: rm

8056   In the SYNOPSIS section, change from:

8057   `rm [-fiRr] file...`

8058   to:

8059   `rm [-iRr] file...`
8060   `rm -f [-iRr][file...]`

8061   *Rationale*: Austin Group Defect Report(s) applied: 542. See http://austingroupbugs.net/view.php?id=542.

8062   **Change Number: XCU/TC2/D4/0164** [819]

8063   On Page: 3135 Line: 104178 Section: rm

8064   In the DESCRIPTION section, insert the following text at the start of step 2b:

8065   If *file* is an empty directory, *rm* may skip to step 2d.

8066   *Rationale*: Austin Group Defect Report(s) applied: 819. See http://austingroupbugs.net/view.php?id=819.
8067   The standard does not allow an optimization that is currently in use.

8068   **Change Number: XCU/TC2/D4/0165** [542]

8069   On Page: 3136 Line: 104209 Section: rm

8070   In the OPTIONS section, change from:

8071   Do not write diagnostic messages or modify the exit status in the case of nonexistent operands.

8072   to:

8073   Do not write diagnostic messages or modify the exit status in the case of no file operands, or in the case of

8074   operands that do not exist.

8075   *Rationale*: Austin Group Defect Report(s) applied: 542. See http://austingroupbugs.net/view.php?id=542.

8076   **Change Number: XCU/TC2/D4/0166** [945]

8077   On Page: 3154 Line: 104823 Section: sed
8078   (2013 edition Page: 3180 Line: 106330)

8079   In the STDERR section, change from:

8080   The standard error shall be used only for diagnostic messages.

8081   to:

8082   The standard error shall be used only for diagnostic and warning messages.

8083   *Rationale*: Austin Group Defect Report(s) applied: 945. See http://austingroupbugs.net/view.php?id=945.

8084   **Change Number: XCU/TC2/D4/0167** [944]

8085   On Page: 3156 Line: 104896 Section: sed
8086   (2013 edition Page: 3182 Line: 106404)

8087   In the EXTENDED DESCRIPTION section, change from:

8088   Command verbs other than **{**, **a**, **b**, **c**, **i**, **r**, **t**, **w**, **:**, and **#** can be followed by a <semicolon>, optional
8089   <blank> characters, and another command verb. However, when the **s** command verb is used with the *w*
8090   flag, following it with another command in this manner produces undefined results.

8091   to:

8092   Editing commands other than **{...}**, **a**, **b**, **c**, **i**, **r**, **t**, **w**, **:**, and **#** can be followed by a <semicolon>, optional
8093   <blank> characters, and another editing command. However, when an **s** editing command is used with the
8094   *w* flag, following it with another command in this manner produces undefined results.

8095   On Page: 3156 Line: 104900 Section: sed
8096   (2013 edition Page: 3182 Line: 106408)

8097   In the EXTENDED DESCRIPTION section, change from:

8098   A function can be preceded by one or more '!' characters,

8099   to:

8100   A function can be preceded by a '!' character,

8101   *Rationale*: Austin Group Defect Report(s) applied: 944. See http://austingroupbugs.net/view.php?id=944.
8102   Some implementations do not support multiple '!' characters before a function. Since it is not portable in
8103   practice, it seems unlikely that any applications would be affected by removing the requirement from the
8104   standard.

8105   **Change Number: XCU/TC2/D4/0168** [945]

8106   On Page: 3156 Line: 104904 Section: sed
8107   (2013 edition Page: 3182 Line: 106412)

8108   In the EXTENDED DESCRIPTION section, add a new paragraph:

8109   If a *label* argument (to a **b**, **t**, or **:** command) contains characters outside of the portable filename character
8110   set, or if a *label* is longer than 8 bytes, the behavior is unspecified. The implementation shall support *label*
8111   arguments recognized as unique up to at least 8 bytes; the actual length (greater than or equal to 8)
8112   supported by the implementation is unspecified. It is unspecified whether exceeding the maximum
8113   supported label length causes an error or a silent truncation.

8114   *Rationale*: Austin Group Defect Report(s) applied: 945. See http://austingroupbugs.net/view.php?id=945.
8115   Historical sed implementations did not consistently handle certain characters in label arguments; some
8116   interpreted backslashes as escape characters while others did not, some did not treat characters like ';', '}',
8117   and whitespace like other label characters, and some limited label length by bytes rather than characters.
8118   Limiting conforming scripts to using labels with names created from characters in the portable filename
8119   character set allows those scripts to run on all implementations.

8120   **Change Number: XCU/TC2/D4/0169** [944]

8121   On Page: 3156 Line: 104908 Section: sed
8122   (2013 edition Page: 3182 Line: 106416)

8123   In the EXTENDED DESCRIPTION section, change from:

8124   Execute a list of *sed* functions only when the pattern space is selected. The list of *sed* functions shall be
8125   surrounded by braces and separated by <newline> characters, and conform to the following rules. The
8126   braces can be preceded or followed by <blank> characters. The functions can be preceded by <blank>
8127   characters, but shall not be followed by <blank> characters. The <right-brace> shall be preceded by a
8128   <newline> and can be preceded or followed by <blank> characters.

8129   to:

8130   Execute a list of *sed* editing commands only when the pattern space is selected. The list of *sed* editing
8131   commands shall be surrounded by braces. The braces can be preceded or followed by <blank> characters.
8132   The <right-brace> shall be preceded by a <newline> or <semicolon> (before any optional <blank>
8133   characters preceding the <right-brace>).

8134   Each command in the list of commands shall be terminated by a <newline> character, or by a <semicolon>
8135   character if permitted when the command is used outside the braces. The editing commands can be
8136   preceded by <blank> characters, but shall not be followed by <blank> characters.

8137   *Rationale*: Austin Group Defect Report(s) applied: 944. See http://austingroupbugs.net/view.php?id=944.
8138   This is a layered change on XCU/TC1/D5/0135 [269].
8139   The use of <semicolon> within {...} is common practice and should be specified in the standard. The
8140   standard developers are not aware of any implementation that does not already support it.

8141

8142   **Change Number: XCU/TC2/D4/0170** [945]

8143   On Page: 3156 Line: 104917 Section: sed
8144   (2013 edition Page: 3182 Line: 106426)

8145   In the EXTENDED DESCRIPTION section, change the entire description of the **b** command to:

8146   Branch to the **:** command verb bearing the *label* argument. If *label* is not specified, branch to the end of the
8147   script.

8148   *Rationale*: Austin Group Defect Report(s) applied: 945. See http://austingroupbugs.net/view.php?id=945.

8149   **Change Number: XCU/TC2/D4/0171** [533]

8150   On Page: 3158 Line: 104978,104982 Section: sed

8151   In the EXTENDED DESCRIPTION section, at line 104978 delete:

8152   The meaning of a <backslash> immediately followed by any character other than '&', <backslash>, a digit,
8153   or the delimiter character used for this command, is unspecified.

8154   At line 104982 change from:

8155   The application shall escape the <newline> in the replacement by preceding it by a <backslash>. A
8156   substitution ...

8157   to:

8158   The application shall escape the <newline> in the replacement by preceding it by a <backslash>.

8159   The meaning of an unescaped <backslash> immediately followed by any character other than '&',
8160   <backslash>, a digit, <newline>, or the delimiter character used for this command, is unspecified.

8161   A substitution ...

8162   *Rationale*: Austin Group Defect Report(s) applied: 533. See http://austingroupbugs.net/view.php?id=533.

8163   **Change Number: XCU/TC2/D4/0172** [663]

8164   On Page: 3159 Line: 105039 Section: sed
8165   (2013 edition Page: 3185 Line: 106550)

8166   In the APPLICATION USAGE section, add a new paragraph:

8167   When using *sed* to process pathnames, it is recommended that LC_ALL, or at least LC_CTYPE and
8168   LC_COLLATE, are set to POSIX or C in the environment, since pathnames can contain byte sequences
8169   that do not form valid characters in some locales, in which case the utility's behavior would be undefined.
8170   In the POSIX locale each byte is a valid single-byte character, and therefore this problem is avoided.

8171   *Rationale*: Austin Group Defect Report(s) applied: 663. See http://austingroupbugs.net/view.php?id=663.

8172   **Change Number: XCU/TC2/D4/0173** [945]

8173   On Page: 3161 Line: 105133 Section: sed
8174   (2013 edition Page: 3187 Line: 106644)

8175   In the RATIONALE section, change from:

8176   Implementors are encouraged to provide warning messages about labels that are never used or jumps to
8177   labels that do not exist.

8178   to:

8179   Implementors are encouraged to provide warning messages about labels that are never referenced by a **b** or
8180   **t** command, jumps to labels that do not exist, and label arguments that are subject to truncation.

8181   *Rationale*: Austin Group Defect Report(s) applied: 945. See http://austingroupbugs.net/view.php?id=945.

8182   **Change Number: XCU/TC2/D4/0174** [944]

8183   On Page: 3161 Line: 105136 Section: sed
8184   (2013 edition Page: 3187 Line: 106647)

8185   In the RATIONALE section, delete:

8186   Historically, the *sed* **!** and **}** editing commands did not permit multiple commands on a single line using a
8187   <semicolon> as a command delimiter. Implementations are permitted, but not required, to support this
8188   extension.

8189   *Rationale*: Austin Group Defect Report(s) applied: 944. See http://austingroupbugs.net/view.php?id=944.

8190   **Change Number: XCU/TC2/D4/0175** [584]

8191   On Page: 3163 Line: 105189 Section: sh

8192   In the OPTIONS section, change from:

8193   <hyphen>

8194   to:

8195   <hyphen-minus>

8196   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

8197   **Change Number: XCU/TC2/D4/0176** [584]

8198   On Page: 3163 Line: 105207, 105209 Section: sh

8199   In the OPERANDS section, change from:

8200   <hyphen>

8201   to:

8202   <hyphen-minus>

8203   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

8204   **Change Number: XCU/TC2/D4/0177** [718]

8205   On Page: 3165 Line: 105253 Section: sh

8206   In the INPUT FILES section, change from:

8207   If the input file is empty or consists solely of blank lines or comments, or both, *sh* shall exit with a zero exit
8208   status.

8209   to:

8210   If the input file consists solely of zero or more blank lines and comments, *sh* shall exit with a zero exit
8211   status.

8212   *Rationale*: Austin Group Defect Report(s) applied: 718. See http://austingroupbugs.net/view.php?id=718.

8213   **Change Number: XCU/TC2/D4/0178** [884]

8214   On Page: 3165-3166 Line: 105293-105300 Section: sh
8215   (2013 edition Page: 3191-3192 Line: 106806-106813)

8216   In the ENVIRONMENT VARIABLES section, delete the entry for *IFS*.

8217   *Rationale*: Austin Group Defect Report(s) applied: 884. See http://austingroupbugs.net/view.php?id=884.
8218   Some old shells did inherit IFS from the environment, but since most shell scripts do not set IFS as one of
8219   the steps in their initialization, this creates a security hole. Most, if not all, recent shells initialize IFS when
8220   the shell is invoked and do not change IFS in a subshell environment. This is the desired behavior.

8221   **Change Number: XCU/TC2/D4/0179** [809]

8222   On Page: 3175 Line: 105724 Section: sh
8223   (2013 edition Page: 3201 Line: 107253)

8224   In the EXIT STATUS section, change from:

1-125   A non-interactive shell detected a syntax, redirection, or variable assignment error.

8225   to:

1-125   A non-interactive shell detected an error other than *command_file* not found or executable,
including but not limited to syntax, redirection, or variable assignment errors.

126   A specified *command_file* could not be executed due to an ENOEXEC error (See Section

2.9.1.1, item 2).

8226 *Rationale*: Austin Group Defect Report(s) applied: 809. See http://austingroupbugs.net/view.php?id=809.
8227 This change is layered on **Change Number: XCU/TC1/D5/0141** [299]

8228 **Change Number: XCU/TC2/D4/0180** [884]

8229 On Page: 3177 Line: 105801 Section: sh
8230 (2013 edition Page: 3203 Line: 107331)

8231 In the RATIONALE section, change from:

8232 The KornShell ignores the contents of *IFS* upon entry to the script. A conforming application cannot rely
8233 on importing *IFS*. One justification for this, beyond security considerations, is to assist possible future shell
8234 compilers.

8235 to:

8236 One justification for ignoring the contents of *IFS* upon entry to the script, beyond security considerations, is
8237 to assist possible future shell compilers.

8238 *Rationale*: Austin Group Defect Report(s) applied: 884. See http://austingroupbugs.net/view.php?id=884.

8239 **Change Number: XCU/TC2/D4/0181** [584]

8240 On Page: 3177 Line: 105820 Section: sh

8241 In the RATIONALE section, change from:

8242 <hyphen>

8243 to:

8244 <hyphen-minus>

8245 *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

8246 **Change Number: XCU/TC2/D4/0182** [963]

8247 On Page: 3183 Line: 106005 Section: sort
8248 (2013 edition Page: 3210 Line: 107544)

8249 In the DESCRIPTION section, change from:

8250 ... shall be performed using the collating sequence of the current locale.

8251 to:

8252 ... shall be performed using the collating sequence of the current locale. If this collating sequence does not
8253 have a total ordering of all characters (see [xref to XBD 7.3.2]), any lines of input that collate equally
8254 should be further compared byte-by-byte using the collating sequence for the POSIX locale.

8255 *Rationale*: Austin Group Defect Report(s) applied: 963. See http://austingroupbugs.net/view.php?id=963.

8256 **Change Number: XCU/TC2/D4/0183** [584]

8257 On Page: 3184 Line: 106038 Section: sort

8258 In the OPTIONS section, change from:

8259 optional minus-sign,

8260 to:

8261 optional <hyphen-minus> character,

8262 *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

8263 **Change Number: XCU/TC2/D4/0184** [510]

8264 On Page: 3184 Line: 106060 Section: sort

8265 In the OPTIONS section, for the -k option, change from:

8266 *type* is a modifier from the list

8267 to:

8268 *type* is one or more modifiers from the list

8269 *Rationale*: Austin Group Defect Report(s) applied: 510. See http://austingroupbugs.net/view.php?id=510.

8270 **Change Number: XCU/TC2/D4/0185** [962]

8271 On Page: 3184 Line: 106079 Section: sort
8272 (2013 edition Page: 3211 Line: 107618)

8273 In the OPERANDS section, append the following to the description of the file operand:

8274 If *sort* encounters an error when opening or reading a *file* operand, it may exit without writing any output to
8275 standard output or processing later operands.

8276 On Page: 3186 Line: 106148 Section: sort
8277 (2013 edition Page: 3213 Line: 107687)

8278 In the CONSEQUENCES OF ERRORS section, change from:

8279 Default.

8280 to:

8281 The default requirements shall apply, except that if *sort* encounters an error when opening or reading a *file*

8282   operand, it may exit without writing any output to standard output or processing later operands.

8283   *Rationale*: Austin Group Defect Report(s) applied: 962. See http://austingroupbugs.net/view.php?id=962.
8284   Existing implementations of sort stop processing immediately after encountering an error when reading
8285   input files.

8286   **Change Number: XCU/TC2/D4/0186** [663]

8287   On Page: 3187 Line: 106180 Section: sort
8288   (2013 edition Page: 3214 Line: 107719)

8289   In the APPLICATION USAGE section, add a new paragraph:

8290   When using *sort* to process pathnames, it is recommended that LC_ALL, or at least LC_CTYPE and
8291   LC_COLLATE, are set to POSIX or C in the environment, since pathnames can contain byte sequences
8292   that do not form valid characters in some locales, in which case the utility's behavior would be undefined.
8293   In the POSIX locale each byte is a valid single-byte character, and therefore this problem is avoided.

8294   *Rationale*: Austin Group Defect Report(s) applied: 663. See http://austingroupbugs.net/view.php?id=663.

8295   **Change Number: XCU/TC2/D4/0187** [963]

8296   On Page: 3187 Line: 106180 Section: sort
8297   (2013 edition Page: 3214 Line: 107719)

8298   In the APPLICATION USAGE section, add a new paragraph:

8299   If the collating sequence of the current locale does not have a total ordering of all characters, this can affect
8300   the behavior of *sort* in the following ways:

8301   • As `sort -u` suppresses lines with duplicate keys, it suppresses lines that collate equally but are
8302   not identical.
8303   • The output of *sort* (without **-u**) can contain identical lines that are not adjacent, if it does not
8304   implement the recommended further byte-by-byte comparison of lines that collate equally. This
8305   affects the use of *sort* with *comm* and *uniq*; see the APPLICATION USAGE for those utilities.

8306   On Page: 3188 Line: 106244 Section: sort
8307   (2013 edition Page: 3215 Line: 107783)

8308   In the RATIONALE section, add a new paragraph:

8309   Implementations are encouraged to perform the recommended further byte-by-byte comparison of lines that
8310   collate equally, even though this may affect efficiency. The impact on efficiency can be mitigated by only
8311   performing the additional comparison if the current locale's collating sequence does not have a total
8312   ordering of all characters (if the implementation provides a way to query this) or by only performing the
8313   additional comparison if the locale name associated with the LC_COLLATE category has an '@' modifier
8314   in the name (since locales without an '@' modifier should have a total ordering of all characters - see [xref
8315   to XBD 7.3.2]). Note that if the implementation provides a *stable sort* option as an extension (usually -**s**),
8316   the additional comparison should not be performed when this option has been specified.

8317   On Page: 3188 Line: 106246 Section: sort
8318   (2013 edition Page: 3215 Line: 107785)

8319   In the FUTURE DIRECTIONS section, change from:

8320   None.

8321   to:

8322   A future version of this standard may require that if the collating sequence of the current locale does not
8323   have a total ordering of all characters, any lines of input that collate equally when comparing them as whole
8324   lines are further compared byte-by-byte using the collating sequence for the POSIX locale.

8325   *Rationale*: Austin Group Defect Report(s) applied: 963. See http://austingroupbugs.net/view.php?id=963.

8326   **Change Number: XCU/TC2/D4/0188** [731]

8327   On Page: 3190 Line: 106264-106282 Section: split

8328   In the NAME section, on line 106264 change from:

8329   split files into pieces

8330   to:

8331   split a file into pieces

8332   In the SYNOPSIS section, on lines 106266 and 106267 change from:

8333   [*file*[*name*]]

8334   to:

8335   [*file* [*name*]]

8336   In the DESCRIPTION section, on line 106269 change from:

8337   one or more

8338   to:

8339   zero or more

8340   On line 106282 add to the end of the final paragraph of the DESCRIPTION section:

8341   If the input is an empty file, no output file shall be created and this shall not be considered to be an error.

8342   *Rationale*: Austin Group Defect Report(s) applied: 731. See http://austingroupbugs.net/view.php?id=731.
8343   When the input is an empty file, historical practice has been to produce no output files. We see no reason
8344   why conforming implementations should be required to created an empty output file in this case.

8345

8346 **Change Number: XCU/TC2/D4/0189** [908]

8347 On Page: 3201 Line: 106678 Section: stty
8348 (2013 edition Page: 3228 Line: 108217)

8349 In the OPERANDS section, under Output Modes add a new item with XSI shading:

8350 **onlcr** (**-onlcr**)
8351   Map (do not map) NL to CR-NL on output. This shall have the effect of setting (not setting)
8352   ONLCR in the **termios** *c_oflag* field, as defined in [xref to XBD Chapter 11].

8353 *Rationale*: Austin Group Defect Report(s) applied: 908. See http://austingroupbugs.net/view.php?id=908.
8354 This was present in XPG3, but appears to have been accidentally dropped in XPG4.

8355 **Change Number: XCU/TC2/D4/0190** [663]

8356 On Page: 3214 Line: 107142 Section: tail
8357 (2013 edition Page: 3241 Line: 108681)

8358 In the APPLICATION USAGE section, add a new paragraph:

8359 When using *tail* to process pathnames, and the **-c** option is not specified, it is recommended that LC_ALL,
8360 or at least LC_CTYPE and LC_COLLATE, are set to POSIX or C in the environment, since pathnames can
8361 contain byte sequences that do not form valid characters in some locales, in which case the utility's
8362 behavior would be undefined. In the POSIX locale each byte is a valid single-byte character, and therefore
8363 this problem is avoided.

8364 *Rationale*: Austin Group Defect Report(s) applied: 663. See http://austingroupbugs.net/view.php?id=663.

8365 **Change Number: XCU/TC2/D4/0191** [898]

8366 On Page: 3223 Line: 107435 Section: test
8367 (2013 edition Page: 3250 Line: 108974)

8368 In the DESCRIPTION section, change from:

8369 In the second form of the utility, which uses "[ ]" rather than *test*, the application shall ensure that the
8370 square brackets are separate arguments.

8371 to:

8372 In the second form of the utility, where the utility name used is *[* rather than *test*, the application shall
8373 ensure that the closing square bracket is a separate argument. The *test* and *[* utilities may be implemented as
8374 a single linked utility which examines the basename of the zeroth command line argument to determine
8375 whether to behave as the *test* or *[* variant. Applications using the *exec*() family of functions to execute these
8376 utilities shall ensure that the argument passed in *arg0* or *argv[0]* is '[' when executing the *[* utility and has a
8377 basename of "test" when executing the *test* utility.

8378 *Rationale*: Austin Group Defect Report(s) applied: 898. See http://austingroupbugs.net/view.php?id=898.

8379

8380   **Change Number: XCU/TC2/D4/0192** [730]

8381   On Page: 3223 Line: 107445 Section: test

8382   In the DESCRIPTION section, change from:

8383   True if *pathname* resolves to en existing directory entry for a block special file.

8384   to:

8385   True if *pathname* resolves to an existing directory entry for a block special file.

8386   *Rationale*: Austin Group Defect Report(s) applied: 730. See http://austingroupbugs.net/view.php?id=730.

8387   **Change Number: XCU/TC2/D4/0193** [898]

8388   On Page: 3228 Line: 107661 Section: test
8389   (2013 edition Page: 3255 Line: 109200)

8390   In the APPLICATION USAGE section, add a new paragraph:

8391   Note that none of the following examples are permitted by the syntax described:

```
8392        [-f file]
8393        [-f file ]
8394        [ -f file]
8395        [ -f file
8396        test -f file ]
```

8397   In the first two cases, if a utility named *[-f* exists, that utility would be invoked, and not *test*. In the
8398   remaining cases, the brackets are mismatched, and the behavior is unspecified. However,

```
8399        test ! ]
```

8400   does have a defined meaning, and must exit with status 1. Similarly,

```
8401        test ]
```

8402   must exit with status 0.

8403   *Rationale*: Austin Group Defect Report(s) applied: 898. See http://austingroupbugs.net/view.php?id=898.

8404   **Change Number: XCU/TC2/D4/0194** [723]

8405   On Page: 3233 Line: 107828 Section: time

8406   In the STDERR section, change from:

8407   The standard error shall be used to write the timing statistics. If **-p** is specified, the following format shall
8408   be used in the POSIX locale:

8409   to:

8410 If the *utility* utility is invoked, the standard error shall be used to write the timing statistics and may be used
8411 to write a diagnostic message if the utility terminates abnormally; otherwise the standard error shall be used
8412 to write diagnostic messages and may also be used to write the timing statistics.

8413 If -**p** is specified, the following format shall be used for the timing statistics in the POSIX locale:

8414 *Rationale*: Austin Group Defect Report(s) applied: 723. See http://austingroupbugs.net/view.php?id=723.
8415 Existing practice includes the possibility of diagnostics, and also the possibility of no timing when only
8416 diagnostics appear.

8417 **Change Number: XCU/TC2/D4/0195** [474]

8418 On Page: 3239 Line: 108047-108053 Section: touch

8419 In the APPLICATION USAGE, delete:

8420 One ambiguous situation occurs if -**t** *time* is not specified, -**r** *ref_file* is not specified, and the first operand
8421 is an eight or ten-digit decimal number. A portable script can avoid this problem by using:

8422 ```
touch -- file
```

8423 or:

8424 ```
touch ./file
```

8425 in this case.

8426 *Rationale*: Austin Group Defect Report(s) applied: 474. See http://austingroupbugs.net/view.php?id=474.

8427 **Change Number: XCU/TC2/D4/0196** [663]

8428 On Page: 3250 Line: 108473 Section: tr
8429 (2013 edition Page: 3277 Line: 110019)

8430 In the RATIONALE section, delete:

8431 This meant that historical practice of being able to specify *tr* -**cd**\000-\177 (which would delete all bytes
8432 with the top bit set) would have no effect because, in the C locale, bytes with the values octal 200 to octal
8433 377 are not characters.

8434 *Rationale*: Austin Group Defect Report(s) applied: 663. See http://austingroupbugs.net/view.php?id=663.

8435 **Change Number: XCU/TC2/D4/0197** [584]

8436 On Page: 3265 Line: 108979 Section: umask

8437 In the EXAMPLES section, change from:

8438 <hyphen>

8439 to:

8440   &lt;hyphen-minus&gt;

8441   *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

8442   **Change Number: XCU/TC2/D4/0198** [885]

8443   On Page: 3277 Line: 109367 Section: unexpand
8444   (2013 edition Page: 3304 Line: 110915)

8445   In the RATIONALE section, change from:

8446   base documents

8447   to:

8448   base documents for POSIX.2-1992

8449   *Rationale*: Austin Group Defect Report(s) applied: 885. See http://austingroupbugs.net/view.php?id=885.

8450   **Change Number: XCU/TC2/D4/0199** [963]

8451   On Page: 3282 Line: 109519 Section: uniq
8452   (2013 edition Page: 3309 Line: 111067)

8453   In the ENVIRONMENT VARIABLES section, delete:

8454   LC_COLLATE

8455        Determine the locale for ordering rules.

8456   On Page: 3283 Line: 109551 Section: uniq
8457   (2013 edition Page: 3310 Line: 111099)

8458   In the APPLICATION USAGE section, change from:

8459   The *sort* utility can be used to cause repeated lines to be adjacent in the input file.

8460   to:

8461   If the collating sequence of the current locale has a total ordering of all characters, the *sort* utility can be
8462   used to cause repeated lines to be adjacent in the input file. If the collating sequence does not have a total
8463   ordering of all characters, the *sort* utility should still do this but it might not. To ensure that all duplicate
8464   lines are eliminated, and have the output sorted according the collating sequence of the current locale,
8465   applications should use:

8466   ```
LC_ALL=C sort -u | sort
```

8467   instead of:

8468   ```
sort | uniq
```

8469 To remove duplicate lines based on whether they collate equally instead of whether they are identical,
8470 applications should use:

8471 `sort -u`

8472 instead of:

8473 `sort | uniq`

8474 *Rationale*: Austin Group Defect Report(s) applied: 963. See http://austingroupbugs.net/view.php?id=963.

8475 **Change Number: XCU/TC2/D4/0200** [663]

8476 On Page: 3283 Line: 109551 Section: uniq
8477 (2013 edition Page: 3310 Line: 111099)

8478 In the APPLICATION USAGE section, add a new paragraph:

8479 When using *uniq* to process pathnames, it is recommended that LC_ALL, or at least LC_CTYPE and
8480 LC_COLLATE, are set to POSIX or C in the environment, since pathnames can contain byte sequences
8481 that do not form valid characters in some locales, in which case the utility's behavior would be undefined.
8482 In the POSIX locale each byte is a valid single-byte character, and therefore this problem is avoided.

8483 *Rationale*: Austin Group Defect Report(s) applied: 663. See http://austingroupbugs.net/view.php?id=663.

8484 **Change Number: XCU/TC2/D4/0201** [635]

8485 On Page: 3291 Line: 109831 Section: uudecode

8486 In the DESCRIPTION section, change from:

8487 If the pathname of the file to be produced exists, and the user does not have write permission on that file,
8488 *uudecode* shall terminate with an error. If the pathname of the file to be produced exists, and the user has
8489 write permission on that file, the existing file shall be overwritten.

8490 to:

8491 If the pathname of the file resolves to an existing file and the user does not have write permission on that
8492 file, *uudecode* shall terminate with an error. If the pathname of the file resolves to an existing file and the
8493 user has write permission on that file, the existing file shall be overwritten and, if possible, the mode bits of
8494 the file (other than standard output) shall be set as described above; if the mode bits cannot be set,
8495 *uudecode* shall not treat this as an error.

8496 *Rationale*: Austin Group Defect Report(s) applied: 635. See http://austingroupbugs.net/view.php?id=635.
8497 The current standard does not match existing (and desired) behavior.

8498 **Change Number: XCU/TC2/D4/0202** [812]

8499 On Page: 3314 Line: 110686 Section: vi

8500 In the EXTENDED DESCRIPTION section, change from:

8501     ... specified by the **map** command (see *ed*).

8502     to:

8503     ... specified by the **map** command (see *ex*).

8504     *Rationale*: Austin Group Defect Report(s) applied: 812. See http://austingroupbugs.net/view.php?id=812.

8505     **Change Number: XCU/TC2/D4/0203** [499]

8506     On Page: 3382 Line: 113189 Section: xargs

8507     In the OPTIONS section, for the -L option change from:

8508     ... is a <blank>; a trailing <blank> signals continuation to the next non-empty line, inclusive.

8509     to:

8510     ... is an unescaped <blank>; a trailing unescaped <blank> signals continuation to the next non-empty line,
8511     inclusive.

8512     *Rationale*: Austin Group Defect Report(s) applied: 499. See http://austingroupbugs.net/view.php?id=499.

8513     **Change Number: XCU/TC2/D4/0204** [977]

8514     On Page: 3388 Line: 113441-113443 Section: yacc
8515     (2013 edition Page: 3415 Line: 114993-114995)

8516     In the OPTIONS section, for the -d option change from:

8517     Write the header file; by default only the code file is written. The **#define** statements associate the token
8518     codes assigned by *yacc* with the user-declared token names. This allows source files other than **y.tab.c** to
8519     access the token codes.

8520     to:

8521     Write the header file; by default only the code file is written. See the OUTPUT FILES section.

8522     *Rationale*: Austin Group Defect Report(s) applied: 977. See http://austingroupbugs.net/view.php?id=977.

8523

8524 ## 5. Changes to Rationale

8525 This section contains the set of changes to the text of the Rationale.
8526 [*Note to reviewers: References to defect reports are provided to aid reviewers.*]

8527 **Change Number: XRAT/TC2/D4/0001** [937]

8528 On Page: 3416 Line: 114407 Section: A.1.5 Terminology
8529 (2013 edition Page: 3444 Line: 115962)

8530 Delete the paragraph:

8531 The term "application" is not defined in POSIX.1-2008; it is assumed to be a part of general computer
8532 science terminology.

8533 *Rationale*: Austin Group Defect Report(s) applied: 937. See http://austingroupbugs.net/view.php?id=937.

8534 **Change Number: XRAT/TC2/D4/0002** [934]

8535 On Page: 3444 Line: 115531 Section: A.4 General Concepts

8536 Add a new section (and renumber subsequent sections as needed):

8537 **A.4.2 Default Initialization**

8538 There is no additional rationale provided for this section.

8539 *Rationale*: Austin Group Defect Report(s) applied: 934. See http://austingroupbugs.net/view.php?id=934.

8540 **Change Number: XRAT/TC2/D4/0003** [584]

8541 On Page: 3446 Line: 115631 Section: A.4.7 Filename Portability

8542 Change from:

8543 <hyphen>

8544 to:

8545 <hyphen-minus>

8546 *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

8547 **Change Number: XRAT/TC2/D4/0004** [543]

8548 On Page: 3452 Line: 115876 Section: A.4.19 Treatment of Error Conditions for Mathematical Functions

8549 Change from:

8550    There is no additional rationale provided for this section.

8551    to:

8552    It is intended that undeserved underflow and inexact floating-point exceptions are raised only if avoiding
8553    them would be too costly.

8554    *Rationale*: Austin Group Defect Report(s) applied: 543. See http://austingroupbugs.net/view.php?id=543.

8555    **Change Number: XRAT/TC2/D4/0005** [663]

8556    On Page: 3454 Line: 115933 Section: A.6.2 Character Encoding
8557    (2013 edition Page: 3483 Line: 117516)

8558    Add a new paragraph to the end of the section:

8559    Earlier versions of this standard did not state the requirement that the POSIX locale contains 256 single-
8560    byte characters. This was an oversight; the intention was always that the POSIX locale should have an 8-
8561    bit-clean single-byte encoding.

8562    *Rationale*: Austin Group Defect Report(s) applied: 663. See http://austingroupbugs.net/view.php?id=663.

8563    **Change Number: XRAT/TC2/D4/0006** [745]

8564    On Page: 3454 Line: 115933 Section: A.6.2 Character Encoding

8565    Add a new paragraph to the end of the section:

8566    The encodings for <newline> and <carriage-return> are required to be the same across all locales since they
8567    are special to the general terminal interface and cannot be changed (see [xref to XBD 11.1.9]).

8568    *Rationale*: Austin Group Defect Report(s) applied: 745. See http://austingroupbugs.net/view.php?id=745.

8569    **Change Number: XRAT/TC2/D4/0007** [796]

8570    On Page: 3457 Line: 116059 Section: A.7.2 POSIX Locale
8571    (2013 edition Page: 3486 Line: 117642-117644)

8572    Change from:

8573    The POSIX locale is equal to the C locale.

8574    to:

8575    On POSIX.1 implementations the POSIX locale is equal to the C locale, even though the requirements for
8576    the POSIX locale are more extensive than the C standard's requirements for the C locale.

8577    *Rationale*: Austin Group Defect Report(s) applied: 796. See http://austingroupbugs.net/view.php?id=796.

8578

8579    **Change Number: XRAT/TC2/D4/0008** [584]

8580    On Page: 3461 Line: 116234, 116235, 116236 Section: A.7.3.2 LC_COLLATE

8581    Change from:

8582    <hyphen>

8583    to:

8584    <hyphen-minus>

8585    *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

8586    **Change Number: XRAT/TC2/D4/0009** [938]

8587    On Page: 3461 Line: 116237 Section: A.7.3.2 LC_COLLATE
8588    (2013 edition Page: 3490 Line: 117820)

8589    Add a new paragraph:

8590    This standard recommends (by the use of "should" in the normative text) that all implementation-provided
8591    locales define a collation sequence that has a total ordering of all characters unless the locale name has an
8592    '@' modifier indicating that it has a special collation sequence. Defining locales in this way eliminates
8593    unexpected behavior when non-identical strings can collate equally (for example, sort -u and sort |
8594    uniq are not equivalent). The exception for locales with a suitable '@' modifier in the name allows
8595    implementations to supply locales which do not have a total ordering of all characters provided that they
8596    draw attention to it in the modifier name. For example, @icase could indicate that each upper- and lower-
8597    case character pair collates equally. Even with an '@' modifier, total ordering is preferred when possible;
8598    for example, characters that are "ignored" in dictionary order need not be completely ignored (by using
8599    **IGNORE** for all collation weights), but can instead be given a unique weight after one or more **IGNORE**
8600    weights.

8601    *Rationale*: Austin Group Defect Report(s) applied: 938. See http://austingroupbugs.net/view.php?id=938.

8602    **Change Number: XRAT/TC2/D4/0010** [796]

8603    On Page: 3468 Line: 116551 Section: A.8.2 Internationalization Variables
8604    (2013 edition Page: 3497 Line: 118151)

8605    Change from:

8606    If this were omitted, the ISO C standard specifies that the C locale would be used.

8607    to:

8608    If this were omitted, the ISO C standard specifies that the C (or POSIX) locale would be used.

8609    *Rationale*: Austin Group Defect Report(s) applied: 796. See http://austingroupbugs.net/view.php?id=796.

8610

8611    **Change Number: XRAT/TC2/D4/0011** [584]

8612    On Page: 3469 Line: 116625 Section A.8.3 Other Environment Variables

8613    In the description of TZ change from:

8614    the character plus ('+'), the character minus ('-'), or digits),

8615    to:

8616    the <plus-sign> ('+'), the <hyphen-minus> ('-'), or digits),

8617    *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

8618    **Change Number: XRAT/TC2/D4/0012** [496]

8619    On Page: 3505 Line: 117934 Section: B.2.3 Error Numbers
8620    (2013 edition Page: 3535 Line: 119628)

8621    Change from:

8622    The return of [ENOSYS] is to be taken to indicate that the function of the interface is not supported at all;
8623    the function will always fail with this error code.

8624    to:

8625    In some earlier versions of this standard, the difference between [ENOTSUP] and [ENOSYS] was that
8626    [ENOSYS] indicated that the function was not supported at all. This is no longer the case as [ENOSYS]
8627    can also be used to indicate non-support of optional functionality for a function that has some required
8628    functionality. (See XSH *encrypt*().)

8629    *Rationale*: Austin Group Defect Report(s) applied: 496. See http://austingroupbugs.net/view.php?id=496.

8630    **Change Number: XRAT/TC2/D4/0013** [681]

8631    On Page: 3507 Line: 118020 Section: B.2.3 Error Numbers
8632    (2013 edition Page: 3535 Line: 119628)

8633    Change from:

8634    EOPNOTSUP

8635    to:

8636    EOPNOTSUPP

8637    *Rationale*: Austin Group Defect Report(s) applied: 681. See http://austingroupbugs.net/view.php?id=681.

8638

8639    **Change Number: XRAT/TC2/D4/0014** [516]

8640    On Page: 3514 Line: 118375 Section: B.2.4.3 Signal Actions

8641    Change from:

8642    The behavior of unsafe functions, as defined by this section, is undefined when they are invoked from
8643    signal-catching functions in certain circumstances.

8644    to:

8645    The behavior of unsafe functions, as defined by this section, is undefined when they are called from (or
8646    after a *longjmp*() or *siglongjmp*() out of) signal-catching functions in certain circumstances.

8647    On Page: 3515 Line: 118392,118400 Section: B.2.4.3 Signal Actions

8648    At line 118392 change from:

8649    Note that *longjmp*() and *siglongjmp*() are not in the list of async-signal-safe functions.

8650    to:

8651    Note that although *longjmp*() and *siglongjmp*() are in the list of async-signal-safe functions, there are
8652    restrictions on subsequent behavior after the function is called from a signal-catching function.

8653    At line 118400 change from:

8654    POSIX.1 does not define the behavior when any unsafe function is called in a signal handler that interrupts
8655    any unsafe function.

8656    to:

8657    POSIX.1 does not define the behavior when any unsafe function is called in (or after a *longjmp*() or
8658    *siglongjmp*() out of) a signal handler that interrupts any unsafe function or the non-async-signal-safe
8659    processing equivalent to *exit*() that is performed after return from the initial call to *main*().

8660    *Rationale*: Austin Group Defect Report(s) applied: 516. See http://austingroupbugs.net/view.php?id=516.
8661    The restrictions on using longjmp() and siglongjmp() are more restrictive than they need to be on POSIX
8662    systems. The loosened restrictions presented here do not break existing implementations and make it easier
8663    for application writers to create portable applications.

8664    **Change Number: XRAT/TC2/D4/0015** [904]

8665    On Page: 3578 Line: 121252 Section: B.2.9.1 Thread-Safety
8666    (2013 edition Page: 3606 Line: 122868)

8667    Change from:

8668    While a read from a pipe of {PIPE_MAX}*2 bytes may not generate a single atomic ...

8669    to:

8670   While a read from a pipe of {PIPE_BUF}*2 bytes may not generate a single atomic ...

8671   *Rationale*: Austin Group Defect Report(s) applied: 904. See http://austingroupbugs.net/view.php?id=904.

8672   **Change Number: XRAT/TC2/D4/0016** [829]

8673   On Page: 3622 Line: 123021 Section: B.2.12.3 Pointer Types

8674   Delete section B.2.12.3.

8675   *Rationale*: Austin Group Defect Report(s) applied: 829. See http://austingroupbugs.net/view.php?id=829.
8676   Section 2.12.3 in XSH has previously been deleted.

8677   **Change Number: XRAT/TC2/D4/0017** [690]

8678   On Page: 3622 Line: 123023 Section: B.2 General Information
8679   (2013 edition Page: 3649 Line: 124639)

8680   Add a new section:

8681   **B.2.13 Status Information**
8682
8683   POSIX.1-2008 does not require all matching WNOWAIT threads (threads in a matching call to *waitid*()
8684   with the WNOWAIT flag set) to obtain a child's status information because the status information might be
8685   discarded (consumed or replaced) before one of the matching WNOWAIT threads is scheduled. If the
8686   status information is not discarded, it will remain available, so all of the matching WNOWAIT threads will
8687   (eventually) obtain the status information.

8688   *Rationale*: Austin Group Defect Report(s) applied: 690. See http://austingroupbugs.net/view.php?id=690.

8689   **Change Number: XRAT/TC2/D4/0018** [835]

8690   On Page: 3622 Line: 123023 Section: B.2 General Information

8691   Add a new section:

8692   **B.2.14 File Descriptor Allocation**

8693   Functions such as *pipe*() and *socketpair*() which allocate two file descriptors are permitted to perform the
8694   two allocations independently. This means that other threads or signal handlers may perform operations on
8695   file descriptors in between the two allocations and this can result in the two file descriptors not having
8696   adjacent values or in the second allocation producing a lower value than the first.

8697   *Rationale*: Austin Group Defect Report(s) applied: 835. See http://austingroupbugs.net/view.php?id=835.

8698   **Change Number: XRAT/TC2/D4/0019** [584]

8699   On Page: 3642 Line: 123784 Section: C.1.5 Utility Description Defaults

8700   Change from:

8701    <hyphen>

8702    to:

8703    <hyphen-minus>

8704    *Rationale*: Austin Group Defect Report(s) applied: 584. See http://austingroupbugs.net/view.php?id=584.

8705    **Change Number: XRAT/TC2/D4/0020** [888]

8706    On Page: 3652 Line: 124166-124186 Section: C.2.5.2 Special Parameters
8707    (2013 edition Page: 3680 Line: 125783-125803)

8708    Change from:

8709    Some examples of the '*' and '@' properties, including the concatenation aspects:

```
8710    set "abc" "def ghi" "jkl"
8711
8712    echo $* => "abc" "def" "ghi" "jkl"
8713    echo "$*" => "abc def ghi jkl"
8714    echo $@ => "abc" "def" "ghi" "jkl"
```

8715   but:

```
8716    echo "$@" => "abc" "def ghi" "jkl"
8717    echo "xx$@yy" => "xxabc" "def ghi" "jklyy"
8718    echo "$@$@" => "abc" "def ghi" "jklabc" "def ghi" "jkl"
```

8719   In the preceding examples, the double-quote characters that appear after the "=>" do not appear in the
8720   output and are used only to illustrate word boundaries.

8721   The following example illustrates the effect of setting *IFS* to a null string:

```
8722    $ IFS=''
8723    $ set foo bar bam
8724    $ echo "$@"
8725    foo bar bam
8726    $ echo "$*"
8727    foobarbam
8728    $ unset IFS
8729    $ echo "$*"
8730    foo bar bam
```

8731   to:

8732   The following examples illustrate some of the ways in which '*' and '@' can be expanded:

```
8733    set "abc" "def ghi" "jkl"
8734    unset novar
8735    IFS=' ' # a space
8736    printf '%s\n' $*
8737    abc
8738    def
8739    ghi
```

```
8740   jkl
8741   printf '%s\n' "$*"
8742   abc def ghi jkl
8743   printf '%s\n' xx$*yy
8744   xxabc
8745   def
8746   ghi
8747   jklyy
8748   printf '%s\n' "xx$*yy"
8749   xxabc def ghi jklyy
8750   printf '%s\n' $@
8751   abc
8752   def
8753   ghi
8754   jkl
8755   printf '%s\n' "$@"
8756   abc
8757   def ghi
8758   jkl
8759   printf '%s\n' ${1+"$@"}
8760   abc
8761   def ghi
8762   jkl
8763   printf '%s\n' ${novar-"$@"}
8764   abc
8765   def ghi
8766   jkl
8767   printf '%s\n' xx$@yy
8768   xxabc
8769   def
8770   ghi
8771   jklyy
8772   printf '%s\n' "xx$@yy"
8773   xxabc
8774   def ghi
8775   jklyy
8776   printf '%s\n' $@$@
8777   abc
8778   def
8779   ghi
8780   jklabc
8781   def
8782   ghi
8783   jkl
8784   printf '%s\n' "$@$@"
8785   abc
8786   def ghi
8787   jklabc
8788   def ghi
8789   jkl
8790   IFS=':'
8791   printf '%s\n' "$*"
8792   abc:def ghi:jkl
8793   var=$*; printf '%s\n' "$var"
8794   abc:def ghi:jkl
8795   var="$*"; printf '%s\n' "$var"
8796   abc:def ghi:jkl
8797   unset var
8798   printf '%s\n' ${var-$*}
8799   abc
8800   def ghi
8801   jkl
8802   printf '%s\n' "${var-$*}"
```

```
8803    abc:def ghi:jkl
8804    printf '%s\n' ${var-"$*"}
8805    abc:def ghi:jkl
8806    printf '%s\n' ${var=$*}
8807    abc
8808    def ghi
8809    jkl
8810    printf 'var=%s\n' "$var"
8811    var=abc:def ghi:jkl
8812    unset var
8813    printf '%s\n' "${var=$*}"
8814    abc:def ghi:jkl
8815    printf 'var=%s\n' "$var"
8816    var=abc:def ghi:jkl
8817
8818    IFS='' # null
8819    printf '%s\n' "$*"
8820    abcdef ghijkl
8821    var=$*; printf '%s\n' "$var"
8822    abcdef ghijkl
8823    var="$*"; printf '%s\n' "$var"
8824    abcdef ghijkl
8825    unset var
8826    printf '%s\n' ${var-$*}
8827    abcdef ghijkl
8828    printf '%s\n' "${var-$*}"
8829    abcdef ghijkl
8830    printf '%s\n' ${var-"$*"}
8831    abcdef ghijkl
8832    printf '%s\n' ${var=$*}
8833    abcdef ghijkl
8834    printf 'var=%s\n' "$var"
8835    var=abcdef ghijkl
8836    unset var
8837    printf '%s\n' "${var=$*}"
8838    abcdef ghijkl
8839    printf 'var=%s\n' "$var"
8840    var=abcdef ghijkl
8841    printf '%s\n' "$@"
8842    abc
8843    def ghi
8844    jkl
8845
8846    unset IFS
8847    printf '%s\n' "$*"
8848    abc def ghi jkl
8849    var=$*; printf '%s\n' "$var"
8850    abc def ghi jkl
8851    var="$*"; printf '%s\n' "$var"
8852    abc def ghi jkl
8853    unset var
8854    printf '%s\n' ${var-$*}
8855    abc
8856    def
8857    ghi
8858    jkl
8859    printf '%s\n' "${var-$*}"
8860    abc def ghi jkl
8861    printf '%s\n' ${var-"$*"}
8862    abc def ghi jkl
8863    printf '%s\n' ${var=$*}
8864    abc
8865    def
```

```
8866  ghi
8867  jkl
8868  printf 'var=%s\n' "$var"
8869  var=abc def ghi jkl
8870  unset var
8871  printf '%s\n' "${var=$*}"
8872  abc def ghi jkl
8873  printf 'var=%s\n' "$var"
8874  var=abc def ghi jkl
8875  printf '%s\n' "$@"
8876  abc
8877  def ghi
8878  jkl


8879  set one "" three
8880  printf '[%s]\n' $*
8881  [one]
8882  [] (this line of output is optional)
8883  [three]
8884  printf '[%s]\n' $@
8885  [one]
8886  [] (this line of output is optional)
8887  [three]


8888  set --
8889  printf '[%s]\n' foo "$*"
8890  [foo]
8891  []
8892  printf '[%s]\n' foo "$novar$*$(echo)"
8893  [foo]
8894  []
8895  printf '[%s]\n' foo $@
8896  [foo]
8897  printf '[%s]\n' foo "$@"
8898  [foo]
8899  printf '[%s]\n' foo ''$@
8900  [foo]
8901  []
8902  printf '[%s]\n' foo ''"$@"
8903  [foo]
8904  []
8905  printf '[%s]\n' foo "$novar$@$(echo)"
8906  [foo]
8907  [] (this line of output is optional)
8908  printf '[%s]\n' foo ''"$novar$@$(echo)"
8909  [foo]
8910  []
```

8911 In all of the following commands the results of the expansion of '@' (if performed) are unspecified:

```
8912  var=$@
8913  var="$@"
8914  printf '%s\n' ${var=$@}
8915  printf '%s\n' "${var=$@}"
8916  printf '%s\n' ${var="$@"}
8917  printf '%s\n' ${var?$@}
8918  printf '%s\n' "${var?$@}"
8919  printf '%s\n' ${var?"$@"}
8920  printf '%s\n' ${#@}
8921  printf '%s\n' "${#@}"
8922  printf '%s\n' ${@%foo}
```

```
8923    printf '%s\n' "${@%foo}"
8924    printf '%s\n' ${@#foo}
8925    printf '%s\n' "${@#foo}"
8926    printf '%s\n' ${var%$@}
8927    printf '%s\n' "${var%$@}"
8928    printf '%s\n' ${var%"$@"}
8929    printf '%s\n' ${var%%$@}
8930    printf '%s\n' "${var%%$@}"
8931    printf '%s\n' ${var%%"$@"}
8932    printf '%s\n' ${var#$@}
8933    printf '%s\n' "${var#$@}"
8934    printf '%s\n' ${var#"$@"}
8935    printf '%s\n' ${var##$@}
8936    printf '%s\n' "${var##$@}"
8937    printf '%s\n' ${var##"$@"}
```

8938   *Rationale*: Austin Group Defect Report(s) applied: 888. See http://austingroupbugs.net/view.php?id=888.

8939   **Change Number: XRAT/TC2/D4/0021** [935]

8940   On Page: 3664 Line: 124689 Section: C.2.9.1 Simple Commands
8941   (2013 edition Page: 3694 Line: 126371)

8942   Insert a new paragraph:

8943   Various historical implementations have used the names in item 1.b. as built-ins or reserved words. This
8944   standard does not specify their behavior, but their existance means that it is important for portable
8945   applications to avoid giving functions (or utilities in PATH) those names because the function (or utility in
8946   PATH) might not be executed as expected.

8947   *Rationale*: Austin Group Defect Report(s) applied: 935. See http://austingroupbugs.net/view.php?id=935.

8948   **Change Number: XRAT/TC2/D4/0022** [521]

8949   On Page: 3665 Line: 124711 Section: C.2.9.2 Pipelines

8950   Change from:

8951   The reserved word ! allows more flexible testing using AND and OR lists.

8952   to:

8953   The reserved word ! allows more flexible testing using AND and OR lists. The behavior of !(is unspecified
8954   because in the Korn Shell this introduces a negated pathname expansion. Portable applications need to
8955   separate the ! and (to ensure the command is treated as a negated subshell.

8956   *Rationale*: Austin Group Defect Report(s) applied: 521. See http://austingroupbugs.net/view.php?id=521.
8957   Requiring a negated subshell conflicts with shells that provide an extension of negated pathname
8958   expansion.

8959

8960   **Change Number: XRAT/TC2/D4/0023** [736]

8961   On Page: 3670 Line: 124914 Section: C.2.10 Shell Grammar
8962   (2013 edition Page: 3700 Line: 126612)

8963   Delete the final paragraph of the section:

8964   The start symbol of the grammar (**complete_command**) represents either input from the command line or a
8965   shell script. It is repeatedly applied by the interpreter to its input and represents a single "chunk" of that
8966   input as seen by the interpreter.

8967   *Rationale*: Austin Group Defect Report(s) applied: 736. See http://austingroupbugs.net/view.php?id=736.

8968   **Change Number: XRAT/TC2/D4/0024** [751]

8969   On Page: 3671 Line: 124921 Section: C.2.11 Signals and Error Handling

8970   Add a new first paragraph to the section:

8971   Historically, some shell implementations silently ignored attempts to use *trap* to set SIGINT or SIGQUIT
8972   to the default action or to set a trap for them after they have been set to be ignored by the shell when it
8973   executes an asynchronous subshell (and job control is disabled). This behavior is not conforming. For
8974   example, if a shell script containing the following line is run in the foreground at a terminal:

8975   `(trap - INT; exec sleep 10) & wait`

8976   and is then terminated by typing the interrupt character, this standard requires that the *sleep* command is
8977   terminated by the SIGINT signal.

8978   *Rationale*: Austin Group Defect Report(s) applied: 751. See http://austingroupbugs.net/view.php?id=751.
8979   This is what the specification requires.

8980   **Change Number: XRAT/TC2/D4/0025** [885]

8981   On Page: 3679 Line: 125270,125274 Section: C.4.3 Exclusion of Utilities
8982   (2013 edition Page: 3709 Line: 126969,126973)

8983   In these two lines, change from:

8984   base documents

8985   to:

8986   base documents for POSIX.2-1992

8987   On Page: 3679 Line: 125281 Section: C.4.3 Exclusion of Utilities
8988   (2013 edition Page: 3709 Line: 126980)

8989   Change from:

8990   evaluated by the standard developers of the base documents

8991   to:

8992   evaluated by the POSIX.2-1992 standard developers

8993   On Page: 3680 Line: 125313 Section: C.4.3 Exclusion of Utilities
8994   (2013 edition Page: 3710 Line: 127012)

8995   Change from:

8996   not be included in the base documents because

8997   to:

8998   not be included in POSIX.2-1992 because

8999   On Page: 3681 Line: 125351 Section: C.4.3 Exclusion of Utilities
9000   (2013 edition Page: 3710 Line: 127050)

9001   Change from:

9002   in a historical draft of the base documents

9003   to:

9004   in an early draft of the POSIX.2-1992 UPE

9005   *Rationale*: Austin Group Defect Report(s) applied: 885. See http://austingroupbugs.net/view.php?id=885.

9006   **Change Number: XRAT/TC2/D4/0026** [885]

9007   On Page: 3685 Line: 125420 Section: D.1 User Requirements
9008   (2013 edition Page: 3715 Line: 127119)

9009   Change from:

9010   as typified by the base documents listed in [xref to section A.1.1].

9011   to:

9012   as typified by the base documents for POSIX.1-1996.

9013   *Rationale*: Austin Group Defect Report(s) applied: 885. See http://austingroupbugs.net/view.php?id=885.

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