--	--

IEEE P1003.2 Draft 11.2 – September 1991

STANDARDS PROJECT

Draft Standard for Information Technology — Portable Operating System Interface (POSIX) Part 2: Shell and Utilities

Sponsor

Technical Committee on Operating Systems and Application Environments
of the
IEEE Computer Society

Work Item Number: JTC 1.22.21.2

Abstract: ISO/IEC 9945-2: 199x (IEEE Std 1003.2-199x) is part of the POSIX series of standards for applications and user interfaces to open systems. It defines the applications interface to a shell command language and a set of utility programs for complex data manipulation.

Keywords: API, application portability, data processing, open systems, operating system, portable application, POSIX, shell and utilities

P1003.2 / D11.2
September 1991

IEEE Standards Department
Copyright and Permissions
445 Hoes Lane, P.O. Box 1331
Piscataway, NJ 08855-1331, USA
+1 (908) 562-3800
+1 (908) 562-1571 [FAX]

September 1991 *SH XXXXX*

Editor's Notes

The IEEE ballot for Draft 11.2 is due at the IEEE Standards Office on ***21 October 1991***. You are also asked to e-mail any balloting comments to me: `hlj@posix.com`. Please read the balloting instructions in Annex G.

This document is also registered as ISO/IEC CD 9945-2.2. The international balloting period is unrelated to the IEEE balloting. Member bodies, please consult any accompanying materials from SC22. Also, please read the remainder of these Editor Notes to see explanations of stylistic differences between a draft and the final standard (copyright notices, inline rationale, etc.).

The IEEE balloting will be on hiatus during the international balloting period, which is probably scheduled to complete at the May 1992 WG15 meeting. This is in accordance with the WG15 Synchronization Plan, which calls for coordinated balloting to result in the approval of an IEEE/ANSI standard that is identical to the ISO/IEC Draft International Standard (DIS). There will be a final recirculation of a full draft (12) to the IEEE balloting group before it is sent to the Standards Board.

This section will not appear in the final document. It is used for editorial comments concerning this draft. Draft 11.2 is the fifth recirculation of the balloting process that began in December 1988 with Draft 8. Please consult Annex G and the cover letter for the ballot that accompanied this draft for information on how the recirculation is accomplished.

This draft uses small numbers in the right margin in lieu of change bars. ''2'' denotes changes from Draft 11.1 to Draft 11.2. ''1'' denotes changes from Draft 11 to Draft 11.1. All diff-marks prior to Draft 11.1 have been removed. Trivial informative (i.e., non-normative) changes and purely editorial changes such as grammar, spelling, or cross references are not diff-marked.

There are two versions of Draft 11.2 in circulation. The full printed version was sent for SC22 balloting and is also available from the IEEE for a duplication fee [call (800) 678-IEEE or +1 (908) 981-1393 outside the US]. The version sent to the IEEE balloting group consists (mostly) of pages containing normative changes. This was done to focus balloting group attention on the changes being balloted and to reduce costs and administrative time. The changes-only version contains a few handwritten pointers in the margins to show context where it would not be obvious; numbers near the normal page numbers show what the corresponding Draft 11 page number would be.

The following minor global changes have been made without diff-marks:

— Instances of the verbs ''print,'' ''report,'' ''display,'' ''issue,'' and ''list'' are being changed to ''write'' as part of a general cleanup related to the UPE, where ''write'' and ''display'' have precise meanings. This is probably not completed and will continue throughout ballot resolution and the final editing process.

ISO and IEEE have tightened up the requirements for the use of ‘‘shall.’’ We have been directed that all sentences that are currently declarative must be changed to use the ‘‘shall’’ form if they pose a requirement: ‘‘The status is zero’’ → ‘‘The status shall be zero.’’ One specific instance of this was changing ‘‘The following options/operands are available’’ to ‘‘The following options/operands shall be supported by the implementation.’’ Another: ‘‘The `foo` utility follows the utility argument syntax standard described in 2.11.2’’ to ‘‘The `foo` utility shall conform to the utility argument syntax guidelines described in 2.10.2.’’ It is a tedious process to do all these translations and they are not complete. They will completed on a draft-by-draft basis. In the meantime, please assume that all declarative sentences mean to use ‘‘shall’’ and treat them as either implementation or application requirements unless they specifically say ‘‘may,’’ ‘‘should,’’ or ‘‘can.’’

The rationale text for all the sections has been temporarily moved from Annex E and interspersed with the appropriate sections. The rationale sections are identified with the phrase ‘‘*(This subclause is not a part of P1003.2)*’’ in the heading. This colocation of rationale with its accompanying text was done to encourage the Technical Reviewers to maintain the rationale text, as well as provide explanations to the reviewers and balloters. Not all of the Rationale sections have contents as of this draft. The empty sections may be partially distracting, but we feel it is imperative to keep them there to encourage the Technical Reviewers to provide rationale as needed.

Please report typographical errors to:

Hal Jespersen
POSIX Software Group
447 Lakeview Way
Redwood City, CA 94062
+1 (415) 364-3410
FAX: +1 (415) 364-4498
Email: `hlj@Posix.COM`

(Electronic mail is preferred.)

The copying and distribution of IEEE balloting drafts is accomplished by the Standards Office. To report problems with reproduction of your copy, contact: 2

Anna Kaczmarek 2
IEEE Standards Office
P.O. Box 1331
445 Hoes Lane
Piscataway, NJ 08855-1331

+1 (908) 562-3811 2
FAX: +1 (908) 562-1571

Additional copies of this draft are available for a duplication and mailing fee. Contact:

IEEE Publications
1 (800) 678-IEEE
+1 (908) 981-1393 [outside US]

This draft is available in various electronic forms to assist the review process. Our thanks to Andrew Hume of AT&T Bell Laboratories for providing online access facilities. Note that this is a limited experiment in providing online access; future ballots may provide other forms, such as diskettes or a bulletin board arrangement, but the instructions shown here are the only methods currently available. Please also observe the additional copyright restrictions that are described in the online files.

Assuming you have access to the Internet, the scenario is approximately

```
ftp research.att.com # research’s IP address is 192.20.225.2
<login as netlib; password is your email address>
cd posix/p1003.2/d11.2
get toc index
binary
get p11-20.Z
```

The draft is available in several forms. The table of contents can be found in `toc`, pages containing a particular section are stored under the section number, sets of pages are stored in files with names of the form `p`*n*−*m*, and the entire draft is stored in `all`. By default, files are ASCII. A `.ps` suffix indicates PostScript. A `.Z` suffix indicates a `compress`’ed file. The file `index` contains a general description of the files available.

These files are also available via electronic mail by sending a message like

```
send 3.4 3.5 9.2 from posix/p1003.2/d11.2
```

to `netlib@research.att.com`. If you use email, you should *not* ask for the the compressed version. For a more complete introduction to this form of *netlib*, send the message

```
send help
```

POSIX.2 Change History

This section is provided to track major changes between drafts. Since it was first added in Draft 11, earlier entries omit some degree of detail.

Draft 11.2 [September 1991] Sixth IEEE ballot (fifth recirculation; only 2
changed pages distributed). Second ISO/IEC CD 9945-2 registra- 2
tion (full draft distributed). 2

- Equivalence classes as starting/ending points of regular 2
  expression bracket expression range expression have been 2
  made unspecified. 2
- The LC_COLLATE `substitute` keyword has been deleted. 2
- `cksum` (4.9): Modifications to the algorithm. 2
- `cp` (4.13): Restoration of the 2
- `stty` (4.59): Addition of the `tostop` operand. 2
- `lex` (A.2): Further clarification of ERE differences. 2
- Miscellaneous clarifications to various utilities. 2

Draft 11.1 [June 1991] Fifth IEEE ballot (fourth recirculation; only changed 1
pages distributed). 1

- Modification of the definition of *byte* and clarifications of 1
  octal/hexadecimal byte representations throughout the utili- 1
  ties. 1
- Clarifications to the locale definition source file description in 1
  2.5; addition of a `yacc` grammar. 1
- Removal of `pax –e` character translation option. 1
- Miscellaneous clarifications to various utilities. 1
- Reconciliation of feature test macros and headers in Annex B 1
  with POSIX.1. 1

Draft 11 [February 1991] Fourth IEEE ballot (third recirculation).

- Changes in 2.3 to the treatment of regular built-ins in regards to their *exec*-able versions.
- Changes to 2.4 (character names and charmap syntax) and 2.5 (`localedef` input format) as a result of international balloting. Addition of the {POSIX2_LOCALEDEF} symbol.
- Changes to the shell quoting rules, arithmetic expression syntax, command search order, error descriptions, and exportable functions.
- Movement of the `command` utility from special built-in status to be a utility in Section 4.

— `cp` (4.13): Significant clarifications and interface changes.

— `date` (4.15): Added field descriptor modifiers to handle alternate calendar forms when supported by the locale and implementation.

— `pax` (4.48): Significant interface changes, including international character set translations.

— `test` (4.62): Deprecated some functionality due to inconsistent behavior in existing implementations that cause portability problems in existing applications.

— `make` (6.2): Addition of the `.POSIX` special target, return of some rules to strict existing practice.

— Miscellaneous clarifications to various utilities.

— The FORTRAN section now has two options associated with it: Development Utilities (`fort77`) and Runtime Utilities (`asa`).

— Addition of full example profiles and charmaps from Denmark in Annex F.

Draft 10 [July 1990] Third IEEE ballot (second recirculation).

— This draft primarily has been one of clarification and amplification. In resolving ballot objections, large portions of the draft have been rewritten, affecting all sections, but comparatively few changes in [intended] functionality have occurred.

— New shell command language features (see Section 3):

— Utility name changes:

Draft 9	**Draft 10**
`create`	`pathchk`
`hexdump`	`od`
`sendto`	`mailx`

— A few of the utilities and global sections now have a more formal description, using a `yacc`-like grammar.

— Considerably more detail has been added to the internationalization features of the standard: global changes to clauses 2.4 and 2.5; new detail to the LC_* variables in each utility section; specification of **LC_MESSAGES** (replacing **LC_RESPONSE**).

— Due to some ISO requirements, Sections 1 and 2 have been reorganized yet again, causing many cross reference number changes. The Related Standards annex has been turned into simply a Bibliography. The Non-Specified Language Compilers annex has been replaced by a Sample National Profile annex.

Draft 9	[August 1989] Second IEEE ballot (first recirculation). Also registered as ISO/IEC CD 9945-2.1. A few minor corrections to some sections. :-)
Draft 8	[December 1988] First IEEE ballot. Also submitted to ISO/IEC JTC 1/SC22 for review and comment.
Draft 7	[September 1988] ‘‘Mock ballot’’ conducted by working group members only.

POSIX.2 Technical Reviewers

The individuals denoted in Table i are the Technical Reviewers for this draft. During balloting they are the subject matter experts who coordinate the resolution process for specific sections, as shown.

Table i — POSIX.2 Technical Reviewers

Section	Description	Reviewer	
1	*General*	Jespersen	
2.4,2.5	*Definitions (Locales)*	Leijonhufvud	1
2 (rest)	*Definitions (Various)*	Jespersen	
3	*Command Language*	Jespersen	
4	*Execution Environment Utilities:* `cp`, `rm`	Bostic	2
4	*Execution Environment Utilities: (the rest)*	Jespersen	2
6	*Software Development Utilities*	Jespersen	
7	*Language-Independent Bindings*	Jespersen	2
A	*C Development Utilities*	Jespersen	
B	*C Bindings*	Jespersen	2
C	*FORTRAN Development and Runtime Utilities*	Jespersen	
D-G	*Various*	Jespersen	

Also, our special thanks to Donn Terry for writing or improving all the `yacc`-based grammars used in Draft 10.

POSIX.2 Proposed Schedule

This section will not appear in the final document. It is used to provide editorial notes regarding the proposed POSIX.2 schedule. In the schedule, the UPE stands for ‘‘User Portability Extension.’’

Date	Milestone (End of Meeting)	Draft	
Sep 7-11, 1987 Nashua, NH	Utility format frozen; 10% of utilities described.	**3**	
Dec 7-14, 87 San Diego, CA	50% of utilities described; shell update; substantial progress in Sections 2, 3, 4, 8.	**4**	
Mar 14-18, 1988 Washington, DC	Utility selection frozen; 75% described.	**5**	
Jul 11-15, 1988 Denver, CO	100% utilities described; functional freeze; produce ‘‘mock ballot’’ and POSIX FIPS draft 7	**6**	
[Sep-Oct 1988]	[Mock ballot]	**7**	
Oct 24-28, 1988 Honolulu, HI	Resolve mock ballot objections; produce first real ballot (draft 8) UPE planning begins	**7**	
[Jan-Feb 1989]	[First ballot]	**8**	
Jan 9-11, 1989 Ft. Lauderdale, FL	Begin UPE definitions; Technical Reviewer coordination of first ballot responses	**8**	
[Feb-Apr 1989]	[Ballot resolution]	**8**	
Apr 24-28, 1989 Minneapolis, MN	Working Group concurrence with ballot resolution; produce Draft 9 for recirculation; UPE work	**9**	
Jul 10-14, 1989 San Jose, CA	UPE work		
[Oct 1989]	[First Recirculation]	**9**	
[Nov-Feb 1990]	[Ballot resolution]	**9**	
[Aug-Sep 1990]	[Second Recirculation]	**10**	
[Mar 1991]	[Third Recirculation]	**11**	
[Jun 1991]	[Fourth Recirculation]	**11.1**	1
[Sep 1991]	[Fifth Recirculation]	**11.2**	1
[mid-1992]	[IEEE Standard Board Approves??]	**12**	2
[Jul 1990 - Apr 1992]	[Ballot .2a UPE supplement]		1

IEEE Standards documents are developed within the Technical Committees of the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Board. Members of the committees serve voluntarily and without compensation. They are not necessarily members of the Institute. The standards developed within IEEE represent a consensus of the broad expertise on the subject within the Institute as well as those activities outside of IEEE that have expressed an interest in participating in the development of the standard.

Use of an IEEE Standard is wholly voluntary. The existence of an IEEE Standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the IEEE Standard. Furthermore, the viewpoint expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard. Every IEEE Standard is subjected to review at least every five years for revision or reaffirmation. When a document is more than five years old and has not been reaffirmed, it is reasonable to conclude that its contents, although still of some value, do not wholly reflect the present state of the art. Users are cautioned to check to determine that they have the latest edition of any IEEE Standard.

Comments for revision of IEEE Standards are welcome from any interested party, regardless of membership affiliation with IEEE. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments.

Interpretations: Occasionally questions may arise regarding the meaning of portions of standards as they relate to specific applications. When the need for interpretations is brought to the attention of the IEEE , the Institute will initiate action to prepare appropriate responses. Since IEEE Standards represent a consensus of all concerned interests, it is important to ensure that any interpretation has also received the concurrence of a balance of interests. For this reason, the IEEE and the members of its technical committees are not able to provide an instant response to interpretation requests except in those cases where the matter has previously received formal consideration.

Comments on standards and requests for interpretations should be addressed to:

Secretary, IEEE Standards Board
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08855-1331

IEEE Standards documents are adopted by the Institute of Electrical and Electronics Engineers without regard to whether their adoption may involve patents on articles, materials, or processes. Such adoption does not assume any liability to any patent owner, nor does it assume any obligation whatever to parties adopting the standards documents.

Contents

PAGE

FIGURES

TABLES

Introduction

(This Introduction is not a normative part of P1003.2 Information technology — Portable Operating System Interface (POSIX) — Part 2: Shell and Utilities, but is included for information only.)

The purpose of this standard is to define a standard interface and environment for application programs that require the services of a ''shell'' command language interpreter and a set of common utility programs. It is intended for systems implementors and application software developers, and is complementary to ISO/IEC 9945-1: 1990 {8} (first in a family of 'POSIX '' standards), which specifies operating system interfaces and source code level functions, based on the UNIX [1] system documentation. This standard, or 'POSIX. 2,'' is based upon documentation and the knowledge of existing programs that assume an interface and architecture similar to that described by POSIX. 1. (See 1.1 for a full description of the relationship between the standards.)

The majority of this standard describes the functions of utilities that can interface with application programs. The standard also provides high-level language interfaces that the application uses to access these utilities and other useful, related services. These language-independent service interfaces are temporarily described in terms of their C language bindings. The C language assumed is that defined by the C Standard: *ANSI /X3.159-1989 Programming Language C Standard* produced by Technical Committee X3J11 of the Accredited Standards Committee X3 — Information Processing Systems.

Organization of the Standard

The standard is divided into ten parts:

— General, including a statement of scope, normative references, and conformance requirements. (Section 1).

— Definitions, general requirements, and the environment available to applications. (Section 2).

— The shell command interpreter language. (Section 3).

— Descriptions of the utilities in the required ''Execution Environment Utilities.'' (Section 4).

— Descriptions of the utilities required for user portability on asynchronous terminals. (Section 5 [to be provided in a future revision]).

— Descriptions of the utilities in the optional ''Software Development Utilities.'' (Section 6).

---

1) UNIX is a registered trademark of UNIX System Laboratories in the USA and other countries.

— Language-independent interfaces for high-level programming language access to shell and related services. (Section 7).

— Descriptions of the utilities in the optional ‘‘C Language Development Utilities.’’ (Normative Annex A).

— C language bindings to the interfaces in Section 6. (Normative Annex B).

— Descriptions of the utilities in the optional ‘FORTRAN Development and Runtime Utilities.’’ (Normative Annex C).

This introduction, the foreword, any footnotes, NOTES accompanying the text, and the *informative* annexes are not considered part of the standard. Annexes D through G are informative.

Base Documents

Many of the interfaces and utilities of this standard were adapted from materials in machine-readable forms donated by the following organizations:

— AT&T: the *System V Interface Definition* (*SVID*) {B24},[2] Issue 2, Volume 2. Copyright © 1986, AT&T; reprinted with permission.

— The X/Open Company, Ltd.: the *X/Open Portability Guide* {B30} {B31}, Issues II and III, Volume 1. Copyright © 1989, X/Open Company, Ltd; reprinted with permission.

— University of California, *The UNIX User's Reference Manual* {B28}, 4.3 Berkeley Software Distribution, Virtual VAX-11 Version, 1986. Copyright © 1980, 1983, The Regents of the University of California; reprinted with permission.[3]

Significant reference use was also made of the following books:

— Bolsky, Morris I., Korn, David G., *The KornShell Command and Programming Language* {B25}, Prentice Hall, Englewood Cliffs, New Jersey (1988).

— Aho, Alfred V., Kernighan, Brian W., Weinberger, Peter J., *The AWK Programming Language* {B21}, Addison-Wesley, Reading, Massachusetts (1988).

Many other proposals for functions and utilities were received from the various working group members, who are listed in the Acknowledgements section of this standard.

2) The number in braces corresponds to those of the references in 1.2 (or the bibliographic entry in Annex D if the number is preceded by the letter B).

3) The IEEE is grateful to AT&T, UniForum, and the Regents of the University of California for permission to use their machine-readable materials.

Related Standards Activities

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

The following areas are under active consideration at this time, or are expected to become active in the near future:[4)]

(1) Language-independent service descriptions of POSIX.1 {8}

(2) C, Ada, and FORTRAN Language bindings to (1)

(3) Verification testing methods

(4) Realtime facilities

(5) Secure/Trusted System considerations

(6) Network interface facilities

(7) System Administration

(8) Graphical User Interfaces

(9) Profiles describing application- or user-specific combinations of Open Systems standards for: supercomputing, multiprocessor, and batch extensions; transaction processing; realtime systems; and multiuser systems based on historical models

(10) An overall guide to POSIX-based or related Open Systems standards and profiles

Extensions are approved as ''amendments'' or ''revisions'' to this document, following the IEEE and ISO/IEC Procedures.

Approved amendments are published separately until the full document is reprinted and such amendments are incorporated in their proper positions.

If you have interest in participating in the TCOS working groups addressing these issues, please send your name, address, and phone number to the Secretary, IEEE Standards Board, Institute of Electrical and Electronics Engineers, Inc., P.O. Box 1331, 445 Hoes Lane, Piscataway, NJ 08855-1331, and ask to have this forwarded to the chairperson of the appropriate TCOS working group. If you have interest in participating in this work at the international level, contact your ISO/IEC national body.

---

4) A *Standards Status Report* that lists all current IEEE Computer Society standards projects is available from the IEEE Computer Society, 1730 Massachusetts Avenue NW, Washington, DC 20036-1903; Telephone: +1 202 371-0101; FAX: +1 202 728-9614. Working drafts of POSIX standards under development are also available from this office.

P1003.2 was prepared by the 1003.2 working group, sponsored by the Technical Committee on Operating Systems and Application Environments of the IEEE Computer Society. At the time this standard was approved, the membership of the 1003.2 working group was as follows:

Technical Committee on Operating Systems and Application Environments (TCOS)

Chair: Jehan-François Pâris

TCOS Standards Subcommittee

Chair:	Jim Isaak
Vice Chairs:	Ralph Barker
	David Dodge
	Robert Bismuth
	Hal Jespersen
	Lorraine Kevra
Treasurer:	Quin Hahn
Secretary:	Shane McCarron

1003.2 Working Group Officials

Chair:	Hal Jespersen
Vice Chair:	Donald W. Cragun
Editors:	Hal Jespersen (1986, 1988-1991)
	Maggie Lee (1987-1988)
Secretaries:	Helene Armitage (1988-1990)
	Dave Grindeland (1991)
	Robert J. Makowski (1987-1988)

Technical Reviewers

Helene Armitage	Ken Faubel	Gary Miller
Keith Bostic	Greger Leijonhufvud	Marc Teitelbaum
John Caywood	Bob Lenk	Donn Terry
Donald Cragun	Mark Levine	Teoman Topcubasi
David Decot	Shane McCarron	David Willcox

Working Group

Helene Armitage	Quin Hahn	Jim Oldroyd
Brian Baird	Michael J. Hannah	Mark Parenti
John R. Barr	Marjorie E. Harris	John Peace
Philippe Bertrand	David F. Hinnant	Jon Penner
Robert Bismuth	Leon M. Holmes	Gerald Powell
Jim Blondeau	Ron Holt	John Quarterman
James C. Bohem	Randall Howard	Joe Ramus
Kathy Bohrer	Steven A. James	Mike Ressler
Keith Bostic	Steve Jennings	Grover Righter
Phyllis Eve Bregman	Hal Jespersen	Andrew K. Roach
Peter Brouwer	Ronald S. Karr	Marco P. Roodzant
F. Lee Brown, Jr.	Lorraine C. Kevra	Seth Rosenthal
Jonathan Brown	Martin Kirk	Maude Sawyer

James A. Capps	Brad Kline	Norman K. Scherer
Bill Carpenter	Hiromichi Kogure	Glen Seeds
Steve Carter	David Korn	Jim Selkaitis
John Caywood	Rick Kuhn	Karen Sheaffer
Bob Claeson	Mike Lambert	Del Shoemaker
Mark Colburn	Maggie Lee	James Soddy
Donald W. Cragun	Perry Lee	Daniel Steinberg
Dave Decot	Greger Leijonhufvud	Scott A. Sutter
Terence S. Dowling	Bob Lenk	Ravi Tavakley
Stephen Dum	Mark Levine	Marc Teitelbaum
Dominic Dunlop	Gary Lindgren	Donn Terry
Mike Edmonds	John Lomas	Jack Thompson
Ron Elliott	Craig Lund	Teoman Topcubasi
Richard W. Elwood	Rod MacDonald	Eugene Tsuno
Hirsaki Eto	Dan Magenheimer	Geraldine Vitovitch
Fran Fadden	Robert J. Makowski	Carl vonLoewenfeldt
Ken Faubel	Shane P. McCarron	Mike Wallace
Martin C. Fong	Jim McGinness	Alan Weaver
Terance Fong	John McGrory	Larry Wehr
Glenn Fowler	Stuart McKaig	Bruce Weiner
Gary A. Gaudet	Sunil Mehta	N. Ray Wilkes
Al Gettier	Bill Middlecamp	David Willcox
Timothy D. Gill	Gary W. Miller	Neil Winton
Gregory Goddard	Jim Moe	David Woodend
Loretta Goudie	Yasushi Nakahara	Morten With
Dave Grindeland	Martha Nalebuff	Ken Witte
John Lawrence Gregg	Sonya D. Neufer	John Wu
Jerry Gross	Landon Noll	Peggy Younger
Douglas A. Gwyn	Robin T. O'Neill	Hilary Zaloom

The following persons were members of the 1003.2 Balloting Group that approved the standard for submission to the IEEE Standards Board:

Derek Kaufman	*X/Open Institutional Representative*
Shane McCarron	*UNIX International Institutional Representative*
Peter Collinson	*USENIX Association Institutional Representative*

Scott Anderson	Carol J. Harkness	Jim R. Oldroyd
Helene Armitage	Craig Harmer	Craig Partridge
David Athersych	Dale Harris	Rob Peglar
Geoff Baldwin	Myron Hecht	John C. Penney
Jerome E. Banasik	Morris J. Herbert	Rand S. Phares
Steven E. Barber	David F. Hinnant	P. J. Plauger
Robert M. Barned	Lee A. Hollaar	Gerald Powell
David R. Bernstein	Ronald Holt Jr.	Scott E. Preece
Kabekode V. S. Bhat	Randall Howard	James M. Purtilo
Robert Bismuth	Jim Isaak	J. S. Quarterman
Jim Blondran	Richard James	Wendy Rauch-Hindin
Robert Borochoff	Hal Jespersen	Brad Rhoades
Keith Bostic	Greg Jones	Christopher J. Riddick
James P. Bound	Michael J. Karels	Andrew K. Roach
Joseph Boykin	Lorraine C. Kevra	Arnold Robbins
Kevin Brady	Alan W. Kiecker	R. Hughes Rowlands
Phyllis Eve Bregman	Jeff Kimmel	Robert Sarr

A. Winsor Brown
F. Lee Brown Jr.
Luis-Felipe Cabrera
Nicholas A. Camillone
Andres Caravallo
Steven L. Carter
John Caywood
Kilnam Chon
Chan F. Chong
Robert L. Claeson
Mark Colburn
Kenneth N. Cole
Richard Cornelius
William M. Corwin
Mike R. Cossey
William Cox
Donald W. Cragun
Terence Dowling
Stephen A. Dum
John D. Earls
Ron Elliott
Richard W. Elwood
David Emery
Philip H. Enslow
Ken Faubel
Terence Fong
Ed Frankenberry
John A. Gertwagen
Al Gettier
Michel Gien
Gregory W. Goddard
Robert C. Groman
Judy Guist
Gregory Guthrie
Michael J. Hannah
M. J. Kirk
Kenneth C. Klingman
Joshua W. Knight
David Korn
Takahiko Kuki
Robin B. Lake
Mike Lambert
Doris Lebovits
Maggie Lee
Greger Leijonhufvud
Robert M. Lenk
David Lennert
Mark E. Levine
Kevin Lewis
Kin F. Li
James P. Lonjers
Joseph F. P. Luhukay
Paul Lustgarten
Ron Mabe
Robert J. Makowski
Roger J. Martin
Joberto S. B. Martins
Yoshihiro Matsumoto
Shane McCarron
Martin J. McGowan III
Marshall Kirk McKusick
Robert W. McWhirter
Doug Michels
Gary W. Miller
James M. Moe
J. W. Moore
Anita Mundkur
Martha Nalebuff
Fred Noz
Alan F. Nugent
Norman Schneidewind
Wolfgang Schwabl
Richard Scott
Glen Seeds
Dan Shia
Roger Shimada
Mukesh Singhal
Richard Sniderman
Steven Sommars
Bryan W. Sparks
Richard Stallman
Daniel Steinberg
Douglas H. Steves
Peter Sugar
Scott A. Sutter
Ravi Tavakley
Donn Terry
Gary F. Tom
A. T. Twigger
Mark-Rene Uchida
L. David Umbaugh
Michael W. Vannier
M. B. Wagner
John W. Walz
Alan G. Weaver
Larry Wehr
Bruce Weiner
Brian Weis
Peter J. Weyman
Andrew E. Wheeler
David Willcox
Jeff Wubik
Oren Yuen
Jason Zions

When the IEEE Standards Board approved this standard on *<date to be provided>*, it had the following membership:

(to be pasted in by IEEE)

Information technology — Portable Operating System Interface (POSIX) — Part 2: Shell and Utilities

Section 1: General

1.1 Scope

This standard defines a standard source code level interface to command interpretation, or ‘‘shell,’’ services and common utility programs for application programs. These services and programs are complementary to those specified by ISO/IEC 9945-1: 1990 {8}, hereinafter referred to as ‘‘POSIX.1 {8}.’’

The standard has been designed to be used by both application programmers and system implementors. However, it is intended to be a reference document and not a tutorial on the use of the services, the utilities, or the interrelationships between the utilities.

The emphasis of this standard is on the shell and utility functionality required by application programs (including ‘‘shell scripts’’) and not on the direct interactive use of the shell command language or the utilities by humans.

Portions of this standard comprise optional language bindings to system service interfaces. See, for example, the C Language Bindings Option in Annex B. This standard is intended to describe language interfaces and utilities in sufficient detail so that an application developer can understand the required interfaces without access to the source code of existing implementations on which they may be based. Therefore, it does not attempt to describe the source programming language or internal design of the utilities; they should be considered ‘‘black boxes’’ that exhibit the described functionality.