



Standards Reports

End of an Era

by **Dave Blackwood**

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I first got involved in standards in 1989 when the Canadian POSIX Working Group (CPWG) was formed. Our first task was to review IEEE Std 1003.1-1998, which had been submitted to ISO/IEC JTC1 for adoption as an International Standard. At that time we always had 20 to 30 of us at each quarterly meeting, and we closely followed the progress of the JTC1 and IEEE PASC working groups and sent representatives to as many meetings as funding permitted.

Today, CPWG consists of four people who communicate very infrequently and then only by email. This decline in participation reflects similar declines in other countries and in the working groups themselves. To some extent the decline can be attributed to a decline in the tech sector overall, and a feeling that standards are part of overhead. But there has also been a general perception for several years that these standards were complete and no further work needed to be done.

With the recent adoption by The Open Group of the Single UNIX Specification, Version 3 and by the IEEE of Std 1003.1-2001, perhaps the work really is done. Oh sure, there is some continuing work in the areas of realtime, embedded systems, and profiles, but these aren't of universal interest and cater primarily to niche markets. The only remaining work is a final ballot at the ISO/IEC JTC1 level to adopt the new release as an International Standard (IS 9945-1:2002) and the winding up of the various working groups.

IEEE PASC expects to move to an all-electronic format following its next

(and possibly final) meeting. I would expect maintenance of 1003.1-2001 will then be largely delegated to The Open Group. ISO/IEC JTC1/SC22/WG15 should also be able to wind up its affairs at its next meeting, leaving little more than a project editor and a convenor in place to mind the shop.

Unfortunately, standards cannot remain static and stable for very long without also quickly losing their relevance. The danger in winding down the face-to-face contacts is that participation will decline further and the resources will simply not be available for the next revision. At ISO and at the IEEE, standards must be reaffirmed every five years or face automatic withdrawal. Will there still be anyone in the working groups in five years who knows or cares enough to make this happen?

Time, of course, will tell. A lot can happen in five years. People change jobs, retire, or otherwise move on. POSIX standards are no longer of relevance in my own job as it has evolved over the years. This has certainly affected my participation since my employer no longer picks up the tab, and I now have to do this on my own time. I'm sure I'm not alone.

I think, then, that this may very well be the end of an era, one that started when /usr/group (later UniForum) published the /usr/group standard based on System III in 1984. AT&T introduced the System V Interface Definition (SVID) in 1986. Though it was publicly available, it was not open. In 1987 X/Open (now The Open Group) produced the first release of the X/Open Portability Guide (XPG). And, of course, everyone remembers AT&T and Sun entering into the agreement to produce System V, Release 4, the first major integration of System V and BSD. Other vendors reacted by forming the Open Software Foundation (OSF) and producing OSF/1.

Our standards report editor, David Blackwood, welcomes dialogue between this column and you, the readers. Please send your comments to [<dave@usenix.org>](mailto:dave@usenix.org)

AT&T, Sun, and others then formed UNIX International in response. And, finally, IEEE produced Std 1003.1-1988, defining the System Application Program Interface (API) [C Language] and submitted it to ISO/IEC for adoption as an International Standard. This brings me back to where I started.

In some respects the future of open standards has come full circle too. Expect to see more industry consortia leading the way, developing “industry standards,” some of which may achieve formal recognition. But the value of that ISO or IEEE stamp of approval, too, will likely decline...until some future user group decides that enough is enough when it comes to competing vendor-consortia-defined standards and insists on something more. Those who cannot remember history are condemned to repeat it.

The Single UNIX Specification, Version 3

by Andrew Josey

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Work commenced in late 1998 on the Single UNIX Specification, Version 3. The core of the Single UNIX Specification, Version 3, collectively known as the Base Specifications, was developed, and is maintained, by a joint working group of members of the IEEE Portable Applications Standards Committee (PASC), of The Open Group, and of the ISO/IEC Joint Technical Committee 1. This joint working group is known as the Austin Group.¹

The Austin Group arose out of discussions among the parties that started in early 1998, leading to an initial meeting and formation of the group in September 1998. This represented a sea change

in attitude regarding development of two related specifications by three development organizations, which to that time had been developed separately, often involving the same standards developers.

The purpose of the Austin Group has been to revise, combine, and update the following standards: ISO/IEC 9945-1, ISO/IEC 9945-2, IEEE Std 1003.1, IEEE Std 1003.2, and the Base Specifications of The Open Group Single UNIX Specification.

After two initial meetings, an agreement was signed in July 1999 between The Open Group and the Institute of Electrical and Electronics Engineers (IEEE) to formalize the project, with the first draft of the revised specifications being made available at the same time. Under this agreement, The Open Group and IEEE agreed to share joint copyright of the resulting work. The Open Group has provided the chair and secretariat for the Austin Group.

This unique development has combined both the industry-led efforts and the formal standardization activities into a single initiative, and has incorporated a wide spectrum of participants, including people from the private sector, academia, government, and the open source communities.

The approach to specification development was one of “write once, adopt everywhere,” with the resulting set of specifications being approved as IEEE Std 1003.1-2001 (POSIX) and The Open Group Base Specifications, Issue 6. At the time of writing, the specifications are in the final stage of gaining ISO/IEC approval. This set of specifications forms the core of the Single UNIX Specification, Version 3.

The Base Specifications, Issue 6 consist of the following technical standards:

- Base Definitions, Issue 6 (XBD)
- Shell and Utilities, Issue 6 (XCU)
- System Interfaces, Issue 6 (XSH)
- Rationale (Informative)

The revision of the Base Specifications has tried to minimize the number of changes required to bring implementations that conform to the earlier versions of the approved standards into conformance with the current standard. Specifically, the scope of this work excluded doing any “new” work but instead focused on collecting into a single document what had been spread across a number of documents, and presenting it in what had been proven in practice to be a more effective way. Some changes to prior conforming implementations were unavoidable, primarily as a consequence of resolving conflicts found in prior revisions, or which became apparent when bringing the various pieces together.

However, since the revision now references the 1999 version of the ISO C standard, there are a number of unavoidable changes that have been made which will affect applications’ portability.

In addition to the Base Specifications, the Single UNIX Specification, Version 3 includes the X/Open Curses, Issue 4, Version 2 specification. Updates to X/Open Curses, Issue 4, Version 2 have been limited to production of a Corrigendum to allow it to exist in a Base Specifications, Issue 6 environment.

THE SINGLE UNIX SPECIFICATION, VERSION 3 – CONTENTS

This section gives an overview of the documents that comprise the different parts of the Single UNIX Specification, Version 3 and how they are organized. The Single UNIX Specification, Version 3 is made up of the Base Specifications,

Issue 6 and X/Open Curses, Issue 4, Version 2.

BASE DEFINITIONS (XBD)

The XBD document is part of the Base Specifications, Issue 6. XBD provides common definitions for the Base Specifications of the Single UNIX Specification; therefore, readers should be familiar with it before using the other parts of the Single UNIX Specification. The presence of this document reduces duplication in the other related parts of the Single UNIX Specification and ensures consistent use of terminology. This document is structured as follows:

Chapter 1 is an introduction, which includes the scope of the Base Specifications, and the scope of the changes made in this revision. Normative references, terminology, and portability codes used throughout the Base Specifications are included in this chapter.

Chapter 2 defines the conformance requirements, both for implementation and application conformance. For implementation conformance, this includes documentation requirements, conformance definitions for the core POSIX subset, conformance definitions for systems conforming to the Single UNIX Specification (denoted as the XSI extension), and option groups (previously known as feature groups).

Chapter 3 contains the general terms and definitions that apply throughout the Base Specifications.

Chapter 4 describes general concepts that apply throughout the Base Specifications.

Chapter 5 describes the notation used to specify file input and output formats in XBD and XCU.

Chapter 6 describes the portable character set and the process of character set definition.

Chapter 7 describes the syntax for defining internationalization locales as well as the POSIX locale provided on all systems.

Chapter 8 describes the use of environment variables for internationalization and other purposes.

Chapter 9 describes the syntax of pattern matching using regular expressions employed by many utilities and matched by the `regcomp()` and `regex()` functions. Both Basic Regular Expressions (BREs) and Extended Regular Expressions (EREs) are described in this chapter.

Chapter 10 describes files and devices found on all systems and their semantics. For example, the device `/dev/null` is an infinite data source and data sink.

Chapter 11 describes the asynchronous terminal interface for many of the functions in XSH and the `stty` utility in XCU.

Chapter 12 describes the policies for command line argument construction and parsing. It contains the utility argument syntax used throughout XCU and the utility syntax guidelines for naming utilities and specifying their arguments and option-arguments and operands.

Chapter 13 defines the contents of headers that declare constants, macros, and data structures that are needed by programs using the services provided by the system interfaces defined in XSH. These are in the form of reference pages and are organized alphabetically.

SHELL AND UTILITIES (XCU)

The XCU² document is part of the Base Specifications, Issue 6. XCU describes the shell and utilities that are available to application programs on systems conforming to this part of the Single UNIX Specification. Readers are expected to be familiar with the XBD

document. The XCU document is structured as follows:

Chapter 1 explains the status of this document and its relationship to other formal standards, including the ISO C standard and the XSH document. It also describes the utility limits, grammar conventions, defaults used by the utility descriptions, considerations for utilities in support of large files, and the list of required built-in utilities. The scope, conformance, and definitions sections are pointers to the XBD document; the sections are here to meet ISO/IEC rules regarding required sections. The terminology and portability codes are identical to the section in XBD and repeated here for ease of reference.

Chapter 2 describes the command language – that is, the shell command language interpreter – used in systems that conform to the Single UNIX Specification.

Chapter 3 describes a set of services and utilities that are implemented on systems supporting the Batch Environment option.

Chapter 4 consists of reference pages for all utilities available on systems conforming to the Single UNIX Specification. These are in the form of reference pages and are organized alphabetically.

SYSTEM INTERFACES (XSH)

The XSH document is part of the Base Specifications, Issue 6. XSH describes a set of system interfaces offered to application programs by systems conforming to this part of the Single UNIX Specification. Readers are expected to be experienced C language programmers and to be familiar with the XBD document. The XSH document is structured as follows:

Chapter 1 explains the status of this document and its relationship to other

formal standards. The scope, conformance, and definitions sections are pointers to the XBD document; the sections are here to meet ISO/IEC rules regarding required sections. The terminology and portability codes are identical to the section in XBD and repeated here for ease of reference.

Chapter 2 contains important concepts, terms, and caveats relating to the rest of this document. This includes information on the compilation environment, the namespace, definitions of error numbers, signal concepts, standard I/O streams, STREAMS, XSI IPC, realtime, threads, sockets, tracing, and data types.

Chapter 3 defines the functional interfaces to systems conformant to this part of the Single UNIX Specification. These are in the form of reference pages and are organized alphabetically.

RATIONALE (XRAT)

The XRAT document is part of the Base Specifications, Issue 6. The XRAT document has been published to assist in reviewing and understanding the main text. It contains historical information concerning the contents of the Base Specifications, Issue 6 and why features were included or discarded by the standard developers. It also contains notes of interest to application programmers on recommended programming practices, emphasizing the consequences of some aspects that may not be immediately apparent. This document is organized in parallel to the normative documents of the Base Specification, with a separate part (Parts A, B, and C) for each of the three normative documents. In addition, two other parts are included: Part D Portability Considerations and Part E Subprofiling Considerations. The Portability Considerations section includes a report on the perceived user requirements for the Base Specifications and how the facilities provided satisfy those requirements, together with guid-

ance to writers of profiles on how to use the configurable options, limits, and optional behavior. Written to meet the requirement that the document address subprofiling, the Subprofiling Considerations section contains an example set of subprofiling options.

X/OPEN CURSES (XCURSES)

XCURSES is not part of the Base Specifications, Issue 6 but, rather, describes a set of interfaces providing a terminal-independent method of updating character screens that are available to application programs on systems conforming to this part of the Single UNIX Specification. This document should be read in conjunction with The Open Group Corrigendum U056. This document is structured as follows:

Chapter 1 introduces Curses, gives an overview of enhancements that have been made to this version, and lists specific interfaces marked TO BE WITHDRAWN. This chapter also defines the requirements for conformance to this document and shows the generic format followed by interface definitions in Chapter 4.

Chapter 2 describes the relationship between Curses and the C language, the compilation environment, and the X/Open System Interface (XSI) operating system requirements. It also defines the effect of the interface on the namespace for identifiers and introduces the major data types that the interfaces use.

Chapter 3 gives an overview of Curses. It discusses the use of some of the key data types and gives general rules for important common concepts such as characters, renditions, and window properties. It contains general rules for the common Curses operations and operating modes. This information is implicitly referenced by the interface definitions in Chapter 4. The chapter explains the system of naming the

Curses functions and presents a table of function families. Finally, the chapter contains notes regarding use of macros and restrictions on block-mode terminals.

Chapter 4 defines the Curses functional interfaces.

Chapter 5 defines the contents of headers that declare constants, macros, and data structures that are needed by programs using the services provided by Chapter 4.

Chapter 6 discusses the terminfo database, which Curses uses to describe terminals. The chapter specifies the source format of a terminfo entry using a formal grammar, an informal discussion, and an example. Boolean, numeric, and string capabilities are presented in tabular form.

Appendix A discusses the use of these capabilities by the writer of a terminfo entry to describe the characteristics of the terminal in use.

The chapters are followed by a glossary, which contains normative definitions of terms used in the document.

IEEE STD 1003.1-2001

The core of the Single UNIX Specification, Version 3 (the Base Specifications) is also IEEE Std 1003.1-2001. IEEE Std 1003.1-2001 is a major revision and incorporates IEEE Std 1003.1-1990 (POSIX.1), and its subsequent amendments, and IEEE Std 1003.2-1992 (POSIX.2), and its subsequent amendments, combined with the core volumes of the Single UNIX Specification, Version 2. It is technically identical to The Open Group, Base Specifications, Issue 6; they are the same document, the front cover having both designations. The final draft achieved 98% approval by the IEEE ballot group and was officially approved by the IEEE-SA Standards Board on December 6, 2001.

More information on Version 3 of the Single UNIX Specification can be found at <http://www.UNIX-systems.org/version3/>; <http://www.UNIXsystems.org/version3/>; or register to read the specification online at <http://www.unix-systems.org/version3/online.html>; <http://www.unix-systems.org/version3/online.html>.

Notes

1. The Austin Group is named after the location of the inaugural meeting held at the IBM facility in Austin, Texas, in September 1998.
2. The acronym “XCU” derives from the previous version of the specification, which was called “Commands and Utilities.”

Austin Group Status Update

by Andrew Josey

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The Austin Common Standards Revision Group (CSRG) is a joint technical working group established to consider the matter of a common revision of ISO/IEC 9945-1, ISO/IEC 9945-2, IEEE Std 1003.1, IEEE Std 1003.2, and the appropriate parts of the Single UNIX Specification.

As of January 2002, the final draft of the specification has been approved by two of the three sponsoring organizations (The Open Group and the IEEE) and is now in the final approvals process at ISO, which is a final up/down ballot with no changes allowed to the document.

Given that there can be no further changes to the text, we have now moved to initial publication. The final text for

publication was completed by the editorial team upon IEEE approval on December 6, 2001, and can be obtained in various media formats from both The Open Group and the IEEE (note that the IEEE and The Open Group documents are identical).

The IEEE has the standard available for online delivery in PDF and CD-ROM; to order a copy from the IEEE go to <http://shop.ieee.org> and search on 1003.1-2001.

The Open Group has the standard available for online delivery in PDF and CD-ROM as part of its set for the Single UNIX Specification, Version 3. To order a copy from The Open Group go to <http://www.opengroup.org/pubs/catalog/un.htm> (look for documents, T950X, C950, C951, C952, C953). I am also pleased to report that The Open Group and the IEEE have reached an agreement to produce a freely available HTML version of the standard on the Web. Publication of the Web version will follow in a few weeks.

For the moment, the technical focus of the Austin Group is on Technical Corrigendum 1. The scope of this item is limited to bug fixing. The aardvark bug reporting system is again available and ready to receive defect reports at the Austin Group home page:

<http://www.opengroup.org/austin/defectform.html>.