Standards: An Overview Of the *Single UNIX®* *Specification Version 3*

Andrew Josey
Director of Certification
The Open Group
Email: a.josey@opengroup.org

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The Single UNIX Specification

- Designed to give software developers a single set of APIs to be supported by every UNIX system
- Shifts the focus from incompatible UNIX system product implementations to compliance to a single set of APIs
- If an OS meets the specification and commonly available applications run on it then it is open

What is the Single UNIX Specification?

- It is the codification and de jure standardization of the common core of UNIX® system practice
- The basic objective is portability of both programmers and application source code
  - Portability of the OS kernel itself and/or application binary code are not objectives

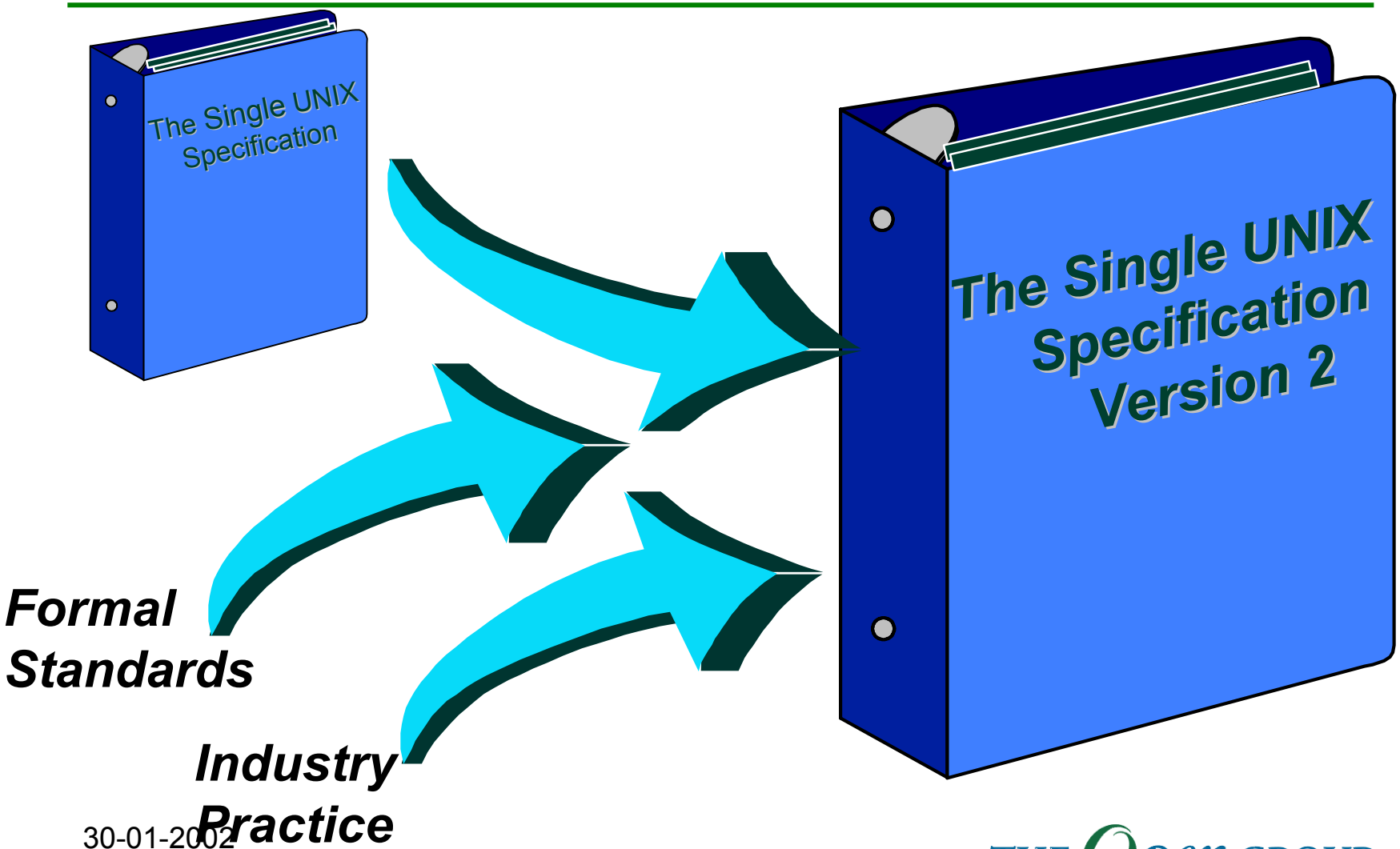
What is an API?

- An API (Application Program Interface) is a written contract between system developers and application developers
- An API is not a piece of code, it is a piece of paper defining what the two sets of developers are guaranteed to receive and are in turn responsible for providing

UNIX - The Brand

- Today, all the major vendors have implemented the Single UNIX Specification
- The UNIX mark is validated using extensive tests and backed up by a unique vendor guarantee - ***The Open Brand***
- The Open Brand
  - operates under trademark law
  - designates products that are guaranteed to conform to open systems specifications
  - a vendor guarantees that any non compliances will be fixed within a defined time period

The Single UNIX Specification Version 2



The Single UNIX Specification Version 3

- Developed by the Austin Common Standards Revision Group
- An open industry initiative to revise the core *POSIX standard* and the *Single UNIX Specification*; standards that lie at the heart of the Linux operating system

The *Austin Group*

- Electronic participation
- Participation in the group is free
- Deliverables:
  - IEEE Std 1003.1-2001 (POSIX.1)
  - The Open Group Base Specifications Issue 6
  - (they are the same document!)

About the *Austin Group*

- Over 700 participants on the mailing list
- Wide industry support:
  - *AT&T, Compaq, Fujitsu, HP, IBM, Lucent, Microsoft, Red Hat, SGI, Siemens, Sun*
  - *DoD, USENIX, Canada revenue*
- Participation in the *Austin Group* from the open source community includes:
  - *The Linux Standard Base, NetBSD, FreeBSD, and many others*

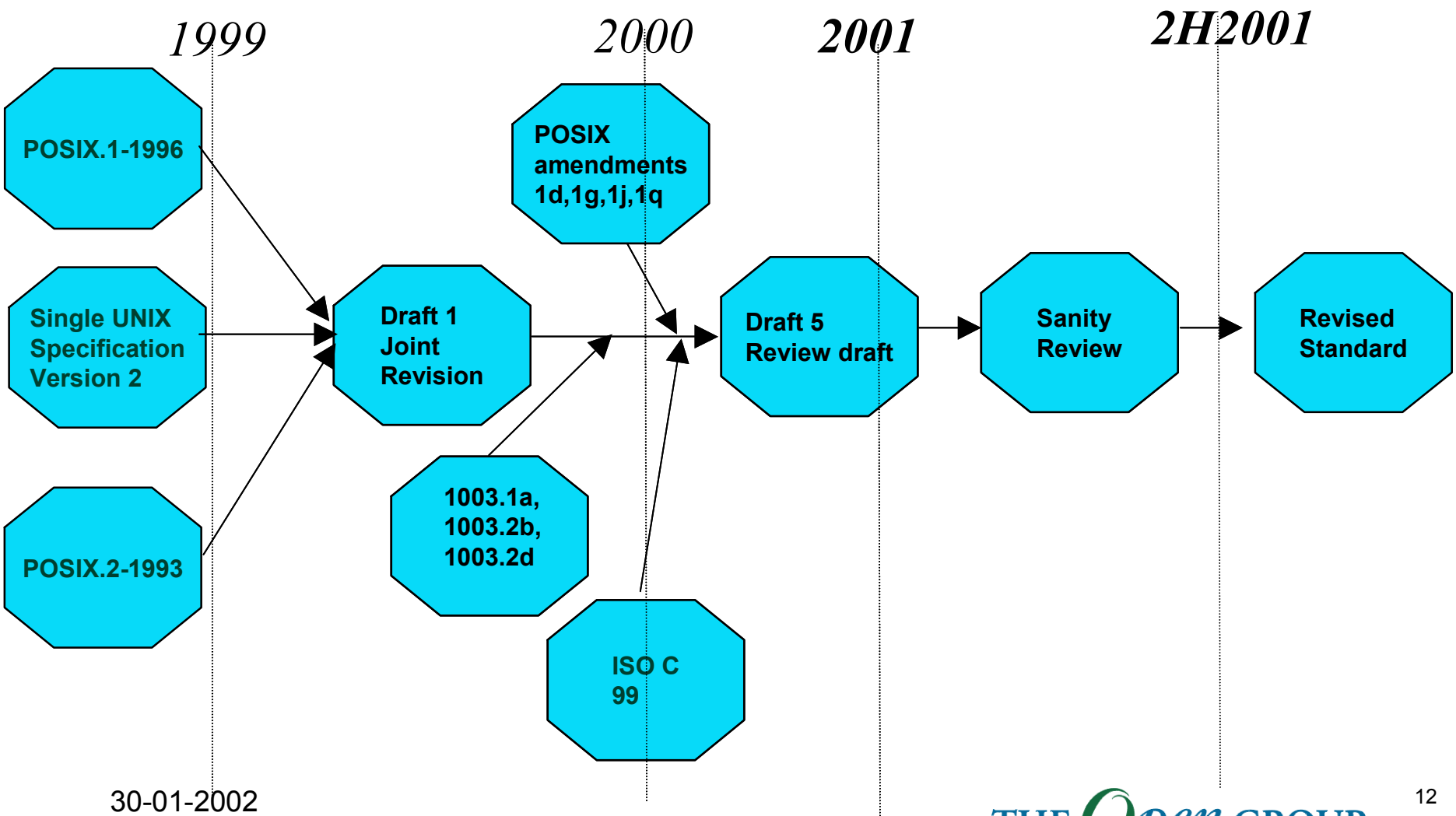
Objectives

- To target the joint specification at the programmer / user rather than the system implementer
- Organization based on the Core volumes of the Single UNIX Specification, organized alphabetically, and including Rationale
- To Produce a standard on schedule

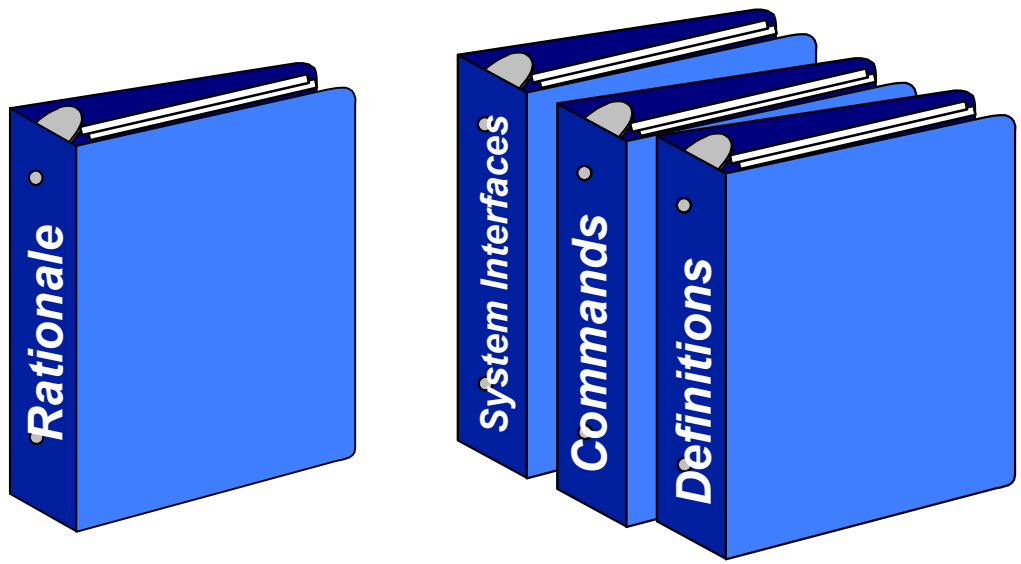
Scope of the revision

- Production of a single document to be adopted by multiple parties
- Minimize the number of changes required to implementations of earlier versions of the Base documents for the revision
- Limit new work items to those related to integration and consistency, resolving any conflicts
- Alignment with the ISO C 1999 standard

Roadmap


1999
2000
2001
2H2001
POSIX.1-1996
Single UNIX Specification Version 2
POSIX.2-1993
Draft 1 Joint Revision
POSIX amendments 1d,1g,1j,1q
1003.1a, 1003.2b, 1003.2d
ISO C 99
Draft 5 Review draft
Sanity Review
Revised Standard

The New Common Specification



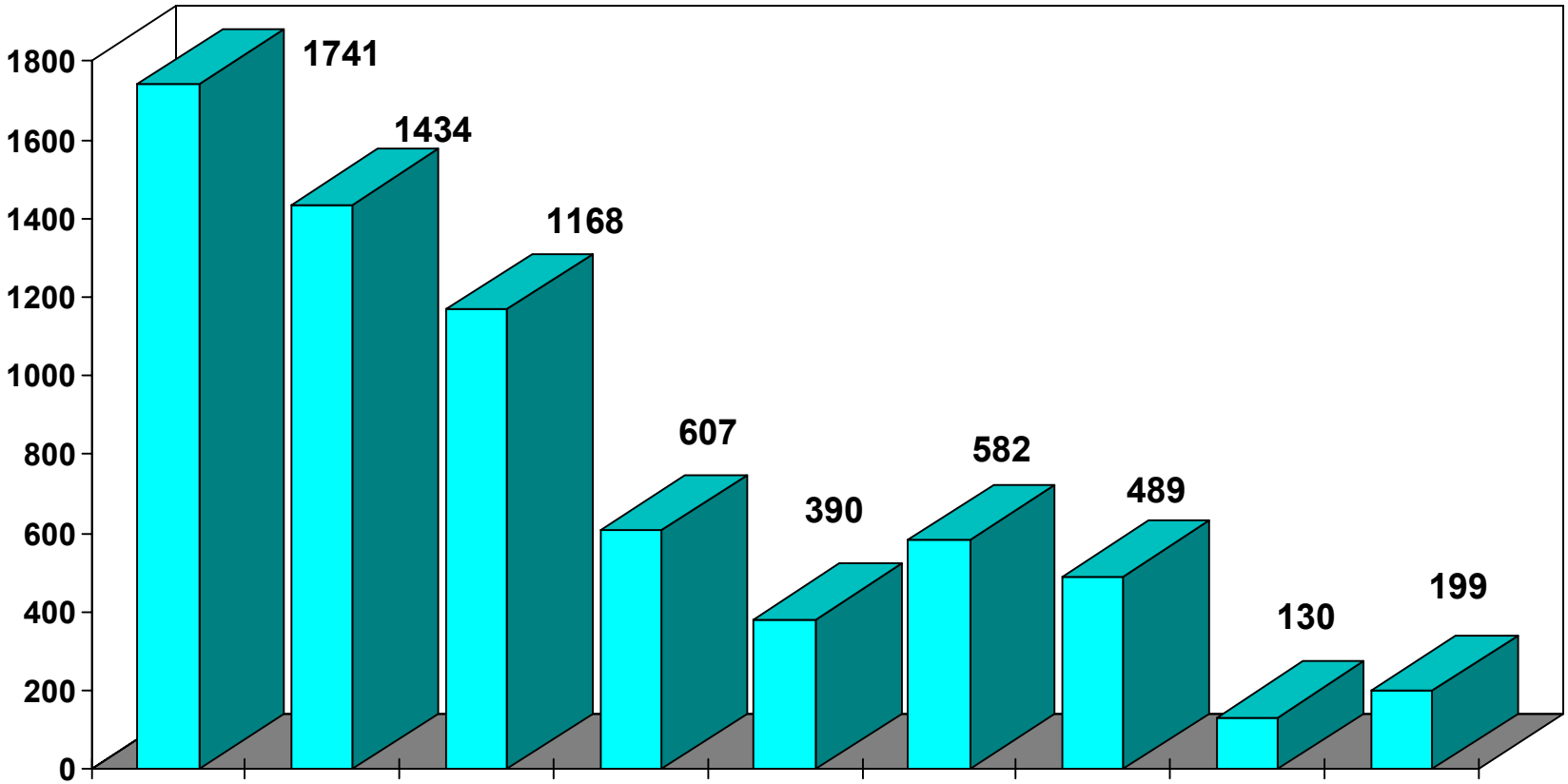
IEEE Std 1003.1-2001,

The Open Group Base Specifications Issue 6

Approvals Status

- The Open Group September 12th 2001
- IEEE December 6th 2001
- Expected ISO/IEC Approval in 1H2002

Portability Functions



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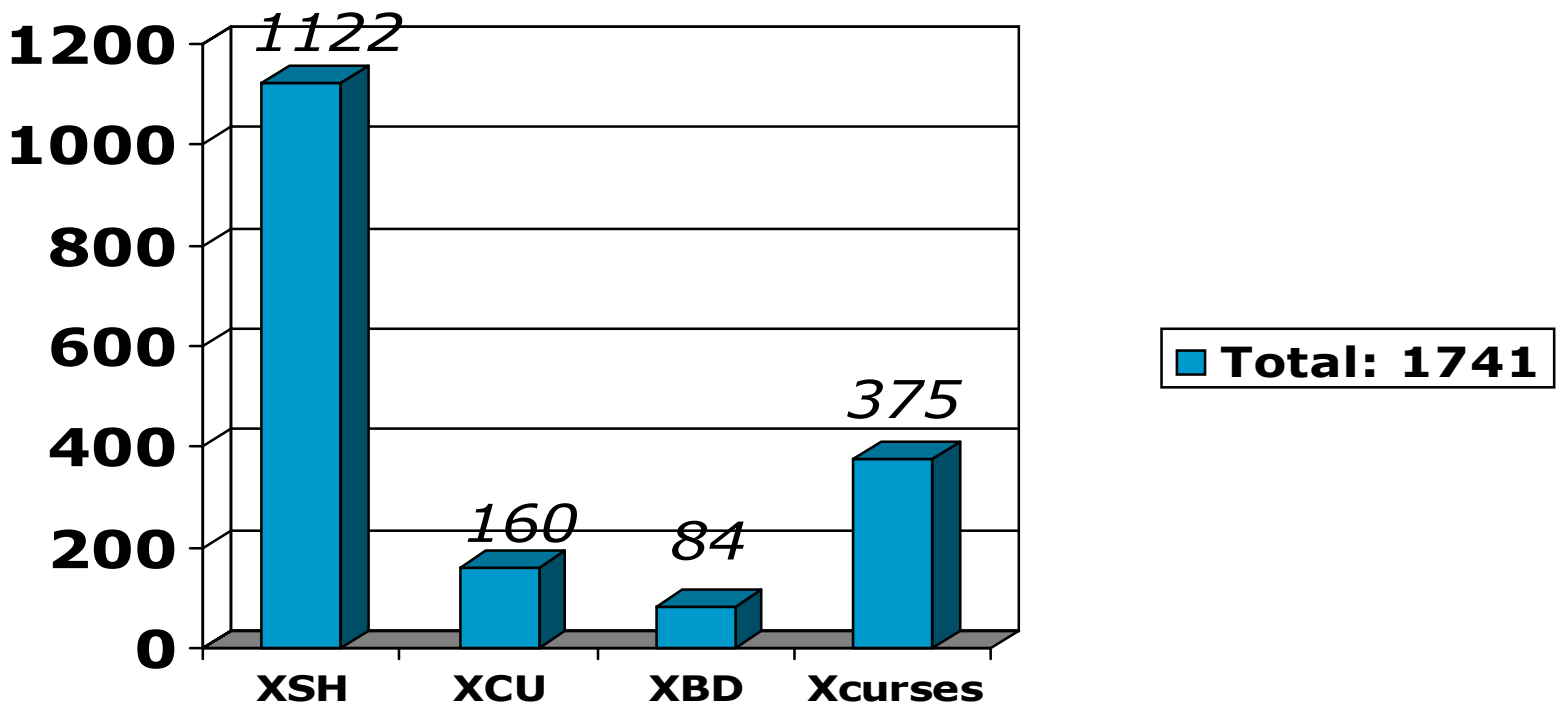
Interface Count



Formal Standards Alignment

- IEEE Std 1003.1-2001 (POSIX.1)
  - The Base Specifications Issue 6 is technically identical to POSIX.1, they are one and the same document
- ISO/IEC 9899:1999, Programming Languages – C (ISO C)

Options

- Encryption
- Realtime
- Realtime Threads
- Advanced Realtime
- Advanced Realtime Threads
- Tracing
- XSI STREAMS
- Legacy

Feature Test Macros

- _XOPEN_SOURCE=600
  - Used by applications to request the implementation make available the symbols and prototypes from the Single UNIX Spec V3
  - Subsumes the definition of the POSIX macro _POSIX_C_SOURCE=200112L

Compiling an Application

```
c99 -D_XOPEN_SOURCE=600  myapp.c \
     -o myapp -l c

c99 -D_XOPEN_SOURCE=600  myrtapp.c \
     -o myrtapp -l c -l rt

c99 -D_XOPEN_SOURCE=600 myrtthreadsapp.c \
     -o myrthreadsapp -l rt -l pthread
```

New Features

1003.1d

- Process creation via *posix_spawn()*
- *Sporadic Server Scheduling policy*
- *Execution time monitoring*
- *Time-outs for selected blocking functions*

New Features

1003.1j

- Enhanced threads functions:
  - barriers
  - spin locks
- Additional realtime functionality:
  - monotonic clock
  - synchronized clock

New Features

1003.1q

- 1003.1q , Tracing
- Provides tools to access and manage a stream of event data :
  - Traced process can record a trace event
  - Controller process can manage a trace stream
  - Analyzer process can retrieve traced events

New Features

IP v 6

- IP version 6
  - Overcomes the shortage of address space
  - Designed for better manageability
    - *Security enhancements*
      - IPSEC
    - *Quality of service*

New Features

IP v 6

- API Enhancements
  - new functions if_freenameindex(), if_indextoname(), if_nameindex() and if_nametoindex() have been added to the Sockets Interfaces.
  - New functions inet_ntop() and inet_pton() have been added to the IP Address Resolution Interfaces.

New Features

- The UNIX feature set is now available as an option within POSIX
- The new document set forms the core of the Single UNIX Specification Version 3
- Extended pthreads functions

New Features

- ISO/IEC 9899:1999 ISO C (*c99*)
  - *Language changes*
    - *New keywords: inline, restrict, _Bool, _Complex, _Imaginary, long long*
  - *Complex number and complex maths*
  - *Floating point environment support*
  - *Type generic math*
  - *Other library changes*

Key Changes

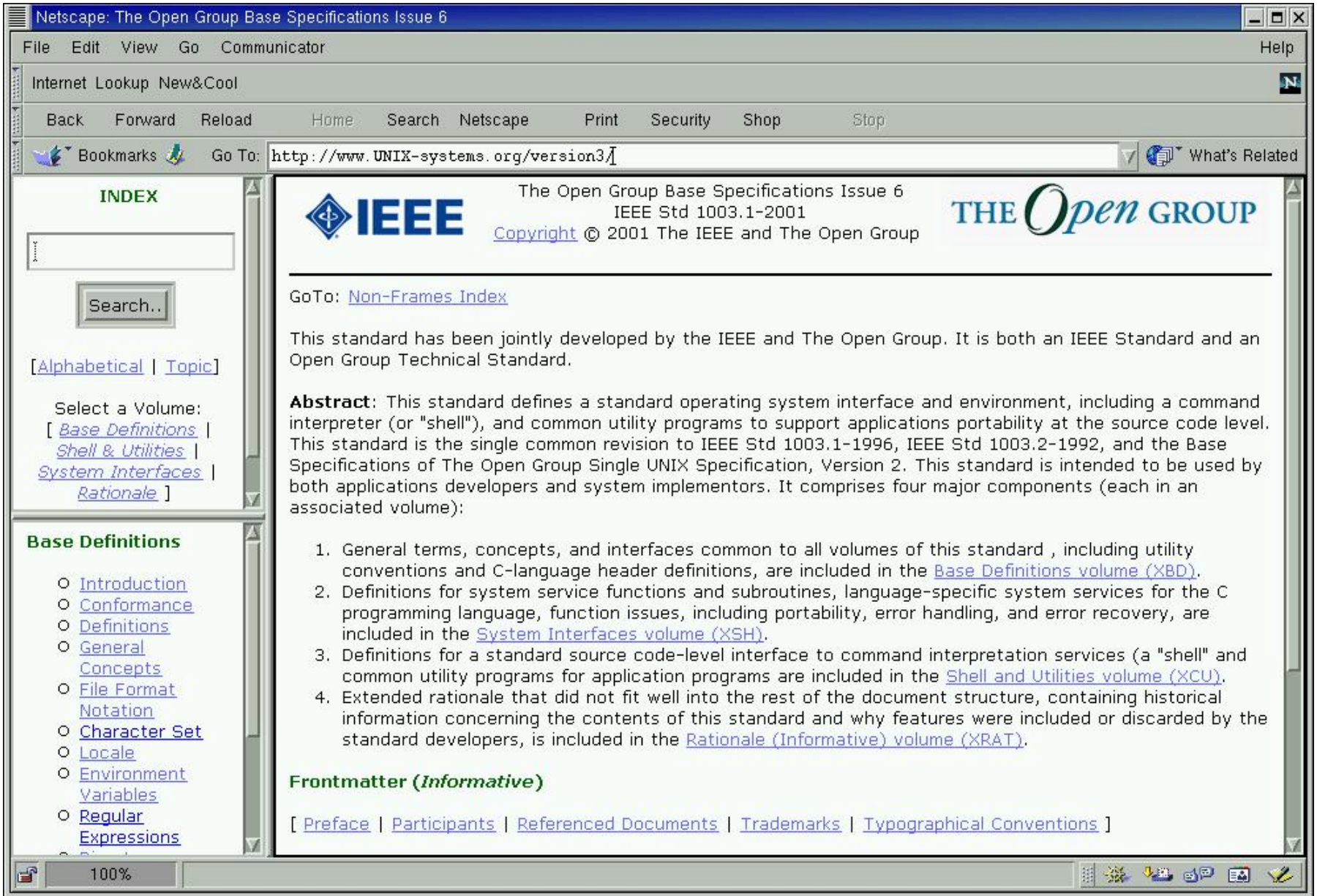
- Legacy and obsolescent features dropped
  - Much of this was to compromise between System V and BSD
- Job control and certain options in POSIX.1 mandated (FIPS 151-2 alignment)
  - ditto
- Corrigenda incorporated

Key Changes (Cont'd)

- XTI dropped
  - Is retained a separate specification but not required for POSIX or UNIX conformance
- STREAMS optional
  - An optional feature group for those systems that wish to support the functionality

Where to Obtain the Specification?

- The html version is online at
  - http://www.UNIX-systems.org/version3
- PDF either electronically or on CDROM can be ordered from
  http://www.opengroup.org/pubs/catalog/un.htm
  - The PDF is free to members of The Open Group
- Available also on CDROM with *The Authorized Guide to the Single UNIX Specification Version 3* (coming soon!)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GoTo: Non-Frames Index
This standard has been jointly developed by the IEEE and The Open Group. It is both an IEEE Standard and an Open Group Technical Standard.
Abstract: This standard defines a standard operating system interface and environment, including a command interpreter (or "shell"), and common utility programs to support applications portability at the source code level. This standard is the single common revision to IEEE Std 1003.1-1996, IEEE Std 1003.2-1992, and the Base Specifications of The Open Group Single UNIX Specification, Version 2. This standard is intended to be used by both applications developers and system implementors. It comprises four major components (each in an associated volume):
1. General terms, concepts, and interfaces common to all volumes of this standard , including utility conventions and C-language header definitions, are included in the Base Definitions volume (XBD).
2. Definitions for system service functions and subroutines, language-specific system services for the C programming language, function issues, including portability, error handling, and error recovery, are included in the System Interfaces volume (XSH).
3. Definitions for a standard source code-level interface to command interpretation services (a "shell" and common utility programs for application programs are included in the Shell and Utilities volume (XCU).
4. Extended rationale that did not fit well into the rest of the document structure, containing historical information concerning the contents of this standard and why features were included or discarded by the standard developers, is included in the Rationale (Informative) volume (XRAT).
Frontmatter (Informative)
[Preface | Participants | Referenced Documents | Trademarks | Typographical Conventions]
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