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Information technology—
Guide to the POSIX®
Open System Environment (OSE)

Sponsor

Portable Applications Standards Committee
of the
IEEE Computer Society

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Abstract: This guide presents an overview of open system concepts and their applications. Information is provided to persons evaluating systems based on the existence of, and interrelationships among, application software standards, with the objective of enabling application portability and system interoperability. A framework is presented that identifies key information system interfaces involved in application portability and system interoperability and describes the services offered across these interfaces. Standards or standards activities associated with the services are identified where they exist or are in progress. Gaps are identified where POSIX® Open System Environment services are not currently being addressed by formal standards. Finally, the concept of a profile is discussed with examples from several application domains.

Keywords: application portability, application interoperability, open system environments, profiles, POSIX®

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Introduction

(This introduction is not a normative part of IEEE Std 1003.0-1995 or of ISO/IEC TR 14252:1996.)

Purpose

This guide describes the POSIX Open System Environment (POSIX OSE). It is intended to be used by anyone interested in using standards to construct an information processing system, including consumers, systems integrators, application developers, systems providers, and procurement agencies.

The scope of this guide is much broader than a single standard. This guide identifies standards from many different areas produced by many different organizations. The POSIX OSE is intended to be broad enough to cover the entire scope of general-purpose information processing systems. While the intent of this guide is to identify completely the user services for a general-purpose information processing system, it is acknowledged that this will take some time, and this version of the guide may be incomplete in areas that are still evolving.

It is important to note that this guide is not a base standard itself; it merely identifies standards that might be used when constructing a complete information processing system.

It is not appropriate to claim conformance to this guide because it contains no mandatory requirements. This guide is intended to be used only as a source of reference material.

Although this guide is a product of the IEEE POSIX standardization efforts, its scope is much broader than those efforts. IEEE POSIX is currently developing base standards and standardized profiles focused primarily on application programming interfaces. At the end of the introduction is a cross-reference of the POSIX standardization efforts and where they fit into the POSIX OSE. For a more detailed discussion of POSIX profiling projects, see Section 7.

The process of selecting standards for a particular application domain is called profiling. Recommendations for the production of different types of profiles are included in this guide.

It may never be necessary to implement an information processing system that provides an implementation of every standard in the POSIX OSE.

In addition to listing and categorizing existing standards efforts, this guide identifies important services that standards have not yet addressed. In areas where these services are not addressed, emerging standards efforts and existing public specifications are described. These emerging standards and public specifications are not part of the POSIX OSE. They are included in this guide to identify some of the existing work that has been done in areas that are gaps in the POSIX OSE. This guide does not promote the use of these specifications that are outside the POSIX OSE. They are included for information purposes only.

User needs and standards to meet those services are continuously expanding. As such, this guide will need regular revision to incorporate new user services and

the new standards that evolve to meet those user needs.

The POSIX OSE Reference Model

To describe the POSIX OSE, this guide develops a reference model used to classify information processing standards. The reference model categorizes standards at two types of interfaces:

Application Program Interface (API) Standards

These standards govern how application software interacts with the computer system. These standards affect application portability.

External Environment Interface (EEI) Standards

These standards affect how an information processing system interacts with its external environment. These standards affect system interoperability, user interface usability, and data portability.

These standards allow users to procure portions of their information processing systems independently from multiple vendors according to the needs of each user.

The services provided at the interfaces are classified into four major categories:

— System services

— Communication services

— Information services

— Human/Computer interaction services

Within these categories, service component areas are identified.

Using the reference model, a general set of services for each component area is developed. For each of the services, existing or emerging standards are identified that address each of the services. If a service is not completely addressed by an existing or emerging standard, this gap in the standards is noted.

Goals

The POSIX OSE described in this guide should provide services to satisfy the following objectives, summarized from 3.1.

Application Portability at the Source Code Level
To allow for movement of source code and data to a variety of application platforms

System Interoperability
To allow application software and application platform interoperability

User Portability
To allow people to use a wide range of application platforms without retraining

Accommodation of Standards
To provide users and vendors with information about key interface specifications related to OSE objectives

Accommodation of New Information System Technology

To allow for migration to new technologies and a variety of marketplace solutions

Application Platform Scalability

To allow portability and software reuse across application platform types

Distributed System Scalability

To assure that related standards do not inappropriately limit the growth of distributed systems

Implementation Transparency

To allow the widest latitude in providing consistent and standard interfaces to the application, regardless of the underlying implementation technology

Functional Requirements of the User

To allow clear statement of user needs and provide context for identifying related standards

Benefits

The following items are some of the benefits derived from the use of POSIX OSE.

Integration of Components From Multiple Vendors

As the standards for system integration and system interoperability are produced and implemented, users will have the choice of mixing software and equipment from multiple vendors. This will allow users to tailor their information processing system to their particular needs by selecting hardware and software based on the needs of the application rather than the ability of the hardware and software to interoperate with the existing equipment.

Efficient Development and Implementation

Normally, systems users and providers have development and implementation activities that utilize personnel possessing skills in a specific computer environment. As a result of this specialization, a change in the target computer environment for a developer requires significant retraining expense. As standards for application portability, system interoperability, and system integration are developed, computer personnel will begin to develop skills in working with these standards.

This will allow a company to hire personnel with existing skills that can be put to use in their operation. In addition, within a company, resources can be redeployed between development efforts with a minimum of retraining.

Efficient Porting of Applications

The difficulty of moving an application from one hardware or software environment to another is widely known. The porting of an application that uses standards-based interfaces to another system that provides the same standards-based interfaces is considerably simpler than ports involving completely different systems. The amount of system tailoring

(i.e., changes to either the operating or application system required to make them work well together) is greatly reduced.

Related Standards Activities

In addition to this guide, the Portable Applications Standards Committee (PASC) has authorized other standards activities that are related to the content of this guide.

The following table summarizes the current PASC standardization efforts[1)] and how they relate to sections of this guide:

Project	Standard/Profile	Section
P1003.1, .1a	System Interfaces	4.2
P1003.1b, .1d	Realtime (formerly P1003.4)	4.2
P1003.1c	Threads (formerly P1003.4)	4.2
P1003.1e	Security API (formerly P1003.6.1)	5.2
P1003.1f	Transparent File Access (formerly P1003.8)	4.3
P1003.1g	Protocol-Independent Network API (formerly P1003.12)	4.3
P1003.2, .2b	Shell and Utilities	4.7
P1003.2c	Security Utilities (formerly P1003.6.2)	5.2
P1003.2d	Batch Queueing Extensions	4.7
P1003.5	Ada Bindings	4.1
P1003.5b	Ada Realtime Binding (formerly P1003.20)	4.1
P1003.9	Fortran Bindings	4.1
P1003.10	Supercomputing Profile	7.2
P1003.13	Realtime Profile	7.2
P1003.14	Multiprocessing Profile	7.2
P1003.18	POSIX Platform Profile	7.2
P1003.21	Realtime Distributed Systems Communications	4.3
P1003.22	Guide to POSIX OSE Security Framework	5.2
P1201.1	Uniform API for Graphical User Interfaces	4.9
P1201.2	User Interface Drivability	4.9
P1224	OSI API — Abstract Data Manipulation	4.3
P1224.1	OSI API — X.400 Electronic Mail/Messaging	4.3
P1224.2	OSI API — X.500 Directory Services (formerly P1003.17)	4.3
P1238.0	OSI API Common Support Functions	4.3
P1238.1	OSI API FTAM Test Methods and C Binding	4.3
P1327	OSI API Abstract Data Manipulation — C Binding	4.3
P1327.1	OSI API X.400 — C Binding	4.3
P1327.2	OSI API X.500 — C Binding	4.3
P1387.*n*	System Administration (formerly P1003.7.*n*)	5.3

1) 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, USA; Telephone: +1 202 371-0101; FAX: +1 202 728-9614.

Project	Standards/Profile	Section
P2003.*n*	Test Methods (formerly P1003.3.*n*)	

Most these efforts are in the areas of API standards and standardized profiles.

Extensions are approved as "amendments" or "revisions" to this document, following 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 an interest in participating in the PASC 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, USA, and ask to have this forwarded to the chairperson of the appropriate PASC working group. If you have an interest in participating in this work at the international level, contact your ISO/IEC national body.

IEEE Std 1003.0-1995 was prepared by the IEEE P1003.0 working group, sponsored by the Portable Applications Standards Committee of the IEEE Computer Society. At the time this standard was approved, the membership of the P1003.0 group was as follows:

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