

Conference Report

APPLICATION PORTABILITY PROFILE AND OPEN SYSTEM ENVIRONMENT USER'S FORUM Gaithersburg, MD May 9–10, 1995

Report prepared by

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1. Introduction

The National Institute of Standards and Technology (NIST), Systems and Software Division, sponsored a Users' Forum on the Application Portability Profile (APP) and Open System Environment (OSE) at NIST in May. This forum was the fifteenth in a continuing semi-annual series on the NIST APP and its application to OSE. The APP Users' Forums are designed to provide users and providers with the opportunity to exchange information and respond to NIST proposals regarding

the evaluation and adoption of an integrated set of standards to support the APP and OSE.

The forum offered the customary presentation of standards and activities in the APP, OSE, Institute of Electrical and Electronic Engineers (IEEE), and Joint Technical Committee 1 (JTC1-international activities). A workshop on Automated Testing Technologies was featured on the second day with extensive discussions concerning participants' case studies, current activities, plans and lessons learned. A tutorial for beginners with little or no experience with the APP and OSE was held on the morning of the first day. The tutorial presented basic OSE concepts and the reference model.

The next APP/OSE Users' Forums will be held May 7 and 8, 1996 at NIST.

The APP/OSE Users' Forum has been developed to assist federal agencies with information technology (IT) issues. Central to this assistance is publication and maintenance of a technical guidance document, the Application Portability Profile (APP), facilitating the migration to open systems. An Open System Environment encompasses the functionality needed to provide interoperability, portability, and scalability of computerized applications across networks of heterogeneous, multi-vendor hardware/software/communications platforms. The APP integrates industry, federal, national, international, and other specifications into a Federal application profile to provide the functionality necessary to accommodate a broad range of Federal information technology requirements. The Application Portability Profile (APP), The U.S. Government's Open System Environment Profile OSE/1 Version 3.0 provides recommendations on a variety of specifications that will generally fit the requirements of U.S. Government systems. A specific organization will not necessarily require all of the recommended specifications in the APP. As the U.S. Government's OSE profile, this guidance is provided to assist Federal agencies in

making informed choices regarding the selection and use of OSE specifications, and in the development of more selective application profiles based on the APP. It is directed toward managers and project leaders who have the responsibilities of acquiring, developing, and maintaining information systems supported by heterogeneous application platform environments.

2. Standards Status

Fritz Schulz, NIST, presented the following updates on the OSE standards activities of IEEE, JTC1 and the Computer Systems Laboratory (CSL) of NIST.

The IEEE Portable Application Steering Committee (PASC), which sponsors the Portable Operating System Interface (POSIX) projects has reorganized. Previously each standard activity had been individually numbered, and now activities are grouped into seven areas. These areas are system services, shells and utilities, system administration, language bindings, security, profiles, and test methods. In addition to lowering overhead and increasing efficiency, this reorganization will make it easier to progress approved standards to the international arena.

The OSE guide developed by P1003.0 has been approved and will be published very soon as a technical guide. The POSIX OSE guide describes an OSE Reference Model (OSE/RM) that is closely aligned with the APP and that provides a framework for describing open system concepts and defining a lexicon of terms that can be agreed upon generally by all interested parties. The same document is in ballot as a draft technical report (DTR) 14252 within working group (WG)15 of subcommittee (SC)22 of JTC1. The DTR is also expected to be approved very soon. The status of individual programs within the POSIX project were distributed in a handout.

Technical Report 10000-3: "Information Technology—Framework and Taxonomy of International Standardized Profiles—Part 3: Principles and Taxonomy for Open System Environment Profiles," produced by the JTC1 Special Group on Functional Standardization (SGFS) has been approved and will be published very soon. TR 10000, part 3 provides a context for functional standardization in support of Open System Environments (OSE). It outlines the basic OSE objectives and concepts, and defines an approach to the taxonomy and format for OSE Profiles specified by International Standardized Profiles. The technical report gives guidance on the nature and content of International Standardized Profiles (ISPs) documents to organizations proposing Draft OSE ISPs.

2.1 Application Portability Profile (APP) Version 3

Gary Fisher, NIST, made the presentation on the new version of the APP.

A selected suite of specifications that defines the interfaces, services, protocols, and data formats for a particular class or domain of applications is called a profile. The Application Portability Profile (APP) integrates industry, Federal, national, international, and other specifications into a Federal application profile to provide the functionality necessary to accommodate a broad range of Federal information technology requirements.

The APP is *not* a standard and is not designed to cover every case. In some instances, the selection of one specification recommended in the APP will obviate the need for other specifications that are also recommended (i.e., select one or the other, but not both.) There is some overlap in functionality covered in different specifications. There are also gaps in functionality. In areas where the APP does not meet all of a user's requirements, the user must augment the recommended specifications to ensure that proposed systems built on these specifications meet organizational requirements. The APP is designed to help users determine which specifications to use.

Not only is the U.S. Government involved in the development of profiles, but industry, national, and international organizations are preparing specifications that encompass numerous types of profiles. Corporations such as American Airlines, Boeing, DuPont, General Electric, Kodak, McDonnell Douglas, Merck, Motorola, Northrop, and Unilever are developing profiles for use within their own organizations and in many cases have based these profiles on the APP. The Institute of Electrical and Electronics Engineers, the International Organization for Standardization, and other standards-making organizations are in the process of developing profiles for specific types of application domains. U.S. Government organizations that are engaging the concepts of organizational profiles include the U.S. Army Sustaining Base Information Services, the U.S. Bureau of the Census, the Internal Revenue Service, the Defense Information Systems Agency, and many others.

Many specifications were reviewed and evaluated before the final recommended specifications were selected. If there are other specifications that should be considered in the APP and that meet a broad range of U.S. Government application requirements, users, vendors, and other interested parties should formally recommend them for evaluation using the same evalua-

tion criteria applied to the selected specifications. This is one of the ways in which the APP will continue to evolve as technology evolves.

The initial version of the APP was published by the National Institute of Standards and Technology (NIST) in April 1991 as Special Publication 500-187. Version 2 of the APP Guide, NIST Special Publication 500-210, was published in June 1993. The changes in this third revision reflect the evolutionary developments that have occurred in the standards arena. Examples of the types of changes in this version include the following:

- a) The introductory material incorporates work done by the Institute of Electrical and Electronics Engineers (IEEE) POSIX Working Group 1003.0 on the Open System Environment Reference Model (OSE/RM).
 - b) The evaluation criterion, *de facto usage*, has been removed and others have been reworded to provide more usable definitions.
 - c) A new *bindings* information item has been added to individual specifications where appropriate.
 - d) All of the recommended specifications have been updated and many new ones have been added. Areas that have seen the most change are those that encompass data interchange and communications where numerous new specifications have been added.
- Specific changes between Version 2 and Version 3 recommended specifications include the following:
- a) Operating System Services
 - IEEE 1003.2-1992 POSIX Shells and Utilities is now FIPS 189.
 - IEEE 1003.4 Realtime is now IEEE 1003.1b.
 - IEEE 1003.6 Security is now IEEE 1003.1e and IEEE 1003.2c.
 - IEEE P1387.2, .3, and .4 are new.
 - b) Human/computer Interface Services
 - Proposed FIPS 158-1 X Window System is now officially FIPS 158-1.
 - IEEE P1295 X Window Toolkit is now IEEE 1295.1.
 - c) Software Engineering Services
 - FIPS 119 Ada is now FIPS 119-1 Ada.
 - FIPS 21-3 COBOL is now FIPS 21-4 COBOL.
 - FIPS 119 Pascal has been deleted due to very limited interest in this specification.
 - ECMA PCTE has been replaced by ISEE Repository ISO/IEC 13719-1.
 - d) Data Management Services
 - FIPS 127-1 SQL is now FIPS 127-2.
 - FIPS 193 SQL Environments is new.
 - e) Data Interchange Services
 - ODA/ODIF/ODL ISO 8613 has been deleted due to lack of implementations.
 - Draft Portable Document Delivery Format (PDDF) is new.
 - SPDL ISO 10180 has been deleted and replaced by PDDF.
 - Standard Data Elements ISO 11179 Parts 3, 4, and 5 are new.
 - FIPS 194 Raster is new.
 - JPEG is new.
 - MPEG is new.
 - STEP ISO 10303 has been replaced by the planned FIPS on STEP.
 - FIPS 173 SDTS is now FIPS 173-1.
 - f) Graphics Services
 - FIPS 153 PHIGS is now FIPS 153-1.
 - g) Network Services
 - PII API P1003.12 has been renamed P1003.1g.
 - IEEE 1238.1 FTAM has been deleted. (This specification is part of FIPS 146-2.)
 - FIPS 146-1 GOSIP is now FIPS 146-2 POSIT.
 - ISDN is now FIPS 182 ISDN.
 - IEEE 1003.8 TFA has been deleted. (This specification is part of FIPS 146-2.)
 - CORBA is new.
 - FIPS 179 GNMP has been deleted and replaced with OMNIPoint.
 - FIPS 192 GILS is new.
 - NISO Z39.50 is new.
 - FIPS 46-2 DES is new.
 - FIPS 186 DSS is new.

The universe of OSE is continually evolving and the APP Guide will strive to reflect this evolution. The Computer Systems Laboratory (CSL) welcomes any recommendations for changes to the APP.

2.2 Profiles for Open System Internetworking Technology (POSIT)

Tassos Nakassis, NIST, reported that the Secretary of Commerce recently approved two revised standards: FIPS 146-2, Profiles for Open Systems Internetworking Technologies (POSIT), and FIPS 179-1, Government Network Management Profile (GNMP). Effective immediately, FIPS 146-2 removes the requirement that federal agencies specify Government Open Systems

Interconnection Profile (GOSIP) protocols when they acquire networking products and services and communications systems and services. FIPS 179-1 provides implementations for network management based on the service and protocol standards issued by the International Organization for Standardization (ISO). These revised standards promote the interoperability of computers and systems that are acquired from different manufacturers in an open systems environment.

2.3 Document Management Services

Mike Rubinfeld, NIST presented the status of three standards used in document management, Joint Photographic Experts Group (JPEG), Moving Pictures Experts Group (MPEG) and Portable Document Delivery Format (PDDF). JPEG is being developed under the auspices of ISO/IEC JTC1/SC2 Working Group 10. The current standard, IS 10918:1992, specifies the digital compression and coding of continuous-tone still images. These images can be either grayscale or color. The standard uses 24 bit compression and consists of three elements, an encoder, a decoder, and the interchange format. ISO 10918:1992 uses other standards as well. They are SGML Z39.50, MPEG, Huffman Encoding and ISO/IEC IS9660.

ISO/IEC JTC1/SC2 Working Group 11 is the sponsor of the IS 11172:MPEG-1 standard. The standard is for video compression for multimedia applications. It addresses compression of video signals up to 1.5 Mbits/s. MPEG audio compresses the audio signal at rates of 64, 128 and 192 kbits/s. MPEG is used in conjunction with mass media such as hard drives, CD-ROM and other optical storage, writable CD, DAT tape, and network servers.

MPEG utilizes two techniques, blocked-based motion compression—reduction of temporal redundancy and transform domain-based compression—reduction of spatial redundancy (DCT).

PDDF is based on a blue ribbon panel's recommendations and a set of basic requirements for a standard. Final Form Portable Document Delivery Format consists of encoded representation on electronic medium in presentation quality final form. The current situation requires the use of proprietary formats resulting in conversion nightmares that often require resorting to ASCII as a common denominator. The PDDF project goals are:

- Identify Needs within the Government
- Develop a set of Requirements
- Assess the Current Technology
- Describe a PDDF that meets the Requirements
- Develop a Conformance Test Suite Based on the PDDF
- Draft a FIPS for the Preferred PDDF

To meet these goals, government user and vendor workshops were held with NIST serving as an overall catalyst, coordinator and initiator of cooperative research and development agreements (CRADAs) with vendors. NIST will also provide documents from workshops, develop a conformance test plan and consider PDDF as a future FIPS.

PDDF provides new way to preserve documents that will alleviate costs associated with conversion and use of unnecessary software. This will make the use of electronic medium for document exchange much easier. Storage cost and paper cost savings will be significant.

The baseline set of requirements for choosing a format was developed in the Open System Environment Implementors Workshop (OIW) from contributions by vendors and the Blue Ribbon Panel. A set of 19 requirements was established to serve as a guide for selecting a PDDF. The project will also address the following recommendations from the Blue Ribbon Panel:

- Conformance Verification—Provide for software conformance to the format specification via a conformance test plan and associated test suite. Provide a registry of conformant software products.
- Organize a Users PDDF Forum comprised of government users and industry developers.

2.4 SQL Standards and FIPS 127-2

Joan Sullivan, NIST, gave the presentation on SQL and the associated FIPS. First introduced in 1986, FIPS 127 (SQL-86) addressed only basic functionality. In 1989, integrity enhancement was added resulting in FIPS 127-1 (SQL-89). 1992 saw the issuance of FIPS 127-2 (SQL-92), with a four level structure. The levels are entry, transitional, intermediate, and full. The next revision of FIPS 127-2 will be based on SQL-9x, which will consist of six major parts.

The SQL conformance testing began in 1988 with 191 tests growing to 384 by December of 1989. In April of 1990, NIST started a SQL trial testing service, and issued registered validation summary reports. The trial period ended in 1992, and testing certificates started being issued in 1993. Currently tests exist for FIPS 127-1 and two levels (entry and transitional) of FIPS 127-2. Additional levels of FIPS 127-2 will be available in 1996. The FIPS 127-1 validated product list contains 12 companies, offering 14 products. The list for FIPS 127-2 has six companies, offering 12 products. There is worldwide interest in SQL testing. The NIST test suite is licensed internationally in Australia, Belgium, Canada, China, France, Germany, Italy, Greece, Japan, Korea, Sweden, United Kingdom, and the USA.

To ensure portability of SQL programs, a simple FIPS 127-2 strategy is necessary. Users should specify FIPS 127-2 conformance in request for proposals (RFPs) and require a test certificate. On existing database products users should upgrade to validated products. Most importantly, they should educate development staff on standard SQL and enforce its use in application development.

2.5 Digital Encryption Standard (DES) and Digital Signature Standard (DSS)

Lisa Carnahan, NIST, presented the status of FIPS 46-2, DES, and FIPS 186, DSS. FIPS 46 was first issued in 1977 to protect unclassified information from unauthorized disclosure or modification. NIST reviews the standard every 5 years, and has reaffirmed it at its last review in 1993. As a result of that review, use of software implementations is now allowed in addition to hardware implementations. DES is documented and is validated in accordance with NIST SP 500-20. The validation test entails using a NIST supplied key and 64 bit input and then performing 8 million encryptions and 4 million decryptions.

FIPS 186, DSS, was issued in May of 1994. The standard contains an algorithm to use in designing and implementing public-key based signature systems. A companion FIPS 180-1 for a secure hash standard (SHS) was issued in April of 1995 for use when computing a condensed representation of a message or data file. Any change in the message will, with a high degree of probability, result in a different result. DSS conformance tests are modular, consisting of signature generation, signature verification, primality tests, global parameter generation (p,q,g), key generation (x,y), and per message parameter generation (k). All implementations must generate k (per message parameter) and sign or verify.

2.6 Standard for the Exchange of Product Model Data

A FIPS has been proposed for the Standard for the Exchange of Product Model Data (STEP) that will adopt the voluntary industry specification International Organization for Standardization (ISO) Product Data Representation and Exchange, ISO 10303:1994. STEP defines and describes all product data used during the manufacturing life-cycle of a product, the production steps needed to make and product, and the order in which they occur. Comments on this proposed standard are welcomed. The proposed FIPS is available from the CSL Office.

2.7 Standard Generalized Markup Language (SGML)

Ron Wilson, NIST reported on a task initiated by the CALS Project Office to organize an SGML Conformance Testing Service. The NIST SGML Conformance Testing Program will certify that SGML parsers meet the requirements of the Federal Information Processing Standard (FIPS) 152. The Computer Systems Laboratory of the National Institute of Standards and Technology (NIST) is responsible for establishing conformance testing programs for Federal Information Processing Standards (FIPS). In carrying out this responsibility, CSL specifies the necessary conformance test specifications, test methods (i.e., test suites, test tools, and technical procedures), validation procedures, and testing laboratories for testing product compliance to FIPS.

NISTIR 5538, SGML Parser Validation Procedures, establishes operating policy and procedures for the Computer Systems Laboratory's (CSL) validation program for Federal Information Processing Standards (FIPS) 152, Standard Generalized Markup Language (SGML) parsers. The testing methodology is based on ANSI X3.190-1992, Text and Office Systems—Conformance Testing for Standard Generalized Markup Language Systems. This document contains operating policy for a Standard Generalized Markup Language Conformance Testing Service and is not intended to explain the detailed procedures that can be found in the documentation associated with the SGML parser validation system, commonly called the SGML Test Suite.

2.8 POSIX.2 Shells and Utilities

Sheila Frankel, NIST Portable Operating System Interface (POSIX)—Part 2: Shells and Utilities provides a command language interpreter (shell) and a set of utility programs that promotes user and application portability. It is used for directory/file/data creation and manipulation, interaction with the operating system, and automation of repetitive tasks. POSIX part 2, shells and utilities is the subject of FIPS 189, and is based on ISO/IEC standard 9945-2:1993. This standard is also known as ANSI/IEEE Standard 1003.2-1993 or POSIX.2. The effective date of FIPS 189 is April 3, 1995. FIPS 189 is required for operating systems and/or applications development where POSIX shell and utility interfaces are required. FIPS 189 adopts the POSIX.2 Standard, but omits obsolescent features, or violation of the general syntactic guidelines of POSIX.2 that may be deleted from POSIX.2 at a future date. POSIX.2 requires that these features not be used by strictly conforming applications. Most obsolescent features have

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