

# U.S. Environmental Protection Agency **Target Architecture** Version 1.0

**Technical Reference Model** 



# **Strategic Direction**



**Technology and Security** 

Development

Health Protection

December 16, 2002 Final



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## TABLE OF CONTENTS

1	Introduction	1-1
	1.1 Abstract	1-2
	1.2 Purpose and Intended Use	1-2
	1.3 Scope	1-2
	1.4 Applicability	1-3
2	Concept of a Technical Reference Model	2-1
_	2.1 Background	
	2.2 Structure	
	2.2.1 Consistent and Common Description of Interoperability Requirements	2-2
	2.2.2 Consistent Specification of System Architecture	2-2
	2.2.3 Support for Commonality Across Systems	2-3
	2.2.4 Consistent Use of Standards	2-3
	2.2.5 Comprehensive Identification of Interfaces	2-3
r	Veeebulery	24
J		J-I
4	EPA Technical Reference Model	4-1
	4.1 EPA TRM Design	4-1
	4.2 EPA TRM Detail	4-2
	4.2.1 User Environment	4-2
	4.2.1.1 User Device Hardware and Interfaces	4-3
	4.2.1.2 User Device Operating and File Systems	4-3
	4.2.1.3 Office Automation	4-3
	4.2.1.4 Utilities	4-3
	4.2.1.5 Groupware	4-3
	4.2.2 Applications	4-5
	4.2.2.1 Environmental	4-5
	4.2.2.2 Business	4-5
	4.2.2.3 Scientific	4-5
	4.2.2.4 Integration	4-5
	4.2.2.5 Document Management	4-5
	4.2.2.6 Workflow	4-6
	4.2.2.7 Collaboration	4-6
	4.2.2.8 Geospatial	4-6
	4.2.2.9 Analysis	4-6
	4.2.2.10 Modeling	4-6
	4.2.2.11 Statistics	4-6
	4.2.2.12 Lab Science	4-7
	4.2.2.13 Data Collection	4-7

4.2.3 Hosting
4.2.3.1 Enterprise Server (Mainframe)
4.2.3.2 High Performance Computing
4.2.3.3 Central Unix & Windows Servers
4.2.3.4 Distributed Unix. Netware and Windows Servers
4.2.3.5 Storage Systems and Arrays
4.2.3.6 Backup and Recovery
4.2.3.7 Disaster Recovery
4.2.4 Communications
4.2.4.1 Data, Audio and Video Transfer
4.2.4.2 Protocols
4.2.4.3 Physical Plant
4.2.4.4 External Facilities
4.2.4.5 Remote Sensing
4.2.5 Data
4.2.5.1 Databases for Data and Metadata
4.2.5.2 Data Integration
4.2.5.3 Data Migration
4.2.5.4 Data Interchange
4.2.5.5 Data Quality
4.2.5.6 Data Marts
4.2.6 Technology Management
4.2.6.1 Systems Management
4.2.6.2 Developer Support Management
4.2.6.3 User Support Management
4.2.6.4 Data Management
4.2.6.5 Content Management
4.2.7 Security Service
4.2.7.1 Identity Management
4.2.7.2 Perimeterization
4.2.7.3 Data Confidentiality and Integrity Assurance
4.2.7.4 Data Availability Assurance
4.2.7.5 Surveillance
4.2.7.6 Audit and Forensics
Appendix A: References
Appendix B: Glossary of Terms
Appendix C: Standards Profile
List of Figures
Figure 4-1, USEPA Technical Reference Model
Figure 4-2. USEPA Detailed Technical Reference Model

## **1** INTRODUCTION

The Clinger-Cohen Act (EA) 1996 assigns the Chief Information Officer (CIO) the responsibility to develop an Enterprise Architecture with an information technology (IT) architecture to manage information resources. The Office of Management and Budget (OMB) M-97-02, *Funding Information Systems Investments*, October 1996, requires that Agency investments in major information systems be consistent with the information technology architecture.<sup>1</sup> The objective of a Technical Reference Model (TRM) is to *define* the building blocks for developing the information technology architecture.<sup>2</sup>

The United States Environmental Protection Agency (EPA) has embarked on a major EA program that will realign the Agency's information technology resources with the Agency's mission, goals, and business processes. One component of the EA program is the development of an Enterprise Technology Architecture (ETA) that serves as the blueprint for how information technology works together to support the Agency's mission. The ETA provides explicit descriptions of the current and desired state of the information technology as a resource to facilitate and enhance the business processes and management of the Agency.

The EPA's Enterprise Technology Architecture contains four elements:

- Technical Reference Model
- Baseline Enterprise Technology Architecture
- Target Enterprise Technology Architecture
- Standards Profile

This paper is concerned primarily with documenting the first and last of these elements: the Technical Reference Model (TRM) and the Standards Profile (see Appendix C). This is done first generically to explain the concept of the TRM (Section 2) and then specifically to describe the building blocks of EPA's information technology (Sections 3 and 4). The Appendices also provide References (Appendix A) and a Technology Glossary (Appendix B).

The remainder of this section explains further the purpose, intended use and scope of the TRM.

<sup>&</sup>lt;sup>1</sup> Preface, Federal Enterprise Architecture Framework, V1.1, CIO Council, September 1999.

<sup>&</sup>lt;sup>2</sup> Department of Commerce Technical Reference Model and Standards Profile Framework, pg 1, February 6, 2001.

## **1.1 Abstract**

The OMB Memorandum of June 1997, concerning IT architectures, calls for all federal agencies to develop a TRM and a Standards Profile:

"The Technical Reference Model identifies and describes the information services used throughout the agency ... The standards profile defines a set of IT standards that supports the services articulated in the Technical Reference Model; they are the cornerstone of interoperability ... Together with the Technical Reference Model, the Standards Profile enables the development and acquisition of standardized systems to cost effectively meet the business needs of the agency."

The Environmental Protection Agency's TRM establishes a framework for the EPA's Enterprise Technology Architecture. This document describes EPA's TRM. The EPA TRM consists of three major component areas that cover seven major services with associated minor services into which all the Agency's IT standards may be categorized.

The three major component areas are: 1) User Environment, 2) Applications and 3) Common Infrastructure. The seven major services are: 1) User Environment, 2) Applications, 3) Hosting, 4) Communications, 5) Data, 6) Technology Management and 7) Security.

## **1.2 Purpose and Intended Use**

The purpose of the EPA TRM described in this document is to provide a common conceptual framework for describing the Agency's information technology, to define a common vocabulary for the Enterprise Technology Architecture, to provide a set of IT service definitions and to show the relationship between the services and their respective technology components.

The EPA TRM provides guidance to enterprise architects, technology managers, developers, and individuals that plan, acquire, develop, and use information systems. The TRM promotes open system design by identifying the relationship between IT components and services. The TRM establishes a common technology vocabulary and identifies a set of services and interfaces common to EPA systems. The TRM provides the foundation for the organization and structure of the technology architecture. The reference model and technology architecture support the IT infrastructure and become blueprints for the development of future systems.

## 1.3 Scope

The EPA TRM is to be considered as the foundation model describing services, interfaces, and their interrelationships that can be applied to all systems, including multi-platform, networked, and distributed applications. All EPA organizations are encouraged to apply the model to support interoperability, portability, open systems and standards.

## 1.4 Applicability

The EPA TRM can be applied to all EPA information systems and information technology applications at all EPA organization levels and environments. The EPA TRM guides the selection of interfaces and services in support of a technology architecture. The model provides a basis for addressing interoperability issues relative to service and interface definitions.

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A Technical Reference Model is a framework that:

- Defines the building blocks for developing an Enterprise Technology Architecture;
- Provides a common conceptual view of information technology;
- Establishes a common vocabulary to better describe, compare, and contrast systems and components;
- Provides a consistent set of service areas, definitions, interfaces, and relationships used to address interoperability and open system issues; and
- Serves as a basis (or aid) for the identification, comparison, and selection of existing and emerging standards and their parent services.

In a more colloquial and generic sense, a TRM is the way in which one views an organization's information technology architecture.

The following subsections describe the concepts behind a TRM and are based on DOD's TRM.<sup>3</sup>

## 2.1 Background

When two or more systems or components are required to interoperate or exchange information, a set of common and consistent service and interface definitions is needed to ensure the integrity of the information to be passed or exchanged. The set of definitions, integrated into a framework or abstract, is known as a reference model. The IT community now recognizes the need for a reference model. Rapid changes in technology and the need to provide extensive user coordination and effect joint operations have further underscored the need for such a set of definitions associated around a model. The need for a foundation model that provides greater definition and clarity of services and interfaces is essential for an open-systems approach conducive to achieving interoperability.

The intent of the TRM is to support standards and interoperability across organizational domains, in joint development, and across a wide range of applications.

3

Technical Reference Model

Department of Defense Technical Reference Model, Ver 2.0, Section 2, April 9, 2001, Web site at: http:// www-trm.itsi.disa.mil

## 2.2 Structure

Diverse and demanding IT requirements often result in the need for a structured TRM. Proper attention to, and application of, a TRM will assist organizations in achieving more effective levels of portability and interoperability in the following ways:

- Consistent and common description of interoperability requirements;
- Consistent specification of system architecture;
- Support for commonality across systems;
- Consistent use of standard; and
- Comprehensive identification of interfaces.

Any such model must also be evolutionary and flexible enough to support current as well as future needs across a broad range of requirements and platform configurations. The model must be tailored to enable users to extract only those elements required to support their domain needs and to leverage technology. The set of services and interfaces must also be robust enough and malleable enough to enable system architects and developers to develop their domain-specific views. The higher-level abstraction of a TRM is intended to fill that role.

#### 2.2.1 Consistent and Common Description of Interoperability Requirements

Information exchange and interoperability requirements between systems can be described in terms of the model's vocabulary and the particular layer of the model affected by the requirement. The use of the TRM may influence the description of requirements in such a way that standards may emerge for describing interoperability requirements.

Using the TRM, systems can be defined in terms of consistent definitions and common functionality (i.e., via the services and interfaces). The functionality is needed to provide interoperability, portability, and scalability of computerized applications across networks of heterogeneous hardware/software platforms. The model may even be used to develop guides for describing interoperability requirements.

#### 2.2.2 Consistent Specification of System Architecture

The TRM facilitates developing system architectures that specify the characteristics of key system interface requirements and ensures that these requirements and the system and technical "responses" are clearly related to each other across all views of a technology architecture. The application layer, for example, should be defined primarily in support of application interoperability and portability. The data layer should define the standardization and registration of individual data element types to meet the requirements for data sharing and interoperability among information systems throughout the enterprise.

#### 2.2.3 Support for Commonality Across Systems

The TRM facilitates the development of a common infrastructure to support interoperability and portability of applications. The TRM guides the implementation of a communications and computing infrastructure based on standards and common interoperability and including, but not limited to, operating systems, database management, data interchange, network services, network management, and user interfaces. The basis for a common infrastructure is to identify core capabilities that are applicable across multiple services. This, in the near term, enables the migration from static applications to a more open environment enabling data and data format transparency across different platforms.

#### 2.2.4 Consistent Use of Standards

Use of the TRM facilitates the profiling and grouping of technology so that standards can be set for use and acquisition. A Standards Profile defines a set of technologies and products that support the services and interoperability in the TRM.

The Standards Profile establishes the minimum criteria needed to specify technology that achieves standardization across the enterprise. It also identifies a limited number of mandatory standards while providing a published set of recommendations for others.<sup>4</sup>

#### 2.2.5 Comprehensive Identification of Interfaces

The TRM, via its combination of service and interface views, facilitates the identification and definition of interface services and specifications. This is needed to support the development of complex and enterprise-wide systems.

4

EPA's Standards Profile is provided on the IT Roadmap Web site (http://basin.rtpnc.epa.gov/etsd/ITARoadMap.nsf) and is included as an appendix to EPA's TRM (see Appendix C).

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## **3** VOCABULARY

One of the goals of this document is to establish a common vocabulary to better describe, discuss, compare, and contrast information technology components at EPA. This vocabulary is specific to EPA, but by no means exclusive to the Agency as other agencies may use a similar vocabulary. This section introduces the principal common technology vocabulary that is used to describe the technology services in Section 4.

#### Enterprise Technology Architecture (ETA)

A comprehensive blueprint of an organization's information technology that includes four components: 1) TRM, 2) Standards Profile, 3) Baseline Architecture, 4) Target Architecture. The ETA provides explicit descriptions of the current and desired state of the information technology resource of an organization.

#### Technical Reference Model (TRM)

A common conceptual framework that defines a common vocabulary and a set of service definitions and relationships, in order to define the building blocks of the Enterprise Technology Architecture of an organization, in this case, the EPA. The use of a TRM allows an organization to better control and coordinate development, acquisition, interoperability, and support of its IT systems.

#### IT Service

The TRM describes the main elements of a complete IT system as a set of IT services. An IT service is a higher level abstraction that consists of a collection of components organized to accomplish a specific function or set of functions. Services support requirements via their functions and capabilities. The services discussed in this document represent an extensive set of IT services necessary for EPA to conduct business.

#### **User Environment Service**

The sum of all hardware and software components required to provide access to EPA information for all levels and types of users. The User Environment Service defines how users interact with applications. The User Environment is categorized into five minor services outlined in Section 4.2.1.

#### Applications Service

Describes a comprehensive enterprise-wide domain of software systems that provide specific functions for the end-user and for system interoperability. The Applications Service does not include COTS software relegated to the User Environment Service. The Applications Service is categorized into 13 minor services outlined in Section 4.2.2.

#### Common Infrastructure

A Common Infrastructure provides the necessary common services that are used across an enterprise and that support the operation of the Applications and User Services. The common infrastructure is managed centrally or coordinated in a distributed fashion. It is the basic infrastructure of technology systems and their connections, management, and security. The EPA's Common Infrastructure is further divided into five services which are: Hosting, Communications, Data, Technology Management, and Security. These services are discussed in further detail in Section 4.2.3, Section 4.2.4, Section 4.2.5, Section 4.2.6 and Section 4.2.7, respectively.

#### Hosting Service

Provides a comprehensive processing environment-the computing platforms, storage systems and maintenance systems needed to enable the Applications Services of the EPA. The Hosting Service can be centrally located or distributed geographically, but centrally coordinated. The maintenance systems are needed to maintain the processing environment such as backup storage and uninterruptible power supplies. This TRM divides the Hosting Service into seven minor services outlined in Section 4.2.3.

#### Communications Service

Supports the transfer, translation and transport of data across the distributed enterprise so that all the services can interoperate and connect to the User Environment. This service includes handling different data formats and protocols, routing of data, and maintenance of the networks that connect the enterprise. The Communications Service is categorized into five minor services outlined in Section 4.2.4.

#### Data Service

The handling and storage of data that can be defined independently of the processes that create or use it. This service provides the "Store for Use" function or the "activities necessary to ensure (that) data are readily available and ready for analysis."<sup>5</sup> This service includes maintaining a set of coordinated databases, providing for data integration, interchange, and migration, and making data available to the Applications Service and the User Environment Service. The Data Service is categorized into six minor services outlined in Section 4.2.5.

#### Technology Management Service

Provides the comprehensive administration, control and management of information systems and resources, information content and services. Technology Management Services interact with and help to facilitate the smooth functioning of all the other TRM services and layers. Since this service involves so many other service areas of technology, it is sometimes difficult to isolate from other areas. For instance, this service does

Technical Reference Model

<sup>5</sup> 

*Model for Information Integration*, EPA Information Integration Program, Draft, February 19, 2002, pages vi and 37-50.

not include the routine maintenance of application systems but does include the enhancement of systems technology to meet certain usage and performance goals. The Technology Management Service is categorized into five minor services outlined in Section 4.2.6.

#### Security Service

Security Services refer to the set of mandates enforced by an organization to ensure appropriate levels of integrity, confidentiality and availability of information processing systems and mission critical information. Information Security Services are necessary to protect the IT infrastructure from hostile and accidental attacks and to protect sensitive information contained within an information system. Security Services are concerned with qualifying access to the enterprise information technology and detecting unauthorized intrusions. The Security Service cuts across all layers and services of the TRM although security controls are currently most prevalent in the User Environment and Communications Services. The Security Service is categorized into six minor services outlined in Section 4.2.7.

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## 4 EPA TECHNICAL REFERENCE MODEL

The Environmental Protection Agency (EPA) Technical Reference Model (TRM) describes the association of information technology (IT) services within three major areas that comprise the EPA's Enterprise Technology Architecture (ETA). The TRM also diagrams the relationship between the three major areas and the major services. The usefulness of this model is to compartmentalize the wide array of information technology into manageable components and to guide the development of the target ETA. The diverse groups at EPA applying information technology to their business needs can now reference a common model of their information technology and a common vocabulary, thus improving the representation of these groups in the target technology. This model also provides a springboard for coordinating the research of information technology.

## 4.1 EPA TRM Design

The EPA TRM defines three major areas that collectively describe the EPA Enterprise Technology Architecture. These three major areas are the User Environment, the Applications, and the Common Infrastructure. Figure 4.1 below illustrates these three areas and their interfaces. The User Environment and Applications provide end user services and application services. The Common Infrastructure area is further divided into five major services which are: 1) Hosting, 2) Communications, 3) Data, 4) Technology Management, and 5) Security. Figure 4.1 below illustrates the seven major services and their interfaces.

The TRM diagram layers the services in a meaningful fashion. Each distinct layer is separated by a dark line. The top layer consists of End-User Services and its position serves to emphasize that the other layers exist to support the end-user. The second layer is Application Services which provides the end-user with the EPA's mix of environmental and business application services. The third layer is the Common Infrastructure (divided with white lines) which makes possible the operation and communication of the Application Services with the end user and with the Agency's data stores. See Figure 4.1 below to review the interfaces of the various services.

The TRM diagram has been designed to emphasize the role of Technology Management and Security in relation to the other services, even though they are part of the Common Infrastructure. The reader should note that Technology Management surrounds the other services since it is necessary to all these services given the complexity of today's information technology. Security has been designed to surround Technology Management since secure technology is currently the overriding factor for technology implementation and is a requirement in all the other services.

Each of these major services and their associated minor services are discussed in detail in the following sections.



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Figure 4-1. USEPA Technical Reference Model

## 4.2 EPA TRM Detail

The initial delineation of the seven major service areas, identified in Figure 4-1, provides a framework that enables a basic viewpoint and understanding of EPA technology architecture.

The EPA TRM high-level or major service areas are each associated with lower-level services (i.e., minor services). Some of these minor services are also associated with a finer level of detail (e.g., Systems Management). The purpose of this section is to define these minor services so that readers and users of the TRM have a good understanding of the services and will contribute to the validation of the definition and/or the modification of the definition to accurately reflect the particular use of technology at EPA. As new technologies are implemented, the reader may also discover that an area of technology is missing a service designation and that a service category needs to be created. The TRM is a living document that will be modified to reflect the needs of EPA and the rapid changes occurring in information technology.

Figure 4-2 below provides a detailed view of the TRM with the major and minor services. The seven major service areas and their minor services are considered in the following sections.



USEPA - ©2002

Figure 4-2. USEPA Detailed Technical Reference Model

### 4.2.1 User Environment

In the EPA TRM, User Environment is defined as the sum of all hardware and software components required to provide access to EPA information for all levels and types of users. EPA's User Environment is categorized into five minor services which are fully described below.

#### 4.2.1.1 User Device: Hardware and Interfaces

User Device Hardware and Interfaces are the technology components that provide the end-user with the physical devices necessary to connect, communicate and process information. The device hardware includes digital information processors such as the Personal Computer (PC), scientific Workstation, Mobile Computer, Personal Digital Assistant (PDA) and Mobile Phone. Interfaces include the hardware for connecting to a

network such as the Network Interface Card (NIC) and the hardware the user needs to communicate with the computer such as the optical mouse or the speech recognition processor and microphone. Other interfaces include scanning devices, pen tablets, keyboards, and display screens.

#### 4.2.1.2 User Device: Operating and File Systems

User device operating and file systems provide the services needed to operate and make the user device hardware intelligent and capable of storing and retrieving information. Operating systems include the many versions of Microsoft Windows, Unix, and Linux that are available for user devices.<sup>6</sup> Operating systems provide an interface between the application software and the hardware platform. Operating System Services can include the following: kernel operations, real-time extensions, clock/calender services, fault management, access management, shells, utilities, application program interfaces (APIs) and File System Services. Most File System Services are embedded in the operating systems but some are not. New types of File System Services are provided by storage Web sites, by optical devices, and by Universal Serial Bus (USB) flash drives which store files on removable microchip file systems.

#### 4.2.1.3 Office Automation

Office automation software for common office functions, such as word processing, is used in day-to-day operations at EPA. This software can include: Spreadsheet, Project Management, Calculation, Presentation and Word Processing Services.

#### 4.2.1.4 Utilities

This category includes software that makes the end-user's processing environment more efficient and productive. Examples of such tools include utilities for unused file clean-up, disc defragmentation, file transfer, file compression, system monitoring and searching.

#### 4.2.1.5 Groupware

The services provided under Groupware include those that allow end-users to collaborate with peers inside and outside EPA. Groupware includes software for Email, Calendaring, Conferencing, and Instant Messaging Services. Groupware's most prevalent service is the World Wide Web (WWW) browser which provides a graphical interface to information and services available from all over the world.

#### 4.2.2 Applications

EPA's Applications Service is categorized into 13 minor services which are fully described below.

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Unix and Linux Operating Systems are only supported in limited setting and primarily for statistical, visualization and/or GIS applications.

#### 4.2.2.1 Environmental

Environmental applications provide the Agency with a service to assist its mission to protect the environment. These applications measure, process, analyze and store for use the data that determine whether mandates are being met and the quality of the environment is changing. Examples of these applications include: SDWIS (Safe Drinking Water Information System), RCRIS (Resource Conservation and Recovery System), CLP (Contract Laboratory Program) and PCS (Permits Compliance System).

#### 4.2.2.2 Business

Business Application Services are primarily composed of Administrative applications that provide the Agency with the software services to conduct the internal financial, personnel, and organizational functions required for the success of any large organization. Business Application Services may also include applications that provide necessary business functions such as measuring the effectiveness of project funding against project output. Examples of EPA Administrative applications in this category include: EPAYS (EPA Payroll System), ICMS (Integrated Contract Management System) and IFMS (Integrated Financial Management System).

#### 4.2.2.3 Scientific

This service is a larger category for the myriad group of applications that help EPA to do its science work, such as collecting, validating, analyzing, condensing, and displaying data and developing forecasts. Many of the science applications fall into other minor service categories that follow.

#### 4.2.2.4 Integration

Integration Services provide for the applications that make possible Enterprise Application Integration (EAI). Specifically, this includes middleware products that interface transaction processing between differing applications and platforms (e.g., IBM MQSeries, however, EPA does not use MQSeries) or Web Services that provide application integration (e.g., WebSphere, SeeBeyond, which EPA plans to use) through the use of the standard Web browser interface.

#### 4.2.2.5 Document Management

Document Management Services provide a procedure for archival of EPA information. The EPA archives annually an average of 11,442 cubic feet of paper which is roughly equivalent to 1.583 Terabytes of text data.<sup>7</sup> Different service offerings have been considered for this technology service such as providing a user with the ability to designate Email for automatic archival.

Technical Reference Model

<sup>7</sup> 

*Records Management Storage Architecture Methodology Report*, USEPA-NTSD, September 1999.

#### 4.2.2.6 Workflow

Workflow Services provide a means for routing documents and files automatically to the person or organization responsible for the next step in processing. Examples of this service include time sheet processing and E-forms.

#### 4.2.2.7 Collaboration

Collaboration Services provide support for the online and often real-time capture and processing of information exchange between members of a user group working together on a project but physically not together. Examples of applications for this service would include Sametime, a COTS package from Lotus/IBM. This service would include central hosting support as well for Email and Calendaring as well as for future desktop video-conferencing.

#### 4.2.2.8 Geospatial

Geospatial Services provide applications that process data spatially so that environmental information has a "space and a place." This service includes applications such as: OMS (Ozone Mapping System), MAIA (Mid-Atlantic Integrated Assessment) and EnviroMapper.

#### 4.2.2.9 Analysis

Analysis applications provide environmental researchers with tools to qualify raw data that has been collected and to condense or combine data as required by the project. Analysis software helps to detect and remove "outliers," i.e., raw data that is outside of the valid range of environmental norms, and to reduce raw data into averages that are usable by researchers.

#### 4.2.2.10 Modeling

Modeling applications provide environmental researchers with tools to develop digital representations of reality based on data so that scenarios can be evaluated virtually and conclusions or predictions can be made. Modeling applications provide techniques to predict future behavior of environmental systems and anticipate the consequences of change. Once a model is formulated to represent real environmental conditions, predictions are made and then the model is validated or improved as additional measured data becomes available. Many of EPA's modeling applications run on the High Performance Computing platform, Unix workstations and Linux clusters.

#### 4.2.2.11 Statistics

Statistics Services provide applications (both COTS and custom-developed) that compute numerical profiles or descriptors of sets of numbers according to the theories of mathematical analysis and probability. In environmental science, a statistical descriptor could be the mean concentration of a pollutant or the standard deviation of hydrocarbons in samples of air. This service provides EPA users with applications such as PC and Linux SAS and SAS on the Enterprise Computing platform.

#### 4.2.2.12 Lab Science

Lab Science Application Services are those which support the operation of laboratory work to research environmental questions such as toxicity of chemicals. These services support animal experiments, equipment calibration, chemical identification, etc.

#### 4.2.2.13 Data Collection

Data Collection Services involve computing applications developed or purchased to acquire measured data from instruments, either on-site or remotely, or to receive data from other data submitted. The EPA measures environmental variables in a number of ways using sophisticated instruments that feed data into data loggers and real-time computers. Fairly sophisticated data collection applications are used to interface with instruments. Data Collection Services may also provide applications to interface with other data generators outside of EPA, such as city/county monitoring stations operated by State environmental offices. These applications act as middleware to obtain data that has been collected and stored in non-EPA systems.

#### 4.2.3 Hosting

In the EPA TRM, Hosting is the service that provides the platforms and systems to run the Applications of the Agency and to store and maintain the information processed through these systems. The EPA Hosting Service is categorized by the TRM into seven minor services which are described in the following subsections.

#### 4.2.3.1 Enterprise Server (Mainframe)

The Enterprise Server platform provides for running EPA's enterprise-wide applications (see Environmental and Administrative above). This service also provides for hosting "individual" applications that process data for a particular environmental project. "Customers of this service receive use of an IBM Enterprise Server that supports large-scale data processing and provides information vital to accomplishing the Agency's mission. The Enterprise Server provides resources to over 9,000 registered users. An operations staff continually supports the Enterprise Server to ensure that it is operational at least 99% of its scheduled hours of operation."<sup>8</sup> The Enterprise Server operates 24 hours a day, 7 days a week. This service supports the ADABAS database system and the DB2 relational database system, SAS, a complete set of third party software, and data backup and restoration.

#### 4.2.3.2 High Performance Computing

The High Performance Computing (HPC) Platform Service supports high-performance computing, scientific visualization, and computation sciences service on state-of-the-art high performance computers (vector and parallel). "High performance computing combines very powerful computer processors, massive amounts of data, high speed networks, and mathematical models to simulate global and regional environmental

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WCF Services: http://cfint1.rtpnc.epa.gov/ntsdWeb/currentfyservices/qa/qa.cfm

conditions. Researchers and policy analysts create scientific visualizations from data generated by computer simulations, data collected from monitored data, or text-based data and information. The visualizations are generated from commercial off-the-shelf software or from customized software developed by EPA's Scientific Visualization Center. The scientific visualizations can be displayed on desktops, servers, or through Web-based applications."<sup>9</sup>

#### 4.2.3.3 Central Unix & Windows Servers

The Central Unix & Windows Servers Service (also referred to as Central Client Server Systems) provides platform support for EPA's Oracle databases and other Unix-based components supporting EPA's Public Access, Intranet, and Extranet applications.<sup>10</sup> This service also includes support for Windows platform servers supporting Web application components such as Domino, ColdFusion, and ArcInfo GIS Mapping applications. This service includes hardware, software, and operations and technical support staff tasked to operate EPA's centrally managed Unix/NT systems 24 hours a day, 7 days a week. This service hosts EPA's Public Access Web site and EPA's Intranet Web sites, and provides development and staging systems for Web site developers. Many of EPA's most visible applications are run using this service.

#### 4.2.3.4 Distributed Unix, Netware and Windows Servers

Distributed Computing Services provide specialized support for computing platforms that are physically or logically dispersed geographically among computer systems on a wide area network These servers are typically used to support local area networks which connect groups of users that are geographically close. These servers provide localized application hosting, data storage, file & print services, security monitoring and support for technology management software. Distributed systems support services includes support via Unix, Linux, Novell, Windows 2000 Server, and Windows NT Server operating systems and provide standard configuration documentation that systems must comply with before they can attach to the Wide Area Network and communicate within the Agency. Specialists provide help desk support for Unix, Linux, Novell, Windows NT Server.<sup>11</sup>

#### 4.2.3.5 Storage Systems and Arrays

This service includes the support for centrally storing and managing data for transparent retrieval, highavailability, and long-term retention. Each platform service at EPA has its own particular storage architecture that includes magnetic disc storage, disc arrays, magnetic tape, and magnetic tape juke boxes (tape silos). Though some sharing of resources does occur between platforms at EPA, the Enterprise Computing, HPC, Central Unix and Windows, and Distributed Unix and Windows platforms all currently provide and manage their own systems for this service which includes managing storage allocation per user accounts. File servers

<sup>&</sup>lt;sup>9</sup> WCF Services: http://cfint1.rtpnc.epa.gov/ntsdWeb/currentfyservices/sc/sc.cfm

<sup>&</sup>lt;sup>10</sup> WCF Services: http://cfint1.rtpnc.epa.gov/ntsdWeb/currentfyservices/uc/uc.cfm

<sup>&</sup>lt;sup>11</sup> WCF Services: http://cfint1.rtpnc.epa.gov/ntsdWeb/currentfyservices/u9/u9.cfm

(Netware, NT and Lotus Notes) that are geographically dispersed each have their own storage subsystems to support their user base.

#### 4.2.3.6 Backup and Recovery

This service provides for maintaining a redundant copy of the storage system data available on the various hosting platforms and restoring the data should an on-line storage system fail. This service also provides recovery of data that was erased through human or system error. Currently, each hosting platform operates its own separate Backup and Recovery Service to provide for data security.

#### 4.2.3.7 Disaster Recovery

This service provides restoration of data and computing platforms in the event that a disaster disables one or more critical systems. Disaster Recovery Services include provisions for offsite storage of data and availability of offsite computing capacity. This service is invoked only under certain extreme situations where the normal hosting services are interrupted for an extended period of time.

#### 4.2.4 Communications

The EPA Communications Service is categorized into five minor services which are fully described below.

#### 4.2.4.1 Data, Audio and Video Transfer

This service involves providing the bandwidth that is appropriate for transferring character data, audio data (streaming audio, Voice over IP), and video data (streaming video, desktop teleconferencing, etc.) in a timesensitive manner. This service includes measuring communication loads, load balancing, and forecasting upgrades to the physical plant.

#### 4.2.4.2 Protocols

This part of the Communications Service involves the support of protocols for the transport of data, the most important being the Internet Protocol (IP). Included are local area network protocols such as IPX/SPX, IP, TCP(Transmission Control Protocol)/IP, NetBUI, HTTP(Hypertext Transfer Protocol), FTP(File Transfer Protocol), and other protocols covered under IP security (IPSEC) such as VPN (Virtual Private Network). This service ensures that data is encoded before transmission such that it can be compatible across the Agency infrastructure and the outside world.

#### 4.2.4.3 Physical Plant

The Physical Plant Service includes the communication infrastructure components that the Agency provides to make the wide area, metropolitan area, and local area networks interconnect in a reliable and secure fashion. To provide this service, the physical plant includes fiber optic and copper cabling, ethernet coaxial cable segments, twisted pair copper wiring, network switches, network bridges, and network gateways. These services support the transport of data, in whatever format, using the Internet Protocol.

#### 4.2.4.4 External Facilities

The EPA provides a large part of wide area network connectivity through leased T1, T3, and PSN/ISDN lines. These facilities are not owned or maintained by EPA but are leased as a managed service from external providers. The quality of the service is supervised by EPA and the service these external facilities provide is critical to the operation of EPA's infrastructure. External facilities for communication include EPA's connections to the Agency Internet Service Providers (ISP) and metropolitan and wide area line connections between Agency communication hubs.

#### 4.2.4.5 Remote Sensing

This service provides the communications link to remote sensing devices or measuring instruments located in remote geographic areas or separated from the personnel responsible for their functioning. The communications link may be through dial-up or leased telephone lines, wireless, or through custom cable installation.

### 4.2.5 Data

The EPA Data Service is categorized into six minor services which are fully described below.

#### 4.2.5.1 Databases for Data and Metadata

Database Services provide the capability to store, retrieve, organize, and manipulate data in a database management system (DBMS). These services provide a consistent programming interface to the developer while segmenting access to data from a variety of sources. Query-processing Services provide for interactive selection, extraction, and formatting of stored information from files and databases. The platform that runs a DBMS is relegated in the TRM to the Hosting Service, and the operation of the DBMS including its maintenance, upgrades, partitioning, user accounts, and documentation is relegated to the Data Management Service under Technology Management.

Databases provide structured storage for both the Agency's data and metadata. The Agency's data includes large stores of information on the ecological environment, chemicals, experiments, monitoring, etc. and also include collections for releasing data to the public. The Agency's metadata is inventory of its data, i.e., it provides information about the data collections the Agency is accumulating. Metadata is also one of the tools being used to enable the integration of data. Both data and metadata are maintained primarily in database systems provided by this service.

#### 4.2.5.2 Data Integration

The Data Integration Service is receiving special prominence as the Agency wrestles with data collections that exist in various organizational stovepipes and that may have varying parameters that make joining the data difficult. As a starting point, data integration requires identifying the parameters of the various data collections through the use of metadata and then determining what level of integration can occur. This service

is also concerned with the logistics of handling large data collections and whether to consolidate them logically or physically.

#### 4.2.5.3 Data Migration

This service provides for moving data from one DBMS environment to another DBMS environment. Migration may involve moving data to a new hardware platform, new DBMS software, or both. Migration Services can be small-scale, such as migrating a single database, or large-scale, involving many databases or data collections. Migration Services also include converting data into some common format that can be output from an old database and input into a new database. Since the new database may be organized differently, it is often necessary to write a program that processes the migrating files.

#### 4.2.5.4 Data Interchange

The Data Interchange Service provides specialized support for the access of information between applications and/or between internal and external user environments. This service supports the import and export of data to and from DBMS systems and the format translations that may need to occur to make data readable by an end-user or by another application. Interchange Services apply also to document exchange between computer systems and between document processing software.

#### 4.2.5.5 Data Quality

The Data Quality Service is intended to ensure that data stored in the Agency's collections conforms to standards for accuracy, data definition, and error rates. Data Quality Service also includes validation which applies business rules to check data content. The Data Quality Service also qualifies data for entry into a data warehouse to avoid the hazards of storing and later disseminating incorrect data.

#### 4.2.5.6 Data Marts

The Data Mart Service is the area of information technology that will make it easier for Agency stakeholders and the general public to access information relevant to the environment. This service primarily summarizes data in time and space from more complex detailed data sets. This service provides the "kiosk" for environmental information, including the Web application interface and the data warehouse. The Agency is transitioning to this service as a target architecture away from the stovepiped information delivery provided through the Applications Service.

#### 4.2.6 Technology Management

Information systems are composed of a wide variety of diverse resources that must be managed effectively to achieve the goals of an open system, standards-based environment. While the individual resources may differ widely, the abstraction of these resources as managed objects allows for their treatment in a uniform manner. The basic concepts of management, including operation, administration, and maintenance, may then be applied to the full suite of technology components along with their attendant services. The EPA Technology Management service is categorized into five minor services which are fully described below.

#### 4.2.6.1 Systems Management

Systems management functionality is divided into the following elements: Usage Monitoring, Capacity Planning and Forecasting, Network Management, Change Management, Configuration Management, and Asset/Inventory Management. These elements of the Systems Management service are described individually in this section.

#### 4.2.6.1.1 Usage Monitoring

This service measures system resource utilization on the various hosting platforms provided by the Agency. This service also measures usage of the Agency's Web services, primarily the Public Access (Internet) Web sites, to collect statistics on how many pages are downloaded from the different sites and how much data is transferred each day. Web site usage also records from where page requests are made. Daily usage is combined into monthly averages and is useful for Capacity Planning.

#### 4.2.6.1.2 Capacity Planning and Forecasting

This service takes information on system resource utilization and applies statistical trending techniques to provide short term (Planning) and long term (Forecasting) estimates of resource needs for the Agency's Hosting platforms. Currently, this service is applied primarily to the Enterprise (mainframe) Server and the large Unix platforms. An example of Capacity Planning is to trend the CPU (Central Processing Unit) usage of the major applications running on the mainframe and then to determine if additional processing capacity will need to be added in a few months. An example of Forecasting is to project the trends on CPU and storage utilization to determine if major system changes will be necessary in a two-year time frame.

#### 4.2.6.1.3 Network Management

This service handles the complex task of ensuring that EPA's network systems are functioning well. This service monitors network nodes for traffic density, re-routes network traffic in the event of a network component failure, monitors the type of data being transported, and in general, plans for the availability and bandwidth of the Agency's Wide Area Network, Metropolitan Area Network, and the connections to the Internet.

#### 4.2.6.1.4 Change Management

This service provides for the orderly and planned execution of changes to computer system hardware and software, including processing capacity, storage capacity, peripheral changes, and operating system migrations. This service not only determines if and when changes can and should occur, but also notifies the user community in advance to provide an orderly transition with minimal disruption.

#### 4.2.6.1.5 Configuration Management

This service provides for arranging systems and system resources to make them more efficient and effective and to ensure that they meet the needs of the user community. This service provides the testing and documentation of hardware and operating systems to define the proper operating configuration within the Agency's IT infrastructure so that system conflicts and security concerns can be addressed. This service may also involve placing and removing computer resources and deciding which resources should be allocated.

#### 4.2.6.1.6 Asset/Inventory Management

This service provides for the accounting and allocation of the Agency's computers and peripherals. The output of this service is useful for depreciating resources and planning capital improvements, as well as tracking equipment and licenses for hardware and software.

#### 4.2.6.2 Developer Support Management

This service provides the tools and resources needed by the application development community at EPA. The developers require specialized IT software and systems to coordinate their efforts. This service includes software for code management, code libraries, code life cycle management tools, software emulation tools, CASE tools, object-oriented designer tools, code generators, and automated testing.

#### 4.2.6.3 User Support Management

User Support Management functionality is divided into the following elements: Help Desk Support, Software Distribution, and Problem Management.

#### 4.2.6.3.1 Help Desk Support

This service provides the function for handling the user community's IT problems and questions and for tracking the resolution of the problems. This service is provided at EPA by the Technical Support Center (TSC). The mission of the TSC is to be the central point of contact for technical information and assistance for computer systems, networks, and applications supported by the Agency, to assist the integration of new and target technologies into the Agency, and to act as the user community's advocate by increasing visibility to user issues and by disseminating information relevant to other services.

#### 4.2.6.3.2 Software Distribution

This service is intended to provide for the efficient and effective delivery of software to the distributed computing resources of the Agency, including approximately 24,000 personal computers and the local area network servers that support the user environment. This service is preferably transparent to the user, but at the very least, should provide a more cost-effective approach to updating software in the distributed computer environment.

#### 4.2.6.3.3 Problem Management

This service is available as part of Help Desk Support to track and manage problems with the Agency's IT resources. This service provides for an automated tracking database that will escalate problems that are not resolved and prioritize problems according to need.

#### 4.2.6.4 Data Management

This service provides for the administration, planning and architectural control associated with the Agency's centralized data systems. This service includes managing the DBMS, including its maintenance, upgrades, optimization, partitioning, user accounts, and documentation, while the databases and their maintenance are part of the Data Service in the TRM, and the platform that runs a DBMS is relegated in the TRM to the Hosting Service. This service also includes the planning, distribution, and control of Document and Records Management applications.

#### 4.2.6.5 Content Management

This service is intended primarily to manage the Agency's large and increasing Public Access Web presence, though other types of content may be included in the future. The Web presence of EPA is the main external view of the Agency, and as such, needs to be managed to reflect the mission goals of EPA and to project a consistent and uniform view from a very diverse group of Web site developers and content providers. This service includes making an inventory of Web site content and providing the software and methodology to allocate content and keep it current. Monitoring compliance with the American Disabilities Act for Web page construction is also part of this service.

#### 4.2.7 Security Service

The TRM Security Service allows groups of users to share information systems and data while guaranteeing the security of the computers, networks, and data transported to users. The Security Service is categorized into six minor services which are fully described in the sections below.

#### 4.2.7.1 Identity Management

This service primarily provides identity administration and authentication mechanisms for the Agency's IT infrastructure. Identity administration includes the registration process for authorized users of EPA systems and the serving of identity information to the different control facilities. Administration also includes the synchronization and optimization of Agency directory systems. Authentication includes identifying users when they try to access an EPA information resource. Although this service applies primarily to managing user identities, it may also apply to the identity management of computer systems. DNS, which is a centrally managed service for the network, currently identifies all EPA server-based computer systems.

#### 4.2.7.2 Perimeterization

The Perimeterization Service ensures that unauthorized data are not allowed to be transferred across a perimeter surrounding an IT resource or process. This service includes external and internal perimeterization. External perimeterization refers to maintaining a perimeter between the EPA network and the outside world (primarily the Internet), while internal perimeterization refers to a perimeter between one subset of the EPA internal network and the rest of the internal network.

#### 4.2.7.3 Data Confidentiality and Integrity Assurance

This service provides the necessary measures to ensure that data/information cannot be read or altered by unauthorized personnel while stored in the Agency or during transmission between source and destination. This service includes encryption of data, encryption of communication paths, and processes to provide proof of the integrity of data (i.e., that data are not altered or destroyed in an unauthorized manner). This service applies to data in permanent data stores and to data in active use.

#### 4.2.7.4 Data Availability Assurance

This service provides measures to ensure that data/information remains in existence an available to users when they require it. This service includes policies and planning to ensure backup/restore of data, disaster recovery for data and critical business systems, redundant paths for WAN communications, and fail over clustering support for Email and File and Print systems. This service also includes a number of Continuity of Operations Plan (COOP) initiatives.

#### 4.2.7.5 Surveillance

This service provides systems and procedures to actively monitor network traffic and activity in order to identify attempted and/or successful intrusions or compromises to the network. This service also includes periodically monitoring network and desktop computers to ensure that they conform to security requirements.

#### 4.2.7.6 Audit and Forensics

This service consists of measures to ensure compliance with the Agency's security program and to review records or prior network traffic and activity in order to reconstruct previous attempted and/or successful intrusions or compromises. This Audit Service includes the confirmation of operating computer environments, software (including custom developed applications) environments, and performing internal and external vulnerability assessments. The Forensics Service includes analysis of logs, intrusion reconstruction, investigations and incident response.

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## **APPENDIX A: REFERENCES**

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## **APPENDIX B: GLOSSARY OF TERMS**

**API (Application Program Interface)**—a set of software components that allows a programmer to issue commands and receive results to and from an operating system or other software system, such as a Data Base Management System.

**Backbone**—A network segment that connects other network segments and carries high concentrations of traffic.

**Bandwidth**—The measurement of the capacity of a transmission medium. The terms for measurement vary from analog (hertz – cycles per second) and digital (bits per second). Common measurements include: Kbps (kilobits per second), Mbps (megabits per second), and Gbps (gigabits per second).

**Bit/byte**—A bit is the smallest unit of data in a computer. Computers usually store data and execute instructions in multiples of bits, called bytes. In most computer systems, there are eight bits in a byte (which generally represents a single letter or character, or four bytes to a word). A byte is abbreviated with a capital "B" and a bit is abbreviated with a small "b".

**Broadband**—Any transmission facility providing bandwidth greater than a T3 (45 Mbps). Broadband is generally copper coaxial or fiber optic cable and can carry very high frequencies.

**CASE (Computer Aided Software Engineering)** – software tools used by programers to assist with the task of programming, typically by translating pseudo code into a computer language, providing structure to the programming process, and providing for re-use of code.

**Client-server**—The relationship between two computer programs in which one program, the client, makes a service request from another program, the server, which fulfills the request. Although the client-server idea can be used by programs within a single computer, it is a more important idea in a network. In a network, the client-server model provides a convenient way to interconnect programs that are distributed efficiently across different locations. Computer transactions using the client-server model are very common. For example, to check your bank account from your computer, a client program in your computer forwards your request to a server program at the bank. That program may in turn forward the request to its own client program that sends a request to a database server at another bank computer to retrieve your account balance. The balance is returned back to the bank data client, which in turn serves it back to the client in your personal computer, which displays the information for you.

In the usual client-server model, one server, sometimes called a daemon on Unix or a Service on NT/Windows 2000, is activated and awaits client requests on a port. Typically, multiple client programs share the services of a common server program. Both client programs and server programs are often part of a larger program or application. Relative to the Internet, your Web browser is a client program that requests services

(the sending of Web pages or files) from a Web server (which technically is called a Hypertext Transport Protocol or HTTP server) in another computer somewhere on the Internet. Similarly, your computer with TCP/IP installed allows you to make client requests for files from File Transfer Protocol (FTP) servers in other computers on the Internet. Lotus Notes is another example of a client-server application that uses a specific TCP/IP port. Lotus Development Corporation registered the port they wished to use with the InterNIC so only they could use that port for their applications on the World Wide Web. Most client-server vendors have followed suite and registered their "ports" with the InterNIC.

Other program relationship models included master/slave, with one program being in charge of all other programs, and peer-to-peer, with either of two programs able to initiate a transaction.

**Data Mart**—A repository of data gathered from operational data and other sources that is designed to serve a particular community; emphasis is on meeting the specific demands of a particular group of knowledge users in terms of analysis, content, presentation, and ease-of-use. Most commonly a Data Mart is a summary of various dimensions in time and space, the spatial dimensions answer the "where questions" and the temporal dimension answers the "when" questions. When data is collected according to a sampling plan and properly weighted in a Data Mart, the Data Mart can answer user questions with statistical confidence intervals and make valid scientific inference to a population or target representative population. EPA's primary Data Marts come from statistical summaries of regulatory inventories and frequently by law exclude major components of a "universe of facilities" so that only conditional statements can be made from the Data Mart. For example, from the Toxic Release Inventory, statements about "all toxic" releases to the environment cannot be made since this regulatory program does not regulate "all toxics" only some toxics, and only in various industries. Universe definition for accurate statistical characterizations is one of the goals of a use ful Data Mart that provides an indicator of the "State of the Environment".

**Desktop**—A personal computer that is designed to fit conveniently on top of a typical office desk. A desktop computer typically comes in several units that are connected together during installation: (1) the processor, which can be in a microtome or miniature designed to fit under the desk or in a unit that goes on top of the desk, (2) the display monitor, (3) and input devices - usually a keyboard and a mouse. Today, almost all desktop computers include a built-in modem or Ethernet Network Interface Card (NIC), a CD-ROM drive, a multi-gigabyte magnetic storage drive, and usually a floppy disk drive. At home, most desktop computer users also purchase a printer. In businesses and increasingly at home, desktop computers can be interconnected and can share resources such as printers by being connected to a local area network (LAN).

**Domain Naming Service (DNS)**—a lookup service needed for most networks that translates a computer name into an IP address.

**Enterprise Application Integration (EAI)**—A process to link stove-piped applications so that they provide enterprise-wide processing.

**Enterprise Technology Architecture (ETA)**—A comprehensive blueprint of an organization's information technology that includes four components: 1) TRM, 2) Standards Profile, 3) Baseline Architecture, 4) Target
Architecture. The ETA provides explicit descriptions of the current and desired state of the information technology resource of an organization.

**Extranet**—A private network that uses the Internet protocols and the public telecommunication system to securely share part of a business's information or operations with suppliers, vendors, partners, customers, or other businesses. An extranet can be viewed as part of a company's intranet that is extended to users outside the company.

An extranet requires security and privacy. These require firewall server management, the issuance and use of digital certificates or similar means of user authentication, encryption of messages, and the use of virtual private networks (VPN) that tunnel (encapsulate data) through the public network.

Companies can use an extranet to:

- Exchange large volumes of data using Electronic Data Interchange (EDI)
- Share product catalogs exclusively with wholesalers or those "in the trade"
- Collaborate with other companies on joint development efforts
- Jointly develop and use training programs with other companies
- Provide or access services provided by one company to a group of other companies, such as an online banking application managed by one company on behalf of affiliated banks
- Share news of common interest exclusively with partner companies

Netscape, Oracle, and Sun Microsystems have announced an alliance to ensure that their extranet products can work together by standardizing on JavaScript and the Common Object Request Broker Architecture (CORBA). Microsoft supports the Point-to-Point Tunneling Protocol (PPTP) and is working with American Express and other companies on an Open Buying on the Internet (OBI) standard. The Lotus Corporation is promoting its groupware product, Notes, as well-suited for extranet use.

**FDDI (Fiber Distributed Data Interface)**—A protocol in which computers communicate 100 Mbps over fiber optic cabling.

**Firewall** – A set of related programs, located at a network gateway server, that protects the resources of a private network from users from other networks. (The term also implies the security policy that is used with the programs.) An enterprise with an Intranet connection that allows its workers access to the wider Internet installs a firewall to prevent outsiders from accessing its own private data resources and for controlling what outside resources its own users may access.

Basically, a firewall, working closely with a router program, filters all network packets to determine whether to forward their destination. A firewall also includes or works with a proxy server that makes network requests on behalf of workstation users. A firewall is often installed in a specially designated

computer separate from the rest of the network so that no incoming request can get directly at private network resources.

There are a number of firewall screening methods. A simple one is to screen requests to make sure they come from acceptable (previously identified) domain names and IP addresses. For mobile users, farewells allow remote access in to the private network by the use of secure logon procedures and authentication certificates.

**FTP (File Transfer Protocol)**—A protocol used for transferring files from one computer to another over a TCP/IP network (including the Internet).

**Gateway**—Electronic repeater devices that intercept and steer electrical signals from one network to another. A gateway is an entrance into, and exit out of, a communications network.

**Identity Management**—A security strategy built on a foundation of the enterprise directory (user information store), branching out to permissions, policy management, and authentication. Identity management ensures security, increases productivity and reduces operating costs in an environment requiring a constant, rapid flow of information within and across company borders via the Internet.

**Internet**—Sometimes called simply "the Net," is a worldwide system of interconnected computer networks - running TCP/IP and DNS to find "domains". It was conceived by the Advanced Research Projects Agency (ARPA) of the U.S. government in 1969 and was first known as the ARPANET. The original aim was to create a network that would allow users of a research computer at one university to be able to "talk to" research computers at other universities. A side benefit of ARPANET's design was that, because messages could be routed or rerouted in more than one direction, the network could continue to function even if parts of it were destroyed in the event of a military attack or other disaster.

**Intranet**—A private network that is contained within an enterprise. It may consist of many interlinked local area networks and also use leased lines in the wide area network. Typically, an intranet includes connections through one or more gateway computers to the outside Internet. The main purpose of an intranet is to share company information and computing resources among employees. An intranet can also be used to facilitate working in groups and for teleconferences.

An intranet uses TCP/IP, HTTP, UDP and other Internet protocols and in general looks like a private version of the Internet. With tunneling, companies can send private messages through the public network, using the public network with special encryption/decryption and other security safeguards to connect one part of their intranet to another.

Typically, larger enterprises allow users within their intranet to access the public Internet through firewall servers that have the ability to screen messages in both directions so that company security is maintained. When part of an intranet is made accessible to customers, partners, suppliers, or others outside the company, that part becomes part of an extranet.

**IP (Internetworking Protocol)**—A protocol that uses datagrams, or data packets, for sending data through networks. Data are encapsulated in packets that contain routing and identity information, so that the network knows where the data comes from and where it is supposed to go.

**IPSEC**—(IP Security protocol) is a developing standard for security at the network or packet processing layer of network communication. Earlier security approaches have inserted security at the application layer of the communications model. IPSEC will be especially useful for implementing virtual private networks and for remote user access through dial-up connection to private networks. Security arrangements can be handled without requiring changes to individual user computers. Cisco has included support for IPSEC in its network routers.

**ISDN (Integrated Services Digital Network)**—A digital network standard that supports voice, data, and video over a single telephone line. Basic rate interface (BRI) constitutes two 64 Kbps channels, while primary rate interface (PRI) uses 24 64 Kbps channels.

**ISP (Internet Service Provider)**—An organization that typically offers Email, Internet access, Web hosting services, and high-speed circuits to customers needing access to the Internet.

LAN—See local area network

**Local Area Network**—A network of interconnected workstations sharing resources within a relatively small geographic area such as a building or the floor of a building. However, FDDI extends a local area network over a much wider area. A local area network may serve as few as four or five users or, in the case of FDDI connections, may serve several thousand. Typically, the number of users served is less than 200.

**Local Area Network Server**—Usually, a computer that has applications and data storage that are shared in common by multiple workstation users. The server provides localized hosting services to groups of users connected to an office LAN. These services (see Figure 4.2) include Hosting (file & print services, mass storage, e-mail), communications (pathway that connects the WAN Router to the Desktop), Applications & Data (for locally hosted applications & data bases), Technology Management (by the local System Administrators), and Security (such as local Bindview & ESM monitoring). There are also Local Area Network servers used on research LANs. These servers support realtime data acquisition processes and the specific computational needs of Laboratory instrumentation, data collection and storage. Laboratory Local Area Network servers are generally not connected to the WAN.

**Mainframe**—An industry term for a large computer, typically manufactured by a large company such as IBM for running applications with large-scale computing purposes. Historically, a mainframe is associated with centralized rather than distributed computing. Today, IBM refers to its large processors as servers, and the mainframe is often referred to as the Enterprise Server.

**Modem**—Modulates outgoing digital signals from a computer or other digital device to analog signals for a conventional copper twisted-pair telephone line and demodulates the incoming analog signal and converts it to a digital signal for the digital device.

From early 1998, most new personal computers came with 56 Kbps modems. By comparison, using an ISDN modem instead of a conventional modem, the same telephone wire can now carry up to 128 Kbps. With Digital Subscriber Line (DSL.) modems, now being deployed in a number of communities, bandwidth on twisted-pair can be in the megabit range for a single computer or set of peer-to-peer computers on a home LAN.

**PBX (Private Branch Exchange)**—Computerized telephone systems that route telephone calls within an organization, as well as from outside the organization.

PSN (Public Switched Network)—The network that supports normal dial-up telephone service.

**Remote access**—The ability to get access to a computer or a network from a remote location. In corporations, people at branch offices, telecommuters, and people who are traveling may need access to the corporation's network. Home users get access to the Internet through remote access to an Internet service provider (ISP). Dial-up connection through desktop, notebook, or handheld computer modems over regular telephone lines is a common method of remote access. Remote access is also possible using a dedicated line between a computer or a remote local area network and the "central" or main corporate local area network. A dedicated line is more expensive and less flexible but offers faster data rates. ISDN is a common method of remote access form branch offices since it combines dial-up with faster data rates. Wireless, cable modem, and DSL. technologies offer other possibilities for remote access.

A remote access server is the computer and associated software that is set up to handle users seeking access to network remotely. Sometimes called a communication server, a remote access server usually includes or is associated with a firewall server to ensure security and a router that can forward the remote access request to another part of the corporate network. A remote access server may include or work with a modem pool manager so that a small group of modems can be shared among a large number of intermittently present remote access users.

A remote access server may also be used as part of a virtual private network.

**Router**—On the Internet, a router is a device or, in some cases, software in a computer, that determines the next network point to which a packet should be forwarded toward its destination. The router is connected to at least two networks and decides which way to send each information packet based on its current understanding of the state of the networks to which it is connected. A router is located at any juncture of networks or gateway, including each Internet point-of-presence. A router is often included as part of a network switch.

A router creates or maintains a table of the available routes and their conditions and uses this information along with distance and cost algorithms to determine the best route for a given packet. Typically, a packet

may travel through a number of network points with routers before arriving at its destination. An edge router is a router that interfaces with an asynchronous transfer mode (ATM) network. A brouter is a network bridge combined with a router.

**Server**—1) In general, a server is a computer program that is a "listener service/program/daemon" for other computer programs in the same or other computers. 2) The computer that a server program runs in is also frequently referred to as a server (though it may contain a number of server and client programs). 3) In the client-server programming model, a server is a program that awaits and fulfills requests from client programs in the same or other computers. A given application in a computer may function as a client with requests for services from other programs and a server of requests from other programs.

Specific to the Web, a Web server is the computer program (housed in a computer) that serves requested HTML pages or files. A Web client is the requesting program associated with the user. The Web browser in your computer is a client that requests HTML files from Web servers.

**Server Farm**—A suite of servers that provide a specific server based function such as Web server, terminal server or Instant Messaging Server.

**Supercomputer**—A supercomputer is a computer that performs at or near the currently highest computational speed for computers. A supercomputer is typically used for scientific and engineering applications that must handle very large databases or do a great amount of scientific computation (or both) very quickly. At any given time, there are usually a few well-publicized supercomputers that operate at the very latest and always incredible speeds. The term is also sometimes applied to far slower (but still impressively fast) computers. Most supercomputers are really multiple computers that perform parallel processing. In general, there are two parallel processing approaches: symmetric multiprocessing (SMP) and massively parallel processing (MPP).

**T1 and T3**—The T-carrier system, introduced by the Bell System in the U.S. in the 1960s, was the first successful system that supported digitized voice transmission. The original transmission rate (1.544 Mbps) in the T1 line is in common use today in Internet service provider (ISP) connections to the Internet. Another level, the T3 line, providing 44.736 Mbps, is also commonly used by ISPs. Another commonly installed service is a fractional T1 line, which is the rental of some portion of the 24 channels in a T1 line, with the other channels going unused.

The T-carrier system is entirely digital, using pulse code modulation and time-division multiplexing. The system uses four wires and provides full-duplex capability (two wires for receiving and two for sending at the same time). The T1 digital stream consists of 24 64-Kbps channels that are multiplexed. (The standardized 64-Kbps channel is based on the bandwidth required for a voice conversation.) The four wires were originally a pair of twisted-pair copper wires, but can now also include coaxial cable, optical fiber, digital microwave, and other media. A number of variations on the number and use of channels are possible.

In the T1 system, voice signals are sampled 8,000 times a second and each sample is digitized into an 8-bit word. With 24 channels being digitized at the same time, a 192-bit frame (24 channels each with an 8-bit

word) is thus being transmitted 8,000 times a second. Each frame is separated from the next by a single bit, making a 193-bit block. The 192 bit frame multiplied by 8,000 and the additional 8,000 framing bits make up the T1's 1.544 Mbps data rate. The signaling bits are the least significant bits per frame.

**Technology Architecture**—The IT hardware and software components that enable an organization to process, store, and exchange data with internal and external entities; and the relationship and connectivity between the components.

WAN—See wide area network

**Wide Area Network**—A geographically dispersed telecommunications network that is a broader telecommunication structure than a local area network (LAN). A WAN may be privately owned or rented, but the term usually connotes the inclusion of public (shared user) networks. An intermediate form of network in terms of geography is a metropolitan area network (MAN).

**Virtual Private Network (VPN)**—A VPN is a secure, private network that is configured within a public network. VPNs provide the security of a private network through the use of access controls and encryption technologies, while using the built-in management facilities of a large public network.

# **APPENDIX C: STANDARDS PROFILE**

The Standards Profile defines a set of technologies and products that support the services and interoperability in the TRM. The Standards Profile establishes the technology that achieves standardization across the enterprise and insures interoperability and secure computing. Adherence to technology standards is the first step in assuring that computers comply with standard configurations and security controls.

EPA's Standards Profile has been maintained since 1998 as a Web-enabled database accessible through the *IT Roadmap* Web site (<u>http://basin.rtpnc.epa.gov/ntsd/ITARoadmap.nsf</u>). The IT Roadmap documents EPA's information technology standards and the process for selecting and approving these standards. These technology standards allow the Agency to maintain an infrastructure with a high level of interoperability, stability, and security.

The IT Roadmap database divides EPA's product and technology standards into computer system platforms and technology categories that were established before the development of the Agency's TRM. Since the present TRM facilitates the profiling and grouping of technology in a new framework, an immediate future effort will be to align the platforms and categories of the database with the major and minor services of the TRM.

The IT Roadmap kernel is the Product/Technology Matrix (PTM) database which covers all major IT components considered by the Agency for seven platforms and 12 functional categories. Where specific products or technologies have not evolved sufficiently, the entry may contain a reference to a specification, rather than a product or technology. This matrix allows users to search for supported technologies by platform and to query the database for the status of specific products. Each product or technology in the PTM is listed with one of four status classifications used to describe the implementation level of the product/technology within the Agency. The four classifications are:

- Target—product/technology is a future direction for the Agency in the next five years.
- **Standard**—product/technology has been officially endorsed as a standard for EPA. The product has been tested for stability and integration in the Agency's computing environment. Standard products must be followed, adopted and used to comply with Agency guidelines.
- **Interim**—endorsed as a necessary Agency product/technology being considered for a standard or being used during the migration process toward a standard.
- Legacy—product/technology previously endorsed as a Standard but has been replaced or outdated and is no longer considered for use when planning and developing new IT systems.

The Standards Profile presented in this appendix contains the products and technologies designated as **Standard** by the Agency. The current Standards Profile framework derived from the IT Roadmap PTM database shows the products and technologies divided into seven (7) system platforms and twelve (12) IT categories as follows:

- 1. Central Application Servers (Unix)
- 2. Central Application Servers (Windows)
- 3. Distributed Application Servers (Unix/Windows)
- 4. Enterprise Server
- 5. High Performance Computers
- 6. PC (Windows)
- 7. Scientific Open System Workstations

- 1. Application System Development Support Tools
- 2. Collaborative Computing
- 3. Computing Platform Communications
- 4. Data Interchange
- 5. Data Management
- 6. Graphics Formatting
- 7. Internet, Intranet and Extranet Information Services
- 8. Office Automation
- 9. Scientific Applications
- 10. Security
- 11. System Management
- 12. System Software

Each platform can have products/technologies in all twelve categories; however, if there are no entries for a platform-category combination, then that combination is not represented in the profile.

EPA's Standards Profile for FY2002 is presented in the following pages in tabular format. This profile is not static in its database form. It is refreshed as often as necessary to maintain currency with Agency decisions and changes in information technology. To view the latest profile, the reader should access the IT Roadmap Web site at the URL stated previously (see page C-1).

Technology Type	Status	Product	Version	Note	Technology Type Definition					
	Central Application Servers (Unix) > Application System Development Support Tools									
3rd Generation Programming Language	Standard	с		Fortran is also an accepted Standard product for this category, type & platform.	3rd Generation Programming Languages: A procedural language used to describe operations on individual data elements. These languages include COBOL, FORTRAN, C, BASIC etc.					
3rd Generation Programming Language	Standard	Fortran		C is also an accepted Standard product for this category, type & platform.	3rd Generation Programming Languages: A procedural language used to describe operations on individual data elements. These languages include COBOL, FORTRAN, C, BASIC etc.					
CASE	Standard	Oracle Designer	6i		CASE: Computer Assisted Software Engineering. Software tools designed to aid a programmer in code re-use and in following various programming methodologies. Upper CASE refers to tools aimed at the design process; lower CASE targets programming.					
SQL Development Tools	Standard	Developer	9i		SQL Development Tools: pre-compilers and tools that generate static SQL (Structured Query Language) for use with third generation programming languages; allows developers to build database applications by dynamic generation of SQL.					
	-	Centi	ral Applica	tion Servers (Unix) > Collaborativ	e Computing					
E-Mail	Standard	SMTP-based			Email: Electronic messaging capability including receiving folders, mail agents, attachment processing, and encryption.					
		Central App	lication Se	ervers (Unix) > Computing Platfor	m Communications					
TCP/IP Communications	Standard	In OS		In OS refers to the fact that the functionality is an inherent part of the operating system	TCP/IP Communications: Functionality that provides TCP/IP (Internet Protocol)-based communications between desktop devices and servers.					

Technology Type	Status	Product	Version	Note	Technology Type Definition					
	Central Application Servers (Unix) > Data Interchange									
File Transfer	Standard	FTP			File Transfer: Transfer of files between two computer-based devices.					
		C	entral Appl	ication Servers (Unix) > Data Mar	nagement					
Data Warehouse	Standard	Oracle	8i		Data Warehouse: An implementation of a DBMS (or series of DBMSs) specifically targeted for non-changing historical data. They include special tools for summarizing and characterizing historical data.					
DBMS Application Management	Standard	Oracle Application Server	4.0.8		DBMS Application Management: Application Management systems allow developers to separate application logic from presentation and data logic in 3-tier applications.					
DBMS Transaction Proc. Monitor	Standard	Cool Gen			DBMS Transition Processing Monitor: A central program that ensures the atomicity of a transaction (single logical query and/or update). The program restores the data base to its last state if a transaction fails.					
DBMS Transaction Proc. Monitor	Standard	Trans Enabler			DBMS Transition Processing Monitor: A central program that ensures the atomicity of a transaction (single logical query and/or update). The program restores the data base to its last state if a transaction fails.					
DBMS Transaction Proc. Monitor	Standard	Tuxedo			DBMS Transition Processing Monitor: A central program that ensures the atomicity of a transaction (single logical query and/or update). The program restores the data base to its last state if a transaction fails.					
Dictionary	Standard	Oracle			Dictionary: Functionality for providing information about application systems, programs, data bases, and data elements.					

Technology Type	Status	Product	Version	Note	Technology Type Definition
File Structure	Standard	NFS		UFS is also an accepted standard product for this category, type & platform.	File Structure: The basic file format utilized by the native operating system.
File Structure	Standard	UFS		NFS is also an accepted standard product for this category, type & platform.	File Structure: The basic file format utilized by the native operating system.
RDBMS Comm Access	Standard	Oracle Procedural Gateway		Oracle Procedural Gateway runs on Unix to provide access to mainframe database resources and can be used to also integrate Oracle with non-relational data sources.	RDBMS Communications Access: The applications level protocol for accessing a data base across a network.
Relational Data Base Management System	Standard	Oracle	8i		Relational Data Base Management System (RDBMS): A database system built on the fundamental concept of tables. The RDBMS handles all navigation and returns a table or null for all queries.
		Ce	ntral Applie	cation Servers (Unix) > Graphics	Formatting
Files	Standard	JPEG		JPEG = Joint Photographic Enhancement Group, a poor compression	Graphics Screen/File Formats: The protocol for putting bitmapped or vector graphics onto the computer screen; the file format recommended for saving graphics images.
Files	Standard	x		X = X11, a standard from Project Athena	Graphics Screen/File Formats: The protocol for putting bitmapped or vector graphics onto the computer screen; the file format recommended for saving graphics images.

Technology Type	Status	Product	Version	Note	Technology Type Definition
	C	entral Applicatio	n Servers (	(Unix) > Internet,Intranet and Ext	ranet Information Services
4th Generation Web Programming Language	Standard	Java	2.0		4th Generation Web Programming Language: A "high-level" programming language. A translator converts the statements of the language into machine language (e.g., for Java, the output is called bytecode, which is then converted into appropriate machine code
Scripting Language	Standard	Javascript			Scripting Language: In the context of the Web, script languages are often written to handle forms input or other services for a Web site and are processed primarily on the Web server.
Scripting Language	Standard	Perl		The Agency has identified JavaScript as a possible Web scripting language.	Scripting Language: In the context of the Web, script languages are often written to handle forms input or other services for a Web site and are processed primarily on the Web server.
Search Engine	Standard	Verity Information Server			Search Engine: A Search Engine indexes all pages in target Web sites, creates a 'catalog' from the pages read, receives a user's search request, compares it to the entries in the catalog, and returns Universal Resource Locator (URL) results to the user.
Web Server - Internet	Standard	iPlanet		iPlanet is the new name for NetscapEnterprise Server.	Web Server - Internet: The Web server responds to Web Browser requests and provides several different ways to forward a request to an application server and/or to forward back a Web page to the user's Web Browser. Internet is for servicing public users.
Web Server - Intranet-Extranet	Standard	Apache			Web Server - Intranet/Extranet: The Intranet services Web Browser requests from EPA internal users. The Extranet services Web Browser requests made to the Intranet by EPA Partner users that are external to the EPA network.

Technology Type	Status	Product	Version	Note	Technology Type Definition
Web Server - Intranet-Extranet	Standard	iPlanet		iPlanet is the new name for NetscapEnterprise Server.	Web Server - Intranet/Extranet: The Intranet services Web Browser requests from EPA internal users. The Extranet services Web Browser requests made to the Intranet by EPA Partner users that are external to the EPA network.
		Cen	tral Applica	ation Servers (Unix) > Scientific A	Applications
Data Analysis	Standard	SAS			Data Analysis: Provides statistical analysis of data and produces reports/graphics based on default parameters.
GIS Spatial Analysis Tools	Standard	ArcView/GIS		Unix platform in use for this technology type is Solaris.	GIS/Spatial Analysis Tools: A specified system to create, store, integrate, query, analyze, and display large volumes of spatially-referenced data (e.g., maps, images, natural resources, census, etc.). This functionality includes application development
Mapping	Standard	ArcView/GIS		Unix platform in use for this technology type is Solaris.	Mapping: Functionality to display spatial data on top of base-map information (e.g., roads, hydrography). These systems lack the sophisticated spatial analysis capabilities associated with GIS systems and are used at EPA to serve maps to the Internet.
Scientific Graphics	Standard	SAS Graph			Scientific Graphics: Provides functionality to display graphics with the particular characteristics required for scientific applications.
Scientific Visualization Tools	Standard	AVS		AVS - Application Visualization System	Scientific Visualization Tools: Permits graphical display of complex data in creative formats with multiple attributes. Particularly useful for time-based scientific data in three (or more) dimensions.

Technology Type	Status	Product	Version	Note	Technology Type Definition
Spatial Database Management System	Standard	Arc SDE	8.1		Spatial DBMS: A DBMS used in conjunction with a Geographic Information System. The system provides a means for assembling and storing data that is geographically referenced, combining visual (spatial) data with attribute information.
Spatial Database Management System	Standard	Oracle Spatial			Spatial DBMS: A DBMS used in conjunction with a Geographic Information System. The system provides a means for assembling and storing data that is geographically referenced, combining visual (spatial) data with attribute information.
	Т	-	Central	Application Servers (Unix) > Sec	curity
Content Filtering	Standard	SquidGuard			Content Filtering: Technology to check data being transferred on networks for unwanted or undesirable content.
Encryption	Standard	SSL			Encryption: Technology that transforms usable data into data that is not usable until it is transformed back via a key or password. Most encryption uses advanced algorithms with prime number keys to scramble data until it is intelligible.
Remote Access Identification & Authentication	Standard	TSSMS			Remote Access Identification and Authentication: Technology to provide access control and identification (see 73) for users located outside the EPA network infrastructure. This often requires more than one means of identification and authentication.
Standards Monitoring	Standard	Enterprise Security Management		ESM: Enterprise Security Management, a Symantech product.	Standards Monitoring: Technology that monitors systems to ensure that EPA directives are properly implemented.

Technology Type	Status	Product	Version	Note	Technology Type Definition
User Access Identification and Control	Standard	TSSMS			User Access Identification and Control: Performs the process of user verification and mapping of users to appropriate access levels. With proper security protocols (e.g., Kerberos) this can be done transparently after the initial user verification.
User Access Identification and Control	Standard	Unix OS			User Access Identification and Control: Performs the process of user verification and mapping of users to appropriate access levels. With proper security protocols (e.g., Kerberos) this can be done transparently after the initial user verification.
		Ce	ntral Applic	ation Servers (Unix) > System M	anagement
Backup	Standard	Backup Exec			Backup: Functionality that provides for file copying on servers (and, sometimes, individual workstations) to archival media. There should be complementary programs for bringing individual files back and to replace a damaged storage device.
Backup	Standard	САМ			Backup: Functionality that provides for file copying on servers (and, sometimes, individual workstations) to archival media. There should be complementary programs for bringing individual files back and to replace a damaged storage device.
Capacity Planning	Standard	Best/1for Unix			Capacity Planning: Predicting usage of computer resources to safe operational limits, based on use of modeling tools with specified service levels.
Capacity Planning	Standard	RSAP			Capacity Planning: Predicting usage of computer resources to safe operational limits, based on use of modeling tools with specified service levels.

Technology Type	Status	Product	Version	Note	Technology Type Definition
Problem Management	Standard	Remedy			Problem Management: Provides for the tracking and resolution of problems. Optional components include automatic detection and entry of system related problems, and ties to the platform's change management system.
Resource Usage	Standard	Best 1 for Unix			Resource Usage: Measurement of the utilization of computing resources by software agents usually located with the operating system.
Resource Usage	Standard	RSAP			Resource Usage: Measurement of the utilization of computing resources by software agents usually located with the operating system.
		C	entral App	lication Servers (Unix) > System	Software
Network Operating System	Standard	Unix/NFS		Network File System (NFS), which operates on all Unix-based platforms.	Network Operating System (NOS): The LAN-based network operating system. Functionality ranges from the robustness of Novell NetWare and Windows NT/2000 to basic File Management and Directory functions provided by the Unix-based NFS network operating syst
Operating System	Standard	AIX			Operating System (OS): The native operating system for the hardware platform; the program that, after being initially loaded into the computer, manages all the other programs in a computer.
Operating System	Standard	Linux			Operating System (OS): The native operating system for the hardware platform; the program that, after being initially loaded into the computer, manages all the other programs in a computer.
Operating System	Standard	Solaris			Operating System (OS): The native operating system for the hardware platform; the program that, after being initially loaded into the computer, manages all the other programs in a computer.

Technology Type	Status	Product	Version	Note	Technology Type Definition
Operating System	Standard	Tru64			Operating System (OS): The native operating system for the hardware platform; the program that, after being initially loaded into the computer, manages all the other programs in a computer.
User Interface	Standard	MOTIF			User Interface (UI): End user's interface with personal desktop device. Does not include consoles used to control other computer operations; also includes terminal type as related to server access.
	Ce	entral Application	Servers (\	Vindows) > Application System D	Development Support Tools
CASE	Standard	Cool:Gen	5.1		CASE: Computer Assisted Software Engineering. Software tools designed to aid a programmer in code re-use and in following various programming methodologies. Upper CASE refers to tools aimed at the design process; lower CASE targets programming.
O-O Development	Standard	Powerbuilder			Object Oriented Development: Development tools that provide the ability to construct software out of standard reusable components, referred to as objects. ; Objects are software packages that contain related data and procedures.
SQL Development Tools	Standard	Developer	9i	Powerbuilder is also an accepted Interim product for this category, type & platform.	SQL Development Tools: pre-compilers and tools that generate static SQL (Structured Query Language) for use with third generation programming languages; allows developers to build database applications by dynamic generation of SQL.
SQL Development Tools	Standard	Powerbuilder		Developer 9i is also an accepted Interim product for this category, type & platform.	SQL Development Tools: pre-compilers and tools that generate static SQL (Structured Query Language) for use with third generation programming languages; allows developers to build database applications by dynamic generation of SQL.

Technology Type	Status	Product	Version	Note	Technology Type Definition					
	Central Application Servers (Windows) > Collaborative Computing									
Document DBMS	Standard	Domino	R5.08		Document DBMS: A database management system that allows for the storage and retrieval of free-formatted text documents.					
Document Imaging	Standard	Documentum			Document Imaging: Provides electronic storage, retrieval, and routing of images of paper documents.					
Document Management	Standard	Domino	R5.08		Document Management: Provides for configuration management of document creation, revision, and distribution.					
E-Mail	Standard	Domino	R5		Email: Electronic messaging capability including receiving folders, mail agents, attachment processing, and encryption.					
Scheduling	Standard	Domino Calendar	R5		Scheduling: Provides capabilities for maintenance of personnel scheduling activities. Facilitates setup of meetings while maintaining integrity of individual's schedules across multiple time zones.					
		Central Appli	cation Serve	ers (Windows) > Computing Platf	form Communications					
SNA Communications	Standard	SNA/SAA			SNA Communications: IBM-based software that provides communications capabilities between desktop devices and servers using SNA communications.					
SPX/IPX Communications	Standard	NCP			SPX/IPX Communications: Novell-based software that provides native communications between desktop devices and servers.					
SPX/IPX Communications	Standard	NetWare	5.x		SPX/IPX Communications: Novell-based software that provides native communications between desktop devices and servers.					
TCP/IP Communications	Standard	TCP/IP			TCP/IP Communications: Functionality that provides TCP/IP (Internet Protocol)-based communications between desktop devices and servers.					

Technology Type	Status	Product	Version	Note	Technology Type Definition
		Cer	ntral Applic	cation Servers (Windows) > Data I	Interchange
File Compression	Standard	WinZip			File Compression: A file encoding scheme that can preserve all information while storing the data in a minimum amount of bits. Implies the existence of a compressor and decompressor.
Printing Format Control	Standard	AFP		PCL/PostScript is also an official standard product for this category, type & platform.	Printing Format Control: Controls printing output through printing oriented software (such as Postscript).
Printing Format Control	Standard	PCL/Postscript		Printer Control Language (PCL) from HP: PostScript Language from Adobe. AFP is also an official standard product for this category, type & platform.	Printing Format Control: Controls printing output through printing oriented software (such as Postscript).
		Cer	tral Applic	ation Servers (Windows) > Data N	Nanagement
Dictionary	Standard	Oracle	8i		Dictionary: Functionality for providing information about application systems, programs, data bases, and data elements.
File Structure	Standard	FAT 32			File Structure: The basic file format utilized by the native operating system.
File Structure	Standard	NTFS	4	NTFS (New Technology File System) - The recommended file structure for Windows NT 4.0 and Windows 2000. To retain data and system security features, NTFS is required for these systems.	File Structure: The basic file format utilized by the native operating system.

Technology Type	Status	Product	Version	Note	Technology Type Definition
Navigational DBMS	Standard	ODBC		ODBC (Open Data Base Connectivity) - A data transfer protocol enabled by built in functions provided with database systems and with Rapid Application Development software. ODBC provides for seamless transfer of data between a DBMS and the application.	Navigational Data Base Management System (DBMS): A DBMS where the programmer specifies how to get through (navigate) the data base to find and place individual data.
RDBMS Comm Access	Standard	ODBC			RDBMS Communications Access: The applications level protocol for accessing a data base across a network.
RDBMS Comm Access	Standard	SQL*Net	8		RDBMS Communications Access: The applications level protocol for accessing a data base across a network.
Relational Data Base Management System	Standard	Oracle	8i		Relational Data Base Management System (RDBMS): A database system built on the fundamental concept of tables. The RDBMS handles all navigation and returns a table or null for all queries.

Technology Type	Status	Product	Version	Note	Technology Type Definition						
	Central Application Servers (Windows) > Internet,Intranet and Extranet Information Services										
4th Generation Web Programming Language	Standard	Java	2.0		4th Generation Web Programming Language: A "high-level" programming language. A translator converts the statements of the language into machine language (e.g., for Java, the output is called bytecode, which is then converted into appropriate machine code						
Rapid Web Application Development	Standard	Cold Fusion	4.5		Rapid Web Application Development: RAD (Rapid Application Development) is a concept that products can be developed faster and of higher quality through re-use of software components. RAD usually embraces object-oriented programming methodology.						
Rapid Web Application Development	Standard	Domino	5		Web Server/Intranet: The Web server provides several different ways to forward a request to an application server and to forward back a modified or new Web page to an internal user.						
Scripting Language	Standard	Javascript			Scripting Language: In the context of the Web, script languages are often written to handle forms input or other services for a Web site and are processed primarily on the Web server.						
Scripting Language	Standard	Perl		The Agency has identified JavaScript as a possible Web scripting language.	Scripting Language: In the context of the Web, script languages are often written to handle forms input or other services for a Web site and are processed primarily on the Web server.						
Web Server - Internet	Standard	Domino	5		Web Server - Internet: The Web server responds to Web Browser requests and provides several different ways to forward a request to an application server and/or to forward back a Web page to the user's Web Browser. Internet is for servicing public users.						

Technology Type	Status	Product	Version	Note	Technology Type Definition
Web Server - Internet	Standard	IIS			Web Server - Internet: The Web server responds to Web Browser requests and provides several different ways to forward a request to an application server and/or to forward back a Web page to the user's Web Browser. Internet is for servicing public users.
Web Server - Intranet-Extranet	Standard	Domino	5	Netscape is also an accepted Standard product for this category, type & platform.	Web Server - Intranet/Extranet: The Intranet services Web Browser requests from EPA internal users. The Extranet services Web Browser requests made to the Intranet by EPA Partner users that are external to the EPA network.
Web Server - Intranet-Extranet	Standard	IIS		Domino is also an accepted Standard product for this category, type & platform.	Web Server - Intranet/Extranet: The Intranet services Web Browser requests from EPA internal users. The Extranet services Web Browser requests made to the Intranet by EPA Partner users that are external to the EPA network.
		Cen	tral Applic	ation Servers (Windows) > Office	Automation
Electronic Publishing	Standard	Acrobat			Electronic Publishing: Provides for creation of documents in a portable format that maintains look-and-feel fidelity across heterogeneous desktop operating systems and interfaces.
	•	Centra	al Applicati	on Servers (Windows) > Scientifi	c Applications
Data Analysis	Standard	SAS			Data Analysis Provides statistical analysis of data and produces reports/graphics based on default parameters.
Mapping	Standard	Arc IMS	3.1		Mapping: Functionality to display spatial data on top of base-map information (e.g., roads, hydrography). These systems lack the sophisticated spatial analysis capabilities associated with GIS systems and are used at EPA to serve maps to the Internet.
Mapping	Standard	Map Objects			Mapping: Functionality to display spatial data on top of base-map information (e.g., roads, hydrography). These systems lack the sophisticated spatial analysis capabilities

Technology Type	Status	Product	Version	Note	Technology Type Definition					
					associated with GIS systems and are used at EPA to serve maps to the Internet.					
	Central Application Servers (Windows) > Security									
Encryption	Standard	SSL			Encryption: Technology that transforms usable data into data that is not usable until it is transformed back via a key or password. Most encryption uses advanced algorithms with prime number keys to scramble data until it is intelligible.					
Remote Access Identification & Authentication	Standard	TSSMS			Remote Access Identification and Authentication: Technology to provide access control and identification (see 73) for users located outside the EPA network infrastructure. This often requires more than one means of identification and authentication.					
Standards Monitoring	Standard	BINDVIEW		Enterprise Security Management is also accepted Standard product for this category, type & platform.	Standards Monitoring: Technology that monitors systems to ensure that EPA directives are properly implemented.					
Standards Monitoring	Standard	Enterprise Security Management		ESM: Enterprise Security Management, a Symantech product.	Standards Monitoring: Technology that monitors systems to ensure that EPA directives are properly implemented.					
System Auditing and Intrusion Detection	Standard	Audicon/BindVie w		BindView generates reports from Audicon data.	System Auditing and Intrusion Detection: Products that add to the inherent operating system's audit trail ability and real-time monitoring. Auditing support includes archiving, viewing, and reducing the data to a usable and meaningful subset.					
User Access Identification and Control	Standard	Windows NT SAM		SAM: Security Access Method	User Access Identification and Control: Performs the process of user verification and mapping of users to appropriate access levels. With proper security protocols (e.g., Kerberos) this can be done transparently after the initial user verification.					

Technology Type	Status	Product	Version	Note	Technology Type Definition
Virus Protection	Standard	AntiVirus		Norton AntiVirus software for servers includes three products:AntiVirus for File and Print, AntiVirus for Notes Domino, and AntiVirus for NT/NetWare	Virus Protection: Programs that protect against computer viruses. A computer virus is a program that literally 'infects' other programs and operating systems by changing existing code to perform undesirable functions.
		Centr	al Applicat	ion Servers (Windows) > System	Management
Automatic Inventory	Standard	ZENworks		ZENworks is a Novell Product	Automatic Inventory: A program which automatically detects the hardware and software components of desktops and servers.
Automatic Job Scheduling	Standard	Scheduler		Part of the Windows 95/98/NT/2000 operating systems.	Auto Job Scheduling: Ability to automate the initiation of work on the computer platform through the use of time-dependent computer-based routines.
Backup	Standard	ARCserve	6x		Backup: Functionality that provides for file copying on servers (and, sometimes, individual workstations) to archival media. There should be complementary programs for bringing individual files back and to replace a damaged storage device.
Backup	Standard	NetBackup			Backup: Functionality that provides for file copying on servers (and, sometimes, individual workstations) to archival media. There should be complementary programs for bringing individual files back and to replace a damaged storage device.
Problem Management	Standard	Remedy			Problem Management: Provides for the tracking and resolution of problems. Optional components include automatic detection and entry of system related problems, and ties to the platform's change management system.

Technology Type	Status	Product	Version	Note	Technology Type Definition
Resource Usage	Standard	Datalog			Resource Usage: Measurement of the utilization of computing resources by software agents usually located with the operating system.
Resource Usage	Standard	Perfmon		Part of the Windows 95/98/NT/2000 operating systems.	Resource Usage: Measurement of the utilization of computing resources by software agents usually located with the operating system.
Software Distribution	Standard	ZENworks		ZENworks is a Novell product.	Software Distribution: Functionality which provides for distribution of software (and data files) to either file servers and/or individual nodes on a network. Ideally the software will include scheduling, verification, and reporting back to the distribution center.
		Cen	tral Applic	ation Servers (Windows) > Syste	m Software
Network Operating System	Standard	Windows NT 4.0	SP 6	The Agency has approved windows NT 4.0 as a server OS and by waiver for use as a desktop OS. SP6= Service Pack 6 This technology is Program Office supported.	Network Operating System (NOS): The LAN-based network operating system. Functionality ranges from the robustness of Novell NetWare and Windows NT/2000 to basic File Management and Directory functions provided by the Unix-based NFS network operating system.
Operating System	Standard	Windows NT 4.0	SP 6		Operating System (OS): The native operating system for the hardware platform; the program that, after being initially loaded into the computer, manages all the other programs in a computer.
User Interface	Standard	Windows 95		EPA has designated the Windows 95 interface to be standard for all Windows 95 and Windows 98 users.	User Interface (UI): End user's interface with personal desktop device. Does not include consoles used to control other computer operations; also includes terminal type as related to server access.

Technology Type	Status	Product	Version	Note	Technology Type Definition					
	Distributed Application Servers (Unix/Windows) > Collaborative Computing									
Document DBMS	Standard	Domino	R5.08		Document DBMS: A database management system that allows for the storage and retrieval of free-formatted text documents.					
Document Imaging	Standard	Documentum			Document Imaging: Provides electronic storage, retrieval, and routing of images of paper documents.					
Document Management	Standard	Domino	R5.08		Document Management: Provides for configuration management of document creation, revision, and distribution.					
Scheduling	Standard	Domino Calendar	R5		Scheduling: Provides capabilities for maintenance of personnel scheduling activities. Facilitates setup of meetings while maintaining integrity of individual's schedules across multiple time zones.					
	D	istributed Appli	cation Serve	ers (Unix/Windows) > Computing	Platform Communications					
SNA Communications	Standard	SNA/SAA			SNA Communications: IBM-based software that provides communications capabilities between desktop devices and servers using SNA communications.					
SPX/IPX Communications	Standard	NCP			SPX/IPX Communications: Novell-based software that provides native communications between desktop devices and servers.					
SPX/IPX Communications	Standard	NetWare	5.x		SPX/IPX Communications: Novell-based software that provides native communications between desktop devices and servers.					
TCP/IP Communications	Standard	TCP/IP			TCP/IP Communications: Functionality that provides TCP/IP (Internet Protocol)-based communications between desktop devices and servers.					

Technology Type	Status	Product	Version	Note	Technology Type Definition						
	Distributed Application Servers (Unix/Windows) > Data Interchange										
File Compression	Standard	WinZip			File Compression: A file encoding scheme that can preserve all information while storing the data in a minimum amount of bits. Implies the existence of a compressor and decompressor.						
Printing Format Control	Standard	AFP		PCL/PostScript is also an official standard product for this category, type & platform.	Printing Format Control: Controls printing output through printing oriented software (such as Postscript).						
Printing Format Control	Standard	PCL/Postscript		Printer Control Language (PCL) from HP: PostScript Language from Adobe. AFP is also an official standard product for this category, type & platform.	Printing Format Control: Controls printing output through printing oriented software (such as Postscript).						
		Distribut	ed Applica	tion Servers (Unix/Windows) > D	ata Management						
DBMS Application Management	Standard	Oracle Developers Server			DBMS Application Management: Application Management systems allow developers to separate application logic from presentation and data logic in 3-tier applications.						
Dictionary	Standard	Oracle	8i		Dictionary: Functionality for providing information about application systems, programs, data bases, and data elements.						
File Structure	Standard	FAT 32			File Structure: The basic file format utilized by the native operating system.						

Technology Type	Status	Product	Version	Note	Technology Type Definition
File Structure	Standard	NTFS	4	NTFS (New Technology File System) - The recommended file structure for Windows NT 4.0 and Windows 2000. To retain data and system security features, NTFS is required for these systems.	File Structure: The basic file format utilized by the native operating system.
Navigational DBMS	Standard	ODBC		ODBC (Open Data Base Connectivity) - A data transfer protocol enabled by built in functions provided with database systems and with Rapid Application Development software. ODBC provides for seamless transfer of data between a DBMS and the application.	Navigational Data Base Management System (DBMS): A DBMS where the programmer specifies how to get through (navigate) the data base to find and place individual data.
RDBMS Comm Access	Standard	ODBC			RDBMS Communications Access: The applications level protocol for accessing a data base across a network.
RDBMS Comm Access	Standard	SQL*Net	8	Enabled through TCP/IP.	RDBMS Communications Access: The applications level protocol for accessing a data base across a network.
Relational Data Base Management System	Standard	Oracle	8i		Relational Data Base Management System (RDBMS): A database system built on the fundamental concept of tables. The RDBMS handles all navigation and returns a table or null for all queries.

Technology Type	Status	Product	Version	Note	Technology Type Definition					
	Distributed Application Servers (Unix/Windows) > Internet,Intranet and Extranet Information Services									
4th Generation Web Programming Language	Standard	Java	2.0		4th Generation Web Programming Language: A "high-level" programming language. A translator converts the statements of the language into machine language (e.g., for Java, the output is called bytecode, which is then converted into appropriate machine code					
Rapid Web Application Development	Standard	Cold Fusion	5		Rapid Web Application Development: RAD (Rapid Application Development) is a concept that products can be developed faster and of higher quality through re-use of software components. RAD usually embraces object-oriented programming methodology.					
Rapid Web Application Development	Standard	Domino	5		Rapid Web Application Development: RAD (Rapid Application Development) is a concept that products can be developed faster and of higher quality through re-use of software components. RAD usually embraces object-oriented programming methodology.					
Scripting Language	Standard	Javascript			Scripting Language: In the context of the Web, script languages are often written to handle forms input or other services for a Web site and are processed primarily on the Web server.					
Scripting Language	Standard	Perl			Scripting Language: In the context of the Web, script languages are often written to handle forms input or other services for a Web site and are processed primarily on the Web server.					
Web Server - Intranet-Extranet	Standard	Apache			Web Server - Intranet/Extranet: The Intranet services Web Browser requests from EPA internal users. The Extranet services Web Browser requests made to the Intranet by EPA Partner users that are external to the EPA network.					

Technology Type	Status	Product	Version	Note	Technology Type Definition
Web Server - Intranet-Extranet	Standard	IIS			Web Server - Intranet/Extranet: The Intranet services Web Browser requests from EPA internal users. The Extranet services Web Browser requests made to the Intranet by EPA Partner users that are external to the EPA network.
		Distribut	ted Applica	tion Servers (Unix/Windows) > O	ffice Automation
Electronic Publishing	Standard	Acrobat			Electronic Publishing: Provides for creation of documents in a portable format that maintains look-and-feel fidelity across heterogeneous desktop operating systems and interfaces.
Project Management	Standard	MS Project			Project Management: Provides project management capabilities such as Gantt charts and PERT charts with dependency features and includes both schedule and resource elements.
Spread Sheets	Standard	Lotus 1-2-3			Spreadsheets: Permits entry and manipulation of alphanumeric data in a column/row matrix format.
		Distributed	Applicatio	on Servers (Unix/Windows) > Scio	entific Applications
Mapping	Standard	Arc IMS	3.1		Mapping: Functionality to display spatial data on top of base-map information (e.g., roads, hydrography). These systems lack the sophisticated spatial analysis capabilities associated with GIS systems and are used at EPA to serve maps to the Internet.
Spatial Database Management System	Standard	Arc SDE	8.1		Spatial DBMS: A DBMS used in conjunction with a Geographic Information System. The system provides a means for assembling and storing data that is geographically referenced, combining visual (spatial) data with attribute information.
Spatial Database	Standard	Oracle Spatial			Spatial DBMS: A DBMS used in conjunction with a

Technology Type	Status	Product	Version	Note	Technology Type Definition
Management System					Geographic Information System: The system provides a means for assembling and storing data that is geographically referenced, combining visual (spatial) data with attribute information.
	_	Dist	ributed Ap	plication Servers (Unix/Windows	) > Security
Encryption	Standard	SSL			Encryption: Technology that transforms usable data into data that is not usable until it is transformed back via a key or password. Most encryption uses advanced algorithms with prime number keys to scramble data until it is intelligible.
Remote Access Identification & Authentication	Standard	NDS			Remote Access Identification and Authentication: Technology to provide access control and identification (see 73) for users located outside the EPA network infrastructure. This often requires more than one means of identification and authentication.
Remote Access Identification & Authentication	Standard	Notes			Remote Access Identification and Authentication: Technology to provide access control and identification (see 73) for users located outside the EPA network infrastructure. This often requires more than one means of identification and authentication.
Standards Monitoring	Standard	BINDVIEW		Enterprise Security Management is also accepted Standard product for this category, type & platform.	Standards Monitoring: Technology that monitors systems to ensure that EPA directives are properly implemented.
Standards Monitoring	Standard	Enterprise Security Management		ESM: Enterprise Security Management, a Symantech product.	Standards Monitoring: Technology that monitors systems to ensure that EPA directives are properly implemented.

Technology Type	Status	Product	Version	Note	Technology Type Definition
System Auditing and Intrusion Detection	Standard	Audicon/BindVie w		BindView generates reports from Audicon data.	System Auditing and Intrusion Detection: Products that add to the inherent operating system's audit trail ability and real-time monitoring. Auditing support includes archiving, viewing, and reducing the data to a usable and meaningful subset.
User Access Identification and Control	Standard	NDS	6/7		User Access Identification and Control: Performs the process of user verification and mapping of users to appropriate access levels. With proper security protocols (e.g., Kerberos) this can be done transparently after the initial user verification.
User Access Identification and Control	Standard	Notes	R5		User Access Identification and Control: Performs the process of user verification and mapping of users to appropriate access levels. With proper security protocols (e.g., Kerberos) this can be done transparently after the initial user verification.
Virus Protection	Standard	AntiVirus		Norton AntiVirus software for servers includes three products:AntiVirus for File and Print, AntiVirus for Notes Domino, and AntiVirus for NT/NetWare	Virus Protection: Programs that protect against computer viruses. A computer virus is a program that literally 'infects' other programs and operating systems by changing existing code to perform undesirable functions.
	-	Distribute	d Applicati	on Servers (Unix/Windows) > Sys	stem Management
Automatic Inventory	Standard	GASP			Automatic Inventory: A program which automatically detects the hardware and software components of desktops and servers.
Automatic Job Scheduling	Standard	Scheduler		Part of the Windows 95/98/NT/2000 operating systems	Auto Job Scheduling: Ability to automate the initiation of work on the computer platform through the use of time-dependent computer-based routines

Technology Type	Status	Product	Version	Note	Technology Type Definition
Backup	Standard	ARCserve	6x		Backup: Functionality that provides for file copying on servers (and, sometimes, individual workstations) to archival media. There should be complementary programs for bringing individual files back and to replace a damaged storage device.
Backup	Standard	Backup Exec		Veritas Backup Exec is not used for NetWare or Windows NT/2000 backup.	Backup: Functionality that provides for file copying on servers (and, sometimes, individual workstations) to archival media. There should be complementary programs for bringing individual files back and to replace a damaged storage device.
Problem Management	Standard	Remedy			Problem Management: Provides for the tracking and resolution of problems. Optional components include automatic detection and entry of system related problems, and ties to the platform's change management system.
Resource Usage	Standard	NetWare			Resource Usage: Measurement of the utilization of computing resources by software agents usually located with the operating system.
Resource Usage	Standard	Perfmon		Part of the Windows 95/98/NT/2000 operating systems.	Resource Usage: Measurement of the utilization of computing resources by software agents usually located with the operating system.
Software Distribution	Standard	ZENworks		ZENworks is a Novell product.	Software Distribution: Functionality which provides for distribution of software (and data files) to either file servers and/or individual nodes on a network. Ideally the software will include scheduling, verification, and reporting back to the distribution center.

Technology Type	Status	Product	Version	Note	Technology Type Definition			
	Distributed Application Servers (Unix/Windows) > System Software							
Network Operating System	Standard	NetWare	4/5		Network Operating System (NOS): The LAN-based network operating system. Functionality ranges from the robustness of Novell NetWare and Windows NT/2000 to basic File Management and Directory functions provided by the Unix-based NFS network operating system.			
Network Operating System	Standard	Windows NT 4.0	SP 6	The Agency has approved windows NT 4.0 as a server OS and by waiver for use as a desktop OS. SP6= Service Pack 6 This technology is Program Office supported.	Network Operating System (NOS): The LAN-based network operating system. Functionality ranges from the robustness of Novell NetWare and Windows NT/2000 to basic File Management and Directory functions provided by the Unix-based NFS network operating system.			
Operating System	Standard	Unix		A variety of Unix-based systems are deployed throughout the Agency, the most common being Sun,running Solaris. Silicon Graphics platforms, which run IRIX, RS-6000 and SP2 systems running AIX, and Linux. The most common desktop Unix systems are Solaris and	Operating System (OS): The native operating system for the hardware platform; the program that, after being initially loaded into the computer, manages all the other programs in a computer.			
Operating System	Standard	Windows NT 4.0	SP 6		Operating System (OS): The native operating system for the hardware platform; the program that, after being initially loaded into the computer, manages all the other programs in a computer.			

Technology Type	Status	Product	Version	Note	Technology Type Definition
User Interface	Standard	Windows 95			User Interface (UI): End user's interface with personal desktop device. Does not include consoles used to control other computer operations; also includes terminal type as related to server access.
User Interface	Standard	X-Windows			User Interface (UI): End user's interface with personal desktop device. Does not include consoles used to control other computer operations; also includes terminal type as related to server access.
		Enterpri	se Server >	Application System Developmer	nt Support Tools
3rd Generation Programming Language	Standard	C++		MVS, COBOL 2.1 and Fortran 90 are also accepted Target products for this category, type & platform.	3rd Generation Programming Languages: A procedural language used to describe operations on individual data elements. These languages include COBOL, FORTRAN, C, BASIC etc.
3rd Generation Programming Language	Standard	Fortran	2.6	C++ ,COBOL 2.1 and MVS are also accepted Standard products for this category, type & platform.	3rd Generation Programming Languages: A procedural language used to describe operations on individual data elements. These languages include COBOL, FORTRAN, C, BASIC etc.
3rd Generation Programming Language	Standard	MVS COBOL	2.1	C++, MVS and Fortran 90 are also accepted Target products for this category, type & platform.	3rd Generation Programming Languages: A procedural language used to describe operations on individual data elements. These languages include COBOL, FORTRAN, C, BASIC etc.
CASE	Standard	Cool:Gen	4		CASE: Computer Assisted Software Engineering. Software tools designed to aid a programmer in code re-use and in following various programming methodologies. Upper CASE refers to tools aimed at the design process; lower CASE targets programming.

Technology Type	Status	Product	Version	Note	Technology Type Definition					
Code Management	Standard	Endeavor	3.8		Code Management: Supports the automated tracking and assembly of source code developed by groups of programmers.					
SQL Development Tools	Standard	Platinum Report Facility	4.01		SQL Development Tools: pre-compilers and tools that generate static SQL (Structured Query Language) for use with third generation programming languages; allows developers to build database applications by dynamic generation of SQL.					
	Enterprise Server > Collaborative Computing									
Document Management	Standard	BookManager			Document Management: Provides for configuration management of document creation, revision, and distribution.					
E-Mail	Standard	SMTP-based		Operates on IBM mainframe platform. It is classified as Legacy, based on lack of X.400	Email: Electronic messaging capability including receiving folders, mail agents, attachment processing, and encryption.					
		Ent	erprise Se	rver > Computing Platform Comm	nunications					
SNA Communications	Standard	VTAM			SNA Communications: IBM-based software that provides communications capabilities between desktop devices and servers using SNA communications.					
TCP/IP Communications	Standard	TCP/IP			TCP/IP Communications: Functionality that provides TCP/IP (Internet Protocol)-based communications between desktop devices and servers.					
			Ent	erprise Server > Data Interchang	e					
Electronic Data Interchange	Standard	IBM EDI			Electronic Data Interchange (EDI): Ability to conduct financial transactions electronically between separate organizations.					
File Transfer	Standard	FTP			File Transfer: Transfer of files between two computer-based devices.					
Technology Type	Status	Product	Version	Note	Technology Type Definition					
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Enterprise Server > Data Management										
Data Warehouse	Standard	DB2	v 5	Oracle is also an accepted standard product for this category, type & platform.	Data Warehouse: An implementation of a DBMS (or series of DBMSs) specifically targeted for non-changing historical data. They include special tools for summarizing and characterizing historical data.					
Data Warehouse	Standard	Oracle	9i	DB2 is also an accepted standard product for this category, type & platform.	Data Warehouse: An implementation of a DBMS (or series of DBMSs) specifically targeted for non-changing historical data. They include special tools for summarizing and characterizing historical data.					
DBMS Transaction Proc. Monitor	Standard	CICS/TS	1.2		DBMS Transition Processing Monitor: A central program that ensures the atomicity of a transaction (single logical query and/or update). The program restores the data base to its last state if a transaction fails.					
Dictionary	Standard	DB2	v 5	Oracle is also an accepted Standard product for this category, type & platform.	Dictionary: Functionality for providing information about application systems, programs, data bases, and data elements.					
Dictionary	Standard	Oracle	9i	DB2 is also an accepted Standard product for this category, type & platform.	Dictionary: Functionality for providing information about application systems, programs, data bases, and data elements.					
File Structure	Standard	PDS		VSAM and QSAM are also accepted standard products for this category, type & platform.	File Structure: The basic file format utilized by the native operating system.					
File Structure	Standard	QSAM		PDS and VSAM are also accepted standard products for this category, type & platform.	File Structure: The basic file format utilized by the native operating system.					
File Structure	Standard	VSAM		PDS and QSAM are also accepted standard products for this category, type & platform.	File Structure: The basic file format utilized by the native operating system.					

Technology Type	Status	Product	Version	Note	Technology Type Definition
Navigational DBMS Access to Mainframe	Standard	SAS Access			Navigational DBMS Access to Mainframe: Tools that can provide non-SQL data bases residing on IBM mainframes with client server connectivity and functionality.
Navigational Front-end to Mainframe	Standard	Natural	3.1.4	Focus is also an accepted standard product for this category, type & platform.	Navigational Front-end to Mainframe: The ability to access data contained in mainframe-resident navigational DBMS with user-friendly desktop device formats.
RDBMS Comm Access	Standard	Oracle Transparent Gateway	8.0.4	Oracle Transparent Gateway for DB2 is a mainframe-based product that allows SQL-based read/write access to DB2 for the OS/390. Transparent gateways are most commonly used to enable access to non-Oracle data sources as if they are Oracle databases.	RDBMS Communications Access: The applications level protocol for accessing a data base across a network.
RDBMS Comm Access	Standard	SQL*Net	1.1.1	Oracle Procedural Gateway and Oracle Transparent Gateway are also accepted Standard products for this category, type & platform.	RDBMS Communications Access: The applications level protocol for accessing a data base across a network.
Relational Data Base Management System	Standard	DB2	v 5	Oracle is also an accepted Standard for this category, type & platform.	Relational Data Base Management System (RDBMS): A database system built on the fundamental concept of tables. The RDBMS handles all navigation and returns a table or null for all queries.
Relational Data Base Management System	Standard	Oracle	9i	DB2 is also an accepted Standard for this category, type & platform.	Relational Data Base Management System (RDBMS): A database system built on the fundamental concept of tables. The RDBMS handles all navigation and returns a table or null for all gueries.

Technology Type	Status	Product	Version	Note	Technology Type Definition						
	Enterprise Server > Graphics Formatting										
Files	Standard	CGM		GDDM is also an accepted Standard product for this category, type & platform. CGM = Computer Graphics Metafile (vector based) GDDM = Graphical Data Display Manager (IBM)	Graphics Screen/File Formats: The protocol for putting bitmapped or vector graphics onto the computer screen; the file format recommended for saving graphics images.						
Files	Standard	GDDM		CGM is also an accepted Standard product for this category, type & platform. GDDM = Graphical Data Display Manager (IBM) CGM = Computer Graphics Metafile (vector based)	Graphics Screen/File Formats: The protocol for putting bitmapped or vector graphics onto the computer screen; the file format recommended for saving graphics images.						
		Enterprise	e Server > I	nternet,Intranet and Extranet Info	ormation Services						
3270 Client	Standard	Host on Demand			3270 Client: A TCP/IP based 3270 (mainframe) terminal emulator. Used over the Internet instead of an SNA based emulator.						
3270 Client	Standard	TN3270			3270 Client: A TCP/IP based 3270 (mainframe) terminal emulator. Used over the Internet instead of an SNA based emulator.						
Scripting Language	Standard	Javascript			Scripting Language: In the context of the Web, script languages are often written to handle forms input or other services for a Web site and are processed primarily on the Web server.						
Scripting Language	Standard	Perl			Scripting Language: In the context of the Web, script languages are often written to handle forms input or other services for a Web site and are processed primarily on the Web server.						

Technology Type	Status	Product	Version	Note	Technology Type Definition					
Web Server - Internet	Standard	Websphere			Web Server - Internet: The Web server responds to Web Browser requests and provides several different ways to forward a request to an application server and/or to forward back a Web page to the user's Web Browser. Internet is for servicing public users.					
	Enterprise Server > Office Automation									
Presentation/Business Graphics	Standard	SAS Graph			Presentation/Business Graphics: Provides graphics/charts for use in formal reviews and slide shows.					
			Enterp	rise Server > Scientific Application	ons					
Data Analysis	Standard	SAS			Data Analysis: Provides statistical analysis of data and produces reports/graphics based on default parameters.					
Mapping	Standard	SAS Graph			Mapping: Functionality to display spatial data on top of base-map information (e.g., roads, hydrography). These systems lack the sophisticated spatial analysis capabilities associated with GIS systems and are used at EPA to serve maps to the Internet.					
Scientific Graphics	Standard	SAS Graph			Scientific Graphics: Provides functionality to display graphics with the particular characteristics required for scientific applications.					

Technology Type	Status	Product	Version	Note	Technology Type Definition
				Enterprise Server > Security	
Remote Access Identification & Authentication	Standard	TSSMS			Remote Access Identification and Authentication: Technology to provide access control and identification (see 73) for users located outside the EPA network infrastructure. This often requires more than one means of identification and authentication.
Standards Monitoring	Standard	Consul Audit			Standards Monitoring: Technology that monitors systems to ensure that EPA directives are properly implemented.
Standards Monitoring	Standard	Janus			Standards Monitoring: Technology that monitors systems to ensure that EPA directives are properly implemented.
System Auditing and Intrusion Detection	Standard	CA/Exam		RACF is also an accepted Standard product for this category, type & platform.	System Auditing and Intrusion Detection: Products that add to the inherent operating system's audit trail ability and real-time monitoring. Auditing support includes archiving, viewing, and reducing the data to a usable and meaningful subset.
System Auditing and Intrusion Detection	Standard	RACF		CA/EXAM is also an accepted Standard product for this category, type & platform.	System Auditing and Intrusion Detection: Products that add to the inherent operating system's audit trail ability and real-time monitoring. Auditing support includes archiving, viewing, and reducing the data to a usable and meaningful subset.

Technology Type	Status	Product	Version	Note	Technology Type Definition
User Access Identification and Control	Standard	RACF			User Access Identification and Control: Performs the process of user verification and mapping of users to appropriate access levels. With proper security protocols (e.g., Kerberos) this can be done transparently after the initial user verification.
User Access Identification and Control	Standard	TSSMS			User Access Identification and Control: Performs the process of user verification and mapping of users to appropriate access levels. With proper security protocols (e.g., Kerberos) this can be done transparently after the initial user verification.
			Enter	prise Server > System Manager	nent
Automatic Job Scheduling	Standard	Jobtrac	3.5		Auto Job Scheduling: Ability to automate the initiation of work on the computer platform through the use of time-dependent computer-based routines.
Backup	Standard	ASM2		HSM/SMS is also an accepted Standard product for this category, type & platform.	Backup: Functionality that provides for file copying on servers (and, sometimes, individual workstations) to archival media. There should be complementary programs for bringing individual files back and to replace a damaged storage device.
Backup	Standard	HSM/SMS		ASM2 is also an accepted Standard product for this category, type & platform.	Backup: Functionality that provides for file copying on servers (and, sometimes, individual workstations) to archival media. There should be complementary programs for bringing individual files back and to replace a damaged storage device.
Capacity Planning	Standard	Best/1	5.1	MICS is also an accepted Standard product for this category, type & platform.	Capacity Planning: Predicting usage of computer resources to safe operational limits, based on use of modeling tools with specified service levels.

Technology Type	Status	Product	Version	Note	Technology Type Definition
Capacity Planning	Standard	MICS	1.1	Best/1 Data Center is also an accepted Standard product for this category, type & platform.	Capacity Planning: Predicting usage of computer resources to safe operational limits, based on use of modeling tools with specified service levels.
Correlation Engine	Standard	Omegamon	v 500	TMON is also accepted Standard products for this category, type & platform.	Correlation Engine: An add-on to a network or system management framework that implements rules activated by multiple events. These engines are used to determine (based on user defined programs or tables) the root cause of a problem with several symptoms
Correlation Engine	Standard	TMON	2.2	Omegamon is also accepted Standard products for this category, type & platform.	Correlation Engine: An add-on to a network or system management framework that implements rules activated by multiple events. These engines are used to determine (based on user defined programs or tables) the root cause of a problem with several symptoms
Fault Detection/Alerts Monitoring	Standard	Netview		Omegamon and TMON/CICS are also approved Standard products for this category, type & platform.	Fault Detection/Alerts Monitoring: Ability to detect faults, provide alerts, and monitor ongoing status of servers and network devices.
Fault Detection/Alerts Monitoring	Standard	Omegamon		Netview and TMON/CICS are also accepted Standard products for this category, type & platform.	Fault Detection/Alerts Monitoring: Ability to detect faults, provide alerts, and monitor ongoing status of servers and network devices.
Fault Detection/Alerts Monitoring	Standard	TMON/CICS		Netview and Omegamon are also accepted Standard products for this category, type & platform.	Fault Detection/Alerts Monitoring: Ability to detect faults, provide alerts, and monitor ongoing status of servers and network devices.
Management Agents	Standard	Omegamon	v 500	RMF and TMON are also accepted Standard products for this category, type & platform.	Management Agents: A program or process that lives on a distributed system and feeds health and status information back to a central monitor. May, optionally, be able to take corrective action under the control of the central management system.

Technology Type	Status	Product	Version	Note	Technology Type Definition
Management Agents	Standard	TMON	2.2	RMF and Omegamon are also accepted Standard products for this category, type & platform.	Management Agents: A program or process that lives on a distributed system and feeds health and status information back to a central monitor. May, optionally, be able to take corrective action under the control of the central management system.
Management Console	Standard	Omegamon	v 500	TMON is also accepted Standard products for this category, type & platform.	Management Console: A program that displays the status of multiple (distributed) systems, based on the system management framework.
Management Console	Standard	TMON	2.2		Management Console: A program that displays the status of multiple (distributed) systems, based on the system management framework.
Problem Management	Standard	Remedy	5.1	Remedy is provided on the mainframe via a gateway to Unix where it resides.	Problem Management: Provides for the tracking and resolution of problems. Optional components include automatic detection and entry of system related problems, and ties to the platform's change management system.
Resource Usage	Standard	MICS	1.1	SMF and STARS are also accepted Standard products for this category, type & platform.	Resource Usage: Measurement of the utilization of computing resources by software agents usually located with the operating system.
Resource Usage	Standard	SMF		In OS refers to the fact that the functionality is an inherent part of the operating system.	Resource Usage: Measurement of the utilization of computing resources by software agents usually located with the operating system.
Resource Usage	Standard	STARS		MICS and SMF are also accepted Standard products for this category, type & platform.	Resource Usage: Measurement of the utilization of computing resources by software agents usually located with the operating system.

Technology Type	Status	Product	Version	Note	Technology Type Definition					
	Enterprise Server > System Software									
Operating System	Standard	OS/390			Operating System (OS): The native operating system for the hardware platform; the program that, after being initially loaded into the computer, manages all the other programs in a computer.					
User Interface	Standard	TSO/ISPF			User Interface (UI): End user's interface with personal desktop device. Does not include consoles used to control other computer operations; also includes terminal type as related to server access.					
		High Performa	ince Comp	uters > Application System Devel	opment Support Tools					
3rd Generation Programming Language	Standard	Fortran 90		COBOL is also an accepted Target product for this category, type & platform.	3rd Generation Programming Languages: A procedural language used to describe operations on individual data elements. These languages include COBOL, FORTRAN, C, BASIC etc.					
Code Management	Standard	CVS			Code Management: Supports the automated tracking and assembly of source code developed by groups of programmers.					
Development Library (Subroutine Library)	Standard	NCAR		IMSL are also accepted Standard products for this category, type & platform.	Development Libraries (Subroutine Libraries): A collection of subroutines, such as scientific graphic routines, which can be accessed and used by the application developer.					
		Hiç	gh Perform	ance Computers > Collaborative	Computing					
E-Mail	Standard	SMTP-based			Email: Electronic messaging capability including receiving folders, mail agents, attachment processing, and encryption.					
		High Perf	iormance C	omputers > Computing Platform	Communications					
TCP/IP Communications	Standard	TCP/IP			TCP/IP Communications: Functionality that provides TCP/IP (Internet Protocol)-based communications between desktop devices and servers.					

Technology Type	Status	Product	Version	Note	Technology Type Definition
			High Perfe	ormance Computers > Data Inter	change
File Compression	Standard	compress			File Compression: A file encoding scheme that can preserve all information while storing the data in a minimum amount of bits. Implies the existence of a compressor and decompressor.
File Transfer	Standard	FTP		Net CDF is also an accepted Standard product for this category, type & platform.	File Transfer: Transfer of files between two computer-based devices.
Printing Format Control	Standard	PostScript			Printing Format Control: Controls printing output through printing oriented software (such as Postscript).
	-		High Perfo	ormance Computers > Data Mana	gement
File Structure	Standard	Cray C1			File Structure: The basic file format utilized by the native operating system.
File Structure	Standard	JFS			File Structure: The basic file format utilized by the native operating system.
File Structure	Standard	Unix File System			File Structure: The basic file format utilized by the native operating system.
		ŀ	ligh Perfor	mance Computers > Graphics Fo	ormatting
Files	Standard	X/CGM		X = X11, a standard from Project Athena	Graphics Screen/File Formats: The protocol for putting bitmapped or vector graphics onto the computer screen; the file format recommended for saving graphics images.
	T	High Performan	ce Comput	ers > Internet,Intranet and Extrar	net Information Services
		NA			

Technology Type	Status	Product	Version	Note	Technology Type Definition
		Hi	igh Perforn	nance Computers > Scientific Ap	plications
Scientific Visualization Tools	Standard	Gaussian 98		Application Visualization System. Also includes AMBER, CHARMm22, DISCOVER, DMol, MOPAC, AMSOL.	Scientific Visualization Tools: Permits graphical display of complex data in creative formats with multiple attributes. Particularly useful for time-based scientific data in three (or more) dimensions.
	_		High	Performance Computers > Secur	ity
Standards Monitoring	Standard	AIX			Standards Monitoring: Technology that monitors systems to ensure that EPA directives are properly implemented.
Standards Monitoring	Standard	UNICOS/mk			Standards Monitoring: Technology that monitors systems to ensure that EPA directives are properly implemented.
System Auditing and Intrusion Detection	Standard	AIX			System Auditing and Intrusion Detection: Products that add to the inherent operating system's audit trail ability and real-time monitoring. Auditing support includes archiving, viewing, and reducing the data to a usable and meaningful subset.
System Auditing and Intrusion Detection	Standard	UNICOS/mk			System Auditing and Intrusion Detection: Products that add to the inherent operating system's audit trail ability and real-time monitoring. Auditing support includes archiving, viewing, and reducing the data to a usable and meaningful subset.
User Access Identification and Control	Standard	AIX			User Access Identification and Control: Performs the process of user verification and mapping of users to appropriate access levels. With proper security protocols (e.g., Kerberos) this can be done transparently after the initial user verification.
User Access	Standard	UNICOS/mk			User Access Identification and Control: Performs the process

Technology Type	Status	Product	Version	Note	Technology Type Definition
Identification and Control					of user verification and mapping of users to appropriate access levels. With proper security protocols (e.g., Kerberos) this can be done transparently after the initial user verification.
		ŀ	ligh Perfor	mance Computers > System Mar	nagement
Automatic Job Scheduling	Standard	Load Leveler			Auto Job Scheduling: Ability to automate the initiation of work on the computer platform through the use of time-dependent computer-based routines.
Automatic Job Scheduling	Standard	NQS			Auto Job Scheduling: Ability to automate the initiation of work on the computer platform through the use of time-dependent computer-based routines.
Backup	Standard	Cray Reel		Dmp/Rstr is also an accepted Standard product for this category, type & platform.	Backup: Functionality that provides for file copying on servers (and, sometimes, individual workstations) to archival media. There should be complementary programs for bringing individual files back and to replace a damaged storage device.
Backup	Standard	Dmp/Rstr		Cray Reel is also an accepted Standard product for this category, type & platform.	Backup: Functionality that provides for file copying on servers (and, sometimes, individual workstations) to archival media. There should be complementary programs for bringing individual files back and to replace a damaged storage device.
Backup	Standard	mksysb			Backup: Functionality that provides for file copying on servers (and, sometimes, individual workstations) to archival media. There should be complementary programs for bringing individual files back and to replace a damaged storage device.

Technology Type	Status	Product	Version	Note	Technology Type Definition
Configuration Management	Standard	My SQL		My SQL is used for configuration management of all NESC/SVC systems. The database program does not run on the supercomputers, however.	Configuration Management: Functionality that provides for the tracking of hardware, software, and network configurations. ; The software (often, a DBMS application) should support versioning (before and after configurations) and track dependencies.
Problem Management	Standard	Remedy			Problem Management: Provides for the tracking and resolution of problems. Optional components include automatic detection and entry of system related problems, and ties to the platform's change management system.
Resource Usage	Standard	AIX			Resource Usage: Measurement of the utilization of computing resources by software agents usually located with the operating system.
Resource Usage	Standard	UNICOS/mk			Resource Usage: Measurement of the utilization of computing resources by software agents usually located with the operating system.
			High Perf	ormance Computers > System So	oftware
Operating System	Standard	AIX			Operating System (OS): The native operating system for the hardware platform; the program that, after being initially loaded into the computer, manages all the other programs in a computer.
Operating System	Standard	UNICOS/mk			Operating System (OS): The native operating system for the hardware platform; the program that, after being initially loaded into the computer, manages all the other programs in a computer.
User Interface	Standard	X Windows		The Supercomputers support x windows or telnet clients through a text- based user interface.	User Interface (UI): End user's interface with personal desktop device. Does not include consoles used to control other computer operations; also includes terminal type as related to server access.

Technology Type	Status	Product	Version	Note	Technology Type Definition						
	PC (Windows) > Application System Development Support Tools										
4th Generation Programming Language	Standard	Visual C++			4th Generation Programming Languages: Originally a non-procedural language used to describe manipulation of groups of data or objects. Now frequently also applied to procedural languages dealing with classes of data objects.						
CASE	Standard	Cool:Gen	5.1	Standard products include Oracle Designer 6i,, Cool:Gen, Lotus Notes.	CASE: Computer Assisted Software Engineering. Software tools designed to aid a programmer in code re-use and in following various programming methodologies. Upper CASE refers to tools aimed at the design process; lower CASE targets programming.						
CASE	Standard	Designer	6i	Standard products include Oracle Designer 6i,, Cool:Gen, Lotus Notes.	CASE: Computer Assisted Software Engineering. Software tools designed to aid a programmer in code re-use and in following various programming methodologies. Upper CASE refers to tools aimed at the design process; lower CASE targets programming.						
Code Management	Standard	PVCS		PVCS: includes Version Manager, Version Tracker and Configuration Builder.	Code Management: Supports the automated tracking and assembly of source code developed by groups of programmers.						
End User Tools	Standard	Oracle Reports/Discover er			End-User Tools: this type is for the advanced non-programmer who develops personal applications. The tools address screen presentation, SQL generation, and report preparation.						
O-O Development	Standard	Powerbuilder			Object Oriented Development: Development tools that provide the ability to construct software out of standard reusable components, referred to as objects. Objects are software packages that contain related data & procedures.						

Technology Type	Status	Product	Version	Note	Technology Type Definition
SQL Development Tools	Standard	Developer	9i	Powerbuilder is also an accepted Interim product for this category, type & platform.	SQL Development Tools: pre-compilers and tools that generate static SQL (Structured Query Language) for use with third generation programming languages; allows developers to build database applications by dynamic generation of SQL.
SQL Development Tools	Standard	Powerbuilder		Developer 9i is also an accepted Interim product for this category, type & platform.	SQL Development Tools: pre-compilers and tools that generate static SQL (Structured Query Language) for use with third generation programming languages; allows developers to build database applications by dynamic generation of SQL.
			PC (W	/indows) > Collaborative Comput	ing
Document DBMS	Standard	Notes	R5.08		Document DBMS: A database management system that allows for the storage and retrieval of free-formatted text documents.
Document Imaging	Standard	Documentum			Document Imaging: Provides electronic storage, retrieval, and routing of images of paper documents.
Document Management	Standard	Notes	R 5.08		Document Management: Provides for configuration management of document creation, revision, and distribution.
E-Mail	Standard	Notes	R 5.08		Email: Electronic messaging capability including receiving folders, mail agents, attachment processing, and encryption.
Forms Design	Standard	Acrobat			Forms Design: Provides the ability to design various forms for subsequent Agency-wide use.
Forms Design	Standard	Notes	R5		Forms Design: Provides the ability to design various forms for subsequent Agency-wide use.

Technology Type	Status	Product	Version	Note	Technology Type Definition
Scheduling	Standard	Notes Calendar	R5		Scheduling: Provides capabilities for maintenance of personnel scheduling activities. Facilitates setup of meetings while maintaining integrity of individual's schedules across multiple time zones.
	_	. P(	C (Window	s) > Computing Platform Commu	inications
SNA Communications	Standard	Host On Demand		TCP/IP is also an accepted Standard for this software category, software type and platform.	SNA Communications: IBM-based software that provides communications capabilities between desktop devices and servers using SNA communications.
SNA Communications	Standard	TCP/IP		Host On Demand is also an accepted Standard for this software category, software type and platform.	SNA Communications: IBM-based software that provides communications capabilities between desktop devices and servers using SNA communications.
SPX/IPX Communications	Standard	NCP			SPX/IPX Communications: Novell-based software that provides native communications between desktop devices and servers.
SPX/IPX Communications	Standard	NetWare	5.x		SPX/IPX Communications: Novell-based software that provides native communications between desktop devices and servers.
TCP/IP Communications	Standard	NCP			TCP/IP Communications: Functionality that provides TCP/IP (Internet Protocol)-based communications between desktop devices and servers.
TCP/IP Communications	Standard	TCP/IP			TCP/IP Communications: Functionality that provides TCP/IP (Internet Protocol)-based communications between desktop devices and servers.

Technology Type	Status	Product	Version	Note	Technology Type Definition
			P	C (Windows) > Data Interchange	
Electronic Data Interchange	Standard	XML		XML (Extensible Markup Language) is a Hyper Text language supported by newer Web browsers, office automation software, and publishing software.	Electronic Data Interchange (EDI): Ability to conduct financial transactions electronically between separate organizations.
File Compression	Standard	WinZip			File Compression: A file encoding scheme that can preserve all information while storing the data in a minimum amount of bits. Implies the existence of a compressor and decompressor.
File Transfer	Standard	WinFTP			File Transfer: Transfer of files between two computer-based devices.
Micro-Mainframe Link	Standard	WinFTP			Micro-Mainframe Link: Transfer of files between large computing facilities and desktop devices.
Printing Format Control	Standard	PCL/Postscript		Printer Control Language (PCL) from HP: PostScript Language from Adobe.	Printing Format Control: Controls printing output through printing oriented software (such as Postscript).
Data Warehouse	Standard	Oracle	8i		Data Warehouse: An implementation of a DBMS (or series of DBMSs) specifically targeted for non-changing historical data. They include special tools for summarizing and characterizing historical data.
		-	PC	(Windows) > Data Management	
Data Warehouse	Standard	SAS			Data Warehouse: An implementation of a DBMS (or series of DBMSs) specifically targeted for non-changing historical data. They include special tools for summarizing and characterizing historical data.

Technology Type	Status	Product	Version	Note	Technology Type Definition
DBMS Application Management	Standard	Oracle Lite			DBMS Application Management: Application Management systems allow developers to separate application logic from presentation and data logic in 3-tier applications.
File Structure	Standard	FAT 32			File Structure: The basic file format utilized by the native operating system.
File Structure	Standard	NTFS	4	NTFS (New Technology File System) - The recommended file structure for Windows NT 4.0 and Windows 2000. To retain data and system security features, NTFS is required for these systems.	File Structure: The basic file format utilized by the native operating system.
Navigational DBMS	Standard	ODBC		ODBC (Open Data Base Connectivity) - A data transfer protocol enabled by built in functions provided with database systems and with Rapid Application Development software. ODBC provides for seamless transfer of data between a DBMS and the application.	Navigational Data Base Management System (DBMS): A DBMS where the programmer specifies how to get through (navigate) the data base to find and place individual data.
Navigational DBMS Access to Mainframe	Standard	SAS Access			Navigational DBMS Access to Mainframe: Tools that can provide non-SQL data bases residing on IBM mainframes with client server connectivity and functionality.
RDBMS Comm Access	Standard	SQL*Net	8	Enabled through TCP/IP.	RDBMS Communications Access: The applications level protocol for accessing a data base across a network.

Technology Type	Status	Product	Version	Note	Technology Type Definition					
Relational Data Base Management System	Standard	Approach			Relational Data Base Management System (RDBMS): A database system built on the fundamental concept of tables. The RDBMS handles all navigation and returns a table or null for all queries.					
Relational Data Base Management System	Standard	Oracle	8i PE		Relational Data Base Management System (RDBMS): A database system built on the fundamental concept of tables. The RDBMS handles all navigation and returns a table or null for all queries.					
	PC (Windows) > Graphics Formatting									
Files	Standard	BMP		BMP = Windows Bitmap	Graphics Screen/File Formats: The protocol for putting bitmapped or vector graphics onto the computer screen; the file format recommended for saving graphics images.					
Files	Standard	GIF		GIF = Graphics Image Format	Graphics Screen/File Formats: The protocol for putting bitmapped or vector graphics onto the computer screen; the file format recommended for saving graphics images.					
Files	Standard	JPEG		JPEG = Joint Photographic Enhancement Group, a poor compression of CGM	Graphics Screen/File Formats: The protocol for putting bitmapped or vector graphics onto the computer screen; the file format recommended for saving graphics images.					
Files	Standard	MPEG		MPEG = A moving JPEG (Joint Photographic Enhancement Group)	Graphics Screen/File Formats: The protocol for putting bitmapped or vector graphics onto the computer screen; the file format recommended for saving graphics images.					
Screen Emulation	Standard	eXceed		eXceed provides X Windows (Unix windows) functionality for PC Windows operating systems.	Screen Emulation: A program on the Desktop system that allows it to mimic a non-native user interface, i.e., the user interface of a different computer operating system.					

Technology Type	Status	Product	Version	Note	Technology Type Definition						
	PC (Windows) > Internet,Intranet and Extranet Information Services										
3270 Client	Standard	Host on Demand		Access to EPA computer systems from external environments (non-EPA networks) requires the use of SecuRemote software. Dynacomm Version 8 is also an accepted standard for a 3270 Client.	3270 Client: A TCP/IP based 3270 (mainframe) terminal emulator. Used over the Internet instead of an SNA based emulator.						
4th Generation Web Programming Language	Standard	Java	2.0		4th Generation Web Programming Language: A "high-level" programming language. A translator converts the statements of the language into machine language (e.g., for Java, the output is called bytecode, which is then converted into appropriate machine code						
FTP	Standard	Windows 9x/2000		FTP is available as part of the Windows operating systems. In Windows 95, it is available only as a text based utility in DOS. Access to EPA computer systems from external environments (non-EPA networks) requires the use of SecuRemote software.	FTP: (File Transfer Protocol) is the traditional method for uploading or downloading files to and from a computer via the Internet.						
HTML Editor	Standard	Composer			HTML Editor: Application that facilitates HTML (Hyper Text Markup Language) editing and coding for the Web programmer.						
News	Standard	Netscape Navigator	4/5/6		News: A client for reading UseNet format news. EPA provides an internal UseNet feed Comp.* groups and some EPA.* newsgroups						

Technology Type	Status	Product	Version	Note	Technology Type Definition
Rapid Web Application Development	Standard	Cold Fusion Studio	4.5		Rapid Web Application Development: RAD (Rapid Application Development) is a concept that products can be developed faster and of higher quality through re-use of software components. RAD usually embraces object-oriented programming methodology.
Rapid Web Application Development	Standard	Domino Designer	5		Rapid Web Application Development: RAD (Rapid Application Development) is a concept that products can be developed faster and of higher quality through re-use of software components. RAD usually embraces object - oriented programming methodology.
Scripting Language	Standard	Windows SH	v 1.2	Provided as part of Windows 98 SE desktop operating system.	Scripting Language: In the context of the Web, script languages are often written to handle forms input or other services for a Web site and are processed primarily on the Web server.
Telnet	Standard	Windows 9x/2000		Access to EPA computer systems from external environments (non-EPA networks) requires the use of SecuRemote software.	Telnet: Telnet connects a desktop computer to a remote host computer through the Internet protocol.
Web Browser	Standard	Netscape Navigator	4/5/6		Web Browser: A client program that uses the Hyper Text Transfer Protocol (HTTP) to make requests of Web servers throughout the Internet on behalf of the browser user.
Web Server - Internet	Standard	See Note		Security Violation: The Desktop and Scientific Open System Workstation platforms should not be used as a Web server for the Internet. Windows NT and Windows 2000 Personal Web Server should be de-installed.	Web Server - Internet: The Web server responds to Web Browser requests and provides several different ways to forward a request to an application server and/or to forward back a Web page to the user's Web Browser. Internet is for servicing public users.

Technology Type	Status	Product	Version	Note	Technology Type Definition
Web Server - Intranet-Extranet	Standard	See Note		Potential Security Violation: The Desktop and Scientific Open System Workstation platforms may be used as Web servers for the Intranet by waiver only.	Web Server - Intranet/Extranet: The Intranet services Web Browser requests from EPA internal users. The Extranet services Web Browser requests made to the Intranet by EPA Partner users that are external to the EPA network.
			PC	C (Windows) > Office Automation	
Electronic Publishing	Standard	Acrobat			Electronic Publishing: Provides for creation of documents in a portable format that maintains look-and-feel fidelity across heterogeneous desktop operating systems and interfaces.
ListServe	Standard	Notes Mail	R5		ListServe: Functionality to push information to the desktop computer through the Email system.
Presentation/Business Graphics	Standard	PowerPoint	97/2000	A central Agency license or purchase agreement is not currently available. Help Desk support will be available. Approved for co-existence with the other standard Agency technology.	Presentation/Business Graphics: Provides graphics/charts for use in formal reviews and slide shows.
Presentation/Business Graphics	Standard	Freelance	8/9	A central Agency license is available.	Presentation/Business Graphics: Provides graphics/charts for use in formal reviews and slide shows.
Project Management	Standard	MS Project		Program Office Supported: allowed by using the Agency's standard configuration. A central Agency license or purchase agreement is not available. Help Desk support may not be	Project Management: Provides project management capabilities such as Gantt charts and PERT charts with dependency features and includes both schedule and resource elements.

Technology Type	Status	Product	Version	Note	Technology Type Definition
				available.	
Spread Sheets	Standard	Excel	97/2000	A central Agency license or purchase agreement is not currently available. Help Desk support will be available. Approved for co-existence with the other standard Agency technology.	Spreadsheets: Permits entry and manipulation of alphanumeric data in a column/row matrix format.
Spread Sheets	Standard	Lotus 1-2-3			Spreadsheets: Permits entry and manipulation of alphanumeric data in a column/row matrix format.
Word Processing	Standard	Word	97/2000	A central Agency license or purchase agreement is not currently available. Help Desk support will be available. Approved for co-existence with the other standard Agency technology.	Word Processing: Ability to create textual documents (including tables and graphics) with formatting and contents indexing.
Word Processing	Standard	WordPerfect	8/9/10		Word Processing: Ability to create textual documents (including tables and graphics) with formatting and contents indexing.
			PC (	Windows) > Scientific Application	ns
Data Analysis	Standard	PC SAS			Data Analysis: Provides statistical analysis of data and produces reports/graphics based on default parameters.
Engineering Design Graphics	Standard	Autocad		Interoperability is achieved between various AutoCAD type packages via the use of the DXF format.	Engineering Design Graphics: Permits graphics display of physical layout and engineering features.
Engineering Design	Standard	Visio			Engineering Design Graphics: Permits graphics display of

Technology Type	Status	Product	Version	Note	Technology Type Definition
Graphics					physical layout and engineering features.
GIS Spatial Analysis Tools	Standard	ArcView/GIS	8.1	Requires Windows NT 4.0 or Windows 2000 or Solaris.Requires Windows NT 4.0 or Windows 2000 or Solaris.	GIS/Spatial Analysis Tools: A specified system to create, store, integrate, query, analyze, and display large volumes of spatially-referenced data (e.g., maps, images, natural resources, census, etc.). This functionality includes application development
Mapping	Standard	SAS/ GIS	8.2		Mapping: Functionality to display spatial data on top of base-map information (e.g., roads, hydrography). These systems lack the sophisticated spatial analysis capabilities associated with GIS systems and are used at EPA to serve maps to the Internet.
Scientific Graphics	Standard	PC SAS			Scientific Graphics: Provides functionality to display graphics with the particular characteristics required for scientific applications.
Scientific Visualization Tools	Standard	AVS		Application Visualization System	Scientific Visualization Tools: Permits graphical display of complex data in creative formats with multiple attributes. Particularly useful for time-based scientific data in three (or more) dimensions.
Spatial Database Management System	Standard	Arc SDE	8.1		Spatial DBMS: A DBMS used in conjunction with a Geographic Information System. The system provides a means for assembling and storing data that is geographically referenced, combining visual (spatial) data with attribute information.

Technology Type	Status	Product	Version	Note	Technology Type Definition
		-		PC (Windows) > Security	• •
Encryption	Standard	HTTPS			Encryption: Technology that transforms usable data into data that is not usable until it is transformed back via a key or password. Most encryption uses advanced algorithms with prime number keys to scramble data until it is intelligible.
Encryption	Standard	Notes Mail			Encryption: Technology that transforms usable data into data that is not usable until it is transformed back via a key or password. Most encryption uses advanced algorithms with prime number keys to scramble data until it is intelligible.
Remote Access Identification & Authentication	Standard	Notes			Remote Access Identification and Authentication: Technology to provide access control and identification (see 73) for users located outside the EPA network infrastructure. This often requires more than one means of identification and authentication.
Remote Access Identification & Authentication	Standard	SecuRemote			Remote Access Identification and Authentication: Technology to provide access control and identification (see 73) for users located outside the EPA network infrastructure. This often requires more than one means of identification and authentication.
System Auditing and Intrusion Detection	Standard	Audicon/BindVie w		BindView generates reports from Audicon data.	System Auditing and Intrusion Detection: Products that add to the inherent operating system's audit trail ability and real-time monitoring. Auditing support includes archiving, viewing, and reducing the data to a usable and meaningful subset.

Technology Type	Status	Product	Version	Note	Technology Type Definition
User Access Identification and Control	Standard	NDS	6/7	In OS refers to the fact that the functionality is an inherent part of the operating system.	User Access Identification and Control: Performs the process of user verification and mapping of users to appropriate access levels. With proper security protocols (e.g., Kerberos) this can be done transparently after the initial user verification.
User Access Identification and Control	Standard	Notes	R5		User Access Identification and Control: Performs the process of user verification and mapping of users to appropriate access levels. With proper security protocols (e.g., Kerberos) this can be done transparently after the initial user verification.
User Access Identification and Control	Standard	Win OS			User Access Identification and Control: Performs the process of user verification and mapping of users to appropriate access levels. With proper security protocols (e.g., Kerberos) this can be done transparently after the initial user verification.
Virus Protection	Standard	AntiVirus		McAfee is also an accepted legacy product for this category, type & platform.	Virus Protection: Programs that protect against computer viruses. A computer virus is a program that literally 'infects' other programs and operating systems by changing existing code to perform undesirable functions.
Automatic Inventory	Standard	ZENworks		ZENworks is a Novell Product	Automatic Inventory: A program which automatically detects the hardware and software components of desktops and servers.
			PC	(Windows) > System Managemen	nt
Automatic Job Scheduling	Standard	System Agent		Part of the Windows 95/98/NT/2000 operating systems.	Auto Job Scheduling: Ability to automate the initiation of work on the computer platform through the use of time-dependent computer-based routines.

Technology Type	Status	Product	Version	Note	Technology Type Definition
Problem Management	Standard	Remedy			Problem Management: Provides for the tracking and resolution of problems. Optional components include automatic detection and entry of system related problems, and ties to the platform's change management system.
Resource Usage	Standard	Sysmon		Part of the Windows 95/98/NT/2000 operating systems.	Resource Usage: Measurement of the utilization of computing resources by software agents usually located with the operating system.
Software Distribution	Standard	ZENworks		ZENworks is a Novell product.	Software Distribution: Functionality which provides for distribution of software (and data files) to either file servers and/or individual nodes on a network. Ideally the software will include scheduling, verification, and reporting back to the distribution center.
			P	C (Windows) > System Software	
Network Operating System	Standard	NetWare	4/5		Network Operating System (NOS): The LAN-based network operating system. Functionality ranges from the robustness of Novell NetWare and Windows NT/2000 to basic File Management and Directory functions provided by the Unix-based NFS network operating system.
Operating System	Standard	Windows 98	SE		Operating System (OS): The native operating system for the hardware platform; the program that, after being initially loaded into the computer, manages all the other programs in a computer.
User Interface	Standard	Windows 95		EPA has designated the Windows 95 interface to be standard for all Windows 95 and Windows 98 users.	User Interface (UI): End user's interface with personal desktop device. Does not include consoles used to control other computer operations; also includes terminal type as related to server access.

Technology Type	Status	Product	Version	Note	Technology Type Definition
	S	cientific Open Sy	stem Work	stations > Application System D	evelopment Support Tools
3rd Generation Programming Language	Standard	С		Fortran is also an accepted Standard product for this category, type & platform.	3rd Generation Programming Languages: A procedural language used to describe operations on individual data elements. These languages include COBOL, FORTRAN, C, BASIC etc.
3rd Generation Programming Language	Standard	Fortran	90	C++ is also an accepted Target product for this category, type & platform.	3rd Generation Programming Languages: A procedural language used to describe operations on individual data elements. These languages include COBOL, FORTRAN, C, BASIC etc.
O-O Development	Standard	Powerbuilder			Object Oriented Development: Development tools that provide the ability to construct software out of standard reusable components, referred to as objects. Objects are software packages that contain related data & procedures.
Scripting Language	Standard	Perl			Scripting Language: In the context of the Web, script languages are often written to handle forms input or other services for a Web site and are processed primarily on the Web server.
SQL Development Tools	Standard	Oracle Developer	9i		SQL Development Tools: pre-compilers and tools that generate static SQL (Structured Query Language) for use with third generation programming languages; allows developers to build database applications by dynamic generation of SQL.
	-	Scienti	fic Open S	ystem Workstations > Collaborat	tive Computing
E-Mail	Standard	SMTP-based			Email: Electronic messaging capability including receiving folders, mail agents, attachment processing, and encryption.

Technology Type	Status	Product	Version	Note	Technology Type Definition			
Scientific Open System Workstations > Computing Platform Communications								
SNA Communications	Standard	TN3270		x3270 is also an accepted Standard product for this software category, software type and platform.	SNA Communications: IBM-based software that provides communications capabilities between desktop devices and servers using SNA communications.			
SNA Communications	Standard	x3270		TN3270 is also an accepted Standard product for this task, subtask and platform.	SNA Communications: IBM-based software that provides communications capabilities between desktop devices and servers using SNA communications.			
TCP/IP Communications	Standard	In OS		In OS refers to the fact that the functionality is an inherent part of the operating system	TCP/IP Communications: Functionality that provides TCP/IP (Internet Protocol)-based communications between desktop devices and servers.			
TCP/IP Communications	Standard	Telnet			TCP/IP Communications: Functionality that provides TCP/IP (Internet Protocol)-based communications between desktop devices and servers.			
		Sci	ientific Ope	en System Workstations > Data Ir	nterchange			
File Transfer	Standard	FTP			File Transfer: Transfer of files between two computer-based devices.			
Printing Format Control	Standard	PCL/PostScript	5	Printer Control Language (PCL) from HP; PostScript Language from Adobe.	Printing Format Control: Controls printing output through printing oriented software (such as Postscript).			
		Sci	entific Ope	n System Workstations > Data M	anagement			
File Structure	Standard	NFS			File Structure: The basic file format utilized by the native operating system.			
File Structure	Standard	UFS			File Structure: The basic file format utilized by the native operating system.			
RDBMS Comm Access	Standard	SQL*Net	8	Enabled through TCP/IP.	RDBMS Communications Access: The applications level protocol for accessing a data base across a network.			

Technology Type	Status	Product	Version	Note	Technology Type Definition					
Relational Data Base Management System	Standard	Oracle	9i		Relational Data Base Management System (RDBMS): A database system built on the fundamental concept of tables. The RDBMS handles all navigation and returns a table or null for all queries.					
	Scientific Open System Workstations > Graphics Formatting									
3D	Standard	VRML			Three dimensional rendition of an image that provides the perception of depth or relays depth information.					
Image	Standard	GIF		GIF = Graphics Image Format	An image is a graphical representation that has been created or copied and stored in electronic form. An image can be described in terms of vector graphics or raster graphics.					
Image	Standard	JPEG		JPEG = Joint Photographic Enhancement Group, a poor compression	An image is a graphical representation that has been created or copied and stored in electronic form. An image can be described in terms of vector graphics or raster graphics.					
Image	Standard	SGI		Irix RGB image file	An image is a graphical representation that has been created or copied and stored in electronic form. An image can be described in terms of vector graphics or raster graphics.					
Image	Standard	TIFF		Tagged Image file format	An image is a graphical representation that has been created or copied and stored in electronic form. An image can be described in terms of vector graphics or raster graphics.					
Image	Standard	x		CGM is also an accepted Standard for this task, subtask and platform. X=X11, a standard from project Athena CGM =Computer Graphics Metafile(vector based)	An image is a graphical representation that has been created or copied and stored in electronic form. An image can be described in terms of vector graphics or raster graphics.					
Print	Standard	PDF		Adobe Acrobat	Files used to transfer information in printable format					
Print	Standard	PS		Adobe PostScript File	Files used to transfer information in printable format					
Print	Standard	PS2		Adobe Level 2 PostScript File	Files used to transfer information in printable format					

Technology Type	Status	Product	Version	Note	Technology Type Definition			
Video	Standard	AVI		Microsoft video	Stores images as motion pictures in compressed and uncompressed formats.			
Video	Standard	MPEG		MPEG = A moving JPEG (Joint Photographic Enhancement Group, a poor compression )	Stores images as motion pictures in compressed and uncompressed formats.			
Scientific Open System Workstations > Internet,Intranet and Extranet Information Services								
3270 Client	Standard	TN3270	Plus		3270 Client: A TCP/IP based 3270 (mainframe) terminal emulator. Used over the Internet instead of an SNA based emulator.			
News	Standard	Netscape Navigator	6.01		News: A client for reading UseNet format news. EPA provides an internal UseNet feed Comp.* groups and some EPA.* newsgroups			
Telnet	Standard	xterm			Telnet: Telnet connects a desktop computer to a remote host computer through the Internet protocol.			
Web Browser	Standard	Netscape Navigator	6.01		Web Browser: A client program that uses the Hyper Text Transfer Protocol (HTTP) to make requests of Web servers throughout the Internet on behalf of the browser user.			
Web Server - Internet	Standard	See Note		Security Violation: The Desktop and Scientific Open System Workstation platforms should not be used as a Web server for the Internet. Windows NT and Windows 2000 Personal Web Server should be de-installed.	Web Server - Internet: The Web server responds to Web Browser requests and provides several different ways to forward a request to an application server and/or to forward back a Web page to the user's Web Browser. Internet is for servicing public users.			
Web Server - Intranet-Extranet	Standard	See Note		Potential Security Violation: The Desktop and Scientific Open System Workstation platforms may be used as Web servers for	Web Server - Intranet/Extranet: The Intranet services Web Browser requests from EPA internal users. The Extranet services Web Browser requests made to the Intranet by EPA Partner users that are external to the EPA network.			

Technology Type	Status	Product	Version	Note	Technology Type Definition
				the Intranet by waiver only.	
		Sci	entific Ope	n System Workstations > Office	Automation
Electronic Publishing	Standard	Acrobat			Electronic Publishing: Provides for creation of documents in a portable format that maintains look-and-feel fidelity across heterogeneous desktop operating systems and interfaces.
Word Processing	Standard	WordPerfect	8		Word Processing: Ability to create textual documents (including tables and graphics) with formatting and contents indexing.
		Scien	tific Open	System Workstations > Scientific	Applications
Data Analysis	Standard	SAS			Data Analysis: Provides statistical analysis of data and produces reports/graphics based on default parameters.
Mapping	Standard	ArcView	8.1		Mapping: Functionality to display spatial data on top of base-map information (e.g., roads, hydrography). These systems lack the sophisticated spatial analysis capabilities associated with GIS systems and are used at EPA to serve maps to the Internet.
Scientific Graphics	Standard	SAS Graph	8.2		Scientific Graphics: Provides functionality to display graphics with the particular characteristics required for scientific applications.
Scientific Visualization Tools	Standard	Data Explorer			Scientific Visualization Tools: Permits graphical display of complex data in creative formats with multiple attributes. Particularly useful for time-based scientific data in three (or more) dimensions.

Technology Type	Status	Product	Version	Note	Technology Type Definition					
	Scientific Open System Workstations > Security									
Standards Monitoring	Standard	Enterprise Security Management		ESM: Enterprise Security Management, a Symantech product.	Standards Monitoring: Technology that monitors systems to ensure that EPA directives are properly implemented.					
User Access Identification and Control	Standard	Unix OS			User Access Identification and Control: Performs the process of user verification and mapping of users to appropriate access levels. With proper security protocols (e.g., Kerberos) this can be done transparently after the initial user verification.					
User Access Identification and Control	Standard	Windows OS			User Access Identification and Control: Performs the process of user verification and mapping of users to appropriate access levels. With proper security protocols (e.g., Kerberos) this can be done transparently after the initial user verification.					
		Scie	ntific Open	System Workstations > System	Management					
Automatic Inventory	Standard	Tivoli Inventory	3.6		Automatic Inventory: A program which automatically detects the hardware and software components of desktops and servers.					
Backup	Standard	In OS		In OS refers to the fact that the functionality is an inherent part of the operating system.	Backup: Functionality that provides for file copying on servers (and, sometimes, individual workstations) to archival media. There should be complementary programs for bringing individual files back and to replace a damaged storage device.					
Problem Management	Standard	Remedy			Problem Management: Provides for the tracking and resolution of problems. Optional components include automatic detection and entry of system related problems, and ties to the platform's change management system.					
Scientific Open System Workstations > System Software										

Technology Type	Status	Product	Version	Note	Technology Type Definition
Network Operating System	Standard	Unix/NFS		Network File System (NFS), which operates on all Unix-based platforms.	Network Operating System (NOS): The LAN-based network operating system. Functionality ranges from the robustness of Novell NetWare and Windows NT/2000 to basic File Management and Directory functions provided by the Unix-based NFS network operating system.
Operating System	Standard	Unix			Operating System (OS): The native operating system for the hardware platform; the program that, after being initially loaded into the computer, manages all the other programs in a computer.
User Interface	Standard	MOTIF			User Interface (UI): End user's interface with personal desktop device. Does not include consoles used to control other computer operations; also includes terminal type as related to server access.