

U.S. Department of Education Federal Student Aid



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Federal Student Aid Technology Standards and Products Guide

Version # 6.3

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Document Version Control

Version	Date	Description
1.0	November 2, 2001	Provided general updates under TO 55.
2.0	January 25, 2002	Reformatted document to align with the Department of Education Policy document and updated document to reflect new standards and products.
2.1	February 12, 2002	Updated document with client feedback. Renamed document title.
2.2	March 29, 2002	Included updates from 1/15/2002 to 3/15/2002 in Federal Student Aid standards, products, and policies. Added an Application Development section.
2.3	June 30, 2002	Incorporated planned ITA upgrades, added an executive summary, added Mobile Devices to Network Services section, added External Connections to External Environment section, and updated several version numbers.
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5.0	December 2005	Populated the Metadata management category. Revised and added the software for ADvance and CSB contracts. Removed the Data Strategy section and all references to it. Updated the EDM text as well as Data Modeling. Removed the minimum PC Specifications and all references to it. Added a new Appendix A – Reusable Common Services (RCS) and Portlets. Reflects all updates through revision date.
5.1	February 2006	Added “FileNet” as the Document Management Standard. Changed “WebSphere Application Server 6.0” to “WebSphere Process Server 6.0”.
5.2	June 2006	Updated DRM information, updated web sites, added in Common Operating Environment (COE) Diagrams, updated language.
6.0	July 2007	Document renamed to Technology Standards and Products Guide and re-organized to facilitate architecture understanding, re-categorized products and standards to align with FEA TRM. Removed version numbers from product listing to facilitate maintenance. Evergreen process will provide the current version of products in the environment.

Version	Date	Description
6.1	June 2008	<p>Added the following to Table 3-2, “Service Access and Delivery Channels”: Documentum eRoom, BMC Control Cron, Flash, and Cisco PIX VPN. Changed text in IP Version from IPv4 to IP v6.</p> <p>Added the following to Table 3-3, “component Framework”: Clickcommerce (Formerly BTRADE), Siebel Analytics, WebFocus, WebTrends, Verisign, SiteScope, CA UniCenter, Oracle Enterprise Manager and, WBI Monitor. Added IIS information analyzer, Data stage, quality stage, and xml registry and repository.</p> <p>Added following to Table 3-4, “Service Interface and Integration Standards”: System Architect, Informatica and updated the link to Design Principles of ESB Architectural model and Application Architectural Model (Pg. 28), added Embarcadero ER/Studio</p> <p>Deleted the following from Table 3-4: WebSphere Datapower XML Accelerator XA 35.</p> <p>In Table 3-5: Removed WebSphere Business Modeler. Added the following “Service Platforms and Infrastructure”: FileNet, Interwoven Teamsite, IBM Workplace Web Content Management (WCM), IBM WebSphere Integration Developer, IBM Rational Application Developer, IBM Rational Systems Architect, Mainframe Z Series, 990, HP, Sun, JProbe, Microsoft Office, WinZip, IBM Rational Test Manager,, Performance Testing, and Unit Testing, added “Data standardization” under the service standard, Modeling.</p> <p>In section 2.3.7, replaced the Operating system Open VMS with Z/OS. Added ‘WCM’ to Appendix A.</p> <p>Deleted all intranet links in the document to void broken links.</p>
6.2	September 2008	<p>Deleted entire section on Information Technology Architecture</p> <p>Added Architecture Overview as a reference in Section 1.5</p> <p>Added mystartingline.ed.gov in Table 2-2 as an intranet service standard</p> <p>In Table 2-2, changed the intranet service standard, “The Starting Line” from Federal Student Aid Standard to Federal Student Aid contained</p> <p>Added HP Portfolio and Project management in Table 2-2</p> <p>Deleted CWM in Table 2-3. Added link for XMI.</p> <p>Added WebSphere Service Registry and Repository in Table 2-4</p> <p>Renamed IBM Portal factory in Table 2-5 to IBM Portlet factory</p> <p>Added Rational Software Modeler in Table 2-5</p> <p>Added text on Architecture overview in Section 2, “Service Specifications”</p>
6.3	July 2009	<p>Incorporated the Technical Standards Mosaic. This version has been revamped and re-aligned using Technical Standards Mosaic as the basis for classifying technologies and products</p>

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Executive Summary

The Federal Student Aid Technology Standards and Products Guide (Guide) provides an organized, systematic way of classifying Federal Student Aid's information technology infrastructure and provides a basis for understanding the basic principles, assumptions, and rules governing the development of Federal Student Aid information technology policies.

This Guide focuses on services that maintain a reliable and secure environment. It follows the Technical Standards Mosaic developed by Federal Student Aid. It highlights the Development, Execution, Operations, Communications/Interface, Security, Database, and Networking Architecture and Technical Infrastructure. This Guide establishes standard, by enterprise area, specify how the currently approved architecture helps Federal Student Aid achieve an optimum degree of order and consistency in the environment.

The Guide also explains how Federal Student Aid's enterprise is organized from a technical perspective, distinguishing "infrastructure" from "," "development", "Execution" and "Operations" and provides a high level framework against which enterprise solutions are delivered. This Guide further augments classifications with a Federal Student Aid Classification scheme to help architects identify preferred products and standards. The scheme identifies the governing body and status of a technology or standard in the architecture as follows:

- **Government Standard** - Standards mandated and maintained by the Federal Government.
- **ED Standard** - General use specification maintained at the Department level or accepted de-facto within a given segment (i.e., Network standards).
- **Federal Student Aid Standard** - The technologies and products that have been approved for enterprise business use and are supported in the environment. These standards include **Federal Student Aid Target Standards** that facilitate the alignment of all new applications to the Target State Vision.
- **Federal Student Phase Out** - Technologies/Products approved in the architecture for specific business needs (not to be expanded by investment beyond the need). These can be further defined as **Legacy** products that were in use prior to the establishment of the component-based architecture and **Administrative/Internal Use Only**, which are suitable for internal development and administrative use only. This will also include technologies that will be phased out in due course of time due to system retirement or system upgrade. **Adoption of enterprise-wide standards** promotes interoperability, scalability, and enables cost effective acquisition and development of systems and applications to meet Federal Student Aid's business needs. This Guide is intended to promote a smooth transition from current to future technologies, but it does not attempt to provide a prioritized, scheduled transition plan for moving toward a desired future state.

This Guide contains embedded hyperlinks to publicly available websites and footnotes that contain documents referenced on Federal Student Aid's Intranet web site. Documents referenced that are only available via Federal Student Aid's Intranet website can be requested directly from Federal Student Aid. All references and hyperlinks are listed in Appendix C.

1. Introduction

1.1 Purpose

This Guide is a reference tool for Federal Student Aid architects, business stakeholders, project managers, system administrators, application developers, procurement personnel, and others who require guidance on implementing Federal Student Aid technology standards and standard products.

The Federal Student Aid Technology Standards and Products Guide's primary purpose is to enable architects to identify opportunities to leverage technology, alleviate redundancy, and highlight where technology-overlap limits the value of IT investments.

This Guide addresses the fundamental technologies comprising the infrastructure, and it focuses on standards and products that promote managed services within a reliable and secure environment. This Guide is a critical component in a comprehensive effort to align government-wide investments in information technology with the needs of Federal Student Aid.

This Guide is not intended as a comprehensive list of products in use within Federal Student Aid. Rather, it is the set of identifiable current and target distributed component architecture standards, along with a minimum set of legacy standards and Intranet standards to differentiate current and future technology standards and preferred products.

1.2 Scope

This Guide is for the use by all personnel, including contractors, who are responsible for or involved in the development of Federal Student Aid's general support systems and major applications. This Guide is intended to assist them in determining and applying the relevant standards to systems and applications.

This Guide sets out the standards by which the IT infrastructure is designed and/or operated and lists the technologies and products that promote transition from the current technical architecture to the envisioned technical architecture as described in the Federal Student Aid Target State Vision.

Federal Student Aid uses the Technical Standards Mosaic as the basis for the Technology Standards and Products Guide. This Guide's classification scheme is based on the Technical Standards Mosaic which is an Architecture driven technical framework that identifies the standards and specifications that comprise a service component such as Development, Execution, and Operations etc.

Federal Student Aid leverages the Mosaic which is an architecture driven segmentation to describe its technical environment, and to accomplish its goals in implementing the Federal Student Aid mission.

1.3 Intended Audience

The table below lists the intended users for the Federal Student Aid Technology Standards and Products Guide, the document sections most relevant for each type of user, and the purpose for which the users may use the information in this Guide.

Table 1-1 Intended Audience and Document Usage

Users	Relevant Sections	Uses
Federal Student Aid Executives / Federal Student Aid Business Owners & CIO Staff	Executive Summary Sections 1, 2	Facilitates and communicates an organized, systematic way of classifying the information technology infrastructure
Federal Student Aid Architects	All	Facilitates understanding of Federal Student Aid's technology infrastructure and promotes reuse by identification of preferred products and standards
Potential Vendors	All	Communicates the technology infrastructure and identifies standards, and technologies that support the construction, delivery, and exchange of Federal Student Aid business and application components

1.4 Document Organization

This Guide is comprised of the following sections:

- **Section 1. Introduction** - This section addresses the purpose, scope, audience, document organization and related references.
- **Section 2. Architecture Specifications** – This section profiles the preferred technologies and standards used to support Federal Student Aid Service Components classified by the Technical Standards Mosaic.
- **Appendix A: Acronyms** - This appendix lists the acronyms and definitions used throughout the document.
- **Appendix B: Glossary** - This appendix provides key terms and definitions used throughout the document.
- **Appendix C** - Bibliography

1.5 References and Related Documents

Federal Student Aid's Technology Standards and Products Guide was developed to support Federal Student Aid's business operations in compliance with the laws, regulations, and guidance listed below:

- [Clinger-Cohen Act of 1996](#): Requires agencies to implement IT management processes, integrate management and budget processes, inventory IT investments, and designate a Chief Information Officer
- [OMB Circular A-11](#): Requires agencies to submit plans and progress on their enterprise architectures
- [OMB Circular A-130](#): Requires that Federal agencies create Enterprise Architecture and update OMB as significant changes are made

- [Paperwork Reduction Act of 1995](#): Requires Federal agencies to be more responsible and publicly accountable for reducing the burden of Federal paperwork
- [The Government Paperwork Elimination Act \(GPEA\)](#): Requires agencies to leverage improved network technologies by improving electronic transactions
- [The E-Government Act of 2002](#) (P.L. 107-347): Requires agencies to support e-Government projects and to leverage cross-agency initiatives to further e-Government. It also requires agencies to submit privacy impact assessments for all new IT investments using personally identifiable data from or about members of the public
- [The Federal Records Act of 1950](#): Requires Federal agencies to establish and maintain a continuing program for the economical and efficient management of agency records. Electronic records created or received by the Federal Government must be managed as Federal records
- [Government Performance Results Act of 1993](#): Requires that Federal agencies accurately employ performance metrics to measure and report performance results related to IT investments
- The Federal Chief Information Officer Council [Federal Transition Framework](#): Provides a single information source for cross-agency information technology initiatives

This Guide's classification scheme is based on the Technical Standards Mosaic which is an Architecture-driven, technical framework that identifies the standards and specifications that comprise a service component.

The following documents were also used as reference material for this release:

- Department of Education Enterprise Standards and Guidelines, February 2007
- Department of Education Enterprise Data Standards and Guidelines
- Federal Student Aid Technology Standards and Products Guide (prior versions)

2. Architecture Specifications

Applications hosted in the Virtual Data Center (VDC) share the same hardware, products and support to facilitate re-use and provide cost savings to Federal Student Aid business owners. All Federal Student Aid distributed applications use either IBM HTTP Server and/or WebSphere Application Server.

The objective of defining architecture specifications is to identify and classify standards and technologies that support the construction, delivery, and exchange of Federal Student Aid business and application components (Architecture Components), according to Technical Standards Mosaic, at a level of abstraction that allow principles and rules to be developed and/or followed without being confused by physical implementation details. The architecture at Federal Student Aid is outlined in the, Architecture Overview version 1.5. It outlines the Infrastructure Services, Systems Management and Architecture.

The following graphic depicts Technical Standards Mosaic.

Figure 2-1 Technical Standards Mosaic



Federal Student Aid chose to augment Technical Standards Mosaic with a Standards Classification scheme to help architects identify preferred products and standards. The scheme identifies the governing body and status of a technology or standard in the architecture as follows:

Table 2-1 Federal Student Aid Product Classification

Service Specification	Federal Student Aid Classification	Description
Standard that Federal Student Aid uses to identify standards and technologies in use within the environment	Federal Student Aid Standard	Standards mandated and maintained by the Federal Government, the Department of Education, or a General Use specification accepted as De-Facto within a given segment (i.e., TCP/IP)
	Federal Student Aid Target	Standard that is suitable for new application development for Federal Student Aid.
	Federal Student Aid Phase Out	Technologies/Products approved in the architecture for a specific business need, without expanding the use of the standard to the entire enterprise. Includes legacy systems and products used for administrative and Internal use. Also, includes technologies to be phased out in due course of time due to system retirement or system upgrade

2.1 Development Architecture

The Development Architecture covers the technology associated with building software systems as well as technical solutions supporting management issues, such as testing, modeling and versioning. This tier provides the structure and guidance for all development activities by defining:

- **Development Management Requirements** that provide a consistent and reliable process for development activities such as requirements gathering, testing, and deployment
- **Communication and Collaboration Requirements** that ensure that development activities are coordinated throughout the Federal Student Aid and that developed applications can be fully integrated into the production environment without impacting existing applications

Table 2-2 Development Architecture

Service	Technology/ Application	Federal Student Aid Classification	Comments
Configuration Management	Rational ClearCase	Standard	Version control
	CVS	Phase Out	
	CCC/Harvest	Phase Out	
	Endeavor	Phase Out	
Task Management	Microsoft Office	Standard	Department of Education
	IBM WebSphere Deployment Manager	Standard	Deployment Management
Requirements Management	Rational RequisitePro, SODA	Standard	Requirements Management and Traceability
Defect and Issue Tracking	Rational ClearQuest	Standard	
Build Services	ANT	Standard	
Performance Testing	Mercury LoadRunner	Standard	
Developer Suite	Oracle Financials IDE	Standard	
Project/Portfolio Management	Microsoft Project	Standard	
	HP Portfolio and Project Management with CPIC Accelerator	Standard	Integrated tool used for Portfolio and Project Management and Enterprise Operational Change Management
Java Profiling	JProbe	Phase Out	Java Profiling Tool
Unit Testing	JUnit	Standard	
Test Management	IBM Rational Test Manager	Standard	Functional Testing, Installation Testing, Reliability Testing, Security and Access Control Testing, Usability Testing (508 testing), Performance Testing, Unit Testing
Reusable Common Services	Custom Java Components	Standard	

Service	Technology/ Application	Federal Student Aid Classification	Comments
Process Orchestration	WebSphere Business Modeler	Standard	
	IBM WebSphere Process Server	Target	Business Process Execution Language (BPEL)
Business Logic	C-Sharp (C#), VB Script, Visual Basic, Visual Basic .Net (VB.Net)	Phase Out	
	Enterprise Java Beans (EJB)	Standard	http://java.sun.com/
	Service Component Architecture Specification		See also: Design principles detailed in the ESB Architectural Model and Application Architectural Model documents
	C, C++, Cobol, Fortran	Phase Out	Legacy Business Systems
Integrated Development Environment	Visual Studio, Visual Studio.Net	Phase Out	
	IBM WebSphere Studio	Standard	
	IBM WebSphere Integration Developer	Target	
	IBM Rational Application Developer	Target	
	Eclipse	Standard	http://www.eclipse.org/
	IBM WebSphere Process Server	Standard	
	IBM WebSphere Portlet Factory	Target	
Modeling	Unified Modeling Language (UML)	Target	http://www.uml.org/
	Business Process Execution Language (BPEL)	Target	BPEL Specification 2.0

Service	Technology/ Application	Federal Student Aid Classification	Comments
	Business Process Modeling Notation (BPMN)	Target	http://www.bpmn.org/
	IBM Rational Systems Architect	Target	
	Rational Rose	Phase Out	Application behavior and design tool
	Embarcadero ER/Studio	Standard	This is used for EDD, ECDM and Data model registration.
	Rational Software Modeler	Target	Visual Modeling and Design Tool
	System Architect	Standard	EA Repository

2.2 Execution Architecture

The Execution Architecture defines the standards for executable software that performs common actions including:

- **Information exchange** via the Internet or messaging or Web portal
- **Reporting and Financial** application tools and technologies used across the enterprise
- **Data Management** tools and access methodologies
- **Security** requirements and implementation
- **Document Management** for managing documents and files

Table 2-3 Execution Architecture

Service	Technology/ Application	Federal Student Aid Classification	Comments
Search Engine	Google	Standard	Department of Education
	Microsoft Internet Explorer	Standard	Department of Education
	The Starting Line (currently being phased out)	Phase Out	Federal Student Aid makes use of an intranet for employee communications
	Mystartingline.ed.gov	Standard	Federal Student Aid is migrating towards this portal for employee communications

Service	Technology/ Application	Federal Student Aid Classification	Comments
Document Management	FileNet	Standard	
Reporting and Analysis	MicroStrategy 8 Platform, MicroStrategy Intelligence Server, MicroStrategy Narrowcast Server	Phase Out	http://www.microstrategy.com/ Online Analytical Processing (OLAP) Decision Support and Data Mart System
	Siebel Analytics	Phase Out	
	WebFocus	Standard	
	WebTrends	Standard	Web Statistical Analysis
CRM Suite	Siebel	Standard	
EAI Messaging	MQ Series, Message Broker	Phase Out	
Financials ERP	Oracle Federal Financials	Standard	
Web Server	IBM HTTP Server	Standard	
ESB	IBM WebSphere Data Power Integration Appliance X150	Standard	
Service Monitoring	WBI Monitor	Standard	
Application Server	IBM WebSphere Process Server	Target	Business Process Management
	IBM WebSphere Data Power SOA Appliances	Target	Service Component Architecture
	IBM WebSphere Application Server	Standard	
	IBM WebSphere Deployment Manager	Standard	Deployment Management
Web Statistical Analysis	WebTrends	Standard	
Content Management	Interwoven Teamsite	Phase Out	
	IBM Workplace Web Content Management (WCM)	Standard	
Portal	IBM WebSphere Portal Server	Target	
Security Architecture	Tivoli's TIM/TAM	Standard	

2.3 Operations Architecture

The Operations Architecture defines the ongoing recurring activities processes and tools used to maintain the technology environment to ensure availability of resources for stakeholders including:

- **Monitoring** tools and methodologies to ensure operational status of the technology environment, notification of potential operational failures, and measurement of operational performance
- **Routine Maintenance** procedures and tools required to maintain operational status and meet standards and guidelines established for the technology environments with the Federal Student Aid
- **Change Management** practices and technologies that provide a consistent and management approach to updating any aspect of the technology environment

Table 2-4 Operations Architecture

Service	Technology/ Application	Federal Student Aid Classification	Comments
Web Site Monitor	SiteScope	Phase Out	
Application Server Monitoring	Wily Interscope	Standard	
MQ Monitoring	Candle MQMon, Q Pasa	Standard	
Scheduler	BMC Control Cron	Phase Out	
Backup	Omniback	Standard	
File System and Process Monitoring	CA Unicenter	Standard	
Change Control	Rational ClearQuest	Standard	
DB Monitoring	Oracle DB Utilities	Standard	
Service Monitoring	WBI Monitor,	Standard	
Vulnerability	Oracle Enterprise Manager	Phase Out	Managing Database health, capacity, compliance and vulnerability
Hosting	Virtual Data Center	Standard	

2.4 Communications/Interface Architecture

The Communications/Interface Architecture defines the technologies and standards that govern the interface between clients and enterprise applications including:

- **Data Interchange** standards and tools for managing and transferring data
- **Web Services** interfaces for Internet communications
- **Network Infrastructure and Management** that provides the foundation for communications for the Federal Student Aid

Table 2-5 Communications Interface Architecture

Service	Technology/ Application	Federal Student Aid Classification	Comments
EAI	Data Integrator	Standard	
	IBM WebSphere Adapters	Standard	Application Connectivity
	Informatica	Phase Out	Extract, Transform and Load (ETL)
	IBM Information Server	Standard	
Electronic Data Interchange	BTRADE	Standard	
	Electronic Business using XML (ebXML)	Standard	http://www.ebxml.org/
	XMI	Target	Various Data Exchange standards (i.e. XMI) are under consideration by the Enterprise Data Management Group and will be incorporated into future revisions pending outcome of EDM decisions. See http://www.omg.org for information concerning the standards. See http://en.wikipedia.org/wiki/XMI for additional information on XMI
HTTP Communication	SOAP	Target	http://www.w3.org/TR/soap/
File Compression	WinZip	Standard	Department of Education
FTP	ITA Enterprise FTP Server	Standard	
VPN Client	Checkpoint SecuRemote	Standard	
	F5 Networks Firepass	Standard	

Service	Technology/ Application	Federal Student Aid Classification	Comments
	Citrix	Standard	
	Cisco PIX VPN	Standard	
Service Transport	Hyper Text Transfer Protocol (HTTP)	Standard	Department of Education http://www.w3.org/Protocols/
	Hyper Text Transfer Protocol Secure (HTTPS)	Standard	Department of Education
	Internet Protocol (IP) Version 4 (IPv4)	Standard	Department of Education
	Internet Protocol (IP) Version 6 (IPv6)	Target	Department of Education Target Standard http://www.ipv6.org/
Supporting Network Services	Microsoft Exchange 2000	Standard	Department of Education Internet Message Access Protocol/Post Office Protocol (IMAP/POP3)
Data Quality	IIS Information Analyzer, Quality Stage	Standard	
	Data Stage	Standard	Data Cleansing
Data Standardization (Metadata)	XML Registry and Repository	Standard	Enterprise Data Dictionary and Enterprise Conceptual Data Model
Data Format/Classific ation	eXtensible Markup Language (XML)	Standard	Department of Education http://www.w3.org/XML/
	Namespaces	Standard	Department of Education http://www.w3.org/TR/RFC-xml-names/
	ISO/IEC 11179	Standard	Department of Education

Service	Technology/ Application	Federal Student Aid Classification	Comments
	XML Registry and Repository for the Education Community		The Core Components stored in the XML Registry and Repository have been created and reviewed through a collaborative effort between the Office of Federal Student Aid (FSA), Postsecondary Electronics Standards Council (PESC), and the Education Standards Community.
Data Transformation	eXtensible Stylesheet Language Transform (XSLT)	Standard	http://www.w3.org/Style/XSL/
Data Validation	XML Schema	Standard	http://www.w3.org/TR/REC-xml/
Content Rendering	Cascading Style Sheets (CSS)	Standard	http://www.w3.org/Style/CSS/
	JavaScript	Standard	-
	eXtensible HTML (XHTML)	Standard	The W3C's recommendation for the next generation of HTML leveraging XML http://www.w3.org/TR/2001/REC-xhtml11-20010531/
	Dynamic HTML (DHTML)	Standard	
Dynamic/ Server Side Display	Java Server Pages (JSP), Java Portlet API (JSR 168), Java Servlet (JSR 53), Adobe Forms, IBM Forms (JSR 53)	Standard	
	Active Server Pages (ASP), Active Server Pages .Net (ASP.Net), Oracle Forms (FMS)	Phase Out	
Static Display	Hyper Text Markup Language (HTML)	Standard	The language used to create Web documents http://www.w3.org/TR/html4/

Service	Technology/ Application	Federal Student Aid Classification	Comments
Middleware	IBM WebSphere MQ	Standard	IBM WebSphere MQ is a network communication technology launched by IBM in March 1992. It was previously known as MQSeries, which is a trademark that was rebranded by IBM in 2002 to join the suite of WebSphere products. WebSphere MQ is IBM's Message Oriented Middleware offering.
	ANSI SQL	Standard	SQL (Structured Query Language) has been standardized by both ANSI and ISO
	Commerce Quest DI	Phase Out	
	IBM WebSphere Message Broker	Phase Out	
Interface	IBM WebSphere DataPower XML Security Gateway	Target	
	Web Services Description Language (WSDL)	Target	
Service Discovery	Universal Description Discovery and Integration (UDDI)	Target	
	WebSphere Service Registry and Repository	Target	Managing Enterprise Services
Collaboration	eRoom	Standard	
	Federal Student Aid Gateway	Target	
	Citrix Metaframe Access (PEPS external)	Standard	Postsecondary Education Participants System Web site
	Flash	Phase Out	Application for internal collaboration

2.5 Security Architecture

The Security Architecture defines the methods of protecting information and information systems from unauthorized access, use, disclosure, disruption, modification, or destruction in order to provide integrity, confidentiality and availability. This tier defines the technologies and standards that govern the access to Federal Student Aid information and information systems including:

- **Web Access** standards and tools that protect the Federal Student Aid's information and systems from unauthorized access
- **Directory Services** that control the access to data based on user authentication and access privileges
- **Data Security** standards and tools used to protect data from unauthorized access and disclosure interfaces for Internet communications

Table 2-6 Security Architecture

Service	Technology/ Application	Federal Student Aid Classification	Comments
Host Intrusion Detection	Tripwire	Standard	
Inter Data Centers	DES 3 Encryption w/Router level Accelerator	Standard	
Web Based Security	Server side SSL Verisign	Standard	
Directory Access	LDAP, IBM Tivoli Directory Server	Standard	LDAPv3 Specification - Lightweight Directory Access Protocol (LDAP) v3
Current Students Authentication	FSA PIN	Standard	
Firewall	Checkpoint	Standard	
Mainframe Access Control	RACF	Standard	
Trading Partners and FSA	Tivoli TIM/TAM	Standard	
Supporting Security Services	Web Services Security (WS-Security)	Target	http://www.oasis-open.org/specs/index.php-wssv1.1
	WS-Trust	Standard	
	Security Assertion Markup Language (SAML)	Standard	

Service	Technology/ Application	Federal Student Aid Classification	Comments
	WS-SecureConversation	Standard	
	WS Reliable Messaging	Standard	

2.6 Database Architecture

The Database Architecture defines the technologies and standards that govern the Federal Student Aid storage, management, modification, and extraction of information from a database, and various techniques and devices for storing large amounts of data, including:

- **Database Software** tools that are used to organize, store, modify, and extract the data
- **Data Management** standards and tools that define how data is structured and used

Table 2-7 Database Architecture

Service	Technology/ Application	Federal Student Aid Classification	Comments
RDBMS Development, Test, Production	Oracle, DB2	Standard	
Data Warehouse	DB2 EEE	Standard	
Database Tuning	Oracle Utilities	Standard	
Data Marts	Oracle, MicroStrategy, Informatica, Siebel Analytics	Standard	
Data Modeling	Erwin ER Studio	Standard	
Data Storage	Informix	Phase Out	Legacy
	Oracle	Standard	Business Systems
	SQL Server	Phase Out	Intranet Only
Database Connectivity	Java Database Connectivity (JDBC)	Standard	
	DB2 Connector	Phase Out	
	Active Data Objects (ADO)	Phase Out	

Service	Technology/ Application	Federal Student Aid Classification	Comments
	Active Data Objects .NET (ADO.NET)	Phase Out	
	Open Database Connectivity (ODBC)	Phase Out	

2.7 Technical Infrastructure Architecture

The Technical Infrastructure Architecture defines the technologies and standards that govern the Federal Student Aid collection of platforms, hardware and infrastructure specifications that enable Federal Student Aid to develop component-based architectures and facilitate component reuse including:

- **Production, Test, and Development Environments** tools that create purposeful environments for specific information technology activities
- **Hardware** that includes the physical devices, facilities and standards that provide the computing and networking environments
- **System Software** that manages and controls hardware resources can including operating systems

Table 2-8 Technical Infrastructure Architecture

Service	Technology/ Application	Federal Student Aid Classification	Comments
Development, Testing, Performance, Staging and ProductionServer Bed	HP, Win2K and Sun	Standard	
Mainframe	Z Series 990, HP, Sun	Standard	See Integrated Technology Architecture / Enterprise Application Integration and the Virtual Data Center for current product listing for infrastructure hardware.

2.8 Networking Architecture

The Networking Architecture defines the technologies and standards that govern the Federal Student Aid telecommunications network including:

- **Hardware and Infrastructure Components** that create the network topography

- **Communication Connection Strategies** that define the methods available for connectivity with the Federal Student Aid network
- **Network Management** strategies and tools that ensure availability and consistency for network resources

Table 2-9 Networking Architecture

Service	Technology/ Application	Federal Student Aid Classification	Comments
Content Distribution Network	CDN Akamai	Standard	
Routers/Switches	Cisco, Nokia	Standard	
Load Balancer	CSS	Standard	
IMUXed T1's	Various Telcos	Standard	
Frame Relay	Various Telcos	Standard	

Appendix A Acronyms

Table A-1 Acronyms Listing

Acronym	Definition
ADO	Active Data Objects
ANSI	American National Standards Institute
API	Application Program Interface
APP	Annual Performance Plan
ASP	Active Server Pages
AWG	Architecture Working Group
BPEL	Business Process Execution Language
BPMN	Business Process Modeling Notation
BTIG	Business Technology and Integration Group
CCB	Change Control Board
CDA	Common Data Architecture
CDDTS	Conditional Disability Discharge Tracking System
CDN	Content Distribution Network
CFO	Chief Financial Officer
CIO	Chief Information Officer
CM	Configuration Management
	Change Management
COD	Common Origination and Disbursement
COE	Common Operating Environment
CPIC	Capital Planning and Investment Control
CR	Change Request
CRM	Customer Relationship Management
CSB	Common Services for Borrowers
CSR	Customer Services Representative
CSS	Cascading Style Sheets
CVS	Concurrent Versions System
DB	Database
DHTML	Dynamic Hyper Text Markup Language
DLCS	Direct Loan Consolidation System
DLSS	Direct Loan Servicing System
DMCS	Debt Management Consolidation System
DRM	Data Reference Model
EA	Enterprise Architecture
EAI	Enterprise Application Integration
ECDM	Enterprise Conceptual Data Model
ED	Department of Education
EDD	Enterprise Data Dictionary

Acronym	Definition
EDM	Enterprise Data Management
EJB	Enterprise Java Beans
ESB	Enterprise Service Bus
ETL	Extract, Transform and Load
FAFSA	Free Application for Federal Student Aid
FAP	Financial Aid Professionals
FEA	Federal Enterprise Architecture
FERPA	Family Educational Rights and Privacy Act
FIP	Federal Information Processing
FISMA	Federal Information Security Management Act
FMS	Financial Management System (FSA)
FMSS	Financial Management System Software (ED)
FPDM	Financial Partners Data Mart
FPO	Financial Partners Oversight
FSA	Federal Student Aid
FSC	Federal School Code
FSEOG	Federal Supplemental Educational Opportunity Grant
FTP	File Transfer Protocol
FWS	Federal Work Study
FY	Fiscal Year
GSS	General Support System
HTML	Hyper Text Markup Language
HTTP	Hyper Text Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
IA	Information Assurance
IDE	Integrated Development Environment
IEC	International Engineering Consortium
IF	Information Framework
IFAP	Information for Financial Aid Professionals
IIS	IBM Information Server
IM	Information Management
IMAP	Internet Message Access Protocol
IMS	Integrated Master Schedule
IP	Internet Protocol
ISO	International Organization for Standardization
IT	Information Technology
ITA	Integrated Technical Architecture
ITIL	Information Technology Infrastructure Library
ITIM	Information Technology Investment Management
ITMRA	Information Technology Management Reform Act

Acronym	Definition
J2EE	Java 2 Enterprise Edition
JDBC	Java Database Connectivity
JMS	Java Messaging Service
JSF	Java Server Faces
JSP	Java Server Pages
JSR	Java Specification Request
LCM	Lifecycle Management
LDAP	Lightweight Directory Access Protocol
MA	Major Application
NIST	National Institute of Standards & Technology
NSLDS	National Student Loan Data System
ODBC	Open Database Connectivity
OLAP	Online Analytical Processing
OMB	Office of Management & Budget
OS	Operating System
PC	Personal Computer
PEPS	Postsecondary Education Participants System
PESC	Postsecondary Electronics Standards Council
PIN	Personal Identification Number
PIRWG	Planning and Investment Review Working Group
PMO	Program Management Office
PO	Principal Office
POP3	Post Office Protocol
QA	Quality Assurance
RCS	Reusable Common Services
RDBMS	Relational Database Management System
RM	Requirements Management
RMT	Risk Management Team
SA	Security Architecture
SAIG	Student Aid Internet Gateway
SAML	Security Assertion Markup Language
SOA	Service Oriented Architecture
SOAP	Simple Object Access Protocol
SQL	Structured Query Language
SRM	Service Reference Model
SSL	Secure Sockets Layer
TAM	Tivoli Access Manager
TCP/IP	Transmission Control Protocol/Internet Protocol
TIM	Tivoli Identity Manager
TO	Task Order

Acronym	Definition
TRB	Technical Review Board
TRM	Technical Reference Model
UDDI	Universal Description, Discovery and Integration
UML	Unified Modeling Language
VB	Visual Basic
VDC	Virtual Data Center
VPN	Virtual Private Network
WAS	WebSphere Application Server
WCM	Web Content Management
WS	Web Services
WSDL	Web Services Description Language
XHTML	Extensible Hypertext Markup Language
XMI	XML Metadata Interchange
XML	eXtensible Markup Language
XSL	eXtensible Stylesheet Language
XSLT	Extensible Stylesheet Language Transformation

Appendix B Glossary

Table B-1 Glossary

Term	Definition
508 Compliance	A section of the Rehabilitation Act that requires compliance with the Electronic and Information Technology Accessibility Standards.
Business Area	The office or offices within the Department responsible for managing an IT solution and whose purpose will be to support that business function.
Capital Planning and Investment Control (CPIC)	This process is an integrated approach to managing Information Technology (IT) investments.
Certification and Accreditation (C&A)	This activity entails a comprehensive analysis of the technical and non-technical security features and other safeguards of an IT solution to establish the extent to which a particular solution meets a set of specified security requirements.
Change Management	Process for managing changes to configuration items (see ITIL)
Clinger-Cohen Act	This public law is formerly known as the Information Technology Management Reform Act or ITMRA. It requires each agency to undertake capital planning and investment control by establishing a process for maximizing the value and assessing and managing risks of IT acquisitions of the executive agency.
Configuration Mgmt	Management of collections of hardware, software or other entities belonging to well-defined sets or configurations (see ITIL)
Contract Office	Departmental offices that review and approve acquisition-planning documents.
Core Deliverable	A document that must be completed and approved by the end of a particular stage.
E-Government Act of 2002	This public law requires agencies to develop performance measures for implementing e-government. In addition, the act requires agencies to conduct and submit to OMB, Privacy Impact Assessments (PIAs) for all new IT investments administering information in identifiable form collected from or about members of the public. (Refer to the CPIC process for more information).

Term	Definition
Enterprise Architecture (EA)	This functional area provides resources and processes to help the Department link its business needs with the best available technologies. EA helps the Department accomplish more with existing resources by using common or shared technology features to deliver needed capabilities faster, reduce new technology risks and free key program staff to focus on more important work.
Exhibit 300	Funding request document describing the business case for an investment, financials, performance measures, SRM and TRM mappings.
Exit/Entry Criteria	The required Framework deliverables that must be completed and approved to exit one stage and enter the next.
Family Educational Rights and Privacy Act (FERPA)	A Federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education.
Federal Information Security Management Act (FISMA) of 2002	Federal legislation that requires agencies to integrate IT security into their capital planning and enterprise architecture processes at the agency, conduct annual IT security reviews of all programs and systems and report the results of those reviews to OMB.
Framework	A structured approach of required stages, key activities and core deliverables that provides a foundation for aligning existing interrelated processes within the Department-regardless of system lifecycle methodology employed.
General Support System (GSS)	Interconnected information resources under the same direct management control that shares common functionality. A system normally includes hardware, software, information, data, applications, communications, facilities and people. It provides support for a variety of users or applications, or both.
Information Assurance (IA)	The continuous application of security policies, procedures and processes that protect and defend information and information resources from unauthorized disclosure, modification or denial of services to authorized consumers.
Information Technology (IT)	A term used to describe equipment or an interconnected system or subsystem of equipment, which is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data by an executive agency.

Term	Definition
Information Technology Investment Management (ITIM)	A process area within the Department that provides an integrated management mechanism for the continuous selection, control and evaluation of investments in information systems and resources over the course of their lifecycles. (Refer to the Department's ITIM Process Guide for more information).
Integrated Technical Architecture (ITA)	Infrastructure that will reduce the number of stove piped applications within FSA that are costly to update. FSA applications use this infrastructure to reduce performance bottlenecks and resolve issues.
Key Activity	Any task, procedure or process that enables and supports the development and/or approval of a core deliverable (see definition for core deliverable above).
Key Component	Critical documents, sections of documents or categories of information that pertain to a core deliverable.
Lifecycle Management (LCM)	The coordination of activities associated with the implementation of information systems from conception through disposal, which include defining requirements, designing, building, testing, implementing and disposing of systems.
Major Application	An application that requires special attention to security due to the risk and magnitude of the harm resulting from the loss, misuse, or unauthorized access to, or modification of, the information processed by the application.
National Institute for Standards and Technology (NIST)	This organization is a non-regulatory Federal agency within the U.S. Commerce Department's Technology Administration division. NIST's mission is to develop and promote measurement, standards and technology to enhance productivity, facilitate trade and improve the quality of life.
OMB Circular A-11	The title of this legislation is "Preparing, Submitting and Executing the Budget." A-11 provides guidance on preparing the Fiscal Year Budget submissions for Presidential review and includes instructions on budget execution.
OMB Circular A-123	The revised version of this policy will have the title, "Management's Responsibility for Internal Control," and is effective as of FY 2006. This legislation defines management's responsibility for internal control in Federal agencies and has a strong emphasis on financial reporting, as opposed to IT Capital Planning.

Term	Definition
OMB Circular A-130	The title of this policy is "Management of Federal Information Resources," A-130, provides information resource management policies on Federal Information Management/Information Technology (IM/IT) resources. The ED OCIO recommends that all offices investing in IT resources become familiar with OMB A-130.
OMB Circular A-94	The title of this policy is "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs." A-94 offers guidelines to promote efficient resource allocation through well-informed decision-making.
Paperwork Reduction Act of 1995	Federal legislation intended to minimize the paperwork burden resulting from the collection of information by or for the Federal government in an effort to reduce cost by better managing Federal government information.
Personalization	Delivery of specific services, content or data keyed to user attributes
Planning and Investment Review Working Group (PIRWG)	Department governing body that conducts IT investment analysis reviews and evaluates IT investments and makes recommendations to the CIO. The PIRWG also advises the CIO on Strategic IT investment management issues.
Portal	Portal server subsystem that delivers basic portal services
Portlet	Portal application component (often one of several on one page)
Portlet API	Portal application program interface for portlet manipulation
Principal Office (PO)	Offices within the Department that are responsible for ensuring that they develop automated systems that use information technology in accordance with the Framework.
Privacy Act of 1974, as amended	All Department IT systems processing data that is protected under the Privacy Act must have measures implemented to protect individually identifiable information. Interconnecting systems owned by other departments and agencies that process Department data must also be considered. Protection measures must consist of management, technical and operational controls and ensure an acceptable level of risk. An acceptable level of risk should be determined in accordance with the Department's Risk Management Procedures.
Problem Resolution	Resolution of known errors

Term	Definition
Process Guides	Documents for various process areas within the Department (e.g. ITIM, TRB, CCRB).
Profile Management	Function to manage portal user profile storage and access
Project Manager	Staff person who is responsible for creating deliverables and ensuring that business and technical reviews are executed and required deliverables are completed. This individual is also responsible for managing the day-to-day operations of the Department's IT solutions.
Quality Assurance (QA)	A discipline within project management to objectively monitor control and ensure the completion of key activities and required core deliverables throughout the lifecycle.
Solution	A term to describe all automated information systems, software applications and manual processes at the Department (see System below).
Source Code	Computer application as written in its source language, e.g. Java
Stage	Definitive sections of the lifecycle that indicate a specific purpose or goal (e.g. Vision Stage, Design Stage). The end of each stage is marked by a "stage gate," which marks the exit from one stage and entry into the next.
Stage Gate Review	The integration of various business and technical reviews that ensures core deliverables (and any additional deliverables) required for that stage have been completed.
System	A collection of components (hardware, software, interfaces) organized to accomplish a specific function or set of functions; generally considered to be a self-sufficient item in its intended operational use.
Tailored Project Guide	A document program and project managers use to plan, record and track the completion of all deliverables required for a solution. Project managers should list all Framework core deliverables and any additional required deliverables for their solution.
Technical Review Board (TRB)	Department governing body whose purpose is to govern the technical aspects of new systems development that might affect the performance of the many client and enterprise systems, infrastructure, data and general integrity of the Department's network (EDNet).

Term	Definition
Technical Standards Mosaic	An architecture driven technical framework that identifies the standards and specifications that comprise a service component such as Development, Execution, and Operations.
User	An individual or organization operating or interacting directly with the system; one who uses the services of a system.
Web Services	Web services that connect Internet users or other Internet-based applications.
Work Products Guide	The Work Products Guide seeks to provide project managers with access to a knowledge base of guidelines, procedures, and templates for all critical project activities.

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