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**FSA Modernization Partner**

# NSLDS II Reengineering Operations Architecture Plan

DRAFT

Version 1.0

**September 13, 2002**

## Table of Contents

<b>1</b>	<b>OPERATIONS ARCHITECTURE PLAN OVERVIEW.....</b>	<b>3</b>
<b>1.1</b>	<b>INTRODUCTION.....</b>	<b>3</b>
<b>1.2</b>	<b>SYSTEM MANAGEMENT .....</b>	<b>4</b>
<b>1.3</b>	<b>CONFIGURATION MANAGEMENT AND TEST SOFTWARE.....</b>	<b>5</b>
<b>2</b>	<b>PROJECT OVERVIEW.....</b>	<b>6</b>
<b>3</b>	<b>SYSTEM MANAGEMENT .....</b>	<b>7</b>
<b>3.1</b>	<b>OVERVIEW.....</b>	<b>7</b>
<b>3.2</b>	<b>NSLDS II OPERATIONS ELEMENTS .....</b>	<b>8</b>
<b>3.3</b>	<b>OPERATIONS STATUS MEETINGS .....</b>	<b>9</b>
<b>3.4</b>	<b>HARDWARE MANAGEMENT .....</b>	<b>10</b>
3.4.1	<i>Development Environment Topology.....</i>	<i>10</i>
3.4.2	<i>Test 1 Environment Topology .....</i>	<i>17</i>
3.4.3	<i>Test 2 Environment.....</i>	<i>22</i>
3.4.4	<i>Production (Execution) Environment.....</i>	<i>27</i>
3.4.5	<i>Hardware and Software Tracking.....</i>	<i>33</i>
<b>3.5</b>	<b>SECURITY ADMINISTRATION.....</b>	<b>38</b>
<b>3.6</b>	<b>STARTUP / SHUTDOWN.....</b>	<b>39</b>
<b>3.7</b>	<b>BATCH SCHEDULING .....</b>	<b>39</b>
<b>3.8</b>	<b>DATA BACKUP &amp; RESTORE .....</b>	<b>39</b>
<b>3.9</b>	<b>PERFORMANCE MONITORING/ TUNING.....</b>	<b>39</b>
<b>3.10</b>	<b>DISASTER RECOVERY.....</b>	<b>39</b>
<b>3.11</b>	<b>HELP DESK, ERROR MONITORING, ESCALATION, AND REPORTING .....</b>	<b>40</b>
<b>3.12</b>	<b>HIGH AVAILABILITY .....</b>	<b>40</b>
<b>4</b>	<b>CONFIGURATION MANAGEMENT.....</b>	<b>40</b>
<b>4.1</b>	<b>OVERVIEW.....</b>	<b>40</b>
<b>4.2</b>	<b>CONTROL OF CONFIGURATION ITEMS .....</b>	<b>41</b>
4.2.1	<i>Configuration Items .....</i>	<i>41</i>
4.2.2	<i>Baselining Process.....</i>	<i>41</i>
4.2.3	<i>Historical Archival Process .....</i>	<i>42</i>
4.2.4	<i>Migration Process.....</i>	<i>42</i>
<b>4.3</b>	<b>CHANGE CONTROL PROCESS .....</b>	<b>42</b>
4.3.1	<i>Request for Change.....</i>	<i>44</i>
4.3.2	<i>Evaluation of Change .....</i>	<i>44</i>
4.3.3	<i>Implementation of Change.....</i>	<i>45</i>
4.3.4	<i>Notification of Change.....</i>	<i>46</i>
<b>4.4</b>	<b>CONFIGURATION MANAGEMENT TOOLS.....</b>	<b>46</b>
4.4.1	<i>eProject .....</i>	<i>46</i>
4.4.2	<i>Rational ClearQuest – NSLDS Defect Database.....</i>	<i>46</i>
4.4.3	<i>Rational ClearQuest – ECM Tool.....</i>	<i>50</i>
4.4.4	<i>Rational Requisite Pro.....</i>	<i>50</i>
4.4.5	<i>Rational ClearCase.....</i>	<i>50</i>

**APPENDIX A NSLDS II GLOSSARY ..... 51**  
**APPENDIX B NSLDS II DEVELOPMENT AND TEST1 DATABASE SERVER INVENTORY ..... 52**  
**APPENDIX C DEVELOPMENT, TEST 1, TEST 2, AND PRODUCTION FASTT500 DISK ARRAY INVENTORY. 56**  
**APPENDIX D SERVICE LEVEL AGREEMENTS..... 59**

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# 1 Operations Architecture Plan Overview

## 1.1 Introduction

The Operations Architecture is a combination of tools; support services, procedures and controls intended to help keep a production system up and running. The primary users of the Operations Architecture are people who are responsible for system administration and support. In some instances, however, end users will invoke these services. Described below are the major components of the Operations Architecture.

System Management			Configuration Management	
Hardware Management	Security Administration	Startup/ Shutdown	Document Management	Problem Tracking
Excel Spreadsheets ARGIS Tracking Database	TBD	TBD	Rational RequistPro eProject	Rational ClearQuest
Batch Scheduling	Data Backup & Restore	Performance Monitoring/Tuning	Version Control	Software/Data Distribution
TBD	TBD	Mercury Interactive Load Runner DB2 Performance Monitoring	Rational ClearCase	Rational ClearCase Custom Scripts
Disaster Recovery	Help Desk, Error Monitoring, Escalation, and Reporting	High Availability		
Sungard Disaster Recovery Services	TBD	Load Balance Servers, Failover, Clustering		

**Figure A. Operations Architecture Key Elements**

The purpose of this document is clearly document the tools and services utilized in operation of the NSLDS II Development, Test 1, Test 2, and Production environments. This document is currently in draft format and will be updated periodically as each of the environments are built out and configured.

Computer Sciences Corporation (CSC) is currently contracted for the server level administration of the NSLDS II project. CSC hosts the NSLDS II server environments in the Virtual Data Center (VDC) in Meriden, CT. The following is a description of each environment and a general timeline of the build out of these environments:

- **Development Environment** - Build out and configuration by 10/01/2002. The development environment is utilized for the creation, maintenance, and enhancements of the NSLDS II database. Additionally, the environment will be used to create all reports for the NSLDS II system and the architecture for delivering data to and from the DB2 EEE database server.
- **Test 1 Environment** - Build Out and Configuration TBD. This environment will be utilized for integration testing, system testing, and user acceptance testing.
- **Test 2 Environments** - Build Out and Configuration TBD. This environment will be utilized for integration testing, system testing, user acceptance testing, and potentially some conversion testing.
- **Production (Execution) Environment** - Build Out and Configuration TBD. This environment will be setup approximately 6 months before the deployment of code in order to be used for conversion testing and performance testing. Once the deployment date has been reached, the environment is the execution environment for the NSLDS II project.

As of 09/13/2002, this document will outline the general architecture for each of these environments and focus in on the development environment.

## 1.2 System Management

System Management tools allow operations personnel to control the state of the system and administer the security privileges of users. From Figure A, the operations architecture document describes the systems management tasks broken down into the following elements:

- **Hardware management** – These tools help operators and administrators maintain information associated with all types of system hardware. This information may include things like component volumes, locations, identification numbers, failures, warranty expiration dates, and suppliers.
- **Security Administration** – These tools allow operations personnel to maintain the security privileges of individual users, groups of users, or applications. Access privileges can be specified with respect to data, hardware (i.e., specific platform classes or individual machines) and applications.
- **Startup / Shutdown** – These tools allow operations personnel to startup and shutdown the various components of the system. This includes the various group servers (data and other), common applications on the mainframe or group servers, and bridges/gateways. These tools also allow end users to startup and shutdown their own personal systems. In both instances, these tools also are used to restart parts of the system after a failure, and to coordinate the recovery of data and processes to a known, consistent state prior to making the application(s) available again. This document will examine the high level processes that need to occur in order for a startup and shutdown of the NSLDS II project.

- **Batch Scheduling** – examination of the set of batch scheduling tools used to execute programs and applications. Additionally, this document will describe each of the programs scheduled, their purpose, and their activities.
- **Data Backup and Restore** – detailed description of the backup and restore service level agreements, scheduled times, and information targeted. Additionally, this document will provide detailed planning on restore procedures and testing. This document will not address the archiving of data, as this is an automated process that is covered in the NSLDS II Database Detailed Design.
- **Performance Monitoring/Tuning** – A high level description will be given for the performance testing of the NSLDS II system. For a detailed examination of performance test a separate performance test deliverable will be created. (Reference to document will be inserted in the future). This section of the system management tasks will also provide a high level description of some of the performance monitoring tools and database tuning activities that are scheduled. Additional detailed document links will be inserted for performance tuning.
- **Disaster Recovery** – This document will reference CSC’s disaster recovery plan to display a high level overview of their compliance with FSA service level agreements and scheduling of DR activities.
- **Help Desk, Error Monitoring, Escalation, and Reporting** – a high level description of the types of application errors and monitoring procedures / escalation procedures is provided in this section. Additionally, this section will contain detailed help desk operational procedures and information. Other detailed application errors, escalation procedures, and reporting activities will be documented in other plans. A list of these documents will be provided.
- **High Availability** – This section will cover the different load balancing topologies, failover architectures, and clustering capabilities that will be designed or already put in place for the NSLDS II system.

### 1.3 Configuration Management and Test Software

Configuration Management (CM) enables the controlled and repeatable management of information technology (IT) architecture components as they evolve in all stages of development and maintenance. CM implements a process by which the project teams and stakeholders identify, communicate, implement, document and manage changes in the systems environment. When properly implemented, CM ensures the integrity of the items that have been placed under its control.

For configuration management and testing applications, Modernization Partner has chosen the Rational Enterprise Suite of tools and eProject as standards for FSA. The Rational tools are tightly integrated suite of applications, enabling team members to understand and leverage

project activities and artifacts throughout the lifecycle. Development assets are shared and re-used repeatedly, enhancing overall productivity and improving team collaboration.

For the NSLSDS II project, the Rational Suite of products covers all phases of the project life cycle such as document management, visual models, source code, defects/change requests, test plans, cases and scripts. The following is a list of configuration management areas that the operation architecture plan will detail:

- **Document Management** – A customized version of Rational’s RequistPro application is used for the version controlling of NSLDS II requirements, detailed design, and application documentation. Project information such as project deliverables, status reports, contact lists, and other miscellaneous information will be controlled by eProject.
- **Change Control, Problem Tracking, and Resolution** – Rational’s ClearQuest application has been customized for the NSLDS II project for utilization of raising issues, risks, and system incident reports (SIRs). Configuration Management change requests to production code will be handled through FSA’s customized ClearQuest implementation, the ECMTTool.
- **Version Control** – A customized version of Rational’s ClearCase application has been utilized to handle all version controlling of code, batch programs, and configuration files for the development environment.
- **Software/Data Distribution** – Rational’s ClearCase distribution functionality will be utilized to port production code to the proper server where customized batch scripts will be executed to install the code onto each platform.

## 2 Project Overview

The National Student Loan Data System (NSLDS) was established as part of the Higher Education Act of 1965, as amended, to provide a comprehensive repository of information about Title IV recipients and their loans, grants, lenders guaranty agencies (GAs), servicers and schools. As NSLDS has evolved since its implementation in 1994, it has become much more than an analytical and reporting system and, today, supports key operational requirements. Specific capabilities include:

- Determining student eligibility for Title IV student aid – both pre-screening and post-screening
- Calculating default rates for schools, guarantors and lenders
- Supporting financial management activities including:
  - o Guaranty Agency LPIF and AMF payments
  - o Budget formulation/execution and modeling
  - o Reasonability of payments to guarantors and lenders
- Tracking student enrollment status

- Providing information to policy, research, and other groups

While NSLDS was a good first step in addressing these core requirements, it has been hampered by a number of challenges related to discrepancies between the quality and timeliness of NSLDS data and the system of record, its analytical capabilities, and operating costs. Given these challenges, a project to modernize the system – NSLDS II Reengineering – has been undertaken with the following objectives in mind:

- Improve financial integrity
- Reduce FSA costs associated with NSLDS and related operations
- Improve customer satisfaction through better quality and usability of NSLDS information, benefiting the Department and other NSLDS users in the financial aid community
- Balance FSA data needs with burdens placed on the financial aid community
- Improve usability of the NSLDS data repository through new tools
- Take greater advantage of data resources available within FSA and from the financial aid community

At the heart of NSLDS II Reengineering is the warehousing of data, which provides for restructuring of the NSLDS data repository to support modern data mart analytical tools. Additionally, FSA will have direct access to the data to support more timely, “snapshot-in-time,” views of FSA-maintained Title IV aid data and positions FSA systems to support a future FFEL and Perkins fetch capability by integrating NSLDS II more closely with the EAI Bus architecture

### **3 System Management**

#### **3.1 Overview**

From the mod partner contract with FSA, two technical groups were created that provide the standardization of hardware, performance testing for projects, reporting tools, a common messaging system, and define standard software applications based on functional area (Please reference FSA Technology Policies, Standards & Product Guide v2.3).

The Enterprise Application Integration (EAI) initiative is part of the Enterprise Architecture for the FSA system as part of the Modernization Blueprint. This initiative creates a team of individuals (the EAI team) whose mission is to provide a set of common technology services that enables the sharing of processes and data of disparate systems to support end-to-end business processes. The EAI architecture enables many “stovepipe” applications to exchange information via common, reusable methods and infrastructure. By leveraging IBM’s MQSeries software suite, the EAI team provides the capability to integrate web-based applications, Data Warehouse environments, COTS packages, and existing legacy systems within the SFA technical environment. The cost of the software suite and hardware to run it is shared among the project’s within FSA that utilize the bus.

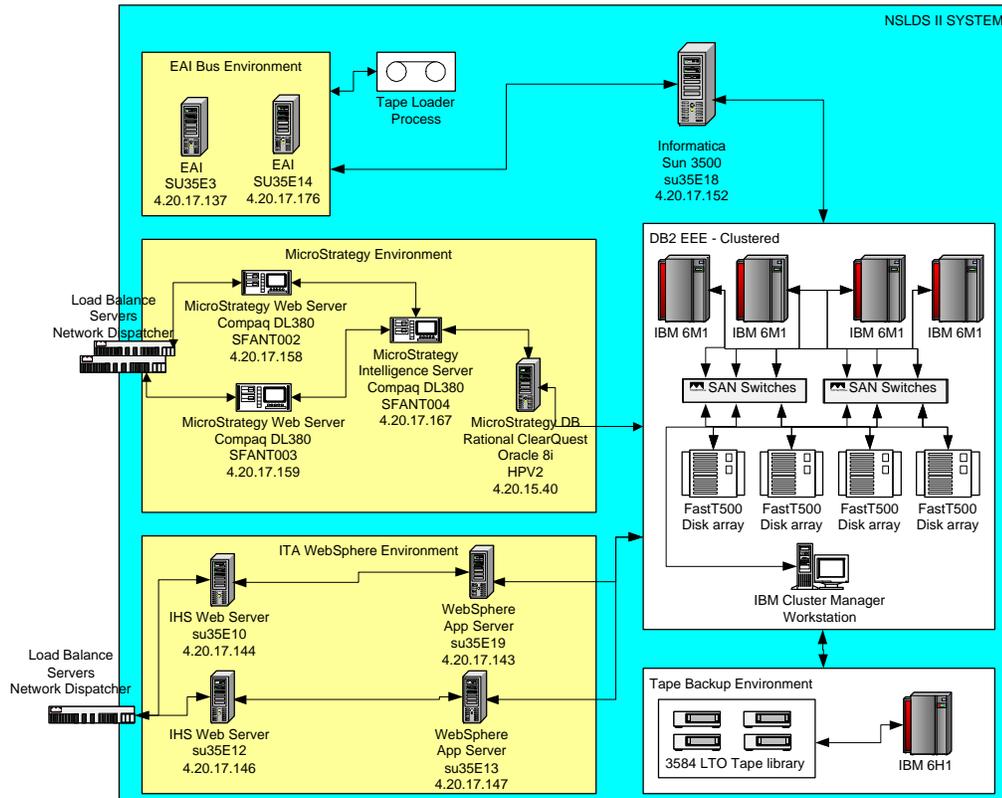
The second group to assist in standardization of architecture is the Integrated Technical Architecture group (ITA). This team provides the following six core services to all projects in the modernization effort.

- **Core Services** - Designing and building the environments
- **Performance Enhancement Services** - Performance goal setting, test execution & troubleshooting
- **Reusable Common Services** - Java based services that 80% of all web-based applications can use.
- **Product Specialty Support** - Resources that are on site and available for troubleshooting.
- **ITA Software Products** - Performance software, web statistics software, automated testing software.
- **SFA Technical Architecture Practices** - Design, code and GUI, and product standards.

The NSLDS II project will utilize ITA's ability to provide common objects for web site design, specialty support for building and testing of the NSLDS II web site, performance-testing services via the Mercury Interactive Load Runner application, transformation of data via the Informatica application, and MicroStrategy Report services.

### 3.2 NSLDS II Operations Elements

The NSLDS II technical architecture will be integrated with the existing FSA technical architecture framework, which incorporates a number of established enterprise-wide solutions (as described in the Technology Standards and Products Guide v. 2.2) to assist in data acquisition and access.



**Figure B. Logical and Physical Groupings of Application Services**

From Figure B, ITA's MicroStrategy Intelligence services will be utilized for all standardized and ad hoc reporting needs, ITA's IHS and WebSphere servers will be utilized for the re-platforming of the existing NSLDS web site, and ITA's Informatica services will be utilized for the extract, transformation, and loading (ETL tool) of data into the data warehouse. Additionally, EAI's MQ Series bus will handle transport of data from all trading partners.

Because the MicroStrategy, Informatica, EAI, and WebSphere/IHS servers are already in production, this operations architecture plan will not detail the system management /configuration management of these servers in depth. Rather, this document will detail the operations of the DB2 EEE environment and how it interfaces with the existing services. Where at all possible, detail shall be provided on the existing services that MicroStrategy, Informatica, EAI, and WebSphere/IHS servers provide in relation to their customization for the NSLDS II project.

### 3.3 Operations Status Meetings

TBD – The operations of the NSLDS II application will not begin until September 2003. This section will document the process of the meetings that will be put into place to deal with the variety of operational activities needed to run the system.

### **3.4 Hardware Management**

The following section will be broken out into the current hardware architectural topology for the NSLDS II project and CSC's tools to track the configuration of each server.

#### **3.4.1 Development Environment Topology**

The NSLDS II Reengineering development environment is a distributed environment with servers located in CSC's Virtual Data Center (VDC) in Meriden Ct and development workstations located at 820 Union Plaza (See Figure C).

##### *3.4.1.1 Workstation Configurations*

Development workstations are all Compaq Evo D500 workstations with Pentium 4 processor running at 1.7 GHz; 256 MB of RAM, and 20 GB hard drives. Standard workstation application configuration consists of Window 2000 Professional, Microsoft Office 2000, Hummingbird – Exceed v7.1, Norton Antivirus 7.03, Attachmate Extra V6.5, and Internet Explorer version 5.0, and Rational Suite v2002.05 (RequistPro, ClearQuest, and ClearCase). The following is a list of the functional team and additional software installed per development requirements.

- Informatica Transformation and Load Team –Informatica PowerConnect v TBD
- MicroStrategy Reporting Team – MicroStrategy TBD
- EAI Bus Data Load Team – TBD
- DB2 EEE Database Team –DB2 Universal Database Personal Client v 7.2 installed, Rational Rose Enterprise Edition v2002.05 and Rational Rose Model Integrator v2002.05
- Rational ClearCase v2002.05 for version control of software
- Rational ClearQuest v2002.05 for issue creation, tracking, and resolution.

All workstations are connected to the Department of Education LAN and additional software will be added as needed based on future requirements

Workstations are connected to the VDC through a switch in the 820 building to a router at the VDC in Meriden Ct. When entering the VDC, information flows through redundant routers to clustered firewalls before entering the main network.

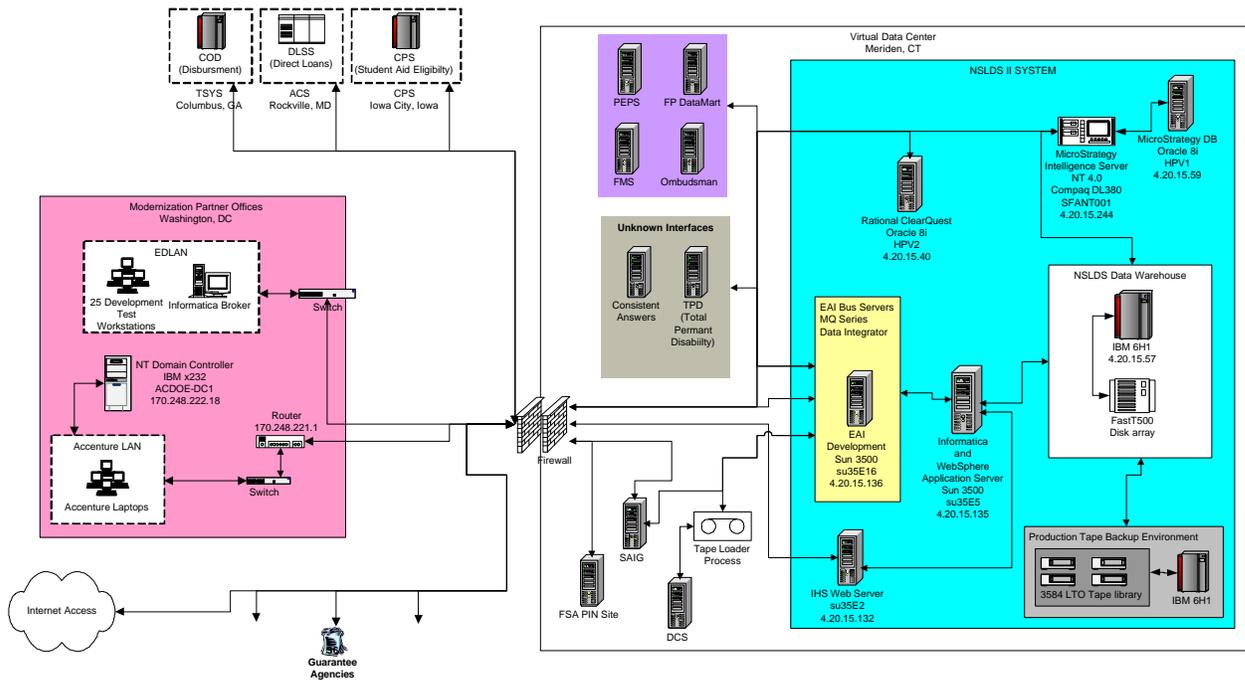


Figure C. Development Environment Topology

### 3.4.1.2 Server Configurations

All servers for the NSLDS II project (Except for the ACDOE domain controller) reside the VDC in meridian ct. The following is a list of servers with a description of their functionality and the group that manages it. Note that operations for the servers are covered in this document for a six-month period after deployment. An operational partner has not been selected at this time (TBD) to take over management of the NSLDS II system after that six-month period.

This section will also provide detailed information for the DB2 EEE database operational architecture. The reporting, ETL, transport, and web operations have already been documented and customization of these services to the NSLDS II architecture will be documented where possible.

#### 3.4.1.2.1 EAI's MQ Series Bus

The EAI development server provides for all trading partners (internal and external) a secure transport mechanism for information with the NSLDS II data warehouse. The EAI architecture guarantees delivery of messages to the Informatica server, which provides the transformation and load process into the Data Warehouse. It is managed by the EAI team and has the following configuration:

- Server Name: su35E16
- Server Intranet IP Address: 4.20.15.136

- 1 - Sun3500 server with 4x400Mhz Sun UltraSparc CPUs, 4 GB of memory, and 4x18GB drives, running on the Solaris 7 operating system.
- This server run MQ Series Messaging v5.1, DB2 UDB Enterprise Edition 6.1, and MQ Series Integrator 2.0.1

#### *3.4.1.2.2 ITA's Informatica Server*

The Informatica server provides all of the transformation and loading process into the NSLDS II data warehouse from the External / Internal trading partners via the EAI bus. Additionally, the Informatica server uploads all database changes from the enterprise data warehouse to the data mart and provides centralize management of metadata repositories. The Informatica server will be managed by the ITA team and has the following configuration:

- Server Name: su35E5 (shared with the WebSphere application server)
- Server Intranet IP Address: 4.20.15.135
- The server is a Sun3500 server with 4x400Mhz Sun UltraSparc CPUs, 4 GB of memory, and 4x18GB drives, running on the Solaris 7 operating system.
- The server has additional application software of Informatica PowerCenter e 1.7, WebSphere Advanced Edition 3.5, and OpenDeploy 5.0.

#### *3.4.1.2.3 NSLDS II Database Server*

The data warehouse server provides a central repository for all external and internal trading partners (transferring data via Informatica and the EAI bus). It contains two distinct databases, an enterprise data warehouse and a data mart database, that are utilized by a separate web based application and MicroStrategy reporting architecture. (See NSLDS II Data Architecture diagram).

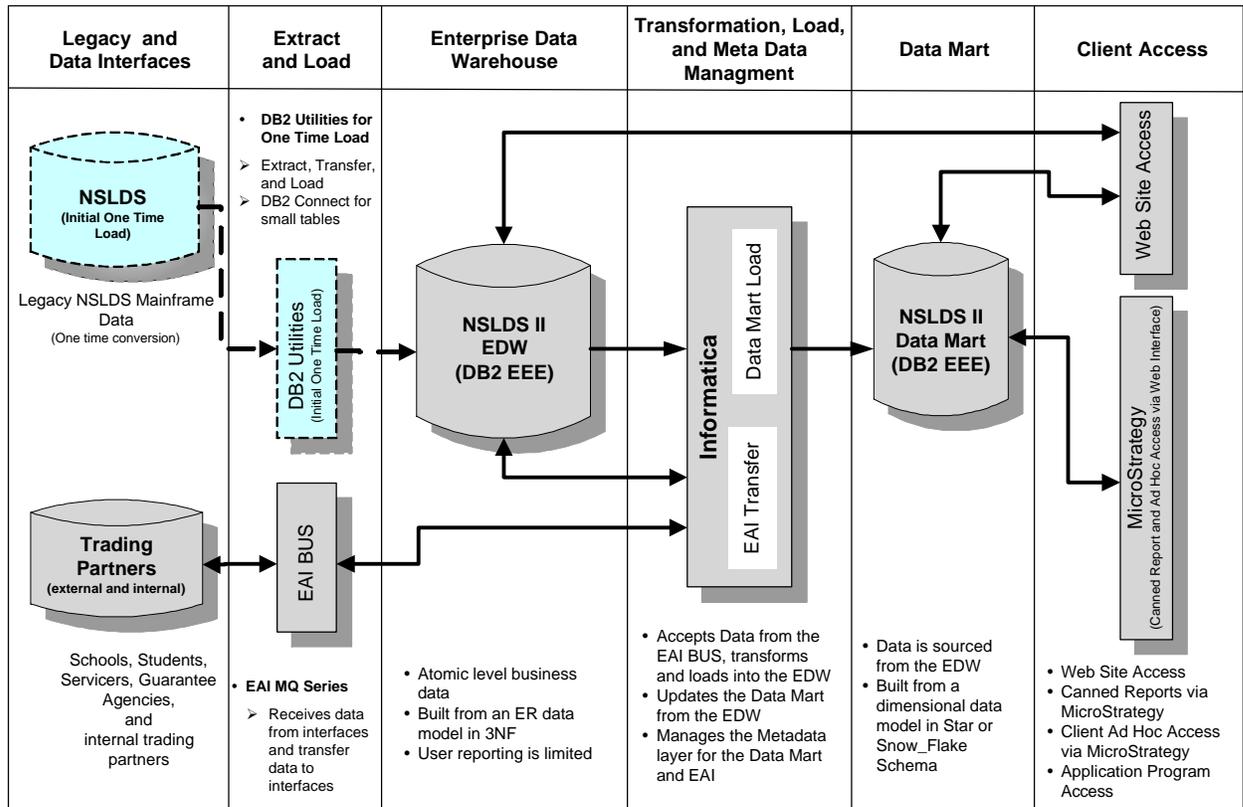


Figure D. NSLDS II Data Architecture

The database server is managed by the NSLDS II development team and is configured as follows:

- Server Name: ibmp1
- Server Intranet IP Address: 4.20.15.57
- Server Internet IP Address: 4.20.14.57
- One IBM pSeries 660 model 6H1 server with four 750MHz RS64-IV processors, 4 GB of memory, two internal 36.4 GB drives running AIX 5L Version 5.1 operating system. (See Figure D)
- One external IBM FastT500 disk array with 500MB of cache and 2.4 TB of disk space is attached to the IBM pSeries 6H1 server via a fiber switch running at 100 MB.
- IBM's DB2 Universal Data Base (UDB) Enterprise Extended Edition (EEE) V7.2.
- IBM's Performance Expert V1.
- IBM's DB2 Recovery Expert V1.
- Native AIX File Manager 5L
- TNG-Unicenter

- Perfview
- Tripwire
- MQ Series
- Measureware
- BMC Control-M
- Sysback for System Backup

### 3.4.1.2.3.1 Disk Configuration

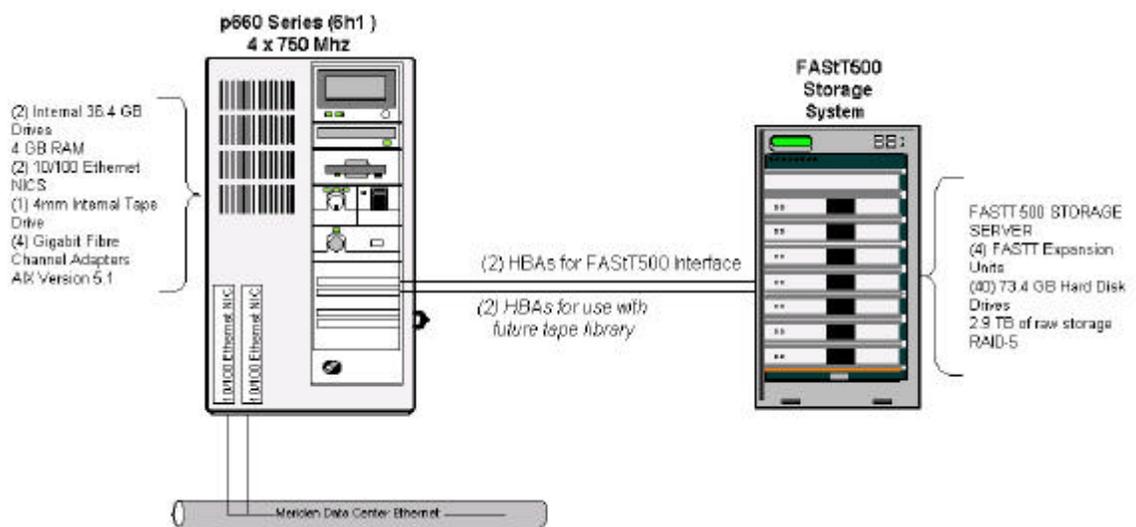


Figure E. Development DB2 EEE Server Configuration

From the diagram, the internal disk configuration of the development DB2 server is two 36.4GB disks that, other than system services software, no other application software will be installed. The external disk configuration that houses the NSLDS II database is detailed in the DB2 EEE database detailed design document.

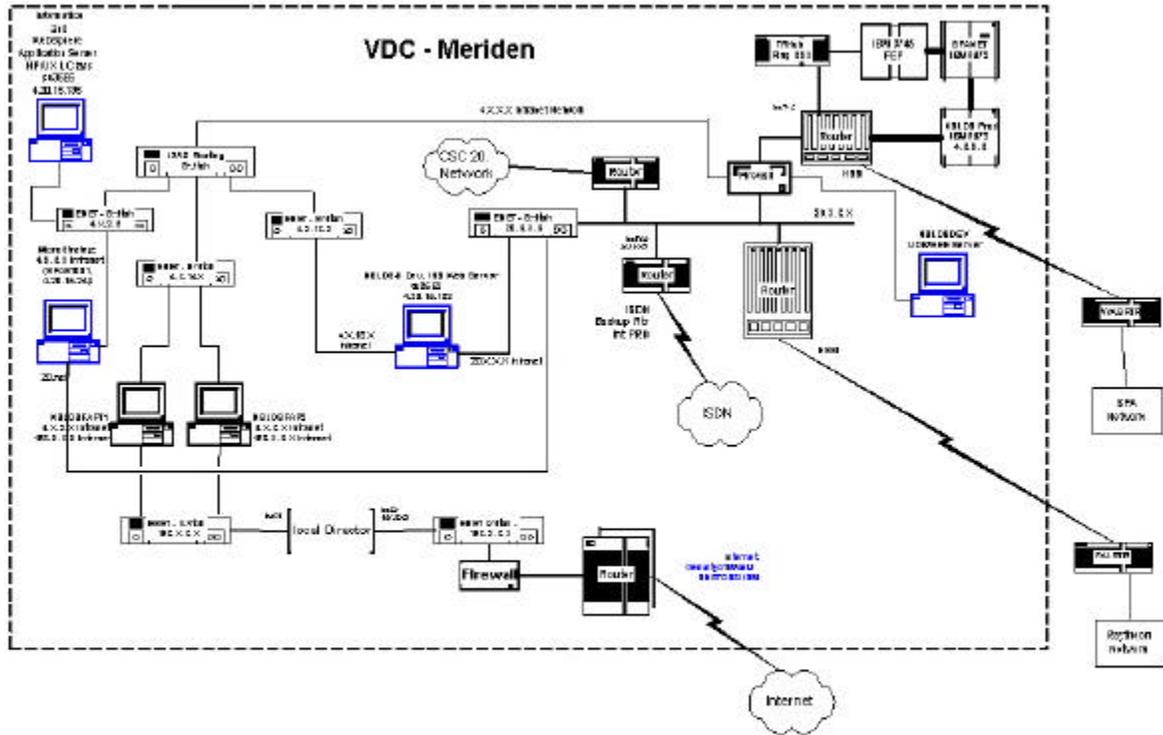
It should be noted that the Development Server hosts IBM's Universal Data Base (UDB) Enterprise Extended Edition (EEE) V7.2, which is a customized version of DB2 for data warehouses. The installation of this application is detailed in the DB2 EEE database detailed design (TBD).

### 3.4.1.2.3.2 Network Configuration

The Network Diagram Figure shows the network communication device layout in relation to the NSLDS environment. **Note:** that the NSLDS-II Development UDB/EEE database server will reside off of a port on the firewall where the NSLDS mainframe database server exists. This should maintain homogeneous security measures for NSLDS-II as is provided for NSLDS.

NSLDS Existing Network Overview  
Diagram - 08/07/02

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Figure F. Network Diagram

3.4.1.2.4 ITA's MicroStrategy Servers

The reporting requirements for the NSLDS II project are met by the implementation of MicroStrategy V7.1. This reporting architecture provides both canned and ad hoc reporting capabilities via a web based interface. It has the ability for data mining using its online analytical processing engine and provides easy of use with a drag and drop interface. The servers are managed by the ITA team and has the following list of main components:

- Server Name: SFANT001 (MicroStrategy Intelligence Server)
  - o Server Intranet IP Address: 4.20.15.244
  - o One Compaq DL380 with two 866 MHz Pentium III processors, 2 GB of memory, 36 GB of hard drive space running on a Microsoft Windows 2000 server platform.
  - o Application software includes MicroStrategy Web Server 7.0, MicroStrategy Intelligence Server 7.0, MS Data Access Components 2.1 sp2, and MS IIS

- Server Name: HPV1 (Oracle Database Server for MicroStrategy)
  - o Server Intranet IP Address: 4.20.15.59
  - o One HP V class server with sixteen 440 MHz CPU's running on HP-UX 11.0
  - o Additionally, Oracle 8.1.6 is currently running on that server.

#### *3.4.1.2.5 ITA's IHS Web Server*

There are three components to the NSLDS II web site, the web server, the application server, and the database server (please see Figure C Development Topology). IBM's HTTP Web Server (IHS) has been selected to provide the web services for the NSLDS II web site. It is bundled as part of the IBM Websphere family offering support for SSL secure connections, fast response cache accelerator, and hardware crypto support. IHS is based on the Apache HTTP server technology. The server will be managed by the ITA team and have the following list of components:

- Server Name: su35E2
- Server Intranet IP Address: 4.20.15.132
- Sun 3500 server running Solaris 2.6. This server has four 400Mhz CPUs, 4GB of memory, and four 18GB drives.
- This server has the following components installed upon it Autonomy Knowledge Server 2.1, Autonomy Knowledge Update 2.1, Autonomy Knowledge Fetch 2.1, Autonomy Knowledge Builder 2.1, I.H.S. version 1.3.12 & 1.3.6, WebSphere Advanced Edition 3.0.2, JDK 1.1.2 & 1.2.2, Servlet API SDK 2.2, and OpenDeploy Server 5.0.

#### *3.4.1.2.6 ITA Websphere Application Server (WAS)*

The second component of the NSLDS web site is the application server. This server handles the transactional processing to the backend database and most of the business logic processing of the web site. IBM's WebSphere application server v5 has been selected due to its flexibility, scalability, and cost. With Web services (IHS server), WebSphere can reduce costs leveraging industry leading technology such as SOAP, UDDI Registry, Web Services Invocation Framework (WSIF), Web services Gateway, and preview versions of Apache SOAP and JSR 109. These technologies make WebSphere Application Server V5 the first production-ready, Web application server for the development and deployment of enterprise Web services solutions for dynamic e-business. The server will be managed by the ITA team and has the components:

- Server Name: su35E5 (shared with the Informatica server)
- Server Intranet IP Address: 4.20.15.135
- The server is a Sun3500 server with 4x400Mhz Sun UltraSparc CPUs, 4 GB of memory, and 4x18GB drives, running on the Solaris 7 operating system.
- The server has additional application software of Informatica PowerCenter v1.7, WebSphere Advanced Edition 3.5, and OpenDeploy 5.0.

#### *3.4.1.2.7 VDC's Backup Environment*

Backups of the development, test1, test2, and production data warehouse environments will be handled by the production backup solution. While this solution has yet to be determined (It is TBD as to whether the VDC backup solution will be used or the proposed IBM Tivoli Storage Manager), the [Backup Environment](#) section of this document will be updated when a decision is reached (expected date 10/01/2002)

#### *3.4.1.2.8 FSA's and Accenture's Windows 2000 File System Servers*

The File system domain controller will be used in development, test, and to support the production environment. The development environment has two different networks, which are used in the creation of the data warehouse applications. There is FSA's ED.GOV domain and the Accenture AC-DOE domain. The following is a list of the main components of these domain controllers:

- Domain Name: ED.GOV (TBD)
  - o Server Name:
  - o Server Intranet IP Address:
  - o This server is
  - o RAM and RAID Configuration.
- Domain Name: ACDOE-DC1
  - o Server Name: IBM x232 Server
  - o Server Intranet IP Address: 170.248.222.18
  - o This server is an IBM x232 server with one Pentium IV 1.4 GHZ processor, 512 MB of RAM, and RAID 5 with 60 GB of hard drive space

### **3.4.2 Test 1 Environment Topology**

The NSLDS II Reengineering test 1 environment is a distributed environment with servers located in CSC's Virtual Data Center (VDC) in Meriden Ct and test workstations located at 820 Union Plaza (See figure below). The Test1 hardware topology uses the same hardware as the Development environment except for the DB2 EEE server. This section will document only the difference between the two environments (mainly the DB2 EEE server).

#### *3.4.2.1 Workstation Configurations*

Test workstations are all Compaq Evo D500 workstations with Pentium 4 processor running at 1.7 GHz; 256 MB of RAM, and 20 GB hard drives. Standard workstation application configuration consists of the following:

- Window 2000 Professional, Microsoft Office 2000
- Hummingbird – Exceed v7.1
- Norton Antivirus 7.03

- Attachmate Extra V6.5
- Internet Explorer version 5.0
- Rational Suite v2002.05 (RequistPro, ClearQuest, ClearCase, Test Manager, and Robot)
- All workstations are connected to the Department of Education LAN and additional software will be added as needed based on future requirements

From figure G., workstations are connected to the VDC through a switch in the 820 building to a router at the VDC in Meriden Ct. When entering the VDC, information flows through redundant routers to clustered firewalls before entering the main network.

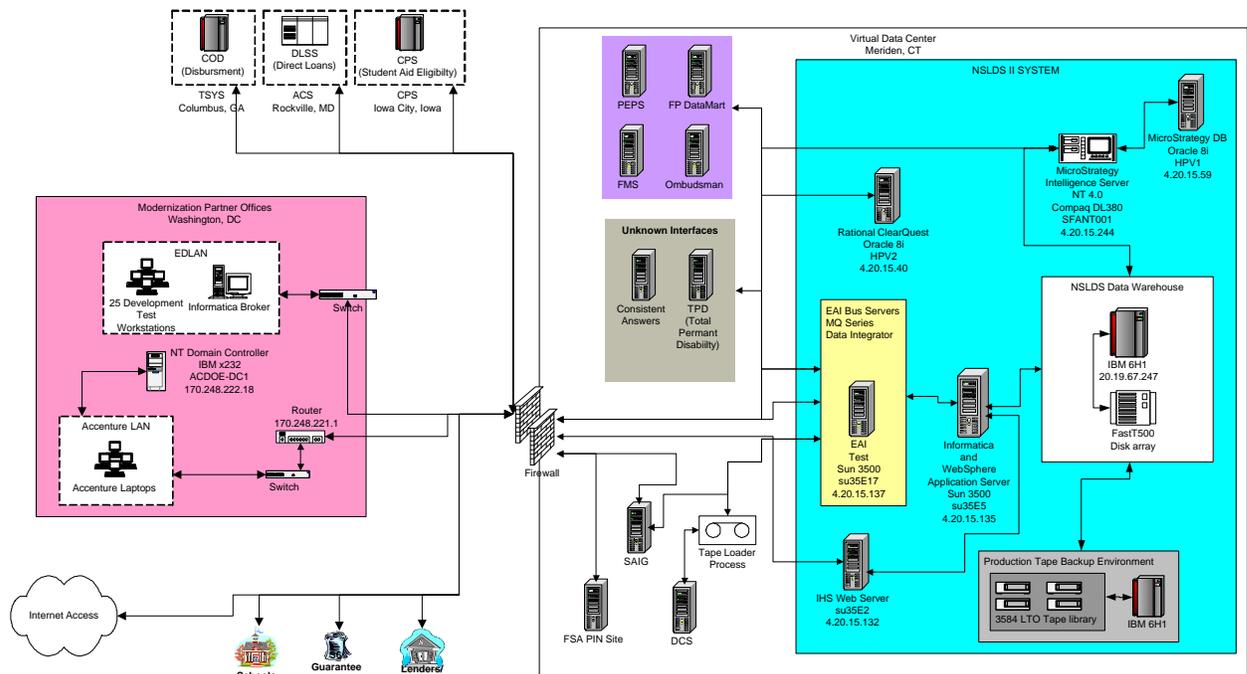


Figure G. Test 1 Environment Topology

### 3.4.2.2 Server Configurations

All servers for the NSLDS II project (Except for the ACDOE domain controller) reside the VDC in meridian CT. The following is a list of servers with a description of their functionality and the group that manages it. Note that this section will only point out the major differences between the test 1 and development environments.

#### 3.4.2.2.1 EAI's MQ Series Bus

The EAI test 1 server is the same server that is used for development. A separate test database is created for this environment that is managed by the EAI team. It has the following configuration:

- Server Name: su35E16
- Server Intranet IP Address: 4.20.15.136
- 1 - Sun3500 server with 4x400Mhz Sun UltraSparc CPUs, 4 GB of memory, and 4x18GB drives, running on the Solaris 7 operating system.
- This server run MQ Series Messaging v5.1, DB2 UDB Enterprise Edition 6.1, and MQ Series Integrator 2.0.1

#### *3.4.2.2.2 ITA's Informatica Server*

The Informatica test 1 server is the same server that is used in development except that a separate test instance is created. The Informatica server is managed by the ITA team has the following configuration:

- Server Name: su35E5 (shared with the WebSphere application server)
- Server Intranet IP Address: 4.20.15.135
- The server is a Sun3500 server with 4x400Mhz Sun UltraSparc CPUs, 4 GB of memory, and 4x18GB drives, running on the Solaris 7 operating system.
- The server has additional application software of Informatica PowerCenter e 1.7, WebSphere Advanced Edition 3.5, and OpenDeploy 5.0.

#### *3.4.2.2.3 NSLDS II Database Server*

The data warehouse server for the test 1 environment is a new server that is managed by the NSLSDS II team. This server will mostly be used for system, intersystem, and user acceptance testing. The test 1 database server is configured as follows:

- Server Name: TBD
- Server Intranet IP Address: TBD
- One IBM pSeries 660 model 6H1 server with four 750MHz RS64-IV processors, 4 GB of memory, two internal 36.4 GB drives running AIX 5L Version 5.1 operating system.
- One external IBM FastT500 disk array with 500MB of cache and 2.4 TB of disk space is attached to the IBM pSeries 6H1 server via a fiber switch running at 100 MB.
- IBM's DB2 Universal Data Base (UDB) Enterprise Extended Edition (EEE) V7.2.
- IBM's Performance Expert V1.
- IBM's DB2 Recovery Expert V1.
- Native AIX File Manager 5L
- TNG-Unicenter
- Perfview

- Tripwire
- MQ Series
- Measureware
- BMC Control-M
- Sysback for System Backup

The server configuration and network design is currently TBD is scheduled to be designed by 10/01/2002.

#### *3.4.2.2.4 ITA's MicroStrategy Servers*

The test 1 MicroStrategy environment uses the same servers as the development environment only a separate instance of a test database is created. These servers are managed by the ITA team and have the following components:

- Server Name: SFANT001 (MicroStrategy Intelligence Server)
  - o Server Intranet IP Address: 4.20.15.244
  - o One Compaq DL380 with two 866 MHz Pentium III processors, 2 GB of memory, 36 GB of hard drive space running on a Microsoft Windows 2000 server platform.
  - o Application software includes MicroStrategy Web Server 7.0, MicroStrategy Intelligence Server 7.0, MS Data Access Components 2.1 sp2, and MS IIS
- Server Name: HPV1 (Oracle Database Server for MicroStrategy)
  - o Server Intranet IP Address: 4.20.15.59
  - o One HP V class server with sixteen 440 MHz CPU's running on HP-UX 11.0
  - o Oracle 8.1.6 is currently running on that server.

#### *3.4.2.2.5 ITA's IHS Web Server*

The test 1 IHS web environment uses the same servers as the development environment only a separate instance of a test environment is created. These servers are managed by the ITA team and have the following component:

- Server Name: su35E2
- Server Intranet IP Address: 4.20.15.132
- Sun 3500 server running Solaris 2.6. This server has four 400Mhz CPUs, 4GB of memory, and four 18GB drives.
- This server has installed upon it Autonomy Knowledge Server 2.1, Autonomy Knowledge Update 2.1, Autonomy Knowledge Fetch 2.1, Autonomy Knowledge Builder 2.1, I.H.S. version 1.3.12 & 1.3.6, WebSphere Advanced Edition 3.0.2, JDK 1.1.2 & 1.2.2, Servlet API SDK 2.2, and OpenDeploy Server 5.0.

#### 3.4.2.2.6 ITA's Websphere Application Server (WAS)

The test 1 WAS environment uses the same servers as the development environment only a separate instance of a test 1 environment is created. These servers are managed by the ITA team and have the following component:

- Server Name: su35E5 (shared with the Informatica server)
- Server Intranet IP Address: 4.20.15.135
- The server is a Sun3500 server with 4x400Mhz Sun UltraSparc CPUs, 4 GB of memory, and 4x18GB drives, running on the Solaris 7 operating system.
- The server has additional application software of Informatica PowerCenter e 1.7, WebSphere Advanced Edition 3.5, and OpenDeploy 5.0.

#### 3.4.2.2.7 VDC's Backup Environment

Backups of the development, test1, test2, and production data warehouse environments will be handled by the production backup solution. While this solution has yet to be determined (It is TBD as to whether the VDC backup solution will be used or the proposed IBM Tivoli Storage Manager), the [Backup Environment](#) section of this document will be updated when a decision is reached (expected date 10/01/2002)

#### 3.4.2.2.8 FSA's and Accenture's Windows 2000 File System Servers

The file system domain controllers will be used in the development, test, and production environments to support each of their life cycles. The domain controllers have two different networks, which are used in the support of each environment. There is FSA's ED.GOV domain and the Accenture AC-DOE domain. The following is a list of the main components of these domain controllers:

- Domain Name: ED.GOV (TBD)
  - o Server Name:
  - o Server Intranet IP Address:
  - o This server is
  - o RAM and RAID Configuration.
- Domain Name: ACDOE-DC1
  - o Server Name: IBM x232 Server
  - o Server Intranet IP Address: 170.248.222.18
  - o This server is an IBM x232 server with one Pentium IV 1.4 GHZ processor, 512 MB of RAM, and RAID 5 with 60 GB of hard drive space

### **3.4.3 Test 2 Environment**

The NSLDS II test 2 environment utilizes the same set of servers as the development and test1 environments do in regards to the MicroStrategy, EAI, WebSphere/IHS servers, and Informatica servers. The major change is for the DB2 EEE environment, which adds an additional 6H1 server and FastT500 array with clustering

#### *3.4.3.1 Workstation Configurations*

Test 2 workstations are all Compaq Evo D500 workstations with Pentium 4 processor running at 1.7 GHz; 256 MB of RAM, and 20 GB hard drives. Standard workstation application configuration consists of the following:

- Window 2000 Professional
- Microsoft Office 2000
- Hummingbird – Exceed v7.1
- Norton Antivirus 7.03
- Attachmate Extra V6.5
- Internet Explorer version 5.0
- Rational Suite v2002.05 (RequistPro, ClearQuest, ClearCase, Test Manager, and Robot).
- All workstations are connected to the Department of Education LAN and additional software will be added as needed based on future requirements

Workstations are connected to the VDC through a switch in the 820 building to a router at the VDC in Meriden Ct. When entering the VDC, information flows through redundant routers to clustered firewalls before entering the main network.

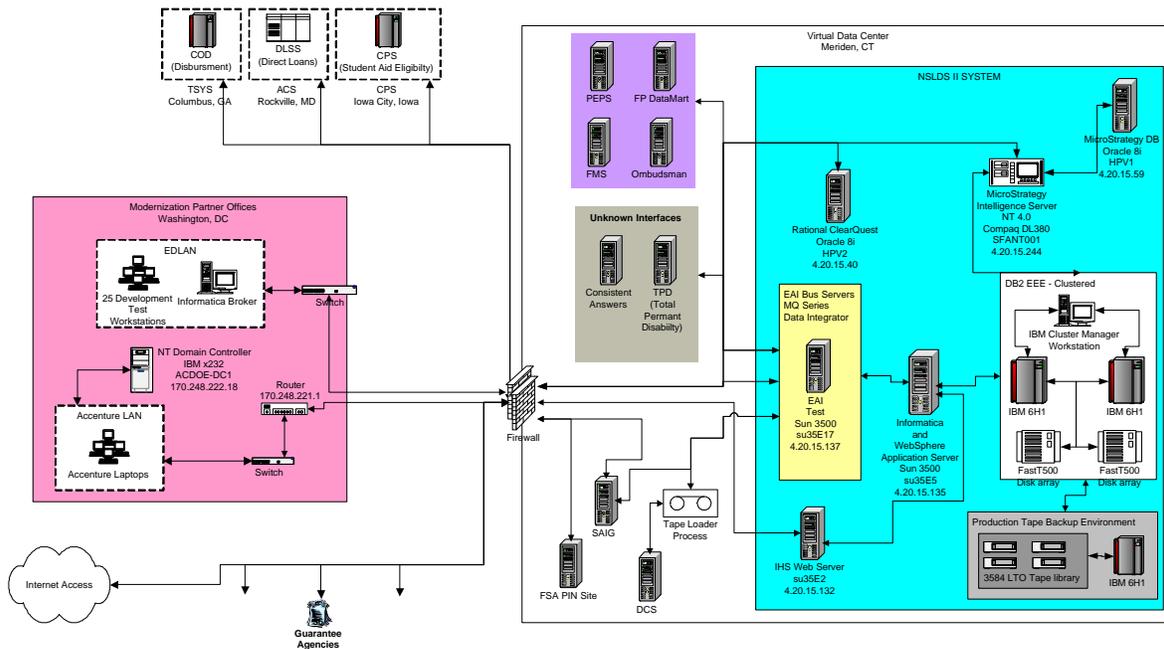


Figure H. Test 2 Environment Topology

### 3.4.3.2 Server Configurations

All servers for the NSLDS II project (Except for the ACDOE domain controller) reside the VDC in meridian ct. The following is a list of servers with a description of their functionality and the group that manages it. Note that this section will only point out the major differences between the test 2 and development environments.

#### 3.4.3.2.1 EAI's MQ Series Bus

The EAI test 2 server is the same server that is used for development. A separate test database is created for this environment that is managed by the EAI team. It has the following configuration:

- Server Name: su35E16
- Server Intranet IP Address: 4.20.15.136
- 1 - Sun3500 server with 4x400Mhz Sun UltraSparc CPUs, 4 GB of memory, and 4x18GB drives, running on the Solaris 7 operating system.
- This server run MQ Series Messaging v5.1, DB2 UDB Enterprise Edition 6.1, and MQ Series Integrator 2.0.1

#### 3.4.3.2.2 ITA's Informatica Server

The Informatica test 2 server is the same server that is used in development except that a separate test instance is created. The Informatica server is managed by the ITA team has the following configuration:

- Server Name: su35E5 (shared with the WebSphere application server)
- Server Intranet IP Address: 4.20.15.135
- The server is a Sun3500 server with 4x400Mhz Sun UltraSparc CPUs, 4 GB of memory, and 4x18GB drives, running on the Solaris 7 operating system.
- The server has additional application software of Informatica PowerCenter e 1.7, WebSphere Advanced Edition 3.5, and OpenDeploy 5.0.

#### 3.4.3.2.3 NSLDS II Database Server

The main difference between the Test 1 database server and the Test 2 database server is the addition of another 6H1 server with FastT500 array in a clustered configuration. Clustering the Test2 database environment allows the testing team to more accurately test the performance of the application and its scalability. The database servers are configured as follows:

- Server Name: TBD
  - o Server Intranet IP Address: TBD
  - o Server Internet IP Address: TBD
  - o One IBM pSeries 660 model 6H1 server with four 750MHz RS64-IV processors, 4 GB of memory, two internal 36.4 GB drives running AIX 5L Version 5.1 operating system.
  - o One external IBM FastT500 disk array with 500MB of cache and 2.4 TB of disk space is attached to the IBM pSeries 6H1 server via a fiber switch running at 100 MB.
  - o IBM's DB2 Universal Data Base (UDB) Enterprise Extended Edition (EEE) V7.2.
  - o IBM's Performance Expert V1
  - o IBM's DB2 Recovery Expert V1
  - o IBM's Parallel Systems Support Programs (PSSP) Version 3.4 Cluster Management Software
- Server Name: TBD
  - o Server Intranet IP Address: TBD
  - o Server Internet IP Address: TBD
  - o One IBM pSeries 660 model 6H1 server with four 750MHz RS64-IV processors, 4 GB of memory, two internal 36.4 GB drives running AIX 5L Version 5.1 operating system.
  - o One external IBM FastT500 disk array with 500MB of cache and 2.4 TB of disk space is attached to the IBM pSeries 6H1 server via a fiber switch running at 100 MB.
  - o IBM's DB2 Universal Data Base (UDB) Enterprise Extended Edition (EEE) V7.2.
  - o IBM's Performance Expert V1

- IBM's DB2 Recovery Expert V1
- IBM's Parallel Systems Support Programs (PSSP) Version 3.4 Cluster Management Software
- Native AIX File Manager 5L
- TNG-Unicenter
- Perfview
- Tripwire
- MQ Series
- Measureware
- BMC Control-M
- Sysback for System Backup

Additionally, there will be a SP Switch2 added to the architecture to allow the servers to cluster the FastT500 arrays in a RAID 5 configuration. The clustering of the DB2 servers shall be controlled through a Control workstation with the following parameters:

- pSeries 610 Model 6E1 - Control Workstation
- Intranet Address: TBD
- Internet Address: TBD
- One 375MHz POWER3-II Copper processor
- 512MB Memory
- 2 Internal 18.2GB Hot Plug Disks
- 1 10/100 Ethernet Adapter – dedicated to SP Ethernet
- 2 Integrated 10/100 Ethernet Adapters
- 2 Integrated Ultra3 SCSI Adapters
- 128-Port Async Controller for connectivity to 6M1 nodes
- 1 GXT130 Graphics Adapter
- 1 20" Color Monitor
- 1 Keyboard and Mouse
- 5 Hot Plug PCI Adapters
- Service Processor
- Redundant Power Supplies
- 48x CD ROM
- 20/40MB 4mm Tape Drive
- 1.44MB 3.5in Diskette Drive
- AIX 5L Version 5.1 – Operating System

- C for AIX Version 5.0 – Compiler

The server configuration and network design is currently TBD but should be designed by 10/01/2002.

#### 3.4.3.2.4 *ITA's MicroStrategy Servers*

The test 2 MicroStrategy environment uses the same servers as the development environment only a separate instance of a test 2 database is created. These servers are managed by the ITA team and have the following components:

- Server Name: SFANT001 (MicroStrategy Intelligence Server)
  - o Server Intranet IP Address: 4.20.15.244
  - o One Compaq DL380 with two 866 MHz Pentium III processors, 2 GB of memory, 36 GB of hard drive space running on a Microsoft Windows 2000 server platform.
  - o Application software includes MicroStrategy Web Server 7.0, MicroStrategy Intelligence Server 7.0, MS Data Access Components 2.1 sp2, and MS IIS
- Server Name: HPV1 (Oracle Database Server for MicroStrategy)
  - o Server Intranet IP Address: 4.20.15.59
  - o One HP V class server with sixteen 440 MHz CPU's running on HP-UX 11.0
  - o Additionally, Oracle 8.1.6 is currently running on that server.

#### 3.4.3.2.5 *ITA's IHS Web Server*

The test 2 IHS web environment uses the same servers as the development environment only a separate instance of a test 2 environment is created. These servers are managed by the ITA team and have the following component:

- Server Name: su35E2
- Server Intranet IP Address: 4.20.15.132
- Sun 3500 server running Solaris 2.6. This server has four 400Mhz CPUs, 4GB of memory, and four 18GB drives.
- This server has installed upon it Autonomy Knowledge Server 2.1, Autonomy Knowledge Update 2.1, Autonomy Knowledge Fetch 2.1, Autonomy Knowledge Builder 2.1, I.H.S version 1.3.12 & 1.3.6, WebSphere Advanced Edition 3.0.2, JDK 1.1.2 & 1.2.2, Servlet API SDK 2.2, and OpenDeploy Server 5.0.

#### 3.4.3.2.6 *ITA's Websphere Application Server (WAS)*

The test 2 WAS environment uses the same servers as the development environment only a separate instance of a test 2 environment is created. These servers are managed by the ITA team and have the following component:

- Server Name: su35E5 (shared with the Informatica server)

- Server Intranet IP Address: 4.20.15.135
- The server is a Sun3500 server with 4x400Mhz Sun UltraSparc CPUs, 4 GB of memory, and 4x18GB drives, running on the Solaris 7 operating system.
- The server has additional application software of Informatica PowerCenter e 1.7, WebSphere Advanced Edition 3.5, and OpenDeploy 5.0.

#### *3.4.3.2.7 VDC's Backup Environment*

Backups of the development, test1, test2, and production data warehouse environments will be handled by the production backup solution. While this solution has yet to be determined (It is TBD as to whether the VDC backup solution will be used or the proposed IBM Tivoli Storage Manager), the [Backup Environment](#) section of this document will be updated when a decision is reached (expected date 10/01/2002)

#### *3.4.3.2.8 Windows 2000 File System Servers*

The file system domain controllers will be used in the development, test, and production environments to support each of their life cycles. The domain controllers have two different networks, which are used in the support of each environment. There is FSA's ED.GOV domain and the Accenture AC-DOE domain. The following is a list of the main components of these domain controllers:

- Domain Name: ED.GOV (TBD)
  - o Server Name:
  - o Server Intranet IP Address:
  - o This server is
  - o RAM and RAID Configuration.
- Domain Name: ACDOE-DC1
  - o Server Name: IBM x232 Server
  - o Server Intranet IP Address: 170.248.222.18
  - o This server is an IBM x232 server with one Pentium IV 1.4 GHZ processor, 512 MB of RAM, and RAID 5 with 60 GB of hard drive space

### **3.4.4 Production (Execution) Environment**

The NSLDS II Reengineering production environment changes all service architectures making the MicroStrategy, EAI, Informatica, and IHS/WebSphere servers highly available as well as building out the DB2 EEE environment to include four 6M1 servers with 4 FastT500 arrays.

#### *3.4.4.1 Clients*

The production system will interface with schools, guarantee agencies, lenders, servicers, and students through the ITA web site. Additionally, trading partners (schools) will utilize the student aid Internet gateway (SAIG) to send information via the EAI bus to Informatica for

transformation to the DB2 EEE database. Other trading partners such as PEPS, FP Data Mart, FMS, and Ombudsman will transfer data via the EAI bus and Informatica to the NSLDS II data warehouse (see Figure in the following page.)

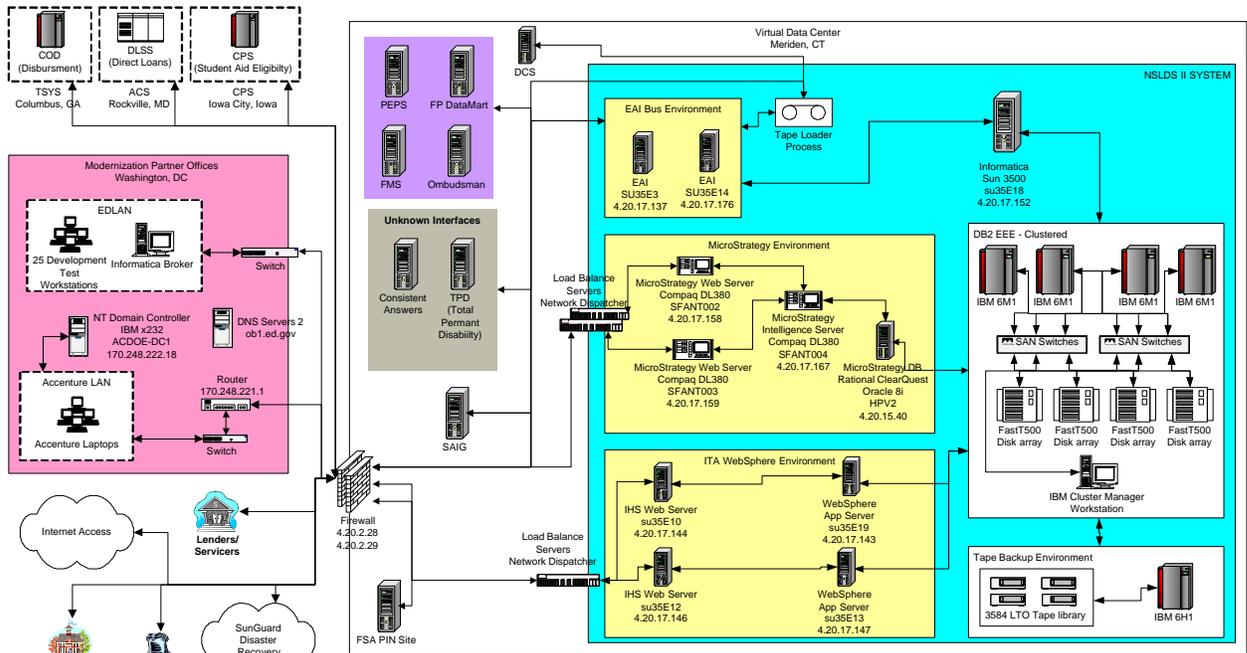


Figure I. Production Environment Topology

### 3.4.4.2 Server Configurations

All servers for the NSLDS II project (Except for the ACDOE domain controller) reside the VDC in meridian ct. The following is a list of servers with a description of their functionality and the group that manages it. It should be noted that all ITA and EAI servers are scheduled for a server refresh of their CPUs, Memory, and Disk space in the spring of 2003.

#### 3.4.4.2.1 EAI's MQ Series Bus

The EAI production servers are managed by the EAI team and differ from the other environments by providing a clustered failover topology. This environment has the following configuration:

- Server Name: su35E3
  - o Server Intranet IP Address: 4.20.17.137
  - o 1 - Sun3500 server with 4x400Mhz Sun UltraSparc CPUs, 4 GB of memory, and 4x18GB drives, running on the Solaris 7 operating system.

- This server run MQ Series Messaging v5.1, DB2 UDB Enterprise Edition 6.1, and MQ Series Integrator 2.0.1
- Server Name: su35E14
  - Server Intranet IP Address: 4.20.15.176
  - 1 - Sun3500 server with 4x400Mhz Sun UltraSparc CPUs, 4 GB of memory, and 4x18GB drives, running on the Solaris 7 operating system.
  - This server run MQ Series Messaging v5.1, DB2 UDB Enterprise Edition 6.1, and MQ Series Integrator 2.0.1

#### 3.4.4.2.2 *ITA's Informatica Server*

The production Informatica server is a single server that is currently being re-evaluated for an upgrade to a failover topology (TBD). The server is administered by the ITA team and has the following configuration:

- Server Name: su35E18
- Server Intranet IP Address: 4.20.17.152
- The server is a Sun3500 server with 4x400Mhz Sun UltraSparc CPUs, 4 GB of memory, and 4x18GB drives, running on the Solaris 7 operating system.
- The server has additional application software of Informatica PowerCenter e 1.7, WebSphere Advanced Edition 3.5, and OpenDeploy 5.0.

#### 3.4.4.2.3 *NSLDS II Database Server*

The proposed server for the NSLDS production environment includes the IBM Cluster 1600, which is comprised of the following building blocks:

- Four pSeries 660 Model 6M1, housed 2 per 19" rack, each with the following features:
  - Server Name: TBD
  - Server Intranet IP Address: TBD
  - Server Internet IP Address: TBD
  - Server Name: TBD
  - Server Intranet IP Address: TBD
  - Server Internet IP Address: TBD
  - Server Name: TBD
  - Server Intranet IP Address: TBD
  - Server Internet IP Address: TBD
  - Server Name: TBD
  - Server Intranet IP Address: TBD
  - Server Internet IP Address: TBD
- Each of these servers has the following configuration:
  - Eight 750MHz RS64-IV Copper and Silicon-on-Insulator (SOI) processors with 8MB L2 Cache per processor

- 16GB Memory
- 2 Internal 36.4GB Disks
- 6 Gigabit Fiber Channel Adapters
- 1 SP Switch2 Attachment Adapter
- 2 10/100 Ethernet Adapters – 1 dedicated to SP Ethernet
- 1 Integrated 10/100 Ethernet
- 1 Integrated SCSI-2 F/W Adapter
- 1 Integrated Ultra2 SCSI Adapter
- 2 Remote I/O Drawers
- 26 Hot Plug PCI Slots
- 32x CD ROM
- 1.44MB 3.5in Diskette Drive
- Cabling for attachment to remote I/O drawers
- Service Processor
- Redundant Power
- AIX 5L Version 5.1 – Operating System
- Parallel Systems Support Programs (PSSP) Version 3.4 – Cluster Management Software
- Each of the servers will be connected to their own FastT 500 DISK Storage Arrays with the following parameters:
  - 3TB of disk storage
  - 4 100MB fiber ports
  - 500MB Cache
  - (There will be four FastT storage arrays the first year, six (two new storage arrays) for the second year, ten (four new storage arrays) for the third year, 15 (five new storage arrays) for the fourth year, and 20 (five new storage arrays) for the last year.)
- Additionally there will be one SP2 switch in the cluster for years one through four and two switches in the cluster for year five.

A pSeries 610 Model 6E1 - Control Workstation to manage the cluster will contain the following configuration:

- 1 375MHz POWER3-II Copper processor
- 512MB Memory
- 2 Internal 18.2GB Hot Plug Disks
- 1 10/100 Ethernet Adapter – dedicated to SP Ethernet
- 2 Integrated 10/100 Ethernet Adapters
- 2 Integrated Ultra3 SCSI Adapters
- 128-Port Async Controller for connectivity to 6M1 nodes
- 1 GXT130 Graphics Adapter

- 1 20" Color Monitor
- 1 Keyboard and Mouse
- 5 Hot Plug PCI Adapters
- Service Processor
- Redundant Power Supplies
- 48x CD ROM
- 20/40MB 4mm Tape Drive
- 1.44MB 3.5in Diskette Drive
- AIX 5L Version 5.1 – Operating System
- C for AIX Version 5.0 – Compiler

(There will be one control workstation to manage the cluster for years one through five.)

Network and Database layout are TBD and shall be designed by 12/01/2002

#### *3.4.4.2.4 ITA's MicroStrategy Servers*

The production MicroStrategy servers differ from the other environments by provide two load balanced web servers with a Intelligence application server and a Oracle database server. It is managed by the ITA team and has the following configuration:

- Web Server Name: SFANT002 (MicroStrategy Intelligence Server)
  - o Server Intranet IP Address: 4.20.17.158
  - o One Compaq DL380 with four 866 MHz Pentium III processors, 2 GB of memory, 36 GB of hard drive space running on a Microsoft Windows 2000 server platform.
  - o Application software includes MicroStrategy Web Server 7.0, MS Data Access Components 2.1 sp2, and MS IIS
- Web Server Name: SFANT003 (MicroStrategy Intelligence Server)
  - o Server Intranet IP Address: 4.20.17.159
  - o One Compaq DL380 with four 866 MHz Pentium III processors, 2 GB of memory, 36 GB of hard drive space running on a Microsoft Windows 2000 server platform.
  - o Application software includes MicroStrategy Web Server 7.0, MS Data Access Components 2.1 sp2, and MS IIS
- Intelligence Server Name: SFANT004 (MicroStrategy Intelligence Server)
  - o Server Intranet IP Address: 4.20.17.167
  - o One Compaq DL380 with four 866 MHz Pentium III processors, 2 GB of memory, 36 GB of hard drive space running on a Microsoft Windows 2000 server platform.
  - o Application software includes MicroStrategy Intelligence Server 7.0, MS Data Access Components 2.1 sp2, and MS IIS
- Server Name: HPV1 (Oracle Database Server for MicroStrategy)

- Server Intranet IP Address: 4.20.15.40
- One HP V class server with sixteen 440 MHz CPU's running on HP-UX 11.0
- Oracle 8.1.6

#### 3.4.4.2.5 ITA's IHS Web Servers

The production IHS web architecture differs from the other environments by providing two load balanced web servers. It is managed by the ITA team and has the following configuration:

- Server Name: su35E10
  - Server Intranet IP Address: 4.20.17.144
  - Sun 3500 server running Solaris 2.6. This server has four 400Mhz CPUs, 4GB of memory, and four 18GB drives.
  - This server has installed upon it Autonomy Knowledge Server 2.1, Autonomy Knowledge Update 2.1, Autonomy Knowledge Fetch 2.1, Autonomy Knowledge Builder 2.1, I.H.S version 1.3.12 & 1.3.6, WebSphere Advanced Edition 3.0.2, JDK 1.1.2 & 1.2.2, Servlet API SDK 2.2, and OpenDeploy Server 5.0.
- Server Name: su35E12
  - Server Intranet IP Address: 4.20.17.146
  - Sun 3500 server running Solaris 2.6. This server has four 400Mhz CPUs, 4GB of memory, and four 18GB drives.
  - This server has installed upon it Autonomy Knowledge Server 2.1, Autonomy Knowledge Update 2.1, Autonomy Knowledge Fetch 2.1, Autonomy Knowledge Builder 2.1, I.H.S version 1.3.12 & 1.3.6, WebSphere Advanced Edition 3.0.2, JDK 1.1.2 & 1.2.2, Servlet API SDK 2.2, and OpenDeploy Server 5.0.

#### 3.4.4.2.6 ITA's Websphere Application Servers (WAS)

The production WAS application architecture differs from the other environments by providing two load balanced application servers. It is managed by the ITA team and has the following configuration

- Server Name: su35E19
  - Server Intranet IP Address: 4.20.17.143
  - The server is a Sun3500 server with 4x400Mhz Sun UltraSparc CPUs, 4 GB of memory, and 4x18GB drives, running on the Solaris 7 operating system.
  - The server has additional application software of Informatica PowerCenter e 1.7, WebSphere Advanced Edition 3.5, and OpenDeploy 5.0.
- Server Name: su35E13
  - Server Intranet IP Address: 4.20.17.147
  - The server is a Sun3500 server with 4x400Mhz Sun UltraSparc CPUs, 4 GB of memory, and 4x18GB drives, running on the Solaris 7 operating system.
  - The server has additional application software of Informatica PowerCenter e 1.7, WebSphere Advanced Edition 3.5, and OpenDeploy 5.0.

#### *3.4.4.2.7 VDC's Backup Environment*

TBD - Backups of the development, test1, test2, and production data warehouse environments will be handled by automated tape backup with IBM's Tivoli Storage Manager (TSM). TSM works in conjunction with DB2 EEE to provide enhanced management of database backups. DB2 EEE has proven backup to tape at 1TB per hour. However, it has not yet been decided the backup schedule for DB2 EEE in regards to an incremental or full backup schedule. The NSLDS II team is currently working with FSA on the service level agreement.

#### **3.4.5 Hardware and Software Tracking**

Internally, CSC uses excel spreadsheets and CA Unicenter's Argis software version 7.0.100 for infrastructure management. The Argis application enables CSC the following functionality:

- Review a comprehensive ownership inventory of assets, including all associated costs, contractual rights and obligations, along with detailed vendor information.
- Use enterprise-wide web-based reporting from detailed information in the Unicenter Argis repository.
- Track and manage IT-specific assets including hardware, software, telecommunications and any other technology that is owned, leased or licensed.
- Use automated workflow for rules-based workflow between people, and interactive workflow between systems.

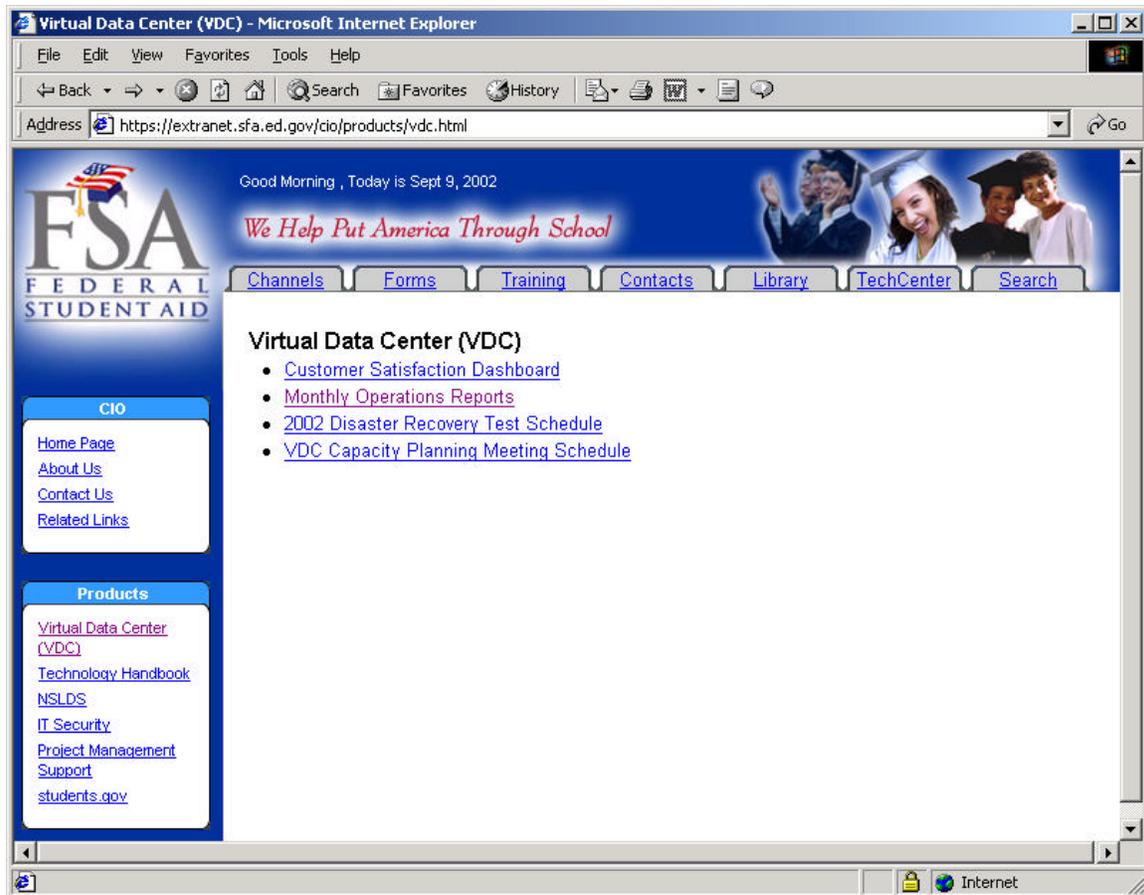
To access the information stored in Argis, CSC publishes the hardware and software configurations for each system on FSA's extranet web site (<https://extranet.sfa.ed.gov>). This web site provides access to review strategic plans and initiatives currently in progress by all of FSA's channels (Students, Schools, Financial Partners, CFO, SIO, FSA Communications, FSA University, Ombudsman, Human Resources, and Acquisitions). The web site also provides performance metrics on servers (CPU, Memory, Disk I/O), web sites (number of hits, number of users, visit lengths, etc), and networks (topology diagrams and network hardware).

The addition of the NSLDS II development, test1, test2, and production environments to the extranet web site will not be completed until all environments are built out. The following section lists screenshots of the web site and will highlight key documents where NSLDS II information will reside.

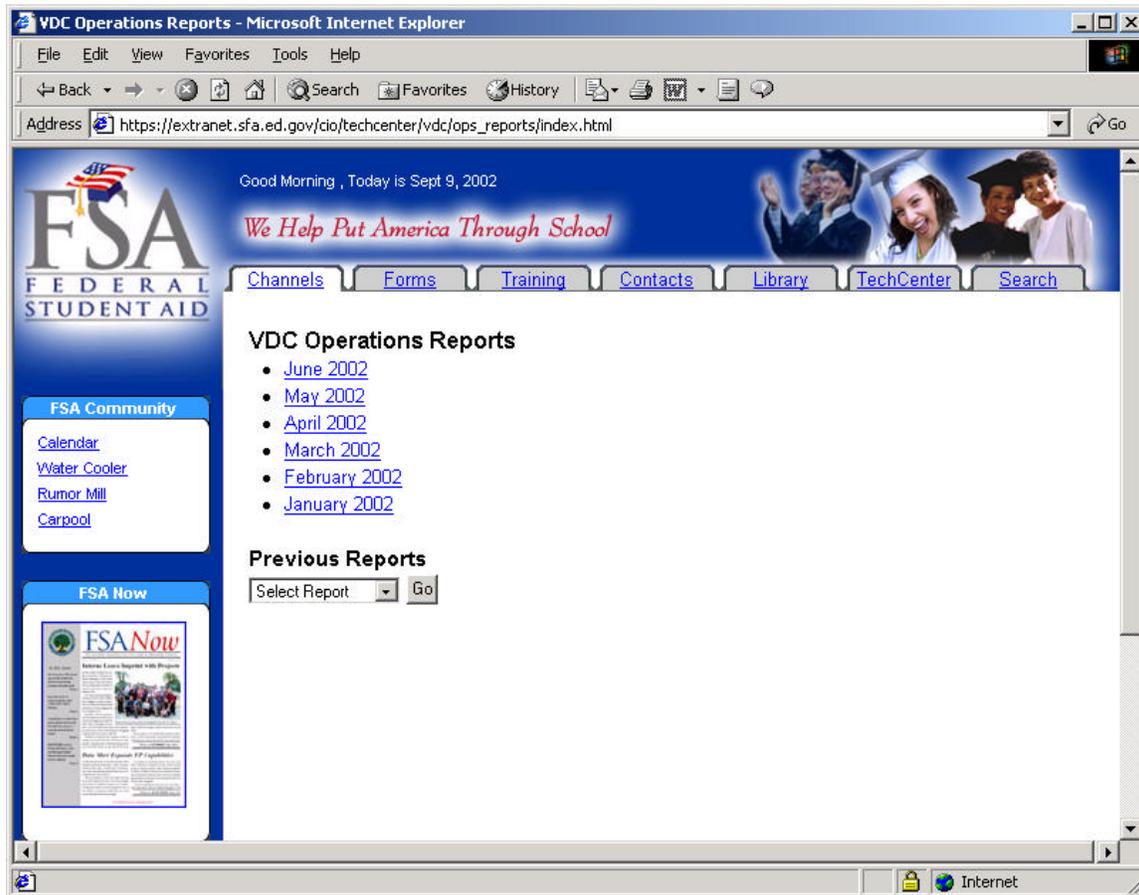
#### *3.4.5.1 FSA Extranet Web Site for Infrastructure Management*

The following is a link and screen shot to VDC Tech Center web page on the FSA extranet web site: <https://extranet.sfa.ed.gov/cio/products/vdc.html>.

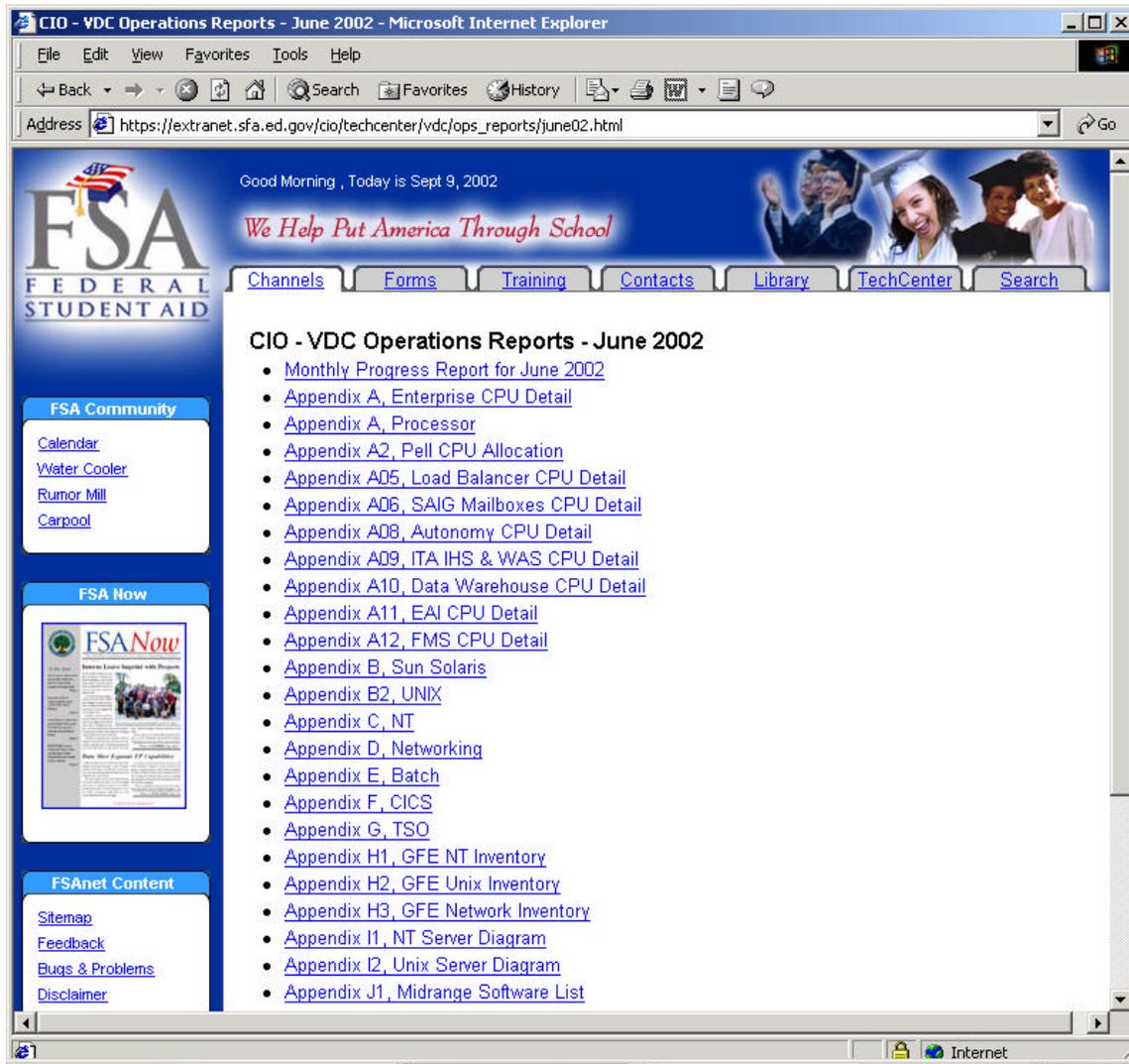
- Log in using User ID: sfapartner and password: success. This link will open the Virtual Data Center (VDC) web page with a list of activities that CSC performs.



- Click on Monthly Operations Reports to see a list of the latest infrastructure tracked at the VDC.



- Select the desired Month



- There are a few key documents in this section where the NSLDS II information is stored. The following is a list of those documents and a short description:
  - **Appendix A05, Load Balancer CPU Detail:** There are currently four load balance servers in production for the NSLDS II data warehouse. Two load balance servers sit in front of the MicroStrategy Web servers and two load balance servers sit in front of the NSLDS II web sites IHS web servers. This excel spreadsheet provides CPU utilization in peak per hour, average and max peak per hour, weekday average and max trends, 3 to 4 month trends, and 4 month hourly trend. Additionally, diagrams are provided for all analysis.
  - **Appendix A06, SAIG Mailboxes CPU Detail:** The SAIG mailbox architecture is used by NSLDS II for delivering data to schools from the data warehouse. This excel spreadsheet provides CPU utilization in peak per hour, average and max peak per hour, weekday

average and max trends, 3 to 4 month trends, and 4 month hourly trend. Additionally, diagrams are provided for all analysis.

- **Appendix A09, ITA IHS & WAS CPU Detail:** The IHS and WAS servers are the architecture behind the NSLDS II web site. These servers interface with the DB2 EEE database server for reads and updates to the system by the schools, lenders, and students. This excel spreadsheet provides CPU utilization in peak per hour, average and max peak per hour, weekday average and max trends, 3 to 4 month trends, and 4 month hourly trend. Additionally, diagrams are provided for all analysis.
- **Appendix A11, EAI CPU Detail:** The EAI server handles the transport of data from the external and internal trading partners to the NSLDS II data warehouse. This excel spreadsheet provides CPU utilization in peak per hour, average and max peak per hour, weekday average and max trends, 3 to 4 month trends, and 4 month hourly trend. Additionally, diagrams are provided for all analysis.
- **Appendix B2, UNIX:** This excel spreadsheet details the average CPU utilization, DISK I/O, Average Disk Queue Length, Average Service Time, and Average Swap Queue Size. Additionally, this size documents the total number of hits (utilizing a web trends report) for each application listed. This spreadsheet touches upon all NSLDS II UNIX servers (DB2 EEE, EAI, Informatica, IHS, and WAS).
- **Appendix C, NT:** This excel spreadsheet details the average CPU utilization, DISK I/O, Average Disk Queue Length, Average Service Time, and Average Swap Queue Size. Additionally, this size documents the total number of hits (utilizing a web trends report) for each application listed. This spreadsheet touches upon the NT MicroStrategy servers that the NSLDS II project will be utilizing.
- **Appendix D, Networking:** This excel spreadsheet provides transfer information about the routers, WAN segments, and frame relay equipment. Specifically, Average CPU Utils per month, Peak CPU Utils per month, Peak Buffer Failures per Hour, Peak Buffer No Memory per hour, Minimum Free Bytes, Average per month Kbps, and Peak Kbps per month.
- **Appendix E, Batch:** This Excel spreadsheets lists the number of jobs per day run, the performance of these jobs, and how each batch job impacts the server (CPU and Disk I/O)
- **Appendix H1, GFE NT Inventory:** This spreadsheet details the software inventory of NT servers in the VDC. Specifically, the application name, environment, task order, host name, vendor name, application, version, owner, and location. Additionally, the spreadsheet has a Hardware Inventory (HW) tab that details the application, environment, task order, host name, vendor name, quantity, model number, description, serial number, CSC assest number, GFE assest number, date purchased, maintenance expiration, # of CPUs, amount of memory, disk space, and location as well as other information. The NT Inventory is applicable to the MicroStrategy reporting infrastructure of the NSLDS II project.

- **Appendix H2, GFE UNIX Inventory:** This spreadsheet details the software inventory of UNIX servers in the VDC. Specifically, the application name, environment, task order, host name, vendor name, application, version, owner, and location. Additionally, the spreadsheet has a Hardware Inventory (HW) tab that details the application, environment, task order, host name, vendor name, quantity, model number, description, serial number, CSC asset number, GFE asset number, date purchased, maintenance expiration, # of CPUs, amount of memory, disk space, and location as well as other information. The UNIX Inventory is applicable to the Informatica, IHS and Websphere servers, EAI servers, and DB2 EEE database servers of the NSLDS II project.
- **Appendix H3, GFE Network Inventory:** This spreadsheet details the network inventory of all servers in the VDC. Specifically, the vendor name, quantity, description, serial number, CSC asset number, GFE asset number, and notes. This applies for all network equipment that is utilized by the NSLDS II project.
- **Appendix I1, NT Server Diagram:** This adobe PDF file displays all the NT servers that are located within the VDC. It provides the server manufacturer name, model, version of the operating system software running on the box, and VDC server name. In some cases, a short description of the server is also included. In regards to the NSLDS II project, this diagram displays the MicroStrategy development, test, and production servers.
- **Appendix I2, Unix Server Diagram:** This adobe PDF file displays all the UNIX servers that are located within the VDC. It provides the server manufacturer name, model, version of the operating system software running on the box, and VDC server name. In some cases, a short description of the server is also included. In regards to the NSLDS II project, this diagram displays the Informatica, EAI, IHS, Websphere, and DB2 EEE database development, test, and production servers.
- **Appendix J1, Midrange Software List:** This excel spreadsheet is another software list for only the mid-range platform broken out by software for server, by product, and by vendor and product. Some of the data this spreadsheet captures is application name, environment, task order, host name, model number, vendor name, product code, description, version, CSC asset number, and quantity.

The above documents highlight the major information for the hardware and software tracking of the NSLDSII project. Other document links will provide additional information on other systems that feed into NSLDS II or provide greater in depth detail on certain topics (CPU utilization for example).

### 3.5 Security Administration

TBD - The security administration of the NSLDS II system will be defined in the NSLDS II security plan. The details for security for the development environment will be determined over the coming months.

### **3.6 Startup / Shutdown**

TBD - The startup and shutdown procedures will be determined over the coming months as the applications are built out on the servers.

### **3.7 Batch Scheduling**

TBD - The batch scheduling procedures will be determined over the coming months as the applications are built out on the servers.

### **3.8 Data Backup & Restore**

TBD - As of 10/01/02, only the NSLDS II development environment will have been configured. The backup solution for the all of the NSLDS II servers is going to tie into the production backup solution and that solution has not been defined yet. This section will be filled out in greater detail in the future. Additionally, backups for the other server environments (MicroStrategy, Informatica, EAI, IHS, WAS) have already been documented by CSC and presented to FSA.

For the development database server as an interim solution until the production backup solution is chosen, CSC has a 90 trial of Sysback/6000 and is doing a full backup each night at midnight. Sysback backs up all the data and creates a bootable tape for reinstallation. The development database will be backed up to multiple tapes if necessary until an enterprise wide solution can be put into place.

The high-level service level agreements for the backups can be found in the Appendix. Detailed SLAs are being researched as to what type of backup should occur each day and when they should occur.

### **3.9 Performance Monitoring/ Tuning**

TBD - The performance monitoring / tuning procedures will be determined over the coming months as the applications are built out on the servers. Additionally, while some SLAs have been determined in the appendix, FSA is currently pursuing getting SLAs on the current NSLDS web site.

### **3.10 Disaster Recovery**

TBD - While the FSA extranet site has a Disaster Recovery schedule, a plan will not be created until the backup solution has been determined and the production hardware is put into place. SLAs for disaster recovery are detailed in the appendix.

### **3.11 Help Desk, Error Monitoring, Escalation, and Reporting**

TBD – CSC is currently configuring the CA Unicenter TNG application for error monitoring, escalation, and reporting. This section will be detailed in the coming months as that application is configured and tested.

This section will also contain the following as the help desk architecture is defined:

- Priorities
- Service Control Process Flow
- Service Control Process Flow
- Service Control Process Descriptions
- Notification Process Flow
- Notification Process Descriptions
- Levels of Support and Notification Participants
- Technology

### **3.12 High Availability**

TBD – The high available architecture is currently being designed for the DB2 EEE server. The configuration of the Web, Reporting, EAI, and Informatica environments has already been architected but not configured for the NSLDS II project. This section will detail the configuration done in the coming months to make the NSLDS II application a highly available application. Note the Appendix contains SLAs for required uptime for the NSLDS II application.

## **4 Configuration Management**

### **4.1 Overview**

The second major component of the operations architecture plan is configuration management (CM). CM is a quality control mechanism. CM enables the controlled and repeatable management of information technology architecture components as they evolve in all stages of development and maintenance. CM implements a process by which the project teams and stakeholders identify, communicate, implement, document, and manage changes in the systems environment. When properly implemented, CM establishes and maintains the integrity of the items that have been placed under its control.

On NSLDS II Reengineering, Configuration Management is the means through which the integrity of the design, development, and other work products is maintained. CM includes the control of configuration items, and the change control process that is used to approve and track additions, modifications, or deletions to a controlled CI baseline.

## **4.2 Control of Configuration Items**

### **4.2.1 Configuration Items**

A configuration item (CI) is defined as a work product that will require configuration control. A CI may be a single piece of work or a group of files that together form the basis for a single program or document. CIs will be grouped together into baselines based on project needs (e.g., requirements baselines, design specifications baselines, source code baselines, test baselines, production baselines, etc.). All changes that occur to the baselines during the project will be accounted for and tracked.

The NSLDS II Reengineering team has identified the following configuration items to be placed under CM:

- Project Deliverables, including Requirements and Design Specifications
- Source Code
- Database Creation items
  - Configuration files (parameters, indices, etc)
  - SQL batch scripts
  - Data Definition Language
- Issues
- Risks

### **4.2.2 Baselining Process**

Baselining is the core of configuration management. By baselining, NSLDS II Reengineering can control and measure the change that occurs to its CIs in a given period of time and ensure the integrity of the product that is released. A baseline is a set of configuration items that has been formally reviewed and agreed upon, which then serves as the basis for further development, and can be changed only through the formal change control process. Usually similar configuration items are grouped in the same baseline (e.g. all of the requirements are part of the Requirements baseline).

NSLDS II Reengineering will support the following baselines:

- Project Deliverable baselines (including Preliminary and Detailed Designs)
- System Requirements baseline
- Development Database Creation baseline
- Development Source Code baseline

- Production Database Creation baseline
- Production Source Code baseline

Baselines will be taken at the following intervals:

- FSA sign-off on deliverables (including Preliminary and Detailed Designs)
- Completion of Milestone Test Phases
- Implementation

#### **4.2.3 Historical Archival Process**

TBD - After a baseline has been approved and released, the baseline will be archived in Rational ClearCase (Source Code and Database items), Rational Requisite Pro (system requirements), or eProject (project deliverables and documentation). The project's historical archival process will retain information about each revision of the CIs, thereby allowing the team access to previous versions of a particular baseline if necessary. This section will be filled out in greater detail as the version control application is defined for the NSLDS II project.

#### **4.2.4 Migration Process**

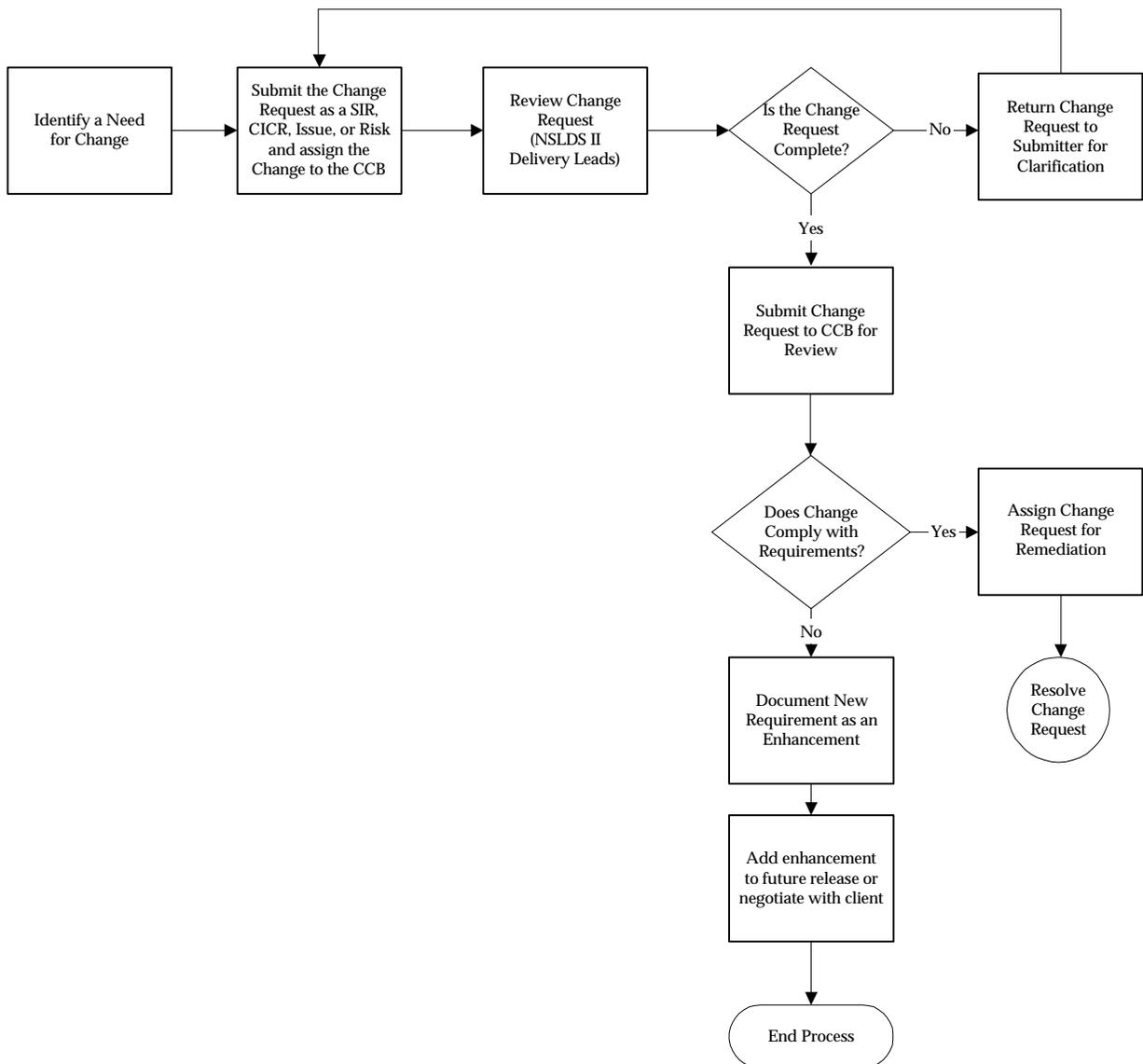
TBD - To facilitate a standard for moving system objects among NSLDS II Reengineering system environments (development, test1, test2, and production), a migration process will be outlined to ensure the coherence of system objects and their relationships as these objects move among the multiple system environments. These multiple system environments will be established to reduce the possibility of contention between different tests competing for the same resources and data. Further, the migration process will minimize the re-creation of system components in subsequent environments, as components will be migrated from one environment to another. This section will be filled out in greater detail as the version control application is defined for the NSLDS II project.

### **4.3 Change Control Process**

During the system lifecycle process, the configuration items within the controlled baselines may require additions, modifications, or deletions. Changes may be required for a variety of reasons, including the addition of new technology or functionality, the resolution of issues, and in response to technical and operational tests and evaluations.

The Change Control Process is designed to manage any change to configuration items. After configuration items are placed under CM, a Change Request must be completed and authorized by the Change Control Board for the CI to be modified. By following this process the NSLDS II project will ensure that only approved changes are incorporated into the configuration items, thus ensuring their integrity.

The Change Control Process for the NSLDS II Release 1 effort is illustrated in the following diagram. This process will be closely followed during the project's Construction (design, build, and test) phase.



**Figure J. Change Control Process**

The process in Figure I can be summarized in four main steps:

- Request for Change

- Evaluation of Change
- Implementation of Change
- Notification of Change

#### **4.3.1 Request for Change**

A Change Request (CR) must be completed to modify a CI, or group of CIs. A CR may result from desired additions, modifications, or deletions in capabilities of the CI. CRs may also result from problems detected during the test process. Identified changes will be logged in the Rational ClearQuest database either as a CICR (changes identified to the project's requirements or scope), SIR (changes identified through testing), Issue, or Risk, and will be assigned to the Change Control Board for evaluation.

#### **4.3.2 Evaluation of Change**

##### *4.3.2.1 Change Control Board*

The NSLDS II Configuration Management Manager has overall responsibility for CM on the NSLDS II project. However, a Change Control Board (CCB) will be established to evaluate and authorize the changes to the system components that have been identified as configuration items. The CCB has the following responsibilities:

- Authorize the establishment of baselines and the identification of configuration items
- Monitor changes and updates to project requirements as part of CM
- Represent the interests of the project manager
- Review and authorize changes to the project's baselines
- Establish, document, and communicate criteria by which Change Requests (CRs) will be evaluated
- Review and approve all new baselines
- Create and communicate CCB decisions to affected groups

The CCB will meet as necessary. The members of the Change Control Board include:

- FSA TBD
- Eric Stackman, Project Manager
- Nathan Brown, Design/Delivery Manager
- Terry Helwig, Technology/Architecture Manager
- Jason Patton, Planning/Test Manager
- Randy Zagorin, Configuration Management Manager

##### *4.3.2.2 CCB Decisions on Change Requests*

Once a CR is submitted to the ClearQuest database, it will be reviewed by one of the NSLDS II Delivery Leads for completeness. CRs that contain the appropriate information and detail will be forwarded to the CCB, while the remainder will be returned to the submitter for clarification.

The Change Control Board will discuss open change requests during regularly scheduled CCB meetings. All CRs must be reviewed by the CCB and will either be approved or rejected. CRs will be evaluated using the following criteria:

- Size of change
- Complexity of change in reference to related system
- Date when change is needed
- Impact of the change on current and subsequent work
- Change implementation costs
- Change implementation benefits
- Criticality of area involved when making a change
- Approved changes already in process
- Test requirements of change
- Resources (e.g., skills, hardware, system) needed for making the change
- Central processing unit and memory impact of change
- Customer or marketing specific needs or request
- Possible alternatives

CCB decisions will be documented within the Rational ClearQuest database along with the exact directions given by the CCB.

Approved CRs will be assigned to the appropriate resource for implementation, and will be implemented based on the procedures set forth in **Implementation of Change section**. During the lifecycle of the CR, additional information regarding the resolution and validation of the Change Request will also be documented in ClearQuest.

Rejected Change Requests will be updated within ClearQuest with comments explaining why the request was not approved. Rejected CRs will then be closed and no further action will be performed on the request.

### **4.3.3 Implementation of Change**

Changes Requests that are approved by the Change Control Board will be implemented. The implementation of CRs consists of version control and baselining, including recording, maintaining, and providing details of changes to CI.

Changes that are related to existing requirements will be assigned for remediation (e.g. code fix, documentation update, etc.). Changes that result in a new requirement will be noted as an enhancement within the ClearQuest database and will either be deferred to a future release or will be negotiated with the FSA Project Sponsor for inclusion into the current release.

Approved CRs that result in changes to the baseline requirements will be performed in Requisite Pro, changes to project documentation will be handled using the latest version stored in eProject, and changes to source code and database components will be handled using ClearCase.

Requirement changes within Requisite Pro will be captured using the tool's history functionality. Configuration items in eProject and ClearCase will be checked out prior to modification, and checked in once the Change Request has been completed. Revision history and notes will be captured within the individual documentation and source code.

#### **4.3.4 Notification of Change**

Groups affected by the Change Requests will be notified of changes through the CCB and the use of emails generated directly through ClearQuest.

### **4.4 Configuration Management Tools**

The NSLDS II project will utilize the following four software applications for Configuration Management:

- eProject – central repository for project documentation
- Rational ClearQuest – two ClearQuest databases will be used for NSLDS II
  - NSLDS II defect tracking for SIRs, CICRs, Issues, and Risks
  - Enterprise Configuration Management (ECM) database for VDC Change Requests
- Rational Requisite Pro – requirements tracking
- Rational ClearCase – source code and database item storage

#### **4.4.1 eProject**

eProject is the central repository for NSLDS II project documentation (deliverables, status reports, etc.). eProject is a web-based application that allows the entire NSLDS II team to access documents saved in the tool through any Internet enabled location. Documents may be downloaded directly to the user's PC, but must be checked out/in in order to update a document contained in the tool. The Modernization Partner's eProject website URL is <http://modpartner.eproject.com>. eProject functionality includes:

- Support multiple control levels of CM
- Provide for the storage and retrieval of CIs
- Provide locks to prevent unauthorized changes
- Provide for the storage and recovery of archive versions of CIs
- Help to ensure the correct creation of products from the CM library
- Provide for the storage, update, and retrieval of CM records

#### **4.4.2 Rational ClearQuest – NSLDS Defect Database**

TBD - Rational ClearQuest is a defect-tracking tool that allows the user to track defects from identification through completion. ClearQuest includes a customizable interface and workflow engine that may be adapted to handle any type of change request.

The NSLDS II ClearQuest solution will be used to track issues, risks, configuration item change requests (CICR), and system investigation requests (SIR). Issues, Risks, CICRs, and SIRs are all types of ClearQuest defects.

#### 4.4.2.1 State Transition

The defect lifecycle is based upon a series of states that serve as the defect status and actions that are used to move a defect from one state to another.

The action / state transition diagram for a defect is shown in the figure below. The states are based on the actions applied to the defect. For instance, to create a new defect the user would perform the “Submit” action. Post creation of a defect, the user will select the appropriate action based upon the current state of the defect. When a defect is in the “Open” state, the user may perform the “Assign”, “Defer”, “Duplicate”, or “Close” action to the defect, with each action moving the defect to a unique state.

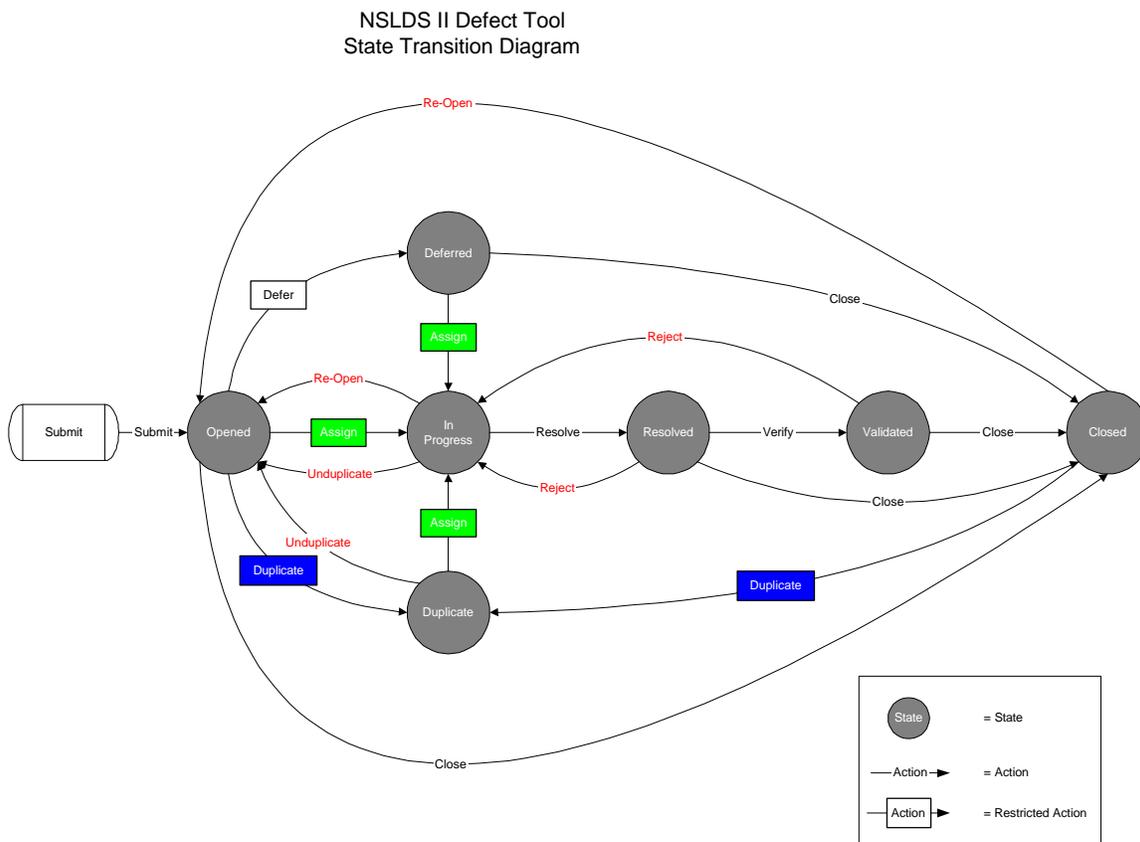


Figure K. State Transition Diagram

The following table contains the defect states that will be used during this effort and a definition of each:

<b>State</b>	<b>Definition</b>
<b>Opened</b>	The defect was created and is awaiting assignment or review
<b>In Progress</b>	The defect was assigned and that resource is currently working on its resolution
<b>Resolved</b>	Corrective action was completed and the defect is awaiting validation
<b>Validated</b>	This defect requires verification and validation activities prior to being closed
<b>Closed</b>	Corrective action has been completed and validated
<b>Deferred</b>	The CCB agreed to postpone the corrective action on this defect to a later release
<b>Duplicate</b>	The issue identified in this defect is identical to another open defect, and the resolution to the duplicate defect will be tracked through the original open defect

Table A, Defect States

#### 4.4.2.2 *Creating a Defect using ClearQuest*

Whenever a SIR, issue, risk, or CICR is identified during the NSLDS II development lifecycle, the user will log the defect in the ClearQuest database. Access to ClearQuest may be obtained through either the Desktop version installed on the users personal computer or the web version through any Internet enabled machine. The user will perform the “Submit” action to create a new defect and the ClearQuest “Main” form will be displayed. The user will enter the type of defect (SIR, Issue, CICR, or Risk), a short and long description of the defect, enter the submitter information, and assign a severity. Additional fields on the “Main” form are used to enter the environment, area, test phase and cycle, along with any reference information.

The following figure displays the “Main” form within the ClearQuest defect tool.

The screenshot shows a software dialog box titled "Submit Defect NS2\_T00000050". It features a tabbed interface with "Main" selected. The "Main" tab contains several input fields: "ID" (text box with "NS2\_T00000050"), "Type" (dropdown), "State" (text box with "Opened"), "Title" (text box), "Severity" (dropdown), "Environment" (dropdown), "Submitter" (dropdown), "Area" (dropdown), "Test Phase" (dropdown), "Cycle" (dropdown), "Reference #" (text box), "ECM Ref #" (text box), "Assignee" (dropdown), and "Target Date" (text box with a calendar icon). A large "Description" text area is at the bottom. A "ReqPro Project" dropdown is at the bottom left. On the right side, there are "OK", "Cancel", and "Values" (dropdown) buttons.

Figure L. Main

Similar forms will be used to capture Notes, Attachments, Resolution, History, and Requirements for the defect:

- Notes form – Allows the user to enter notes or comments on the defect and stores them in a read-only log
- Attachments form – Allows the user to attach supporting documentation (screen prints, requirements documents, etc.) saved in another application such as Microsoft Word to the defect
- Resolution form – Allows the user to enter the resolution type, target release, and deferred to date, along with displaying any duplicate information
- History form – The system tracks and provides a read-only list containing the user ID, date, time, action, old state, and new state for each action performed on the defect
- Requirements form – Allows the user to link the defect to the related system requirement tracked within Requisite Pro

The tool also contains query and reporting features to obtain desired summary information. Additional detail will be added to this section once development starts and modifications are made to the tool.

#### **4.4.3 Rational ClearQuest – ECM Tool**

A different Rational ClearQuest database called the Enterprise Configuration Management (ECM) tool will be used to track all technical change requests submitted to the VDC. This database is administered by the Modernization Partner ECM team and is similar in function to the defect database described in the sections above.

#### **4.4.4 Rational Requisite Pro**

TBD - The NSLDS II team will use the Rational Requisite Pro software to track changes made to the baseline requirements that were approved within deliverable 94.2.2 NSLDS II Preliminary Design. Requisite Pro will demonstrate how NSLDS II Reengineering requirements have been implemented by referencing requirements to design documents, module code, interfaces and test scripts that result from them.

The CCB will control updates to the requirements within the Requisite Pro baseline. All changes to the baseline requirements must be approved through the Change Control Process. This section will be filled out in greater detail as the document version control application is defined for the NSLDS II project.

#### **4.4.5 Rational ClearCase**

TBD – This section will be defined in greater detail once the Rational ClearCase application has been installed on the NSLDS II servers and is configured for its developers. The ClearCase application will provide for the following functionality to the NSLDS II development team:

- Identify the versions of each software item, which together constitute a specific version of a code set.
- Identify the status of software products in development, release, and production.
- Control simultaneous updating of a given software item by more than one person, and provide coordination for the updating of multiple products in one or more locations as required.
- Identify and track all actions and changes resulting from a change request, from initiation through release.

Detailed operational information of the ClearCase tool will be inserted into this section.

**Appendix A**      **NSLDS II Glossary**

<b>Acronym</b>	<b>Definition</b>
DB2 EEE	IBM DB2 Universal Database Enterprise Extended Edition (DB2 EEE)
DB2 Data Propagator	for replicating data between DB2 servers.
PSSP	Parallel Systems Support Program
Extract Transform and Load tool	ETL tool (Informatica)
DSG	decision support group
CA	Computer Associates
COTS	Commercial off the Shelf
CPU	Central Processing Unit
CSC	Computer Sciences Corporation
CTM	Conceptual Technology Model
DAS	Direct Attached Storage
EAI	Enterprise Architecture Integration
GIS	Global Infrastructure Services
GUI	Graphical User Interface
HP	Hewlett Packard
ISV	Independent Software Vendor
LAN	Local Area Network
LMU	Library Management Unit
LoS	Line Of Service
LTM	Logical Technology Model
Mb	Megabit
MB	Megabyte
MDAC	Microsoft Data Access Components
MHz	Megahertz
MS	Microsoft
NSLDS	National Student Loan Data System
O/S	Operating System
PEM	Performance Engineering Model
RAID	Redundant Array of Inexpensive Disk
RAM	Random Access Memory
RFP	Request for Proposal
RPM	Rotations Per Minute
RRS	Remote Replication Services

SAN	Storage Area Network
SCSI	Small Computer System Interface
SLA	Service Level Agreement
SMTP	Simple Mail Transfer Protocol
SNMP	Simple Network Management Protocol
SOE	Standard Operating Environment
SRM	Storage Resource Manager
SQL	Structured Query Language
TI	Technical Infrastructure
TDM	Technology Direction Model
TRM	Technology Requirements Model
TNG	The Next Generation (of CA-Unicenter)
UDWIS	Ultra Differential Wide Intelligent SCSI
VCS	Veritas Cluster Software
VPN	Virtual Private Network
WAN	Wide Area Network
XML	eXtensible Mark-up Language
SAIG	Student Aid Internet Gateway

**Appendix B**      ***NSLDS II Development and Test1 Database Server Inventory***

**Dev p660-6H1**

\*\*\*\*\* HARDWARE  
\*\*\*\*\*

Product	Description	Qty
7026-6H1	pSeries 660	1
	1.44MB 3.5-in Diskette Drive	1
	Integrated SCSI-2 F/W Adapter	1
	Integrated Ultra2 SCSI Adapter	1
	Integrated Ethernet Adapter	1
2456	LC-SC Fibre Channel Converter Cable	4
2624	32x Speed CD-ROM	1
3142	Remote I/O Cable - 3m	2
3169	36.4 GB 10K RPM Ultra2 SCSI Hard Disk Drive	2
3926	Async Printer/Terminal Cable, 9-pin to 25-pin, 4m	1
4075	Memory Board, 16-position	1

4100	1024 MB (2x512MB) SDRAM II DIMMs	4
4962	10/100 Mbps Ethernet PCI Adapter II	2
5005	Preinstall	1
5219	4-Way RS64 IV 750 MHz Processor Card, 8MB L2 Cache	1
5992	System Control and Initialization Cable	1
6132	CEC to Primary I/O Drawer Power Control Cable, 3m	1
6158	20GB/40GB 4mm Tape Drive	1
6228	Gigabit Fibre Channel Adapter	4
6324	Primary I/O Drawer, 5 EIA	1
6540	IPL Disk Mounting Hardware, Cables, Terminator	1
9172	AC Power Specify	1
***** SOFTWARE *****		

Product	Description	Qty
5765-E61	AIX 5L V5.1	1
0001	Processor Entitlement	6
5005	Preinstall	1
9001	Asset Registration	1
	5765-E61 OTC	
5771-AIX	AIX 1 Yr. Enhanced Software Subscription	1
0223	Per Purchased and Active Processors 1 Year Subscription/Renewal	4
	5771-AIX OTC	
5692-A5L	AIX 5L 5.1 SPO	1
0907	AIX 5.1 Power Update	1
0919	AIX 5L	1
0920	AIX 5.1 Bonus Pack	1
0921	AIX 5.1 Expansion Pack	1
1004	Media Process Charge	1
2924	English	1
3410	CD-ROM	1
5005	Preinstall	1
5924	PII - English	1
9001	Asset Registration	1

**Rack**

\*\*\*\*\* HARDWARE \*\*\*\*\*

Product	Description	Qty
7014-T42	Enterprise Rack - 42 EIA	1
6089	Front Door for 2.0m Rack, Sculptured Black	1
6098	Side Panel for 1.8 or 2.0m Rack, Black	2
6171	Additional Power Distribution Unit, Side-Mount, 1 Phase	2
9171	Power Distribution Unit, Side-Mount, 1 Phase	1
9300	Language - English (US)	1
9800	Rack Power Cord - US/Canada	1

**Test\_1 p660-6H1**

\*\*\*\*\* HARDWARE \*\*\*\*\*

Product	Description	Qty
7026-6H1	pSeries 660	1
	1.44MB 3.5-in Diskette Drive	1
	Integrated SCSI-2 F/W Adapter	1
	Integrated Ultra2 SCSI Adapter	1
	Integrated Ethernet Adapter	1
2456	LC-SC Fibre Channel Converter Cable	4
2624	32x Speed CD-ROM	1
3142	Remote I/O Cable - 3m	2
3169	36.4 GB 10K RPM Ultra2 SCSI Hard Disk Drive	2
3926	Async Printer/Terminal Cable, 9-pin to 25-pin, 4m	1
4075	Memory Board, 16-position	1
4100	1024 MB (2x512MB) SDRAM II DIMMs	4
4962	10/100 Mbps Ethernet PCI Adapter II	2
5005	Preinstall	1
5219	4-Way RS64 IV 750 MHz Processor Card, 8MB L2 Cache	1
5992	System Control and Initialization Cable	1
6132	CEC to Primary I/O Drawer Power Control Cable, 3m	1
6158	20GB/40GB 4mm Tape Drive	1
6228	Gigabit Fibre Channel Adapter	4
6324	Primary I/O Drawer, 5 EIA	1
6540	IPL Disk Mounting Hardware, Cables, Terminator	1
9172	AC Power Specify	1
9300	Language - English (US)	1

\*\*\*\*\* SOFTWARE \*\*\*\*\*

Product	Description	Qty
5765-E61	AIX 5L V5.1	1
0001	Processor Entitlement	6
5005	Preinstall	1
9001	Asset Registration	1
	5765-E61 OTC	
5771-AIX	AIX 1 Yr. Enhanced Software Subscription	1
0223	Per Purchased and Active Processors 1 Year Subscription/Renewal	4
	5771-AIX OTC	
5692-A5L	AIX 5L 5.1 SPO	1
0907	AIX 5.1 Power Update	1
0919	AIX 5L	1
0920	AIX 5.1 Bonus Pack	1
0921	AIX 5.1 Expansion Pack	1
1004	Media Process Charge	1
2924	English	1
3410	CD-ROM	1
5005	Preinstall	1
5924	PII - English	1
9001	Asset Registration	1

**Rack**

\*\*\*\*\* HARDWARE \*\*\*\*\*

Product	Description	Qty
7014-T42	Enterprise Rack - 42 EIA	1
6089	Front Door for 2.0m Rack, Sculptured Black	1
6098	Side Panel for 1.8 or 2.0m Rack, Black	2
6171	Additional Power Distribution Unit, Side-Mount, 1 Phase	2
9171	Power Distribution Unit, Side-Mount, 1 Phase	1
9300	Language - English (US)	1
9800	Rack Power Cord - US/Canada	1

*Appendix C Development, Test 1, Test 2, and Production FastT500 Disk Array Inventory*

**Production Environment**

3552-1RU	FASTT 500 STORAGE SERVER	4
2308	FIBRE CHANNELS SHORT WAVE GBIC	24
3502	FASTT MINI-HUB	8
6705	FIBRE CABLE 5M MULTIMODE	8
9800	POWER C.125V 2.8M GROUP 1	4
3560-1RU	FASTT EXP500	16
2308	FIBRE CHANNEL SHORT WAVE GBIC	48
5006	73.4 GB 10K-4 FC HOT SWAP HDD	160
6701	FIBRE CHAN 1M SHORT WAVE CABLE	48
9005	ATTACH TO THE FASTT500(3552)	16
9800	POWER C.125V 2.8M GROUP 1	16
3560-1RU	FASTT EXP500	4
2308	FIBRE CHANNEL SHORT WAVE GBIC	16
5006	73.4 GB 10K-4 FC HOT SWAP HDD	40
6701	FIBRE CHAN 1M SHORT WAVE CABLE	12
6705	FIBRE CHAN 5M SHORT WAVE CABLE	4
9005	ATTACH TO THE FASTT500(3552)	4
9800	POWER C.125V 2.8M GROUP 1	4
2109-S16	SAN FIBRE CHANNEL SWITCH	2
2010	SHORTWAVE GBIC	24
5825	FIBER CHANNEL CABLE MULTIMODE	32
6103	POWER SUPPLY ADDITIONAL	2
3584-L32	ULTRASCALABLE TAPE LIBRARY	1
1456	LTO ULTRIUM FC-AL DRIVE SLED	4
1462	FIBRE CHANNEL PATCH PANEL	1
1662	STORWATCH SPECIALIST	1
2710	REMOTE SUPPORT FACILITY	1
5961	61 M LC-SC FIBRE CABLE	4
8750	ULTRIUM CLEANING CARTRIDGE	4
8757	20-P OF ULTRIUM DATA CARTRIDGE	5
9600	ATCHED TO P-SERIES OR RS/6000	1
9660	10/100 ETHERNET SUPPORT	1

**Development Environment**

3552-1RU	FASTT 500 STORAGE SERVER	1
2308	FIBRE CHANNELS SHORT WAVE GBIC	6
6705	FIBRE CABLE 5M MULTIMODE	2
9800	POWER C.125V 2.8M GROUP 1	1
3560-1RU	FASTT EXP500	4
2308	FIBRE CHANNEL SHORT WAVE GBIC	12
5006	73.4 GB 10K-4 FC HOT SWAP HDD	40
6701	FIBRE CHAN 1M SHORT WAVE CABLE	12
9005	ATTACH TO THE FASTT500(3552)	4
9800	POWER C.125V 2.8M GROUP 1	4

**Test 1**

3552-1RU	FASTT 500 STORAGE SERVER	1
2308	FIBRE CHANNELS SHORT WAVE GBIC	6
6705	FIBRE CABLE 5M MULTIMODE	2
9800	POWER C.125V 2.8M GROUP 1	1
3560-1RU	FASTT EXP500	4
2308	FIBRE CHANNEL SHORT WAVE GBIC	12
5006	73.4 GB 10K-4 FC HOT SWAP HDD	40
6701	FIBRE CHAN 1M SHORT WAVE CABLE	12
9005	ATTACH TO THE FASTT500(3552)	4
9800	POWER C.125V 2.8M GROUP 1	4

**Test 2**

3552-1RU	FASTT 500 STORAGE SERVER	2
2308	FIBRE CHANNELS SHORT WAVE GBIC	12
3502	FASTT MINI-HUB	4
4301	ADDITIONAL 512 MB CACHE	2
6705	FIBRE CABLE 5M MULTIMODE	4
9800	POWER C.125V 2.8M GROUP 1	2
3560-1RU	FASTT EXP500	4
2308	FIBRE CHANNEL SHORT WAVE GBIC	12
5006	73.4 GB 10K-4 FC HOT SWAP HDD	40
6701	FIBRE CHAN 1M SHORT WAVE CABLE	12
9005	ATTACH TO THE FASTT500(3552)	4

9800	POWER C.125V 2.8M GROUP 1	4
3560-1RU	FASTT EXP500	12
2308	FIBRE CHANNEL SHORT WAVE GBIC	48
5006	73.4 GB 10K-4 FC HOT SWAP HDD	120
6701	FIBRE CHAN 1M SHORT WAVE CABLE	48
9005	ATTACH TO THE FASTT500(3552)	12
9800	POWER C.125V 2.8M GROUP 1	12
3560-1RU	FASTT EXP500	4
2308	FIBRE CHANNEL SHORT WAVE GBIC	12
5006	73.4 GB 10K-4 FC HOT SWAP HDD	40
6701	FIBRE CHAN 1M SHORT WAVE CABLE	8
6705	FIBRE CHAN 5M SHORT WAVE CABLE	4
9005	ATTACH TO THE FASTT500(3552)	4
9800	POWER C.125V 2.8M GROUP 1	4

**Appendix D Service Level Agreements**

The following are some preliminary Service Level Agreements (SLAs). FSA is currently researching to provide Mod Partner with some additional SLAs in regards to backup schedule and web site performance.

CSC's Recommended SLA's	SLA Metric	SLA Descriptors	Comments	Recommended Monitor / Capture Tools
1) <b>System Platform Availability</b>	99.5% - Year 1  99.7% - Year 2 99.8% - Year 3	Hardware and operating systems availability – Hitachi GX8214 mainframe and all associated system software  7x24 less negotiated Maintenance Windows.  Excludes planned outages	This target is subject to a 3-6 month baseline  Offering Based on:  Technology Facilities infrastructure Operating systems Subsystem release levels	System Logs Problem Tickets
2) <b>DB2 Availability</b>	99.5% - Year 1  99.7% - Year 2 99.8% - Year 3		This target is subject to a 3-6 month baseline	Software package to monitor the unique subsystem  Problem Tickets
3) <b>CICS Availability</b>	99.5% - Year 1  99.7% - Year 2 99.8% - Year 3		This target is subject to a 3-6 month baseline	Software package to monitor the unique subsystem  Problem Tickets
4) <b>CICS Response Time</b>	Average Response time <= .3 seconds	Less than .3 Ave. Host Response for:  Non-conversational transactions with less than 25 file or DB calls  Excludes: System Transactions File transfer transactions Transactions using >=.3 seconds of CPU  CICS Terminal Owning Region (TOR) Transactions  Development, Test, QA Environments	This target is subject to a 3-6 month baseline  This is internal response time	Software package to monitor the unique subsystem
5) <b>Critical Batch Processing Completion</b>	99.5% by 7:00 AM EST – Year 1 99.7% by 7:00 AM EST – Year 2	<b>Excludes:</b> Application or Network problems that cause a delay in batch completion.	This target is subject to a 3-6 month baseline	CA-7

	99.8% by 7:00 AM EST – Year 2			
<b>6) Critical Batch Output Delivery</b>	99.5% - Year 1  99.7% - Year 2 99.8% - Year 3	Critical Output delivered within 1 hour of schedule. Critical Output to be defined.  Delivered may mean: Placed in a staging area; Available for online viewing; Delivery to client's station	This target is subject to a 3-6 month baseline	Problem Tickets
<b>7) Time to Restore Service – Severity 1</b>	90% within 4 hours from the time CSC receives the problem escalation from EDS or notices the problem via system monitoring.	Severity 1 is defined as Total Loss of critical business functions: ability to process customer orders; total loss of ability to ship goods to customers; total loss of critical lab facilities; total loss of ability to prepare information for a customer sales/meeting/deal.  Examples:  Complete facility outage, computer or network outage Total facility outage at one of the Corporate Data Centers Total Network Outage in a region or for a whole site Total outage of computers or logical partition in one of the Corporate Data Centers Total outage of a business critical, widely shared application.	This target is subject to a 3-6 month baseline  Help Desk SLA's assume that the Help Desk has been outsourced to CSC and that the appropriate Help Desk tool (e.g. AHD) is in place.  CSC assigns Severity Codes based on:  Business Impact defined by Client and CSC  Number of affected users  Major Application Affected	System Logs  Problem Tickets
<b>8) Time to Restore Service: Severity 2</b>	85% <1 business day	The business over a wide area cannot process customer orders, run a production facility, ship goods or comply with governmental regulations  Escalation and Restoration Processes started for major problems that are not circumvented w/in 15 minutes. Severity 2 is defined as a Partial Loss of critical business functions.	This target is subject to a 3-6 month baseline  Help Desk SLA's assume that the Help Desk has been outsourced to CSC and that the appropriate Help Desk tool (e.g. AHD) is in place.	System Logs Problem Tickets

		<p>Same as above but impact is limited to one section of the business rather than affecting the entire business user community; partial loss of functionality; persistent service degradation (unacceptably slow response times, repetitive printing problems).</p> <p>Examples:</p> <p>Whole application outage (e.g. e-mail) Major application outage Building or part of a building network outage Partial network outage affecting a group of users IMS, CICS or VSE outage</p>	<p>CSC assigns Severity Codes based on:</p> <p>Business Impact defined by Client and CSC</p> <p>Number of affected users</p> <p>Major Application Affected</p>	
<p><b>9) Time to Restore Service: Severity 3</b></p>	<p>85% &lt; 3 business days</p>	<p>Severity 3 is defined as a Degradation or Loss of non-critical Business Function.</p> <p>Partial loss of functionality affecting type of application listed above; impact is limited to one section of a business rather than affecting the entire business community at this location – persistent warning or error messages – persistent service degradation (e.g. unacceptably slow response times, repetitive printing problems).</p> <p>Examples:</p> <p>Performance degradation Persistent network degradation Persistent E-Mail degradation Processor degradation Other pertinent warning messages</p>	<p>This target is subject to a 3-6 month baseline</p> <p>Help Desk SLA's assume that the Help Desk has been outsourced to CSC and that the appropriate Help Desk tool (e.g. AHD) is in place.</p> <p>CSC assigns Severity Codes based on:</p> <p>Business Impact defined by Client and CSC</p> <p>Number of affected users</p> <p>Major Application Affected</p>	<p>System Logs</p> <p>Problem Tickets</p>

**Notes:**

All SLA's are subject to a baseline period (preferably 6 months) where SLA targets can be verified and established

Each SLA has an owner (Line of Service); this SLA owner is responsible for identifying and installing (as necessary) the appropriate monitoring and capturing tools

The process of how the SLA metrics is reported on to Acct. Mgmt. (by the LoS) and the client (by the Acct. Mgmt) needs to be identified.