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4.6 System Hardware

RFP reference: 6.6 System Hardware, Page 43

FACTS II infrastructure supports the environments and infrastructure needed to build and deploy the FACTS II solution and provide DSCYF with the tools and foundation to support this system in the future. Our System Hardware approach is guided by DSCYF's business requirements, the underlying technical requirements of high availability and scalability, the ability to reuse assets across environments, leverage existing standards and policies within the State, and the application of industry leading practices.

The Deloitte team has **production-proven**, hands on experience with the computing environments required for FACTS II. Deloitte has developed and executed large-scale hardware and software plans for multiple other public and private sector organizations. The DC FACES.NET application, Alabama FACTS and Allegheny KIDS are a few examples of the large, complex systems for which we have specified the hardware and software infrastructure.

Our experience in building large-scale development projects similar in size and scale of FACTS II solution, coupled with our experience and understanding of the technical and business challenges of an integrated children services system, make us well suited to build FACTS II. The table below lists the benefits of our hardware configuration.

section HIGHLIGHTS

Production proven .NET based system hardware architecture designed for scalability, reliability, accessibility and manageability

- Aligns with State's Enterprise Standards and Policies
- Supports 1,600+ users including external service providers
- Load balanced 64 bit servers to provide reliability & failover capabilities

Features of Deloitte's Approach to Hardware and Software	Benefits to DSCYF
A technical infrastructure that is modeled on production proven infrastructure - Load Balanced Servers configured for high availability	<ul style="list-style-type: none"> The successful DC FACES.NET track record gives everybody confidence that the ultimate FACTS II system performs to standards you demand. Low cost of ownership. Where possible, we propose reuse of existing assets and licenses
A technical team with a Delaware track record	<ul style="list-style-type: none"> The Deloitte team has over 18 years of experience in Delaware. As a partner on our team, MAXIMUS brings deep knowledge of FACTS I and DSCYF specific processes and procedures.
A technical team with an integrated children services track record	<ul style="list-style-type: none"> A long integrated children services track record is essential in understanding how your data growth statistics should be viewed, alongside your detailed functional requirements, to accurately architect and size FACTS II.
A proven solution	<ul style="list-style-type: none"> No other team has developed and implemented more .NET SACWIS systems than ours. There is a reason that states keep selecting us – we know how to get the job done, on time.

Table 4.6-1. Features and Benefits of Our Hardware Plan and Delivery Solution.

Deloitte's Transfer Approach Brings Technology Confidence to DSCYF

Infrastructure Component	Systems similar to FACTS II		
	DC FACES.NET	Alabama Family, Adult and Child Tracking System (FACTS)	Allegheny County, PA Key Information and Demographics System (KIDS)
Server Hardware Type	HP	DELL	HP
Desktop Hardware Type	HP	DELL	HP
Application Server OS	Windows Server 2003	Windows Server 2003	Windows Server 2003
Transactional RDBMS Server OS	HP UX	Windows Server 2003	Windows Server 2003
Reporting RDBMS OS	Red Hat Linux	Windows Server 2003	Windows Server 2003
Application Server	IIS	IIS	IIS
Transactional RDBMS	Oracle	IBM DB2	Oracle
Reporting RDBMS	Oracle	IBM DB2	Oracle
Business Intelligence Tool	Business Objects	Business Objects	Cognos

Table 4.6-2. Infrastructure components implemented by Deloitte for DC FACE.NET in various jurisdictions.

Deloitte has implemented DC FACES.NET solution on a variety of platforms to leverage the investments made by individual jurisdictions. For FACTS II, we propose an infrastructure with which we are not only familiar but also helps you to leverage your existing investments.

Server Hardware, Operating System Platform and Key Software Selection

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In their proposals, Bidders should identify the system hardware requirements/components for their proposed solution, including server and desktop hardware infrastructure to support the development, testing, staging, training, and production/operation phases of the project.

Examples of these types of components are:

- **Server Hardware Infrastructure:** Detailed description of all servers provided or required for the production environment, including operating systems and other system/subsystem software. Include high availability, redundancy, and disaster recovery capabilities.
- **Desktop Hardware Infrastructure:** Detailed description of all desktops provided or required for the production environment, including operating systems and other system software.
- **Network Hardware Infrastructure:** Detailed description of how the proposed solution will be incorporated into the State's existing network.
- **Storage Infrastructure:** Include high availability, redundancy, and disaster recovery capabilities.
- **Printer Hardware Infrastructure.**
- The State reserves the right to acquire all hardware on its own; however, Bidders must propose the hardware including software and configuration needs.

The combination of hardware platforms, the operating systems and key subsystems that we propose for FACTS II has not only proven successful in existing production environments, but confirms our solution's ability to satisfy current as well as future demands and requirements. It provides an optimal ratio of cost-effectiveness and high performance. Based on our analysis, our solution is not only easily maintainable and scalable, but it meshes with DSCYF existing infrastructure and could leverage current assets where possible to provide overall efficiencies for the DSCYF. This proposed hardware and software platform allows us to deploy the FACTS II system quicker, without requiring major configuration changes or the adoption of significant amount of new standards. The choice of Server Hardware Platform and Operating System Platform for the FACTS II project was determined by the following factors:

- **Field-proven operation.** Similar to the benefits of using an existing system, using the same platform provides the DSCYF with less risk in capacity planning, availability, and application support
- **Proven support.** For critical system qualities such as scalability, availability, and security
- **Large installed base.** For the applications use with demonstrated records of accomplishment on projects of similar size and complexity
- **DSCYF Strategic Vision and State Standards.** We understand DSCYF's technical architecture vision and objective and as can be seen from the proposed hardware and software platform selection our FACTS II infrastructure aligns with State of Delaware enterprise standards and policies.

Server Hardware Infrastructure

Our proposed Hardware platform has been standardized across all environments to two specific server types resulting in simplified maintenance and operations of FACTS II solution.

- **Dell PE 2950 M710 Blade:** Database Servers in FACTS II environments use Dell PE 2950 M710 Blade servers optimized for 24x7 mission critical applications with Intel Xeon processor running Red Hat Enterprise Linux operating system. These full-height blade servers provide the bandwidth necessary for virtualization and performance-intensive business-critical applications. Expanding to a full-height form factor enables significant increase in the memory capacity with 18 dual in-line memory module (DIMM) slots and with the possibility of up to 144 GB of total RAM.
- **Dell PE 1950 M610 Blade:** All other servers in the FACTS II use Dell 1950 M610 Blade servers with Intel Xeon processor running Microsoft Windows Server 2008 R2 64 bit operating systems. These servers provide reliability, availability and serviceability (RAS) capabilities and can be rack mounted. These servers can also scale vertically and provide increased memory slots to allow using smaller, less expensive dual in-line memory modules (DIMMs).

The section, Structured Operating Environments below provides detailed description of the number and distribution of servers required for the production and all other proposed environments, including operating systems and other system/subsystem software.

Key Software

Oracle 11g R2 Database Enterprise Edition

The FACTS II system uses the relational database Oracle 11g R2 Database Enterprise Edition as the transactional database store and Reporting Database store. Oracle Database Enterprise Edition offers industry-leading scalability and reliability in clustered as well as single-system configurations.

Software Platform Selection – .Net

FACTS II uses .Net v4.0 platform features such as design patterns, re-usability, standard Application Programming Interfaces (API), and technologies such as ASP.NET, C#, ADO.NET and SOA-based web services. Our platform selection aligns with State of Delaware enterprise standards and DSCYF's technical architecture themes and objectives in the form of a solution which is Web-based and has n-tier architecture.

Internet Information Services 7.5

Internet Information Services, V7.5 is the application/web server from Microsoft for delivering a high-performance and extremely scalable transaction engine for dynamic ASP.NET based applications. Deloitte has successfully used this in the past including the Production proven DC FACES.NET, Alabama FACTS and Allegheny County, Pennsylvania KIDS applications in addition to other health and human services systems.

Our Considerations when Developing the Hardware and Software Plan

This section identifies the criteria we employed in constructing our proposed hardware and software architecture drawing upon our experience from other large-scale integrated children services implementations and across our health and human services practice.

System Availability and Manageability

To achieve the required high degree of system availability, two factors are critical for an effective implementation and operation: enterprise-class architecture (hardware, software, design), responsive service and support. Given the critical nature of integrated children services technology system and the desire for high availability we design the FACTS II system so that the servers operate in failover and clustered mode and have redundancy to prevent a single point of failure in the production environment.

In addition to the technology foundation, ongoing support of the total environment is a significant factor. Our solution is served by a cluster of application servers hosted with load balancers. The incoming requests for resources first goes to the load balancer which in turn forwards these requests to a cluster of application servers configured as highly available failover system. Accompanied with monitoring capabilities, the Load Balancer also enables system administrators to manage the environment and preempt any critical situations. This approach eliminates a single point of failure and minimizes downtime outside of scheduled maintenance windows.

Highly available and high performing server architecture is part of our approach for the FACTS II system. The proposed combination of hardware and software compliments to our solution's ability to satisfy current as well as future demands and requirements. This approach also provides an optimal ratio of cost-effectiveness to high performance.

Reliability and Failover Capabilities

Our solution's strategy for operational continuity calls for the implementation of fault tolerance through the use of redundancy architecture applied to server, storage, and network infrastructure to support the FACTS II solution. Our redundancy scheme uses two distinct configurations: Active-Active and Active-Standby within different tiers of our solution.

- **Active-Active.** This architecture requires that all available hardware is put into service in order to support failover in the event of a hardware fault or component failure. Our Solution Architecture supports this configuration. For example, we use the Active-Active configuration for our Application Servers. This setup allows us to place unused resources into service, as opposed to just resting idle.
- **Active-Standby.** This approach makes provision for a spare resource. It ensures that in the event of a hardware component failure, sufficient processing capacity exists to provide the service levels expected from the system. The advantages of redundancy are simple fault management and fast switchover times.

By supporting in its system architecture and employing redundancy, our solution not only reduces operational downtime from unplanned disruptions, but also obtains productivity improvements by facilitating non-disruptive infrastructure maintenance. Our solution uses an N-Tier architecture which supports failover capability at every tier in critical environments.

Scalability

The underlying n-tier architecture which is based on proven and reliable DC FACES.NET architecture and solution lends itself to improved scalability. Based on the capacity planning and future growth projections the system can be scaled to handle increased workload. The system can be tuned at various tiers for optimal gain depending on the system needs. The system can be scaled at each tier both vertically (scale-up) or horizontally (scale-out). For example, we propose to use Windows Server 2008 64 bit operating system for the application server instances. Having a 64 bit operating system on a 64 bit compatible hardware enables each individual server instance to take full advantage of available memory. For a system that runs on 32 bit operating system, the maximum available RAM is 4 GB. However, no such limitations apply to 64 bit systems. If required, a number of application server instances can be added and processing power or memory can be increased on application servers.

These are just a few examples of various tuning opportunities presented by the underlying architecture. It is also important to note that the FACTS II solution architecture allows this performance tuning with just configuration settings and there is no need for making code changes and allows an increase in performance and availability incrementally. For example, when we transferred our DC FACES.NET solution to the State of Alabama, in order to satisfy a comparatively larger user base, we added additional application servers to our solution. The solution scaled with simple configuration changes but no code changes and continues to support a large user base of 2,300 users spread across sixty counties.

Load Balancing

DC FACES.NET utilizes hardware load balancing to distribute the load across several physical machines and application instances causing these machines to appear as one single unit. The primary benefits of load balancing are:

Features	How Load Balancing Supports DSCYF Needs
Scalability	Service virtualization presents a great benefit for scalability; if the service, or the point of user contact, is separated from the actual servers, scaling of the application simply means adding more servers, which would not affect the service experienced by the end user.

Features	How Load Balancing Supports DSCYF Needs
Accessibility and High Availability (HA)	It is the capability of a site to remain available and accessible even during the failure of one or more systems. Service virtualization also presents an opportunity for HA; if the point of user contact is separated from the actual servers, the failure of an individual server would not render the entire application unavailable. The Load Balancer automatically shifts the incoming requests to remaining available server(s).
Reliability	It describes the capability of having confidence and control in how and when the system delivers services with respect to availability and performance. Load Balancer ensures that there is no single point of failures. And by having a failover Load Balancer, even the failure of load balancer hardware is taken care of.
Increased Performance	Clustering supports a greater number of users to work simultaneously.

Table 4.6-3. Benefits of our Clustering Solution.

The use of Load Balancing for the FACTS II solution minimizes the probability that any one server is overwhelmed and optimizes the bandwidth available to each computer or terminal. In addition, the use of a hardware load-balancing device minimizes network downtime, facilitates traffic prioritization, provides end-to-end application monitoring and helps protect against malicious activity, such as denial-of-service (DoS) attacks.

The proposed load-balancing configuration for Production environments of the FACTS II solution utilizes the load balancing services by using the F5, Big IP Load Balancers appliance. The key features proposed to be used are:

- Distribute IP traffic to multiple copies (or instances) of a TCP/IP service, such as a Web server, each running on a host within the cluster.
- Compress TCP/IP traffic.

Capacity Planning

In designing FACTS II solution infrastructure we have evaluated the proposed Hardware and Software with aspects such as horizontal and vertical scaling to analyze the capability of each individual Software component to scale along with the primary Hardware components such as CPU and Memory. Based on our past implementation experience, including managing current FACTS system, we have also considered key application factors such as seasonal changes in application usage, e.g. the FACTS II system may be used more heavily during last week of the month. The



Our District of Columbia
FACES.NET solution, similar
to FACTS II needs:

- Supports 1,600+ users including external service providers
- Contains over 200,000 active clients
- Manages over 7,500 cases
- Recorded over 1,800 new cases in FY 2009
- Recorded over 6,500 referrals – intake / investigations in FY 2009

table below lists the key system performance characteristics defining the capacity planning targets and which capacity factors they influence. For each of the performance characteristics, the corresponding capacity factor needs monitoring and adjustment. Initial production configuration for the FACTS II application has been sized based on the following business volumetric requirements specified in the RFP.

Performance Characteristics	FACTS II Capacity Requirements	Key Capacity Factors
User Base	<ul style="list-style-type: none"> Initially supporting 1,600 users 	CPU, Memory, Network
Transaction Volume	<ul style="list-style-type: none"> 20,000 unduplicated children served in FY 2009 7,557 children served on a particular day by DSCYF (31st December 2009) 	CPU, Memory, Network
Data Volume	<ul style="list-style-type: none"> FY 2009 statistics from DFS alone for: <ul style="list-style-type: none"> 9,527 reports of abuse and neglect and/or dependency were received, and 5,906 were accepted for investigation. Of the 5,906 reports accepted for investigation, 1,429 reports resulted in substantiated incidents of abuse. 	Storage

Table 4.6-4. Capacity Planning Targets.

We have adopted a conservative approach to the sizing of the FACTS II technical infrastructure. Your data growth statistics were combined with our experience of integrated children services data growth in other jurisdictions in order to craft what we believe is an infrastructure capable of supporting your FACTS II operations. FACTS II solution architecture is comprehensive and supports the full complement of functions in a unified and tightly integrated environment with the horsepower required to meet the State's requirements on capacity and scalability. The robustness, flexibility and scalability of the FACTS II solution have been demonstrated via the production proven architecture of DC FACES.NET.

Structured Operating Environments

To develop the FACTS II solution, we propose the establishment of the environments and applications listed in the table below. Based on our previous integrated children services implementations and FACTS II requirements, we believe this to be an optimal number of environments to support the full development process



distinguishing FACTORS

- Hardware is based on 64bit platforms and is standardized to use Red Hat Linux for database and Windows Server 2008 R2 for the other server roles to maximize the Operational Efficiency
- Disaster Recovery environment has been sized with same capacity as Production environment
- Reuse of hardware and software across multiple physical environments to bring down the Total Cost of Ownership
- Highly scalable architecture – both horizontally and vertically at each tier

and provide isolation and stability for simulations activities during the project. Segregating a system into different environments is critical to its success especially for complex applications such as FACTS II. The combination of environments enables our solution to align with the implementation strategy that results in an efficient and effective design, development, testing, training, and production environment for the FACTS II solution.

These individual environments are physically located on servers in a configuration to maximize performance while minimizing costs. The table below provides a description and purpose of the FACTS II environments.

Environment	Description	Key Features
Production	<ul style="list-style-type: none"> Dedicated environment to support the production application deployment Software is migrated to Production after completion of staging testing and sign off in Pre-Production 	<ul style="list-style-type: none"> Clustered setup for high availability, redundancy and reliability Multiple Application Servers to support initial projected load of 1,600 users Hardware-based load balancing for faster response times
Pre-Production	<ul style="list-style-type: none"> Pre-Production environment is to support sanity test of application code on the same set of hardware, software and network that is used on the Production environment. Software is migrated to Pre-Production after completion of testing and sign off in User Acceptance Test environment 	<ul style="list-style-type: none"> Database refreshed periodically with Production data to ensure reliability in testing Shares hardware with Production environment and brings down the total cost of the hardware ownership while still providing the stability and reliability
Disaster Recovery	<ul style="list-style-type: none"> Disaster Recovery environment purpose is to support the Business continuity for the FACTS II users in the event of physical loss of the Production environment Software is migrated to Disaster Recovery along with the Production release 	<ul style="list-style-type: none"> Sized with same capacity as Production Database synched
Conversion	<ul style="list-style-type: none"> Environment to support the data extraction, conversion and migration from the legacy data stores: FACTS, Cost Recovery Unit Provider Tracking Spreadsheet, Human Resources, OCCL, Early Intervention (EI), EI - CAFAS, ADAD etc 	<ul style="list-style-type: none"> Dedicated to support Conversion activities for FACTS II rollout Shares hardware with Disaster Recovery and brings down the total cost of the hardware ownership while still providing the stability and reliability

Environment	Description	Key Features
Training	<ul style="list-style-type: none"> • Dedicated environment to support training activities to the system users • Hosts the application for supporting training materials and the application for actual training that is delivered to the system users 	<ul style="list-style-type: none"> • Multiple Application Servers to support large user base during the training phase • Support ongoing training post Statewide rollout • Hardware-based load balancing for faster response times • Maintains production versions of software to allow accurate training to system users
User Acceptance Testing	<ul style="list-style-type: none"> • Dedicated user testing environment configured with the infrastructure required to deploy various application components, link these components together, and hook to various external and internal interfaces. • The State testing team performs various test activities to verify and validate integration requirements of the overall application • Software is migrated to this environment upon successful completion of integration testing 	<ul style="list-style-type: none"> • Multiple Application Servers to simulate "production like" environment to help identify any configuration issues beforehand • Supports vigorous systematic evaluation process designed to monitor quality standards • Provides a dedicated environment for the testing team to test the integration of functional and technical modules including batch, information delivery, and interfaces • Hardware-based load balancing for faster response times
Integration Testing	<ul style="list-style-type: none"> • Dedicated environment configured with the infrastructure required to deploy various application components, link these components together, and hook to various external and internal interfaces • Supports internal integration testing by the development team. • Software is migrated to this environment upon successful completion of development and unit testing 	<ul style="list-style-type: none"> • Modular verification of the functionality before work items are released to the User Acceptance Test Team • Execution of automated regression scripts for monitoring the overall stability and functionality

Environment	Description	Key Features
Development/Unit Testing	<ul style="list-style-type: none"> • Unit testing activities take place in this environment • Software is migrated to this environment upon successful completion of development • Multiple development application instances are hosted on this environment to support the various development activities • Additionally hosts the Knowledge Transfer application to facilitate the technical training activities and lab exercises primarily for the State technical team 	<ul style="list-style-type: none"> • Contains hardware necessary to support the development of activities • Supports technical training activities • Shares hardware with Integration Test environment and brings down the total cost of the hardware ownership while still providing the stability and reliability

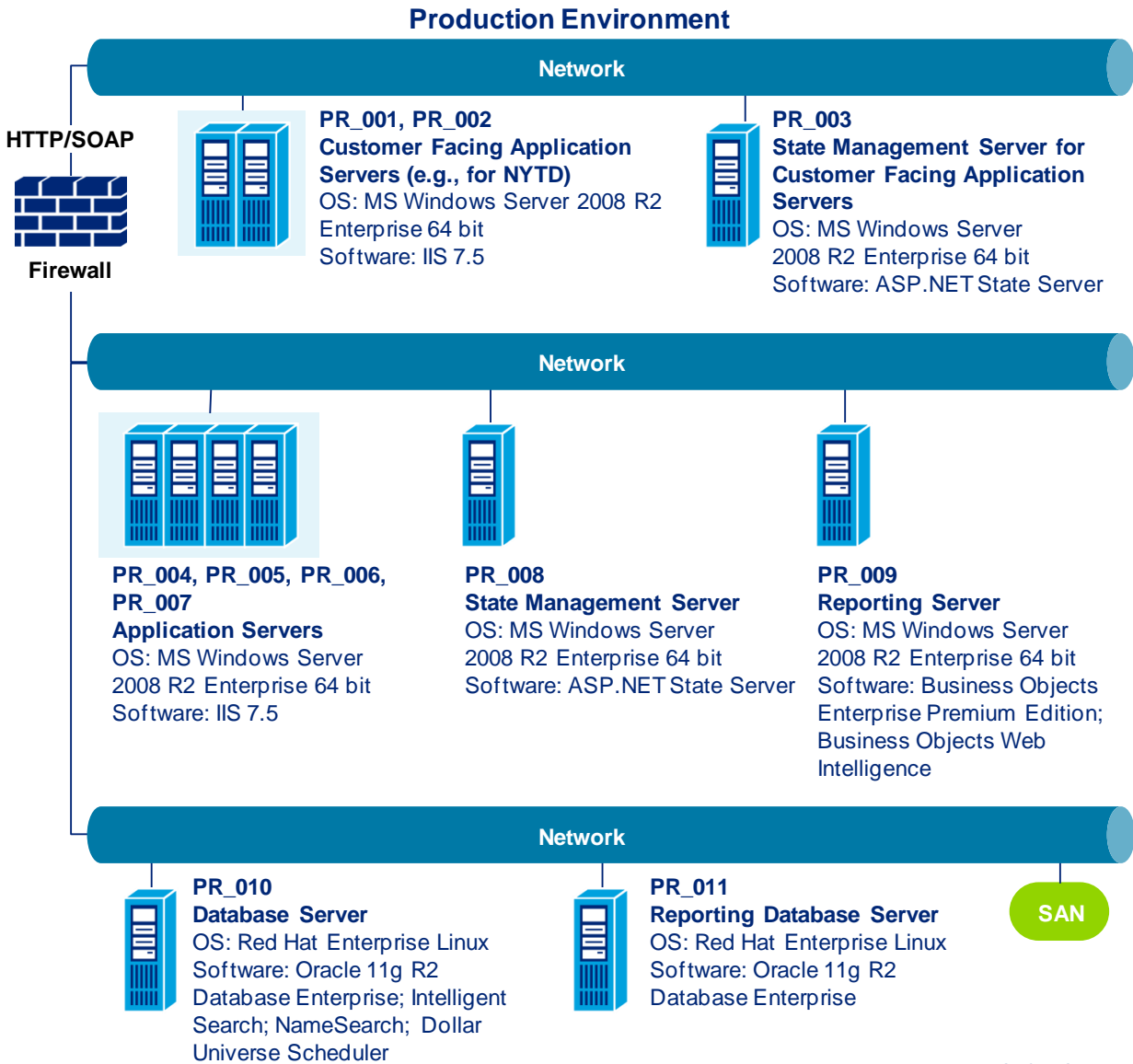
Table 4.6-5. FACTS II Environments.

These environments are set up for multiple layers of testing and validation for technical and functional code implementations. This reduces the risk of each release negatively impacting the overall functionality and stability of FACTS II. Our overall setup allows for multiple extended development projects to occur concurrently, and operate on different schedules. These multiple environments allow the technology team to cater to different groups (development team, testing team, training team, etc.), over the period of project. In the sections below we describe each of the environment conceptual setup along with the hardware and software required for supporting the operations of FACTS II application.

Production Environment Hardware and Software

Our solution uses a dedicated environment that is scalable, reliable, accessible and manageable for deploying the application for production use. This is the environment where code changes are finally targeted. This environment acts as the FACTS II backbone, which contains the version of the application that is in use by field staff on a day-to-day basis. It is here that all of the benefits to the multi-environment setup are seen through a reliable, stable, and functional application.

The production environment employs techniques such as load balancing, clustering to support the high availability and provides the reliability and stability for the FACTS II application. The figure below provides a consolidated graphical depiction of the production environment. It indicates the function of each component, with the associated software components, and the physical server hardware that hosts these components. It is important to note that FACTS II has requirements to allow customers to interface with the system, for example, youth taking surveys for National Youth in Transition Database (NYTD). In order to cater to this audience, we have proposed to distribute our Application on two sets of Application Servers – one that would reside within the State firewall and the other that would be customer facing. The customer facing Application Servers would in turn communicate with firewalled Application Servers by exchanging data through HTTP/SOAP protocol. We do not need to change our architecture to support this and yet we could distribute the solution's tiers on different machines. This again is an example of the level of scalability we could achieve with FACTS II.



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Figure 4.6-1. Production Environment.

The FACTS II Production Environment provides the required high availability, redundancy, performance, scalability, stability and reliability.

Hardware

The table below specifies the quantities, items and descriptions of the physical server hardware that hosts the software components for the Production environment.

Hardware	Type	Configuration	Quantity	Specification
Application Server – Customer Facing	Intel Xeon	Windows Server 2008 R2 Enterprise, 32GB RAM	2	Dell PE 1950, Intel Xeon, M610 Blade
State Management Server -For Customer Facing App Servers	Intel Xeon	Windows Server 2008 R2 Enterprise, 32GB RAM	1	Dell PE 1950, Intel Xeon, M610 Blade
Application Server	Intel Xeon	Windows Server 2008 R2 Enterprise, 32GB RAM	4	Dell PE 1950, Intel Xeon, M610 Blade
State Management Server	Intel Xeon	Windows Server 2008 R2 Enterprise, 32GB RAM	1	Dell PE 1950, Intel Xeon, M610 Blade
Reporting Server	Intel Xeon	Windows Server 2008 R2 Enterprise, 32GB RAM	1	Dell PE 1950, Intel Xeon, M610 Blade
Database Server	Intel Xeon	Red Hat Linux Enterprise – 64 GB RAM	1	Dell PE 2950, Intel Xeon, M710 Blade
Reporting Database Server	Intel Xeon	Red Hat Linux Enterprise – 32 GB RAM	1	Dell PE 2950, Intel Xeon, M710 Blade

Table 4.6-6. Production Hardware.

Standardized hardware infrastructure on Dell PowerEdge for easier maintenance and operational efficiency for FACTS II production application

Software

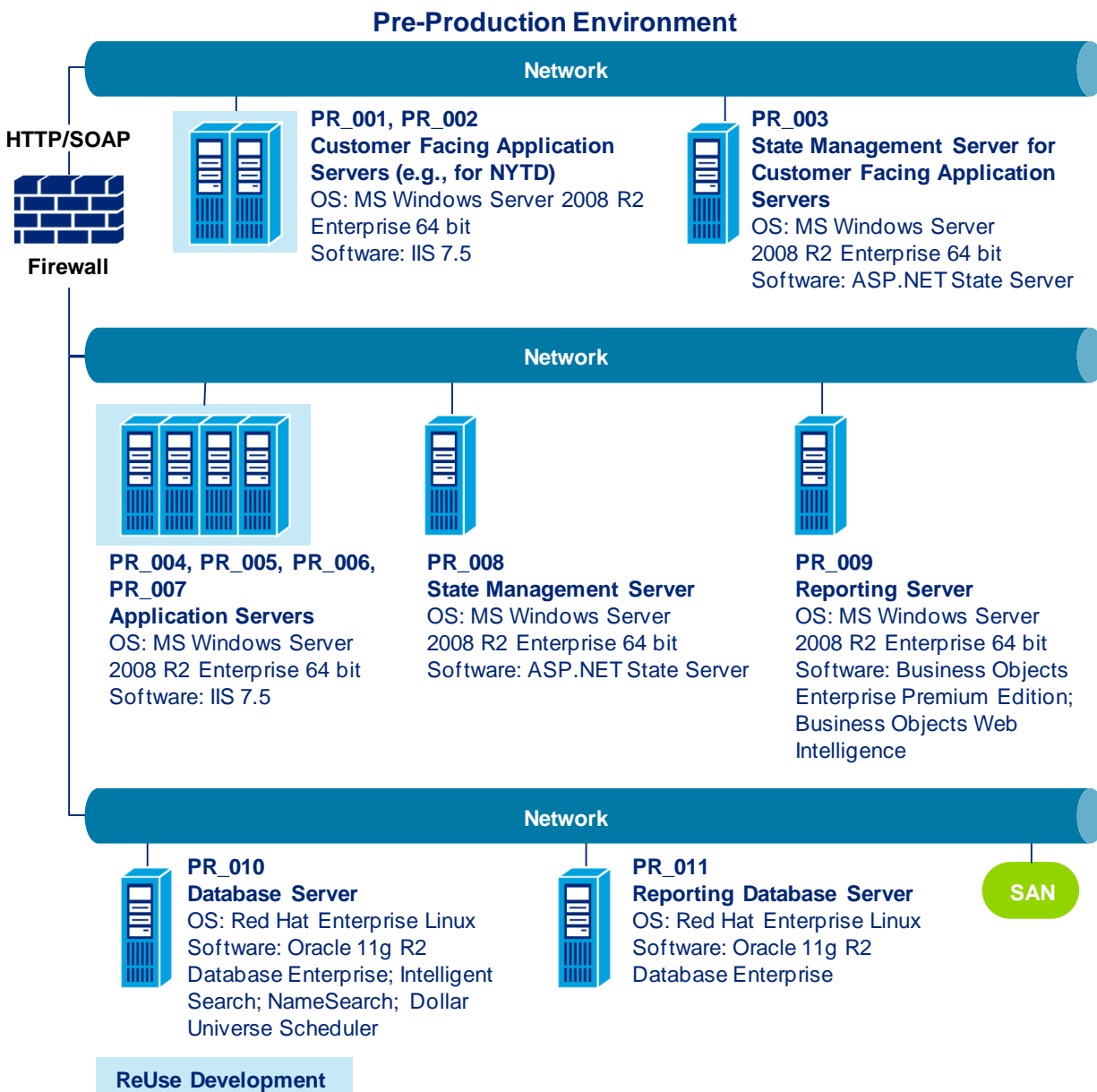
The table below specifies the software components for the Production environment.

Application Server – External Facing
Microsoft .NET Framework v4.0
Workflow Foundation v4.0
Internet Information Services (IIS) 7.5
Oracle Client 11g R2
Google Maps API Premier
State Management Server – For External Facing Application Servers
Microsoft.NET Framework. – v4.0
ASP.NET State Management Service
Application Server
Microsoft .NET Framework v4.0
Workflow Foundation v4.0
Internet Information Services (IIS) 7.5
Oracle Client 11g R2
Google Maps API Premier
State Management Server
Microsoft.NET Framework. – v4.0
ASP.NET State Management Service
Reporting Server
BusinessObjects Enterprise Premium
BusinessObjects Web Intelligence
Database Server
Oracle Database 11g Release 2
Intelligent Search, NameSearch
Dollar Universe
Reporting Database Server
Oracle Database 11g Release 2

Table 4.6-7. Production Software.

Pre-Production Environment Hardware and Software

PreProduction environment is used to stage the application before it is finally deployed to the Production. This is a logical environment and is hosted on the Production servers. Its primary purpose is to enable the State team to perform sanity test and ensure that all pieces of application - .Net and Database code – work in synch with hardware and software of Production environment. The Pre-Production database is refreshed with Production database before such a sanity test is executed. This enables Testing team to even validate any data specific errors.



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Figure 4.6-2. Pre-Production Environment.

The FACTS II Pre-Production Environment enables testing in production like environment. It reuses Production infrastructure.

Hardware

Pre-Production environment leverages the hardware from FACTS II solution's Production environment to minimize infrastructure costs and reduce operational overhead activities that come along with maintenance of the environments. The environment is hosted as separate logical application instance on the Production environment as shown in the above figure.

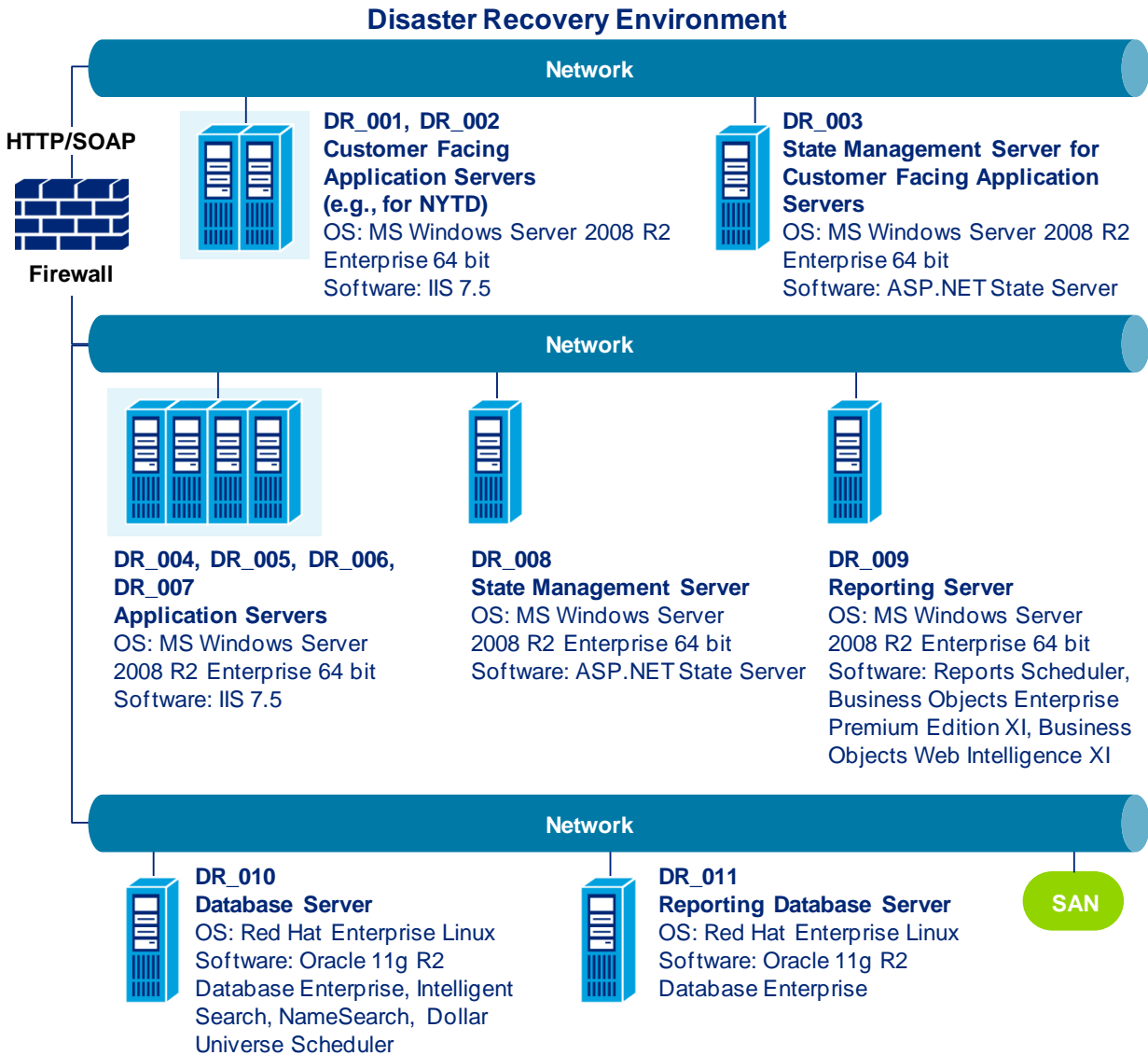
Software

Pre-Production environment leverages the software from FACTS II solution's Production environment to minimize infrastructure costs and reduce operational overhead activities that come along with maintenance of the environments.

Disaster Recovery Environment Hardware and Software

Given the critical nature of integrated children services activities our Disaster Recovery environment is sized the same as FACTS II Production environment to provide the same level of reliability and stability and features in order to support the Business Continuity of DSCYF users in the case of physical loss of Production environment. Similar to our Production environment the Disaster Recovery environment is configured with more redundancy for each server type and employs techniques such as load balancing, clustering to support the high availability and provides the reliability and stability for the FACTS II application. Our experience, quality assurance process combined with our recovery management experience provides you with a reliable and tested Disaster Recovery and Business Continuity environment to mitigate failures ranging from a total physical loss of production environment, a zone of the production environment or multiple component failures.

The figure below provides a consolidated graphical depiction of the Disaster Recovery environment. It indicates the function of each component, with the associated software components, and the physical server hardware that hosts these components.



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Figure 4.6-3. Disaster Recovery Environment.

FACTS II Disaster Recovery environment is sized with same capacity as Production to support Business Continuity with the same high availability, redundancy, performance, scalability, stability as FACTS II Production environment.

Hardware

The table below specifies the quantities, items and descriptions of the physical server hardware that hosts the software components for the Disaster Recovery environment.

Hardware	Type	Configuration	Quantity	Specification
Application Server – Customer Facing	Intel Xeon	Windows Server 2008 R2 Enterprise, 32GB RAM	2	Dell PE 1950, Intel Xeon, M610 Blade
State Management Server -For Customer Facing App Servers	Intel Xeon	Windows Server 2008 R2 Enterprise, 32GB RAM	1	Dell PE 1950, Intel Xeon, M610 Blade
Application Server	Intel Xeon	Windows Server 2008 R2 Enterprise, 32GB RAM	4	Dell PE 1950, Intel Xeon, M610 Blade
State Management Server	Intel Xeon	Windows Server 2008 R2 Enterprise, 32GB RAM	1	Dell PE 1950, Intel Xeon, M610 Blade
Reporting Server	Intel Xeon	Windows Server 2008 R2 Enterprise, 32GB RAM	1	Dell PE 1950, Intel Xeon, M610 Blade
Database Server	Intel Xeon	Red Hat Linux Enterprise – 64 GB RAM	1	Dell PE 2950, Intel Xeon, M710 Blade
Reporting Database Server	Intel Xeon	Red Hat Linux Enterprise – 32 GB RAM	1	Dell PE 2950, Intel Xeon, M710 Blade

Table 4.6-8. Disaster Recovery Hardware.

Software

The table below specifies the software components for the Disaster Recovery environment.

Application Server – External Facing
Microsoft .NET Framework v4.0
Workflow Foundation v4.0
Internet Information Services (IIS) 7.5
Oracle Client 11g R2
Google Maps API Premier
State Management Server – For External Facing Application Servers
Microsoft.NET Framework. – v4.0
ASP.NET State Management Service
Application Server
Microsoft .NET Framework v4.0
Workflow Foundation v4.0
Internet Information Services (IIS) 7.5
Oracle Client 11g R2
Google Maps API Premier
State Management Server
Microsoft.NET Framework. – v4.0
ASP.NET State Management Service
Reporting Server
BusinessObjects Enterprise Premium
BusinessObjects Web Intelligence
Database Server
Oracle Database 11g Release 2
Intelligent Search, NameSearch
Dollar Universe
Reporting Database Server
Oracle Database 11g Release 2

Table 4.6-9. Disaster Recovery Software.

Conversion Environment Hardware and Software

Deloitte establishes a dedicated Conversion environment with the purpose of accurately and reliably supporting the conversion approach. The Deloitte technical team sets-up dynamic environments to support the various testing activities of Conversion and maintains and operates the Conversion environments to support statewide rollout. The Deloitte technical team uses a combination of Development and Unit Testing along with Disaster Recovery environment to support the Conversion SDLC for FACTS II solution to perform an accurate data conversion from the following existing legacy systems to the integrated FACTS II system:

Division	Unit/Program	Description
DSCYF	FACTS	Legacy system
DMSS	Cost Recovery Unit Provider Tracking Spreadsheet	Medicaid service provider information used to manage the Medicaid billing
	Education	IEP within 30 days
	Education	Post-release tracking
	Contracts	Contracts
	Human Resources	Training Database
DFS	OCCL	Credentials
DPBHS	Office of Prevention program outcomes where participants have DFS involvement or treatment cases	Several integrated databases. Includes CA/N substantiations at 3-month intervals over 3 years
	Early Intervention (EI)	EI assessments and outcomes
	EI – CAFAS	Child and Family Functioning Assessment
	ADAD	Screen for drug/alcohol dependency

Table 4.6-10. Conversion Environment Hardware and Software.

Hardware

Conversion environment leverages the hardware from FACTS II solution's Disaster Recovery environment to minimize Infrastructure costs and reduce operational overhead activities that come along with maintenance of the environments. The environment is hosted as separate logical application instance on the Disaster Recovery environment.

Software

Conversion environment leverages the software from FACTS II solution's Disaster Recovery environments to minimize the Infrastructure costs and reduce operational overhead activities that come along with maintenance of the environments.

Training Environment Hardware and Software

Ultimately, DSCYF's goal after a successful FACTS II implementation is to possess the skills and knowledge required to maintain and upgrade the FACTS II system effectively. In order to administer the integrated children services programs effectively and efficiently in the state, it is critical that DSCYF program staff gain proficiency and comfort with the new FACTS II solution. A part of having a successful system is the ability to provide training for new users and guidance for existing ones to familiarize themselves with a new application or a major system enhancement. A training environment becomes an important tool to guide or teach users, simplify the learning curve process, and increase or maintain productivity once the enhancements are released into production. Deloitte implements the FACTS II training environment to help prepare users for upcoming releases.

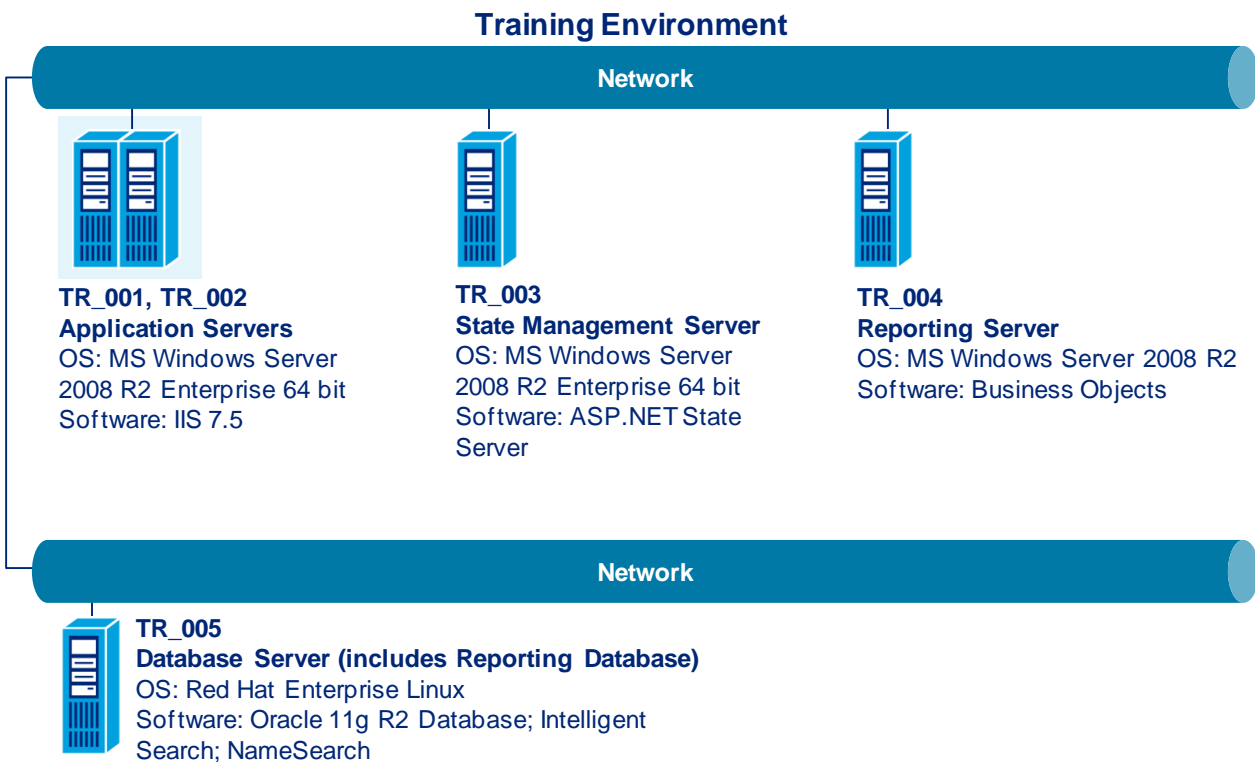
Deloitte establishes a dedicated physical environment where various training activities can be performed. This dedicated environment for training allows the early training and knowledge transfer efforts to have specific version of the application without being impacted by any testing or deployment efforts. This approach provides the most stability and allows trainers to establish "training" specific client and cases to align with training materials. Deloitte utilizes this environment to provide training to the following groups based on their specific needs: DSCYF program Train-the-Trainer, DSCYF program staff, DSCYF technical staff and other end user training groups.

Training is highly controlled environment which hosts the below four training applications:

1. **Training Development.** This application region is where the Deloitte training team works to develop the training materials for upcoming classes.
2. **Training Practice.** This application is used by the Deloitte training team to practice for upcoming training classes.
3. **Training Preparation.** This application is used by the Deloitte Training team to prepare and setting up data for the scenarios on which the users are trained during the upcoming training classes which may include setting up role based users, cases, clients, etc.
4. **Training Production.** This application is used to deliver the training to end users during the training classes. The users, cases, clients and other scenario specific data created in the Training Preparation application are copied over to this application before end user training starts, providing the Training Production application with the necessary data for training exercises.

The figure below provides a consolidated graphical depiction of the Training environment. It indicates the function of each component, with the associated software components, and the physical server hardware that hosts these components. It is important to note that in order to train the users to use Management Statistical Reports, we have consolidated both the Reporting and Reporting Database Servers on a single machine. Based on our prior experience, we believe that the Reporting Database for the purpose of training is controlled, small in size and relatively less burdened with periodic refreshes. This is in contrast with the Production Reporting Database which is refreshed periodically with

Production database to ensure that the Management Statistical Reports are executed against the actual production data.



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Figure 4.6-4. Training Environment.

Supports training activities and allows the trainers to conduct end user training.

Hardware

The table below specifies the quantities, items and descriptions of the physical server hardware that hosts the software components for the Training environment.

Hardware	Type	Configuration	Quantity	Specification
Application Server	Intel Xeon	Windows Server 2008 R2 Standard, 32GB RAM	2	Dell PE 1950, Intel Xeon, M610 Blade
State Management Server	Intel Xeon	Windows Server 2008 R2 Standard, 32GB RAM	1	Dell PE 1950, Intel Xeon, M610 Blade
Reporting Server	Intel Xeon	Windows Server 2008 R2 Standard, 32GB RAM	1	Dell PE 1950, Intel Xeon, M610 Blade

Hardware	Type	Configuration	Quantity	Specification
Database Server (includes Reporting Database)	Intel Xeon	Red Hat Linux Enterprise, 32GB RAM	1	Dell PE 2950, Intel Xeon, M710 Blade

Table 4.6-11. Training Environment Hardware.

Software

The table below specifies the software components for the Training environment.

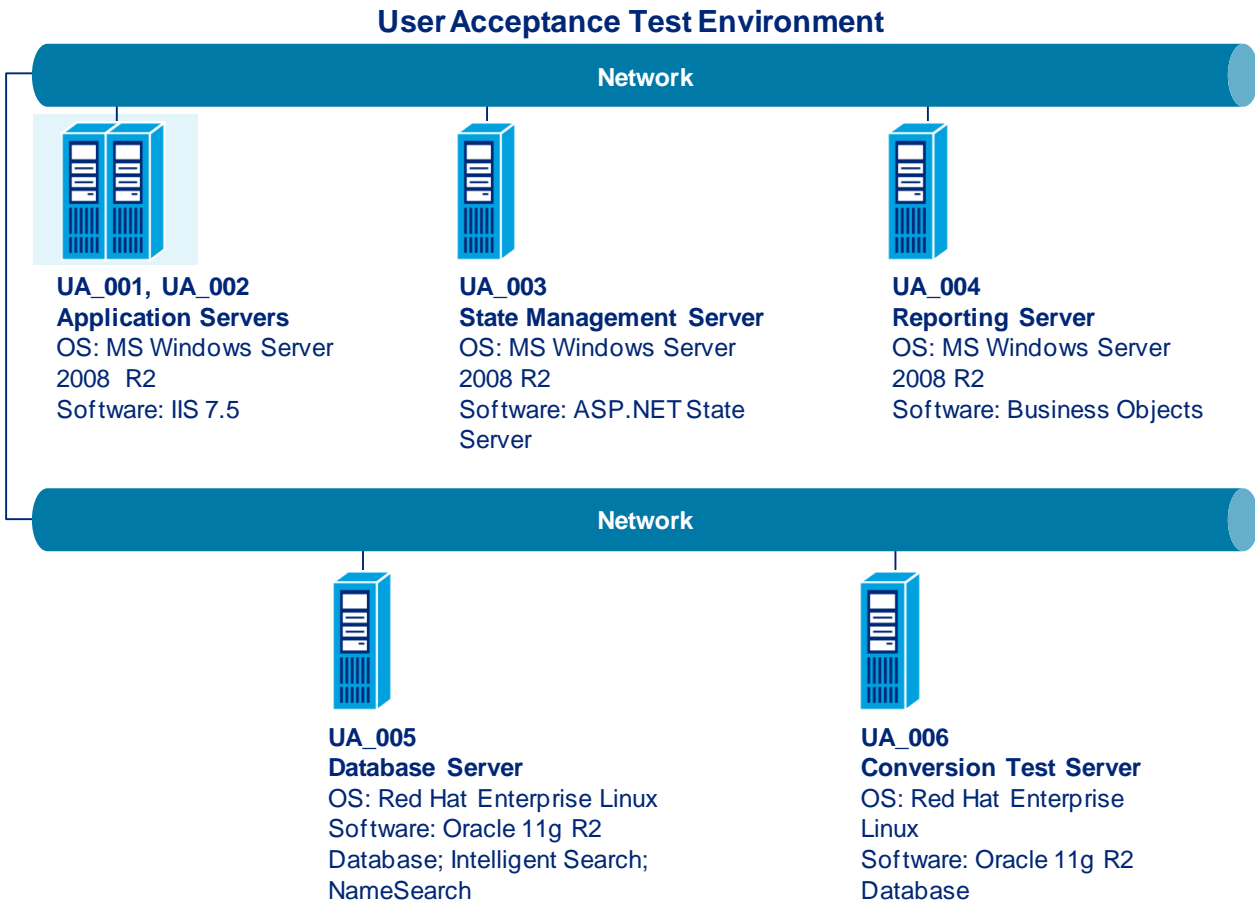
Application Server
Microsoft .NET Framework v4.0
Workflow Foundation v4.0
Internet Information Services (IIS) 7.5
Oracle Client 11g R2
Google Maps API Premier
State Management Server
Microsoft.NET Framework. – v4.0
ASP.NET State Management Service
Reporting Server
Business Objects
Database Server
Oracle Database 11g Release 2
Intelligent Search, NameSearch

Table 4.6-12. Training Software.

User Acceptance Test Environment Hardware and Software

Before introducing any enhanced or new functionality to the FACTS II production environment the State requires performance of a thorough review to provide confirmation that the functionality meets mutually agreed-upon requirements. The UAT environment allows the Test team to do just that. However, apart from testing the business functionalities of the application, the DSCYF Test Team also needs to verify that the conversion scripts to be executed in final conversion environment are delivering the expected results. For example, the DSCYF Test Team could test if all the necessary client and case data from the legacy systems are converted correctly as designed. The UAT environment makes provision for a separate Conversion Test Server that would specifically provide the DSCYF team a unique opportunity to actually review the results expected from conversion. Based on our past experience in converting data for different jurisdictions, we understand that the focus of the team involved in managing conversion programs is quite

different from that of the team focused on testing the functionality of the new system. For example, during UAT a typical test team member might be interested in end to end testing of adoption business process. The focus of this testing could be to verify if the client data created during investigation is carried over to the case management screens, if the system allows the user to select "adoption" as a permanency goal etc. It might be irrelevant to the test team if the client is from legacy system or a sample client created for test purposes. Hence, we believe that a separate Conversion Test Server adds tremendous boost to the overall testing efforts.



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Figure 4.6-5. User Acceptance Test Environment.

An environment that uses Production like systems and tools such as Windows for multiple Application Servers and Linux for Database Server to support vigorous systematic evaluation process designed to monitor quality standards

Hardware

The table below specifies the quantities, items and descriptions of the physical server hardware that hosts the software components for the User Acceptance Test environment.

Hardware	Type	Configuration	Quantity	Specification
Application Server	Intel Xeon	Windows Server 2008 R2 Standard, 32GB RAM	2	Dell PE 1950, Intel Xeon, M610 Blade
State Management Server	Intel Xeon	Windows Server 2008 R2 Standard, 32GB RAM	1	Dell PE 1950, Intel Xeon, M610 Blade
Reporting Server	Intel Xeon	Windows Server 2008 R2 Standard, 32GB RAM	1	Dell PE 1950, Intel Xeon, M610 Blade
Database Server (including Reporting Database)	Intel Xeon	Red Hat Linux Enterprise, 32GB RAM	1	Dell PE 2950, Intel Xeon, M710 Blade
Conversion Test Server	Intel Xeon	Red Hat Linux Enterprise, 32GB RAM	1	Dell PE 2950, Intel Xeon, M710 Blade

Table 4.6-13. User Acceptance Test Hardware.

Software

The table below specifies the software components for the User Acceptance Test environment.

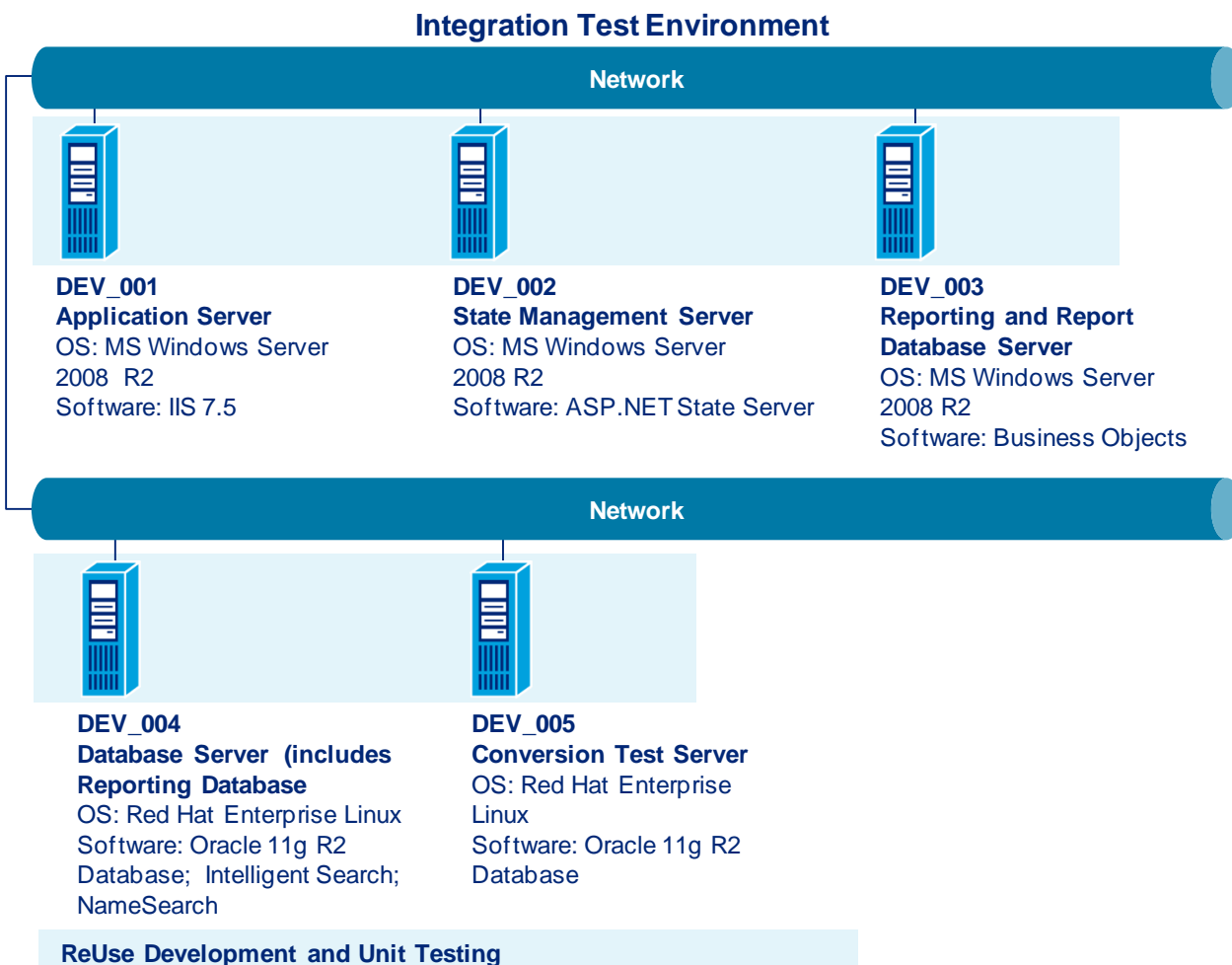
Application Server
Microsoft .NET Framework v4.0
Workflow Foundation v4.0
Internet Information Services (IIS) 7.5
Oracle Client 11g R2
Google Maps API Premier
State Management Server
Microsoft.NET Framework. – v4.0
ASP.NET State Management Service

Reporting Server
Business Objects
Database Server
Oracle Database 11g R2
Intelligent Search, NameSearch
Conversion Test Server
Oracle Database 11g R2

Table 4.6-14. User Acceptance Software.

Integration Environment Hardware and Software

We understand the importance of performing functional verifications when combining individual software modules. FACTS II integration environment is used by the development track leads for each functional area to test the code integration, providing a modular verification of the functionality before work items are released to the Quality Assurance Team. At the same time, the integration environment is used for executing automated regression scripts for monitoring the overall stability and functionality of the FACTS II application. Integration environment is hosted on the same Infrastructure as separate application instances on the Development and Unit Testing environment which is detailed in the following section. The figure below provides a consolidated graphical depiction of the Integration environment.



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Figure 4.6-6. Integration Test Environment.

Supports modular verification of the functionality and automated regression testing before work items are released to the User Acceptance Test Team.

Hardware

Integration environment leverages the hardware from FACTS II solution's Unit testing environment to minimize Infrastructure costs and reduce operational overhead activities that come along with maintenance of the environments. The environment is hosted as separate logical application instance on the Unit Testing environment as shown in the above figure.

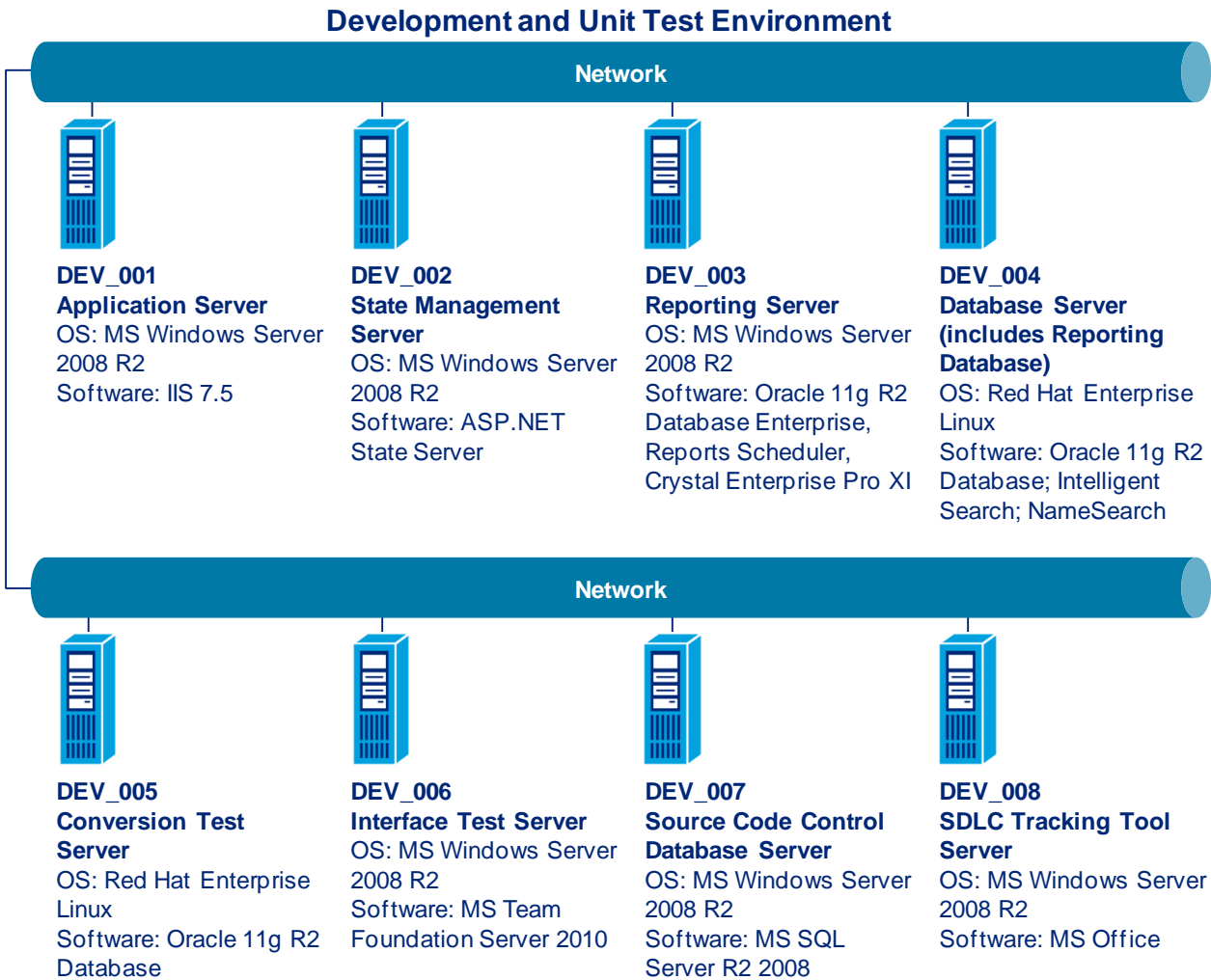
Software

Integration environment leverages the software from FACTS II solution's Unit testing environment to minimize Infrastructure costs and reduce operational overhead activities that come along with maintenance of the environments.

Development and Unit Testing Environment Hardware and Software

The Development System Environment consists of hardware and software implemented to provide an environment to develop and unit test FACTS II system functionality. The development environment is the main component to support development activities and promote changes and code fixes to maintain and expand the system functionality. The development environment is dedicated for developers to complete most of their work and introduces their code changes into the Source Control. Once these changes have been made and verified, they are implemented in the main development application for further testing. The modifications are tested in this environment, allowing developers to validate their changes before promoting them to the higher environments. In general, the development architecture provides a flexible environment to support developers in the following ways:

- Host all project and application development infrastructure
- Manage configuration and version control and act as repository for the project deliverables
- Perform development and unit testing activities with tools like Visual Studio 2010, Oracle client and tools for code analysis, and other common software development tools
- Deloitte recognizes that the state's ultimate goal is to possess the skills and knowledge required to effectively operate, maintain, and enhance the FACTS II system. We recognize your need for a hands-on, interactive technical training, and we are confident that our training activities provide the State with the required knowledge and experience it needs to maintain and enhance the FACTS II solution.



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Figure 4.6-7. Development and Unit Test Environment.

Flexible environment to support development activities, unit testing, technical training and the SDLC Tracking tool servers.

Hardware

The table below specifies the quantities, items, and descriptions of the physical server hardware that hosts the software components for the Development environment.

Hardware	Type	Configuration	Quantity	Specification
Application Server	Intel Xeon	Windows Server 2008 R2 Standard, 32GB RAM	1	Dell PE 1950, Intel Xeon, M610 Blade
State Management Server	Intel Xeon	Windows Server 2008 R2 Standard, 32GB RAM	1	Dell PE 1950, Intel Xeon, M610 Blade
Reporting Server	Intel Xeon	Windows Server 2008 R2 Standard, 32GB RAM	1	Dell PE 1950, Intel Xeon, M610 Blade
Database Server (including Reporting Database)	Intel Xeon	Red Hat Linux Enterprise, 32 GB RAM	1	Dell PE 2950, Intel Xeon, M710 Blade
Conversion Test Server	Intel Xeon	Red Hat Linux, 32 GB RAM Enterprise, 32 GB RAM	1	Dell PE 2950, Intel Xeon, M710 Blade
Source Code Control Server	Intel Xeon	Windows Server 2008 R2 Standard, 32GB RAM	1	Dell PE 1950, Intel Xeon, M610 Blade
Source Code Control Database Server	Intel Xeon	Windows Server 2008 R2 Standard, 32GB RAM	1	Dell PE 1950, Intel Xeon, M610 Blade
File/SDLC Tracking Tool Server	Intel Xeon	Windows Server 2008 R2 Standard, 32GB RAM	1	Dell PE 1950, Intel Xeon, M610 Blade

Table 4.6-15. Development and Unit Testing Hardware.

Software

The table below specifies the software components for the Development and Unit Test environment.

Application Server
Microsoft .NET Framework v4.0
Workflow Foundation v4.0
Internet Information Services (IIS) 7.5
Oracle Client 11g R2
Google Maps API Premier
State Management Server
Microsoft.NET Framework. – v4.0
ASP.NET State Management Service
Reporting Server
Business Objects
Database Server
Oracle Database 11g R2
Intelligent Search, NameSearch
Conversion Test Server
Oracle Database 11g R2
Source Code Control Server
Microsoft Visual Studio Team Foundation Server 2010
Source Code Control Database Server
Microsoft SQL Server 2008 R2 Standard
File/SDLC Tracking Tool Server
Microsoft Office
SACWISMate – Deloitte open source tool

Table 4.6-16. Development and Unit Testing Software.

Desktop Hardware

The table below specifies the quantities, items, and descriptions of the physical desktop hardware that is used by the Deloitte Team including developers, leads and managers.

Hardware	Type	Configuration	Quantity	Specification
Desktops	Intel Dual Core Processor 550, 3.20GHz	Windows 7 Professional 64 bit, 8 GB RAM	50	Dell Optiplex 980

Table 4.6-17. Desktop Hardware.

Desktop Software

The table below specifies the software components for the Desktops. It also indicates the distribution of desktop software based on individual teams.

Software Type	Product Name and Version	Install for Application Developers	Install for Conversion Team members	Install for Interface Team members	Install for Build Engineer	Install for DBA	Install for Reports Team members	Install for Training/Implementation Team members	Install for Help Desk	Install for Leads/Managers/PMO
Framework	Microsoft .NET Framework. –v4.0	Yes	Yes	Yes	Yes					
Database Client	Oracle Client 11g R2	Yes	Yes	Yes	Yes	Yes	Yes			
Help Content Development Tool	Adobe RoboHelp							Yes		
IADE	Microsoft Visual Studio 2010 – ultimate with MSDN	Yes			Yes					
IADE	Microsoft Visual Studio – professional with MSDN		Yes	Yes						
PL/SQL development	Toad for Oracle Base Edition	Yes	Yes	Yes	Yes		Yes			
PL/SQL development	Toad DBA suite for Oracle					Yes				
Spell Check	RapidSpell Web .NET v3.7.0	Yes								

Software Type	Product Name and Version	Install for Application Developers	Install for Conversion Team members	Install for Interface Team members	Install for Build Engineer	Install for DBA	Install for Reports Team members	Install for Training/Implementation Team members	Install for Help Desk	Install for Leads/Managers/PMO
Training Content Development	Macromedia Captivate							Yes		
Training Content Development	Macromedia Studio							Yes		
Data Modeling	CA ALLFUSION ERWIN Data Modeler					Yes				
Imaging SDK	Atalasoft DotImage Document Imaging SDK	Yes								
Imaging DotTwain Scanner Add-On	AtalaSoft DotTwain	Yes								
File Compression	Winzip	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Utility – Documentation	Microsoft Office Professional 2010	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Utility - Flowchart	Microsoft Visio Professional 2010									Yes
Utility – Project Management	Microsoft Project Professional 2010									Yes
QA	FxCop (free)	Yes			Yes					

Software Type	Product Name and Version	Install for Application Developers	Install for Conversion Team members	Install for Interface Team members	Install for Build Engineer	Install for DBA	Install for Reports Team members	Install for Training/Implementation Team members	Install for Help Desk	Install for Leads/Managers/PMO
Scripting Tool	NAnt (open source)				Yes					
Script Automation	NUNIT (free)	Yes			Yes					
Accessibility Tool	JAWS Professional	Yes								
Image Capture Tool	SnagIT	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Secured Content	iText	Yes								

Table 4.6-18. Desktop Software.

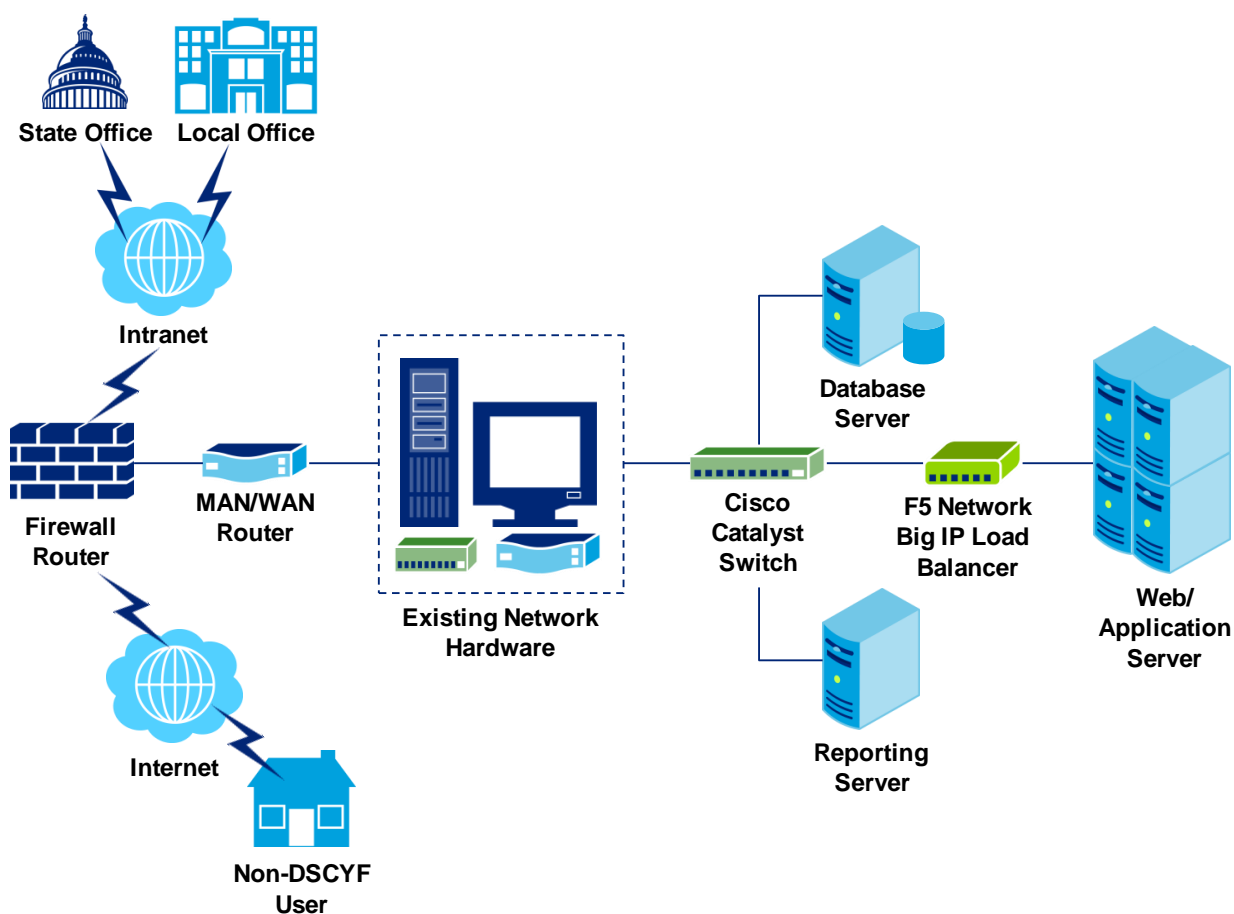
Network Hardware Infrastructure

FACTS II utilizes the DSCYF existing network infrastructure. However, based on our past implementation experience, we also understand that each network has its own flavor. During the requirement confirmation phase of the project, we propose to work with DSCYF staff to further understand your network and the facilities made available for the project. Based on our current understanding, we propose the following network infrastructure. As mentioned in the Section, Structured Operating Environments, our architecture is easily scalable, utilizes redundancy scheme to ensure reliability and is load balanced to ensure performance, manageability and high availability.



did you
KNOW?

- Ever since it went live in February 2006, except for the scheduled maintenance, DC FACES.NET has provided 24/7/365 accessibility to all its 1,500 users [Bullet 1 goes here](#)



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Figure 4.6-8. Network Infrastructure.

The preceding graphic illustrates our understanding of the network in place to support the FACTS II. The central office, regional local offices, and staff are linked via the State Intranet. To support the customer facing components of the FACTS II system, we assume that such users leverage an existing ISP connection via the Internet. This provides them access over the Internet.

To connect to your existing network, we propose a large Cisco Catalyst Switch that connects all the hardware devices used for FACTS II: new web/application servers, reporting, and database servers. Also connected to this switch is a load balancer to load balance traffic that is routed to the web/application servers.

Storage Infrastructure

We propose to locate FACTS II at a secured data center and leverage the existing centralized management. The FACTS II storage uses SAN technology (Storage Area Network). It is RAID protected to maintain reliability and to match the cost of storage required for performance and availability. It has 4 TB of storage capacity and the actual allocations are determined once the project has begun. The SAN is configured for redundancy and highly availability (7x24) storage. It has high I/O requirements and stores production data for FACTS II. It also contains load balanced and fail-over software for high availability and redundancy.

Storage	Type
SAN – Primary	HDS Adaptable Modular Storage 2100 Storage
SAN – Secondary	HDS Adaptable Modular Storage 2100 Storage

Table 4.6-18. Storage.

Printer Hardware Infrastructure

Print services play a critical role in the daily operations of the integrated children services system. Continuous availability of these services is vital for system operations. Our proposed solution, as a Web-based application, is compatible with all windows-based printers. Given the FACTS II requirements, users rely on their ability to publish and print information in a hard copy format. Based on our initial analysis and established standards, we are confident that the State's established operating system and hardware profile adequately support the FACTS II file and print services requirements.

4.6.1 Associated Deliverables

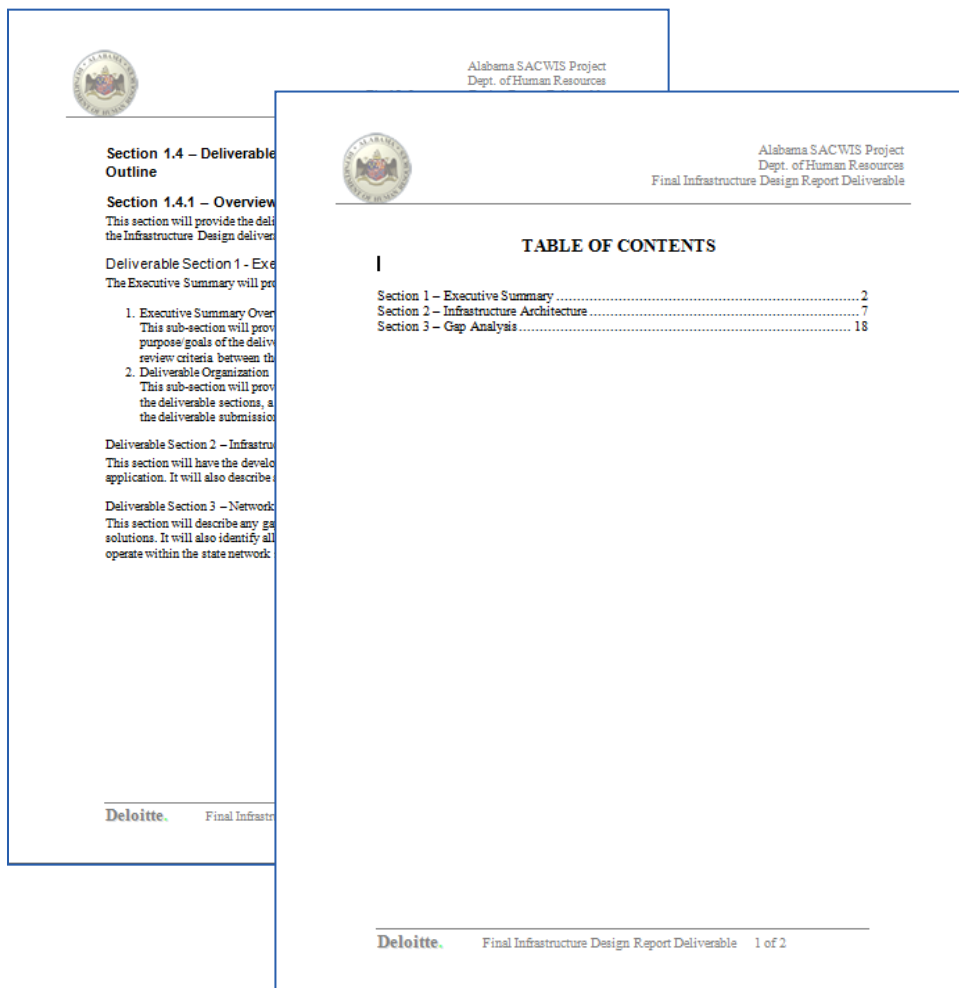
RFP reference: 6.6.1 Associated Deliverables, Page 44

The following deliverable is required during the System Hardware Phase:

- System Hardware Document

The outcome of the System Hardware installation phase is the creation and submission for DSCYF approval the following deliverables:

- System Hardware Document – We have created a similar deliverable – Infrastructure Design Report - for Department of Human Resources, State of Alabama where DC FACES.NET has been transferred. Following is a sample table of content of this deliverable.



The image displays a sample table of contents for a document titled "Alabama SACWIS Project Final Infrastructure Design Report Deliverable". The document is from the Alabama Department of Human Resources. The table of contents lists the following sections and their page numbers:

TABLE OF CONTENTS	
Section 1 – Executive Summary	2
Section 2 – Infrastructure Architecture	7
Section 3 – Gap Analysis	18

The document also includes a "Deloitte" logo and the text "Final Infrastructure Design Report Deliverable" at the bottom.

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