



Deliverable: 2.1 VoteCal System Requirements Specification

VoteCal Statewide Voter Registration System Project

State of California, Secretary of State (SOS)



February 5, 2010
Version: 2.0

Work Product Acceptance

Catalyst Consulting Group is pleased to present the following VoteCal Project work product/deliverable. This work product is now complete and is ready for the Secretary of State to review and approve.

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Secretary of State

By:

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1 Introduction

This document is Deliverable 2.1, the VoteCal System Requirements Specification. It has been developed to the specifications presented in Deliverable Expectation Document (DED) 2.1, and as approved by the Secretary of State (SOS).

The VoteCal System Requirements Specification deliverable is responsible for documenting what (not how) the VoteCal System will provide. It presents the components of the system at a high level of abstraction, reflective of the “analysis model”. Subsequent deliverables will present continued elaborations of the design artifacts incorporated into the deliverable. At the culmination of the design phase is the delivery of deliverables that will contain the detailed design artifacts that document the “design model” – how the system will provide the required functionality.

1.1 Purpose and Objectives

There are three simultaneous objectives for Deliverable 2.1: VoteCal System Requirements Specification:

- To serve as the analysis model of the system that will evolve into a full design model through a process of progressive elaboration.
- To serve as a framework and a backdrop for discussion during the discovery sessions.
- To demonstrate how the system will address all requirements in the form of:
 - general architectural design,
 - interface specifications,
 - description of the database,
 - processing functions,
 - integration of platform products,
 - tools to be used,
 - configuration and modification,
 - environment specifications
 - tools to manage the VoteCal solution.

1.2 Scope

This is one of several documents intended to address the design of the VoteCal System. This document lays the foundation for the design of the VoteCal system by providing a high-level description of the general architecture, along with a description of the interfaces with other State agencies, a description of the database, processing functions, and the overall platform for the system.

This deliverable and its companion document, VoteCal System Functional Specification (Deliverable 2.2) serve as the analysis model of the VoteCal system design. These documents will provide a preliminary view of the design in preparation for the Discovery sessions.

After the Discovery sessions, the VoteCal system design will be elaborated through the following design documents:

- Deliverable 2.7 – VoteCal System Technical Architecture Documentation

- Deliverable 2.3 – VoteCal Detailed System Design Specifications

Certain details of the design will be further elaborated in the following design deliverables:

- Deliverable 2.4 – VoteCal System Standard Report Specifications
- Deliverable 2.8 – VoteCal System Data Model and Data Dictionary
- Deliverable 2.9 – VoteCal System Data Conversion and Data Integration Plan

1.3 Standards

The approach to the design of the VoteCal System is based on a single iteration of the Unified Process. The design artifacts are adapted from the Unified Modeling Language (UML).

1.4 Assumptions, Dependencies, and Constraints

This Requirements Specification was developed on the basis of the following assumptions:

- This deliverable, developed in conjunction with Deliverable 2.2: VoteCal System Functional Specification, collectively documents the VoteCal System “analysis model”. The analysis model is intended to incorporate both assumptions and references to outstanding questions.
- This deliverable captures design artifacts at the point in time the document is submitted.

1.5 Document Control

This document contains a revision history log. When changes occur, the version number will be incremented and the date, name of the person authoring the change, and a description of the change will be recorded in the revision history log of the document.

As with other work products of the VoteCal Project, the approved VoteCal System Requirements Specification will be placed under configuration management in accordance with the Document Management Plan (a subset of the Project Management Plan). Also, in accordance with the Document Management Plan, the VoteCal System Requirements Specification will be stored on the SharePoint server and available to the project team, the Independent Project Oversight Consultant (IPOC), Independent Verification and Validation (IV&V) vendor, and SOS senior management.

2 Requirements Specification

The requirements specification is the first of several technical design deliverables. It presents the VoteCal System analysis model which includes design details at a higher level. The deliverables that follow during the design phase will progressively increase the elaboration while decreasing the abstraction of the design details.

2.1 Executive Summary

This document, Deliverable 2.1, VoteCal System Requirements Specification, is being submitted in conjunction with Deliverable 2.2, VoteCal System Functional Specification to form the “analysis model” of the VoteCal system. This part of the analysis model addresses the components of VoteCal that form the technical foundation of the system:

- General Architecture Design

- General Interface Specifications
- Database Description
- Processing Function Descriptions
- Integrated Platform Products
- Tools to be Used
- Configuration and Modification
- Environment Specifications

Each of these VoteCal System Components is described in the following paragraphs and in the succeeding sections of this document.

The system architecture of the VoteCal system can be described as a set of seamlessly integrated applications. The application architecture consists of a number of application components that, working together meet the requirements for the VoteCal application.

The VoteCal system will interface with a number of other State agencies, specifically: the California Department of Corrections for felon data, The California Department of Public Health for death records, the California Department of Motor Vehicles for both identity verification and voter registration (motor voter), and the Employment Development Department for the National Change of Address (NCOA) information.

VoteCal will use Microsoft SQL Server Enterprise 2008 R2 as the database management system for persistent storage of data and to support data retrieval and reporting.

The VoteCal solution will be built using the Microsoft .NET framework in order to create the seamless integration of the set of VoteCal applications to functions a single system.

The VoteCal integrated platform will be created using the following products:

- Microsoft Windows Server 2008 operating system
- Microsoft Internet Information Services as the web server
- Microsoft SQL Server 2008 as the database management system
- Microsoft SQL Reporting Services to support generation of both pre-defined reports and ad hoc reports.
- Microsoft Active Directory to support user authentication and authorization
- VM vSphere 4 to support virtualization of non-production VoteCal technical environments.

The integrated development environment used to design and develop the VoteCal solution will be Microsoft Visual Studio 2010. The VoteCal development team will also use Microsoft Team Foundation Server 2010 to support automated build management and source code version control. The team will use Microsoft FxCop to confirm that code assemblies conform to .NET framework design guidelines and Tenable Nessus to support vulnerability and penetration security testing.

The project team will continue to use the other tools identified in the approved Software Version Control and System Configuration Management Plan to support the project.

The logical and physical environment specifications are provided in this document, as are the tools to manager of the VoteCal solution.

2.2 General Architecture Design

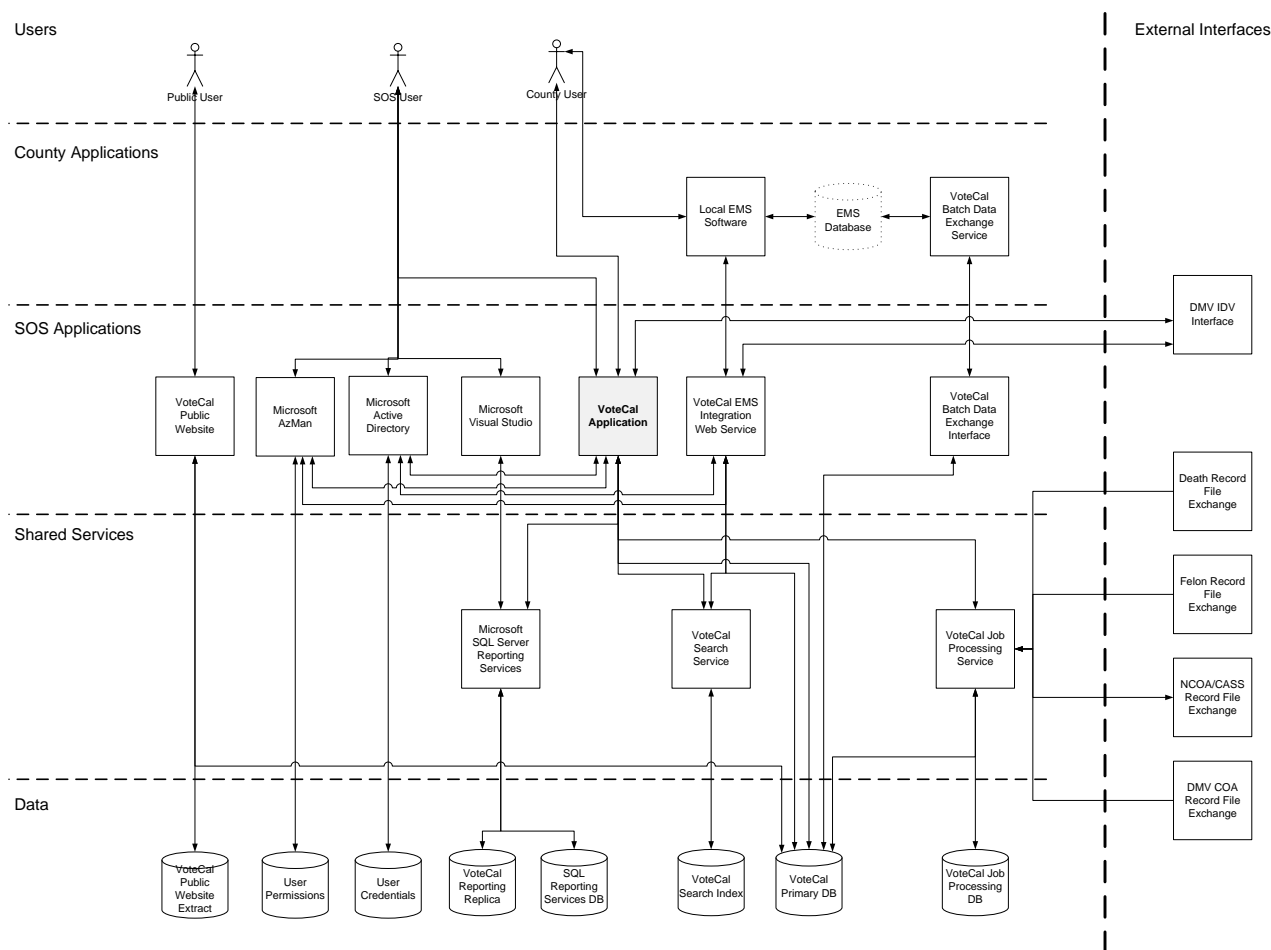
The general architecture of VoteCal can be presented from two perspectives: System and Application. The System Architecture perspective is presented first. This breaks the overall VoteCal system down into deployable components. Both internal and external components are included. Each component is categorized with a brief description. The external components are defined in other sections of this document. Internal components are described in the Application Architecture Perspective.

The Application Architecture perspective follows the System perspective. It dives into each system component that is an installable application to be developed as part of the VoteCal project. Both logical and physical aspects of each application's architecture are described. The general structure focuses on the use of reusable components wherever common functionality is identified.

2.2.1 System Architecture

At the system level, VoteCal's architecture can be described as a set of seamlessly integrated applications. The applications and the interactions between them are graphically depicted in Figure 2-1 below.

Figure 2-1 System Logical Architecture



2.2.1.1 County Applications

The County Applications are those that provide user interfaces for the various county employees and integrate with the integration interfaces provided by the SOS. They are installed at county sites and interact with the county's local databases in order to keep it synchronized with the VoteCal data.

2.2.1.2 SOS Applications

The SOS Applications are those that provide user interfaces for SOS employees and integration interfaces for County Applications. They are installed and operate at the SOS site.

2.2.1.3 Shared Services

Shared Services provide common functionality for any of the interface applications that need to consume it. These applications are generally implemented with web service interfaces and have no direct user interaction.

2.2.1.4 External Interfaces

The External Interfaces are interfaces between VoteCal and agencies other than the SOS. These are application interfaces and generally do not provide a user interface.

2.2.1.5 Data

Data refers to the raw data elements stored on hard disk. The vast majority of data will be stored by Microsoft SQL Server in a relational structure. However, some may be stored as binary, XML, or simple text.

2.2.2 Application Architecture

This section will describe both the logical and physical architecture of each of the application components of the VoteCal System. Descriptions from a functional standpoint are provided in section 2.5.

2.2.2.1 Common Business Logic

A single assembly, VoteCal.Management.Business.dll, will provide common business logic for the set of SOS applications within VoteCal. This assembly will contain all the validation rules and logic for activities such as: voter registration, voter merging, voter transfer, death record matching, felon record matching, and county code to SOS code translation.

Each method call invoked from a consuming application will check that the invoking user has been authenticated and has appropriate permission to perform the applicable operation. Authorization will be performed using the Microsoft Authorization (AzMan) Manager API against the AzMan data store.

This component will also be responsible for interfacing with the primary VoteCal SQL Server database. It will do so by consuming the ADO.NET class libraries provided by the .NET Framework. Communication with SQL Server will be done over TCP/IP port 1433 (or as otherwise determined).

2.2.2.2 VoteCal Application

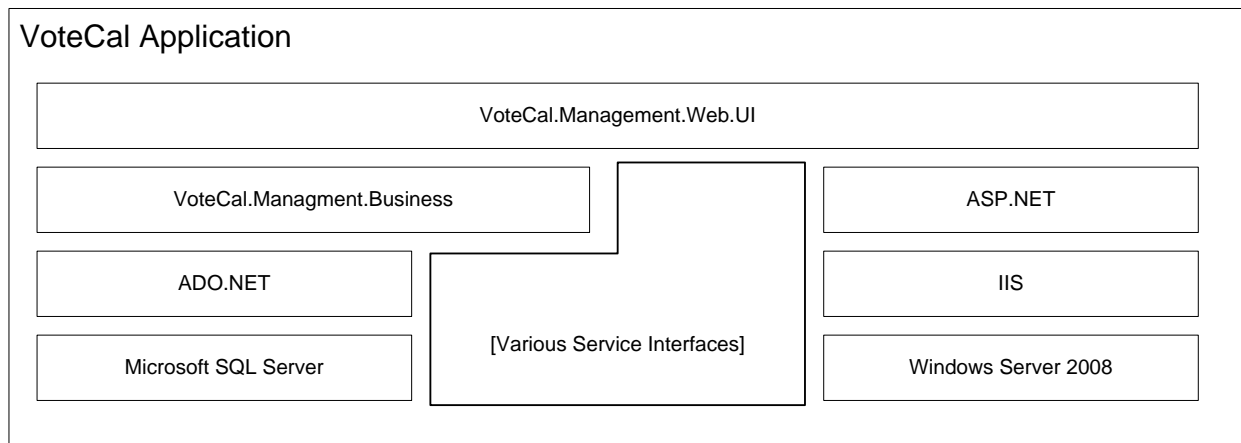
The VoteCal Application will be an ASP.NET web application and will act as the primary user interface for SOS employees and occasional county users. A supported browser will be used to access the VoteCal Application with Secure HTTP (HTTPS) on TCP/IP port 443. The application will be hosted by Internet Information Services (IIS) 7 running on Windows 2008. IIS is responsible for listening for HTTPS requests, decrypting the request and passing it off to ASP.NET for processing. The response returned by ASP.NET is then encrypted and sent back to the requesting browser. Encryption is done using an SSL certificate provided by VeriSign.

Authentication into the VoteCal Application will use ASP.NET Forms Authentication mode. This mode of authentication collects credentials from the user via a web form presented in the application's entry page passes them to the configured authentication provider and upon success returns an encrypted token as a cookie to the browser. When cookies are not enabled the contents of the token are embedded in a query string for each request made by the browser. That token is passed with all subsequent web requests until it expires or until the user logs out of the application, at which time the user is prompted to enter credentials again. The authentication provider will pass the user's credentials to Microsoft Active Directory (AD) using the LDAP protocol over TCP/IP port 389 (or as otherwise determined) for validation.

2.2.2.2.1 Logical Architecture

The VoteCal Application uses a traditional n-tier logical architecture. The logical layers of the VoteCal application are depicted in Figure 2-2.

Figure 2-2 VoteCal Application Logical Architecture



2.2.2.2.1.1 Presentation

The application's presentation layer is implemented in the VoteCal.Management.Web.UI.dll assembly. This is the assembly that is responsible for rendering HTML in response to HTTPS requests from users' browsers. This includes requests for both full and partial page rendering, such as those requests made by AJAX.

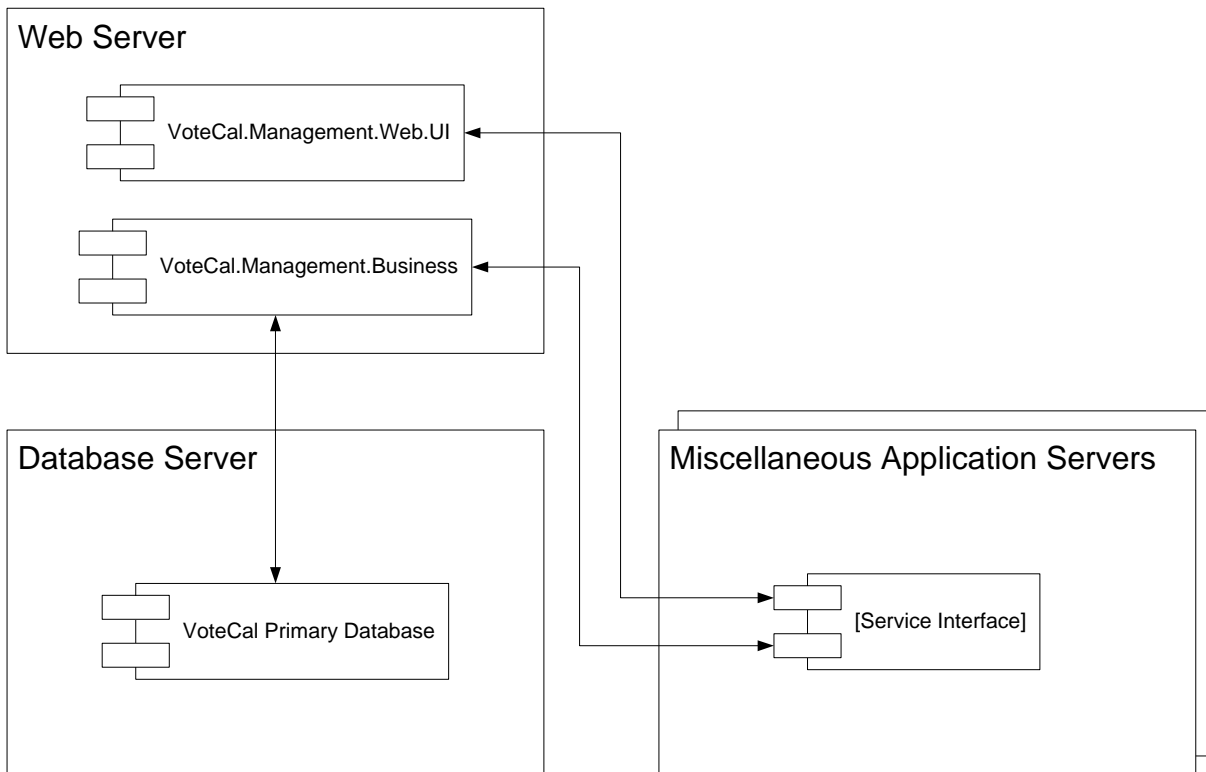
There are other supplemental files that are included in the presentation layer, these include: Cascading Style Sheet (CSS) files which prescribe the look and feel of the application, JavaScript files which provide client site (browser) scripting for early input validation and functionality to enhance the user experience, and resource (.resx) files which are used to support the globalization of the application.

The presentation layer of the VoteCal Application will also be responsible for providing a user interface for the management of the VoteCal Search Service and the VoteCal Job Processing Service.

The **Business Logic**, **Data Access**, and **Data** layers (VoteCal.Management.Business, ADO.NET, and Microsoft SQL Server respectively) are described in the Common Business Logic section above.

2.2.2.2.2 Physical Architecture

The VoteCal Application will use a traditional 2-tier physical architecture at its core, comprised of a web server and a database server. Additionally, other applications will be integrated via their prescribed interfaces. Figure 2-3 shows a graphical representation of the VoteCal Application's physical architecture. The "Miscellaneous Application Servers" node is intended to capture the hosts of the various services that integrate with the VoteCal application and are depicted in Figure 2-1 of this document. This diagram is not intended to depict mechanisms for redundancy or scalability such as clustering and load balancing.

Figure 2-3 VoteCal Application Physical Architecture

2.2.2.3 VoteCal EMS Integration Web Service

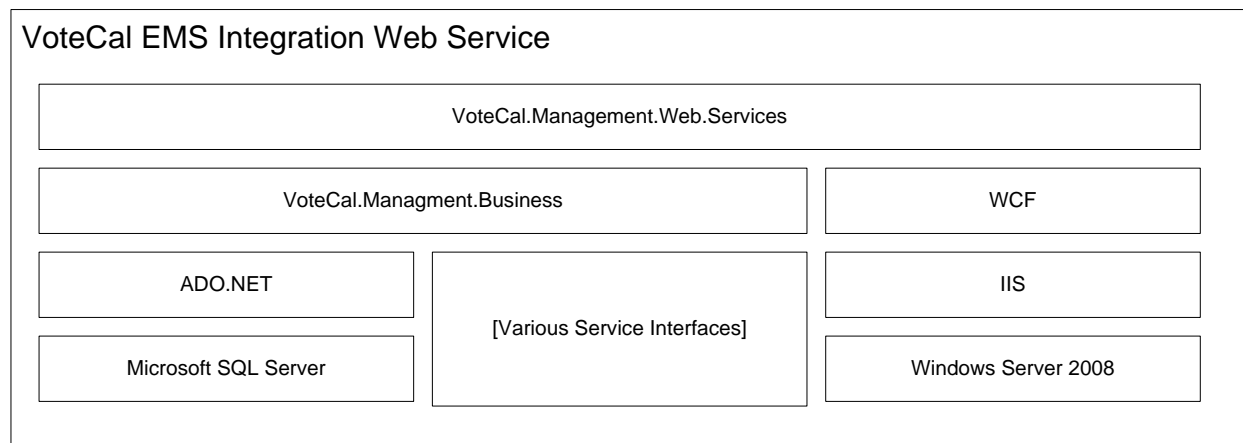
The VoteCal EMS Integration Web Service (IWS) will be a Windows Communication Foundation (WCF) web service and will act as one of the two interfaces through which VoteCal will communicate and synchronize with county election management systems (EMS). IWS will provide an XML interface using SOAP over Secure HTTP (HTTPS) on TCP/IP port 443. The application will be hosted by Internet Information Services (IIS) 7 running on Windows 2008. IIS is responsible for listening for HTTPS requests, decrypting the request and passing it off to WCF for processing. The response returned by WCF is then encrypted and sent back to the requesting browser. Encryption is done using an SSL certificate provided by VeriSign.

Authentication credentials will be passed with every request made to the web service. The authentication provider will pass the user's credentials to Microsoft Active Directory (AD) using the LDAP protocol over TCP/IP port 389 for validation.

2.2.2.3.1 Logical Architecture

IWS uses a traditional n-tier logical architecture. The logical layers of IWS are depicted in Figure 2-4.

Figure 2-4 VoteCal EMS Integration Web Service Logical Architecture



2.2.2.3.1.1 Presentation

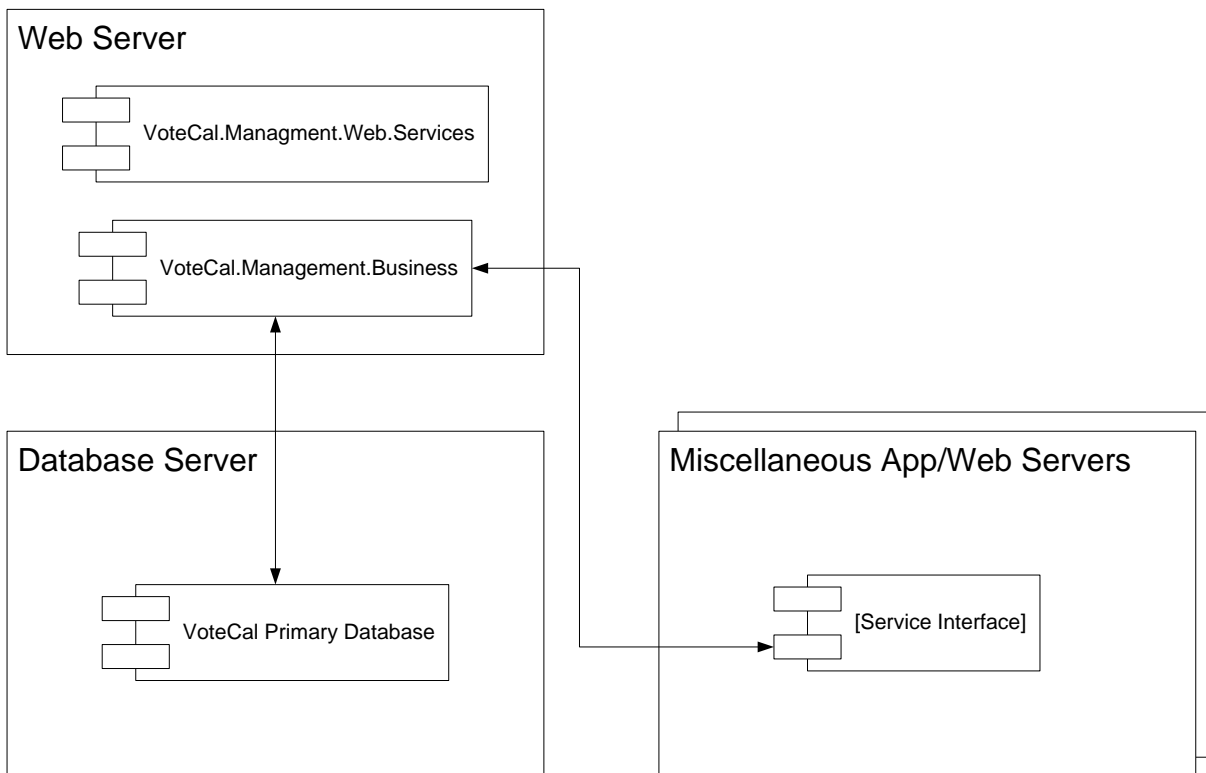
The application's presentation layer will be implemented in the `VoteCal.Management.Web.Services.dll` assembly. This is a non-graphical presentation layer. This is the assembly that is responsible for compiling XML responses to HTTPS requests from authorized client applications. The interface definition will be published as a Web Service Definition Language (WSDL) file and provided to the necessary systems integration teams. Requests and responses will be formatted in well-defined XML and sent in SOAP packets.

The **Business Logic**, **Data Access**, and **Data** layers (VoteCal.Managment.Business, ADO.NET, and Microsoft SQL Server respectively) are described in the Common Business Logic section above.

2.2.2.3.2 Physical Architecture

IWS will use a traditional 2-tier physical architecture at its core, comprised of a web server and a database server. Figure 2-5 shows a graphical representation IWS's physical architecture. This diagram is not intended to depict mechanisms for redundancy or scalability such as clustering and load balancing.

Figure 2-5 EMS Integration Web Service Physical Architecture



2.2.2.4 VoteCal Batch Data Exchange Interface

The VoteCal Batch Data Exchange Interface (DEI) will be a Windows Service application that will be bound to a number of WCF end points to be used for the control of interaction between the Interface and the VoteCal Batch Data Exchange Service (DES) and also for file transfer.

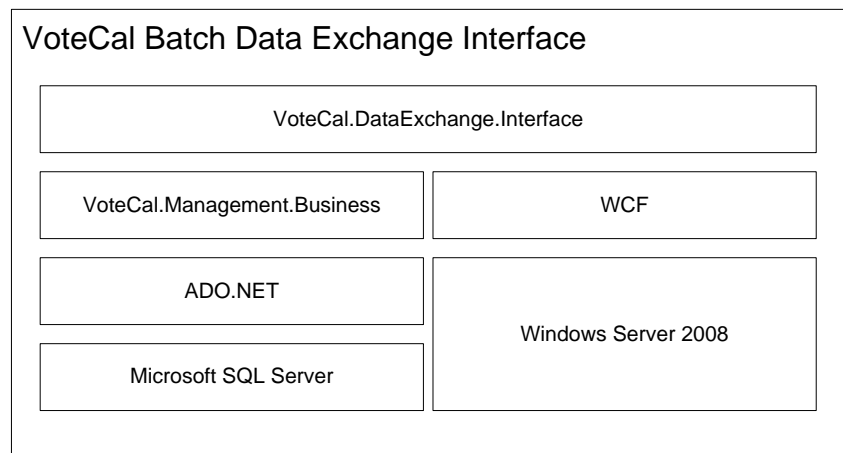
For purposes of controlling the DES, DEI will respond to periodic requests from the DES sent using SOAP over HTTP on TCP/IP port 80. File transfers will be performed over a configurable protocol, either HTTP or TCP/IP, and a configurable port.

As a contingency the interface specifications for the DEI can be made available to the EMS vendors in the event the VoteCal Batch Data Exchange Service cannot be deployed to a specific county location.

2.2.2.4.1 Logical Architecture

The VoteCal Batch Data Exchange Interface uses a traditional n-tier logical architecture. The logical layers of the application are depicted in Figure 2-6.

Figure 2-6 VoteCal Batch Data Exchange Interface Logical Architecture



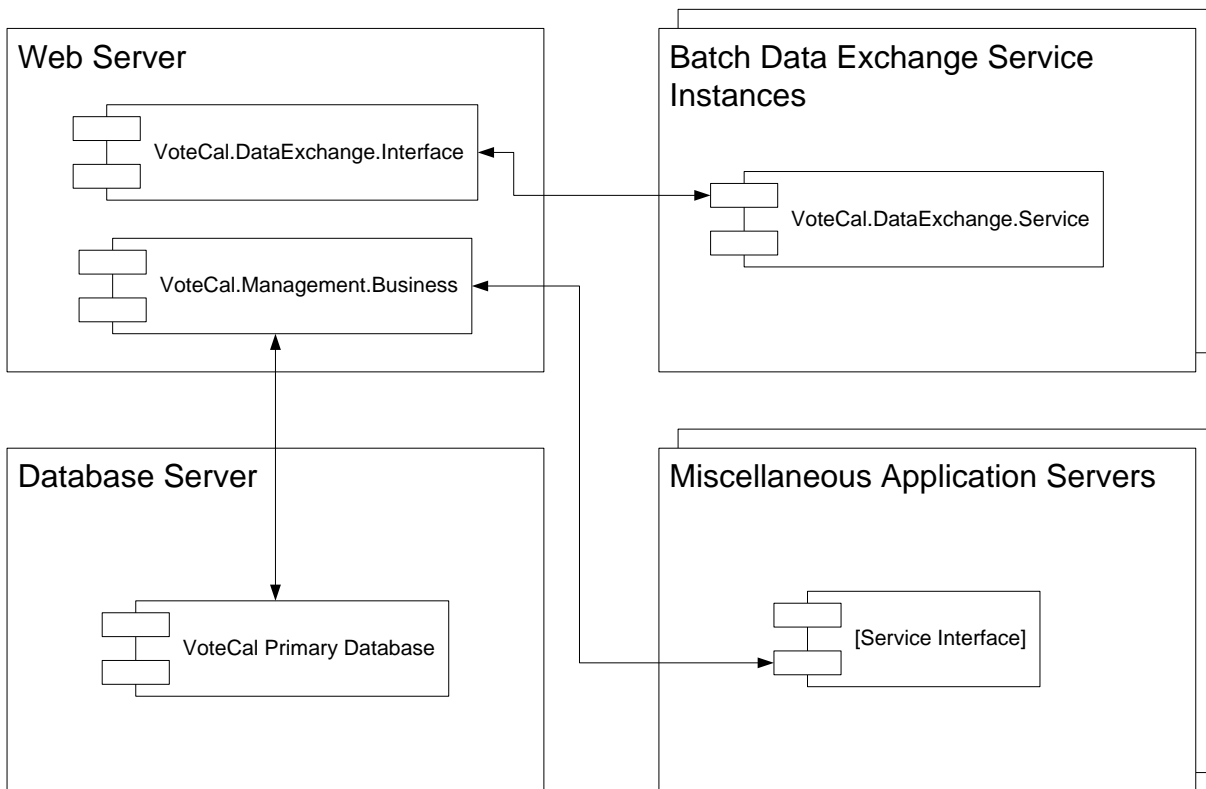
2.2.2.4.1.1 Presentation

The application's presentation layer will be implemented in the `VoteCal.DataExchange.Interface.dll` assembly. This is a non-graphical presentation layer. This layer executes in the context of a Windows Service running on Windows Server 2008 responsible for listening and responding to requests from the VoteCal Batch Data Exchange Service. Communication is executed using a set of protocols and ports as defined by configured WCF endpoints. This service is aware of how to connect with specific instances of the Batch Data Exchange Service located at the various county locations.

The **Business Logic**, **Data Access**, and **Data** layers (`VoteCal.Managment.Business`, `ADO.NET`, and `Microsoft SQL Server` respectively) are described in the Common Business Logic section above.

2.2.2.4.2 Physical Architecture

The VoteCal Batch Date Exchange Interface will use a traditional 2-tier physical architecture at its core, comprised of a web server and a database server. Additionally, other applications will be integrated via their prescribed interfaces. Figure 2-7 shows a graphical representation of the Data Exchange Interface's physical architecture. This diagram is not intended to depict mechanisms for redundancy or scalability such as clustering and load balancing.

Figure 2-7 VoteCal Batch Data Exchange Interface Physical Architecture

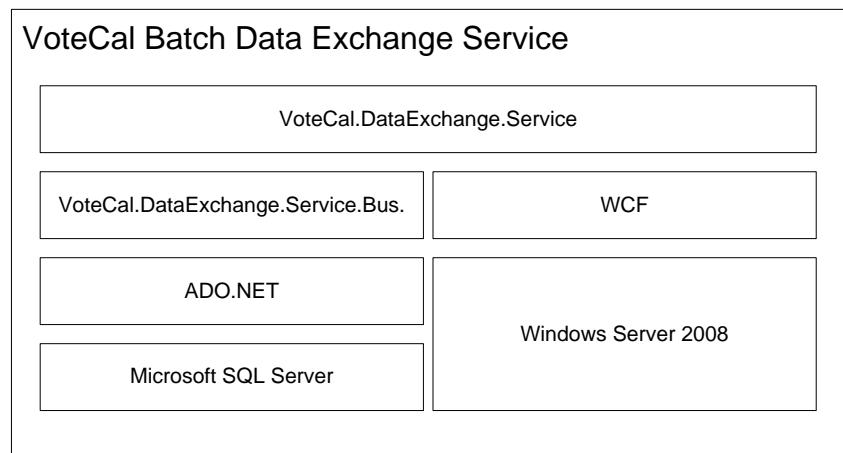
2.2.2.5 VoteCal Batch Data Exchange Service

The VoteCal Batch Data Exchange Service (DES) will be a Windows Service application that will be bound to a number of WCF end points to be used for the control of interaction between the Interface and the VoteCal Batch Data Exchange Interface (DEI) and also for file transfer.

For purposes of control, the DES will periodically request pending work items from the DEI using SOAP over HTTP on TCP/IP port 80. File transfers to and from the DEI will be performed over a configurable protocol, either HTTP or TCP/IP, and a configurable port.

2.2.2.5.1 Logical Architecture

The VoteCal Batch Data Exchange Service uses a traditional n-tier logical architecture. The logical layers of the application are depicted in Figure 2-8.

Figure 2-8 VoteCal Batch Data Exchange Service Logical Architecture

2.2.2.5.1.1 Presentation

The application's presentation layer will be implemented in the VoteCal.DataExchange.Service.dll assembly. This is a non-graphical presentation layer. This layer executes in the context of a Windows Service running on Windows Server 2008 responsible for listening and responding to requests from the VoteCal Batch Data Exchange Service. Communication is executed using a set of protocols and ports as defined by configured WCF endpoints.

2.2.2.5.1.2 Business Logic

The business logic for the service is contained within the VoteCal.DataExchange.Service.Business.dll assembly. This assembly will contain all the validation rules and logic for activities such as extracting data from the local EMS database to be placed in batch files, and importing batch files from VoteCal back into the local EMS database.

2.2.2.5.1.3 Data Access

Data Access will be built into the VoteCal.DataExchange.Service.Business.dll assembly, which will interface with the local EMS database. It will do so by consuming the ADO.NET class libraries provided by the .NET Framework. Communication with EMS database will be done over TCP/IP port otherwise specified at each specific location.

2.2.2.5.1.4 Data

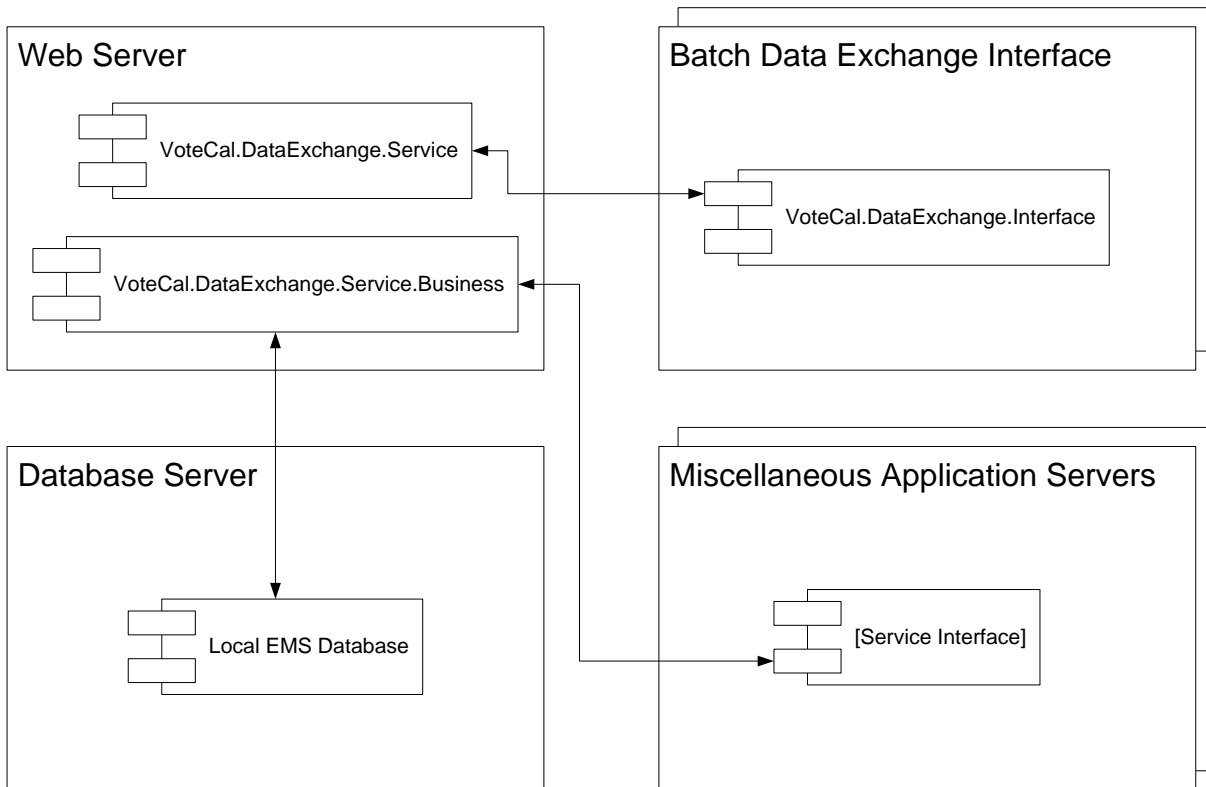
The data consumed by this service will be stored in the specific local EMS database in whichever manner chosen by the specific EMS vendor.

2.2.2.5.2 Physical Architecture

The VoteCal Batch Data Exchange Service will use a traditional 2-tier physical architecture at its core, comprised of a web server and a database server. Additionally, other applications will be integrated via their prescribed interfaces. Figure 2-9 shows a graphical representation of the Data Exchange

Services's physical architecture. This diagram is not intended to depict mechanisms for redundancy or scalability such as clustering and load balancing.

Figure 2-9 VoteCal Batch Data Exchange Service Physical Architecture



2.2.2.6 VoteCal Search Service

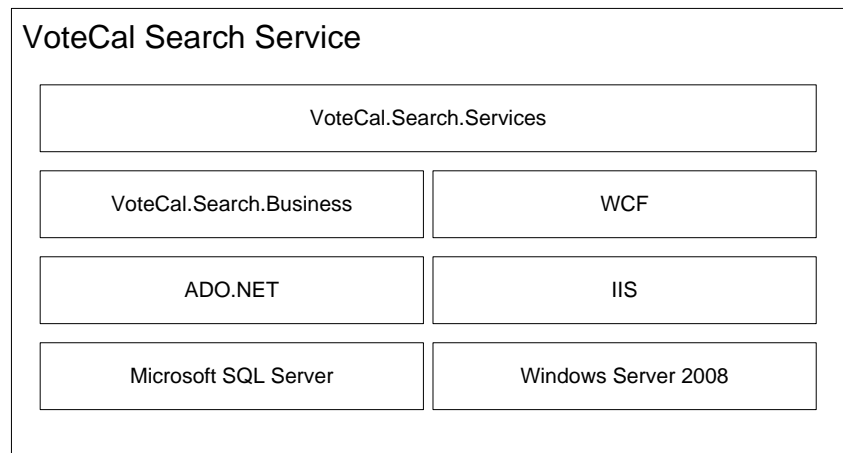
The VoteCal Search Service (Search) will be a Windows Communication Foundation (WCF) web service and will provide a common interface through which all searches on voter and related data will be performed. Search will provide an XML interface using SOAP over HTTP on TCP/IP port 80. The application will be hosted by Internet Information Services (IIS) 7 running on Windows 2008. IIS is responsible for listening for HTTPS requests, decrypting the request and passing it off to WCF for processing. The response returned by WCF is then encrypted and sent back to the requesting browser.

Authentication credentials will be passed with every request made to the web service. The authentication provider will pass the user's credentials to Microsoft Active Directory (AD) using the LDAP protocol over TCP/IP port 389 for validation.

2.2.2.6.1 Logical Architecture

Search uses a traditional n-tier logical architecture. The logical layers of IWS are depicted in Figure 2-10.

Figure 2-10 VoteCal Search Service Logical Architecture



2.2.2.6.1.1 Presentation

The application's presentation layer will be implemented in the `VoteCal.Search.Services.dll` assembly. This is a non-graphical presentation layer. This is the assembly that is responsible for compiling XML responses to HTTPS requests from authorized client applications. The interface definition will be published as a Web Service Definition Language (WSDL) file and provided to the necessary systems integration teams. Requests and responses will be formatted in well-defined XML and sent in SOAP packets.

2.2.2.6.1.2 Business Logic

The business logic for the search service is contained within the `VoteCal.Search.Business.dll` assembly. This assembly will contain all the validation rules and logic for executing searches and assigning confidence ratings.

Each method call invoked from a consuming application will check that the invoking user has been authenticated and has appropriate permission to perform the applicable operation. Authorization will be performed using the Microsoft Authorization (AzMan) Manager API against the AzMan data store.

2.2.2.6.1.3 Data Access

Data Access will be built into the `VoteCal.Search.Business` assembly, which will interface with the VoteCal Search Index SQL Server database. It will do so by consuming the ADO.NET class libraries provided by the .NET Framework. Communication with SQL Server will be done over TCP/IP port 1433.

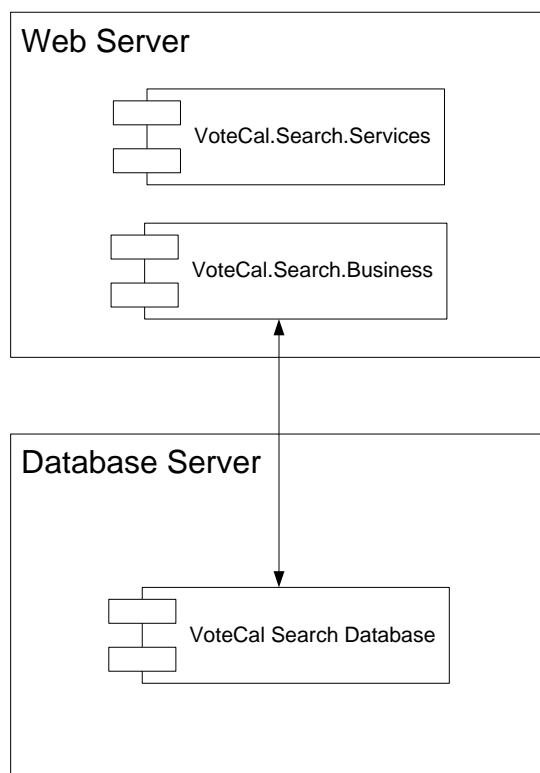
2.2.2.6.1.4 Data

The VoteCal Search Index SQL Server database will be a relational database that contains a subset of data from the Primary VoteCal Database. The schema used in this database however will differ greatly from that of the Primary VoteCal Database. Search's schema will be generalized and optimized for searching the system's data and providing confidence ratings for its results.

2.2.2.6.2 Physical Architecture

Search will use a traditional 2-tier physical architecture at its core, comprised of a web server and a database server. Figure 2-11 shows a graphical representation the search service's physical architecture. This diagram is not intended to depict mechanisms for redundancy or scalability such as clustering and load balancing.

Figure 2-11 VoteCal Search Service Physical Architecture



2.2.2.7 VoteCal Job Processing Service

The VoteCal Job Processing Service (JPS) is really more of a sub-system than an application as it will use multiple application components in its implementation. JPS will use both a Windows Communication Foundation (WCF) web service as its interface and a Windows Service for the actual job processing.

The WCF web service will provide a common interface through which clients can schedule and the check the processing status of executing jobs. JPS will be implemented as an XML interface using SOAP over HTTP on TCP/IP port 80. The application will be hosted by Internet Information Services (IIS) 7 running on Windows 2008. IIS is responsible for listening for HTTPS requests, decrypting the request and passing it off to WCF for processing. The response returned by WCF is then encrypted and sent back to the requesting browser.

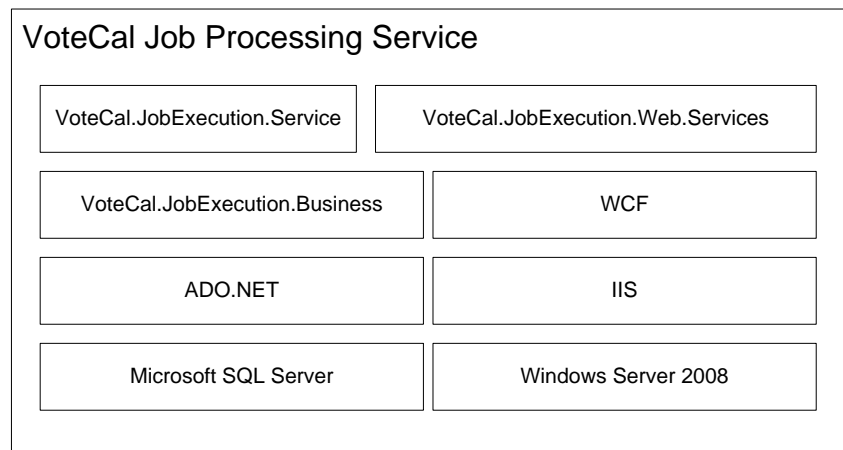
Authentication credentials will be passed with every request made to the web service. The authentication provider will pass the user's credentials to Microsoft Active Directory (AD) using the LDAP protocol over TCP/IP port 389 for validation.

The Windows Service will operate without a user interface on an application server. It will be managed through the Services Management MMC Snap-in on the server on which it operates.

2.2.2.7.1 Logical Architecture

The VoteCal Job Processing Service will use a traditional n-tier logical architecture. The logical layers of the VoteCal application are depicted in Figure 2-12.

Figure 2-12 VoteCal Job Processing Service Logical Architecture



2.2.2.7.1.1 Presentation

The application's presentation layer will be implemented in the `VoteCal.JobExecution.Web.Services.dll` assembly. This is a non-graphical presentation layer. This is the assembly that is responsible for compiling XML responses to HTTPS requests from authorized client applications. The interface definition will be published as a Web Service Definition Language (WSDL) file and provided to the necessary systems integration teams. Requests and responses will be formatted in well-defined XML and sent in SOAP packets.

This service interface will be consumed by the VoteCal Application in order to provide a user interface through which jobs can be scheduled and monitored.

2.2.2.7.1.2 Business Logic

The business logic for the job processing service is contained within the VoteCal.JobExecution.Business.dll assembly. This assembly will contain all the validation rules and logic for scheduling and initiating the execution of jobs. This assembly will be consumed by both VoteCal.JobExecution.Service.dll and VoteCal.JobExecution.Web.Services.dll. VoteCal.JobExecution.Service.dll will execute as a Windows Service and will be responsible for initiating job processes to run according to their schedule.

Each method call invoked from one of the consuming applications will check that the invoking user has been authenticated and has appropriate permission to perform the applicable operation. Authorization will be performed using the Microsoft Authorization (AzMan) Manager API against the AzMan data store.

2.2.2.7.1.3 Data Access

Data Access will be built into the VoteCal.JobExecution.Business assembly, which will interface with the VoteCal Job Processor SQL Server database. It will do so by consuming the ADO.NET class libraries provided by the .NET Framework. Communication with SQL Server will be done over TCP/IP port 1433.

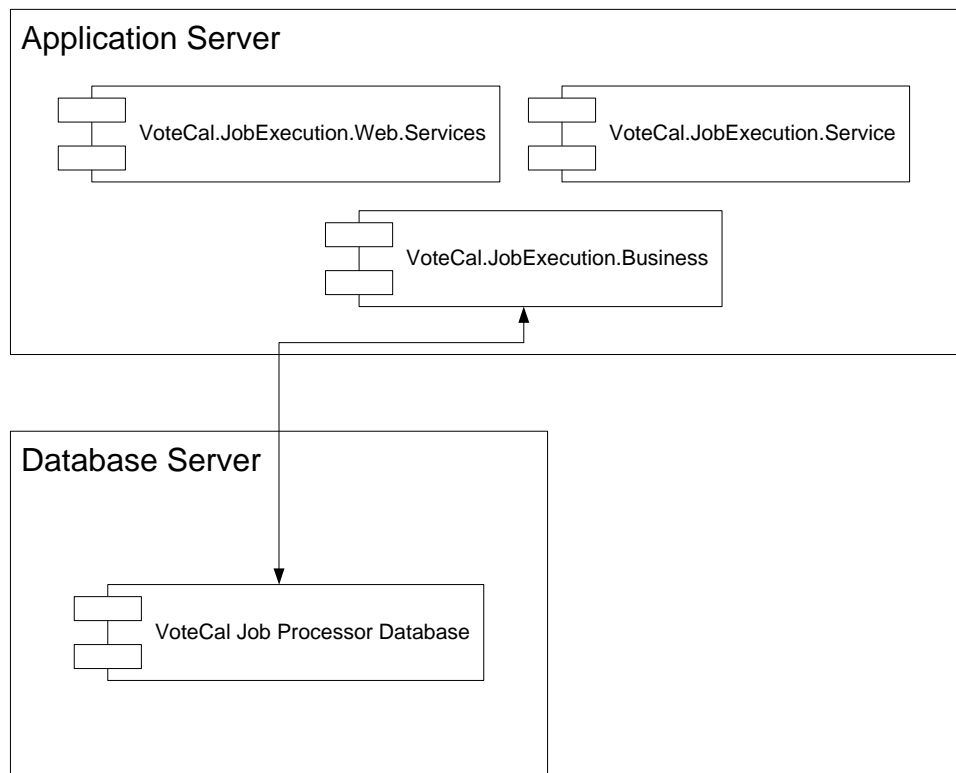
2.2.2.7.1.4 Data

The VoteCal Job Processor SQL Server database will be a relational database that contains job definitions and schedules.

2.2.2.7.2 Physical Architecture

The VoteCal Job Processing will use a traditional 2-tier physical architecture comprised of a web server and a database server. Figure 2-13 shows a graphical representation of the service's physical architecture. This diagram is not intended to depict mechanisms for redundancy or scalability such as clustering and load balancing.

Figure 2-13 VoteCal Job Processing Service

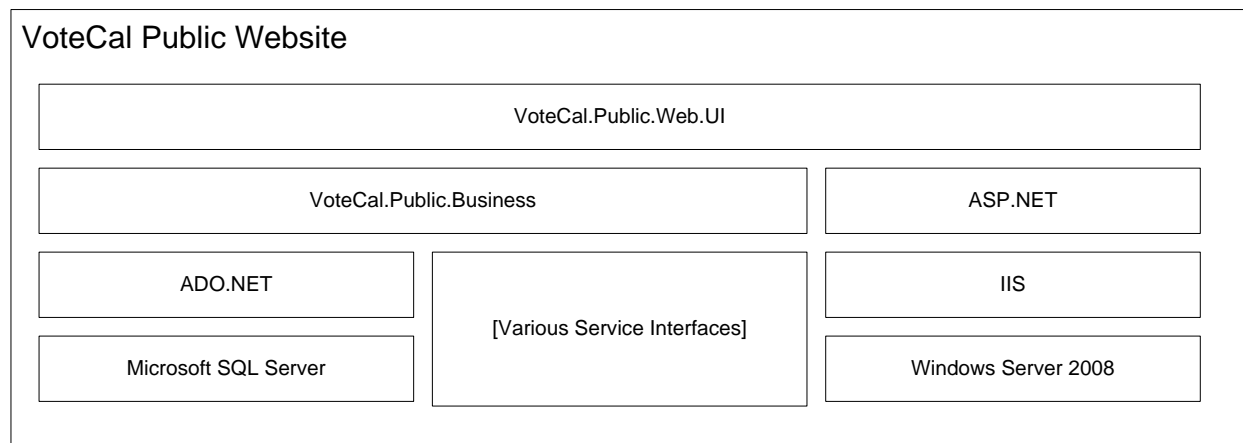


2.2.2.8 VoteCal Public Website

The VoteCal Public Website will be an ASP.NET web application and will act as the user interface for voters. A supported browser will be used to access the website with HTTP on TCP/IP port 80 or HTTPS on TCP/IP port 443 for pages containing sensitive data... The application will be hosted by Internet Information Services (IIS) 7 running on Windows 2008. IIS is responsible for listening for HTTP requests and passing them off to ASP.NET for processing. The response returned by ASP.NET is then sent back to the requesting browser. Anonymous authentication will be used for the website.

2.2.2.8.1 Logical Architecture

The VoteCal Public Website uses a traditional n-tier logical architecture. The logical layers of the application are depicted in Figure 2-14.

Figure 2-14 VoteCal Public Website Logical Architecture

2.2.2.8.1.1 Presentation

The application's presentation layer is implemented in the `VoteCal.Public.Web.UI.dll` assembly. This is the assembly that is responsible for rendering HTML in response to HTTP requests from user's browsers. This includes requests for both full and partial page rendering such as those requests made by AJAX calls.

There are other supplemental files that are included in the presentation layer, these include: Cascading Style Sheet (CSS) files which prescribe the look and feel of the application, JavaScript files which provide client site (browser) scripting for early input validation and functionality to enhance the user experience, and resource (.resx) files which are used to support the globalization of the application.

2.2.2.8.1.2 Business Logic

The business logic for the website is contained within the `VoteCal.Public.Business.dll` assembly. This assembly will contain all the validation rules and logic for activities such as: voter registration status lookup, polling place lookup, and other publically available functionality.

Each method call invoked from a consuming application will check that the invoking user has been authenticated and has appropriate permission to perform the applicable operation. In the case of the VoteCal Public Website, all functions will be performed on behalf of the anonymous user. Authorization will be performed using the Microsoft Authorization (AzMan) Manager API against the AzMan data store.

2.2.2.8.1.3 Data Access

Data Access will be built into the `VoteCal.Public.Business` assembly, which will interface with the VoteCal Public Website SQL Server database. It will do so by consuming the ADO.NET class libraries provided by the .NET Framework. Communication with SQL Server will be done over TCP/IP port 1433, or alternative port as requested.

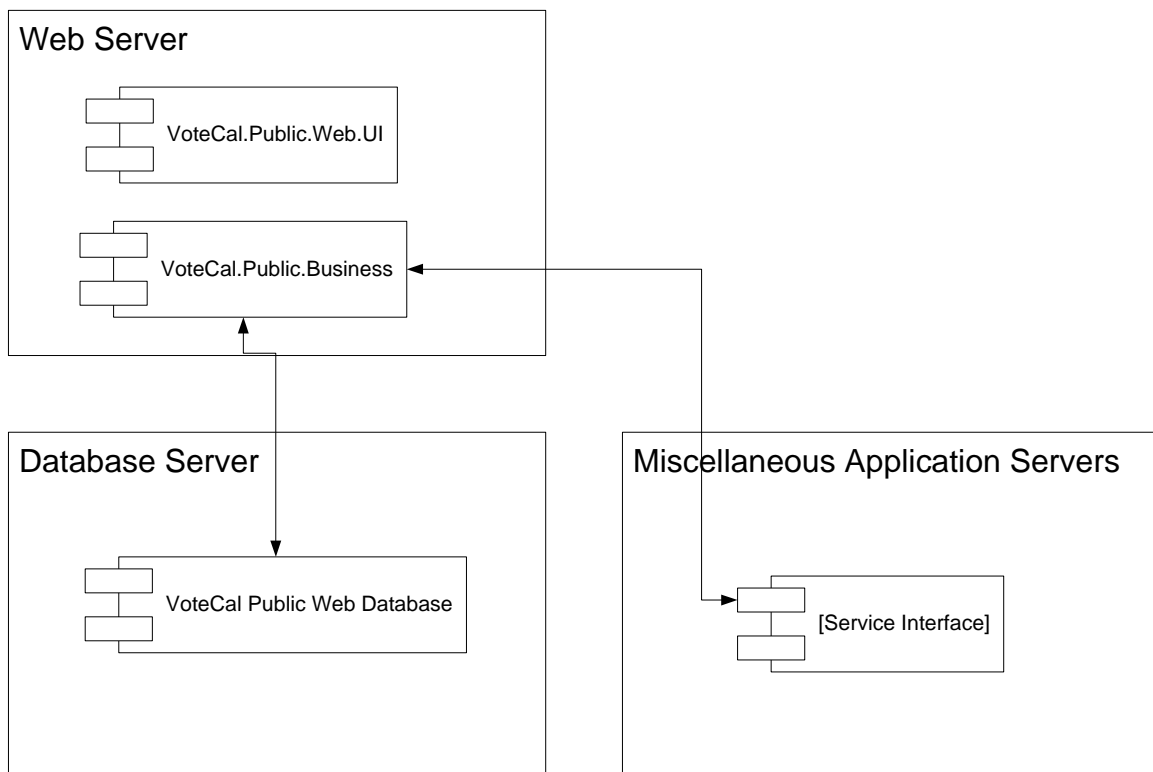
2.2.2.8.1.4 Data

The VoteCal Public Website SQL Server database will be a relational database that contains limited replicated data from the Primary VoteCal Database.

2.2.2.8.2 Physical Architecture

The VoteCal Public Website will use a traditional 2-tier physical architecture comprised of a web server and a database server. Additionally, other applications will be integrated via their prescribed interfaces. Figure 2-15 shows a graphical representation of the VoteCal Public Website's physical architecture. This diagram is not intended to depict mechanisms for redundancy or scalability such as clustering and load balancing.

Figure 2-15 VoteCal Public Website Physical Architecture



2.3 General Interface Specifications

This section presents the general interface specifications for external system interfaces. Specifically, the following interfaces are covered:

- California Department of Corrections and Rehabilitation (CDCR)
- California Department of Public Health (CDPH)

- California Department of Motor Vehicles (DMV)
- United States Social Security Administration (SSA) – Note: This interface is incorporated into the California Department of Motor Vehicles (DMV) interface. Please refer to the DMV interface documented in this section for specifics on the implementation of the SSA interface.
- California Department of Education & Employment (EDD) for NCOA

VoteCal will largely reuse the standards, file formats, processes, constraints, etc. that are already in place for the CalVoter and CalValidator systems. Generally speaking, the VoteCal implementation should not appear any different from CalVoter or CalValidator from the perspective of an external system. This helps cut down on design and development time and effort on the part of the Catalyst team, since we are able to leverage existing standards that are stable, functional and proven. This also limits the changes that the other State agencies need to make on their systems. For features that are not currently available in CalVoter or CalValidator, new standards and processes may be defined.

The majority of these external system interfaces are batch-based, involving the interchange of files on a regular basis. The VoteCal Job Processing Service controls how frequently these processes execute. Every batch-based external system interface involves a process that runs on a defined schedule. The VoteCal Job Processing Service has a user interface that allows users to modify these schedules, and to manually initiate an external system process if the need arises.

The State agencies and their corresponding external system interfaces are described in the subsequent sections.

2.3.1 California Department of Corrections and Rehabilitation (CDCR)

Requirements found under the “S12 – List Maintenance: CDCR Felon Data” section of the VoteCal Request for Proposal (RFP) call for the capability to receive California Department of Corrections and Rehabilitation (CDCR) felon records files. The data contained within the felon records file would be checked against voter registration records, to determine eligibility or disqualification based on the felon status for matching voters. New voter registrations will also be checked against historical felon records.

VoteCal will retain the process that CalVoter uses to communicate with the CDCR. Files will be transferred via File Transfer Protocol (FTP). VoteCal will use the same flat file format used by CalVoter for felon records. The CDCR sends felon record files on a monthly schedule. On average, there are about 11,000 (eleven thousand) records in a new CDCR felon records file.

The Felon Record File Exchange Process will be scheduled to check for the existence of a new felon records file from the CDCR on a regular basis. When a new file becomes available, the service imports the data and initiates the felon record matching process.

2.3.2 California Department of Public Health (CDPH)

Requirements found under the “S11 – List Maintenance: DHS Death Records” section of the VoteCal RFP call for the capability to receive California Department of Public Health (CDPH) death records files. (Note that the RFP refers to the agency’s former name – the Department of Health Services, or DHS.) The data contained within the death records will be matched against voter registration records to identify existing voters that may have died, and subsequently would need to have their registrations cancelled.

VoteCal will retain the process that CalVoter uses to communicate with the CDPH. Files will be transferred via File Transfer Protocol (FTP). VoteCal will use the same flat file format used by CalVoter for death records. The CDPH does not send death record files on a regular schedule. There can be a period of 1 to 3 months between new death record files being sent. On average, there are about 25,000 (twenty-five thousand) records in a new CDPH death records file. New voter registrations will also be checked against historical death records.

The Death Record File Exchange Process will be scheduled to check for the existence of a new death record file from the CDPH on a regular basis. When a new file becomes available, the service imports the data and initiates the death record matching process.

2.3.3 California Employment Development Department (EDD)

Requirements found under the “S14 – List Maintenance: NCOA” section of the VoteCal Request for Proposal (RFP) call for voter registration addresses to be compared, matched, and updated against USPS National Change of Address (NCOA) data. The “cleansed” address data can then be used by the VoteCal system for comparison, matching, verification and confirmation of the changed addresses.

The California Employment Development Department (EDD) is a licensee of the United States Postal Service (USPS) NCOALink system. By policy, all California State agencies, including the Secretary of State (SOS), must contract solely with the EDD to access NCOA data. The Catalyst team is going by the assumption that VoteCal will continue to use the EDD as the NCOA provider. Should this change, there is no significant impact anticipated by the Catalyst team to the rest of the VoteCal implementation. The NCOA/CASS Record File Exchange Process will be designed in such a manner that it is largely decoupled from the rest of the system, so that changing the actual NCOA provider would result in minimal impact to other VoteCal components.

The EDD will receive requests from VoteCal, provide address file correction services, and return the corrected address data to VoteCal. Address file correction services include normalizing addresses to USPS Coding Accuracy Support System (CASS) standards, ZIP code verification and/or correction, and appending carrier route, ZIP+4, and delivery point bar-code data.

VoteCal will retain much of the process and constraints of CalVoter when communicating with the EDD. Files will be transferred via File Transfer Protocol (FTP). The original flat file formats supported by CalVoter will continue to be used by VoteCal. Files will be transferred several times a day. No file will contain more than two (2) million addresses. In a single day, the total of all addresses contained by files transferred to EDD will not exceed three (3) million. The estimated address processing count for VoteCal is 288 million addresses a year, or about 24 million addresses a month.

The NCOA process is different from other external system interfaces in that VoteCal initiates the process by first providing voter registration data (name and address) to the EDD. The EDD receives the data, standardizes the addresses to USPS requirements, and performs its own matching of the voter data against the USPS (NCOA) database. The EDD then exports to VoteCal multiple files containing standardized addresses, as well as forwarding address data for voters whose addresses have changed within a certain amount of time. The NCOA/CASS Record File Exchange Process will be designed with this workflow in mind. The service will be scheduled to prepare files to send to the EDD, and periodically check for the availability of new files from the EDD as they are sent in response.

2.3.4 California Department of Motor Vehicles (DMV)

There are several external system interfaces to be utilized by VoteCal that are under the purview of the California Department of Motor Vehicles (DMV). Each one is described in the following sections.

2.3.4.1 DMV Change of Address (COA)

Requirements found under the “S6 – Voter Registration: Motor Voter” section of the VoteCal RFP call for the capability to receive new voter registration data and voter registration address change data from the DMV. VoteCal matches the DMV voter registration change of address (COA) and new registration transactions against existing voter registration records.

VoteCal will retain much of the process that CalVoter uses to communicate with the DMV COA interface. Files will be transferred via File Transfer Protocol (FTP). The original flat file formats supported by CalVoter will continue to be used by VoteCal. Files will be transferred daily. The number of records per file depends on the size of the county being processed.

The DMV creates a COA extract file and sends it to VoteCal. The DMV Record File Exchange Process regularly checks for the availability of a new DMV COA file. When it finds one, it initiates the DMV COA matching process. A VoteCal enhancement over CalVoter is that non-matching DMV COA records can be potentially processed as new voter registrations.

2.3.4.2 DMV Signatures

Requirements found under the “S6 – Voter Registration: Motor Voter” section of the VoteCal RFP call for the capability of receiving digitized signature images from the DMV. DMV signature images are used for several purposes in VoteCal. For new registrations through the enhanced DMV COA process and the VoteCal Public Website Online Registration process, the DMV signature serves as the voter’s official signature. The signature image files can also be used to compare historical signatures (from the DMV and voter registration affidavits) to assist users in evaluating potential voter matches.

This feature is new to VoteCal; it is not available in the CalVoter system. The Catalyst team will work with the DMV to establish a suitable process for transmitting signature images to VoteCal. File Transfer Protocol (FTP) can be used to exchange the signature request and reply files between VoteCal and the DMV. The VoteCal request file will contain the list of voter records requiring a signature image. The DMV Signature reply file will contain signature images as its payload. The number of signature records per file will depend on the number of new registrations from the DMV COA and the Public Website. The DMV Signature Record File Exchange Process will regularly process the signature request and reply files, and ensure that the signature images are associated to the correct voter records.

2.3.4.3 DMV ID Verification (IDV)

Requirements found under the “S5 – Voter Registration: ID Verification” section of the VoteCal RFP call for the ability to support the DMV ID Verification Process on a transactional basis. This enables VoteCal to immediately verify during data entry if the provided ID information (CA Driver’s License Number, State ID, or SSN4) is valid, assuming that the DMV IDV Web Service is available and functioning. The DMV IDV Web Service is responsible for maintaining the necessary interfaces for them to forward SSN4 verification transactions on to the U.S. Social Security Administration (SSA) system that validates SSN4 data.

VoteCal will largely retain the mechanism CalValidator uses for DMV IDV verification. VoteCal will call the DMV IDV Web Service with the pertinent ID information to validate. These calls will occur more

frequently during the registration period leading up to an election. At peak usage, the system must be able to support 200 transactions per second.

2.3.5 External Interface Summary

The following table summarizes the external system interfaces, presenting the name, description, type, frequency, and size for each.

Table 2-1 Summary of External System Interfaces

External System Interface	Description	Type	Frequency	Size
California Department of Corrections and Rehabilitation (CDCR)	Source of felon records	Batch (Flat File)	Monthly	11,000 records per file (average)
California Department of Public Health (CDPH)	Source of death records	Batch (Flat File)	Irregular – around 1 to 3 months before a new file is available	25,000 records per file (average)
California Employment Development Department (EDD)	NCOA provider; used to update address data to USPS standards	Batch (Flat File)	Several times per day, provided that total record count is not exceeded	3 million records per day (maximum)
California Department of Motor Vehicles (DMV) – COA	Source of DMV Change of Address (COA) records – Motor Voter	Batch (Flat File)	Daily	Depends on county being processed
California Department of Motor Vehicles (DMV) – Signatures	Source of signature images from DMV Driver's License or State ID	Batch (Binary File)	TBD	TBD
California Department of Motor Vehicles (DMV) – ID Verification (IDV)	Validation of CA Driver's License or State ID; validation of SSN4 through United States Social Security Administration (SSA)	Transactional (Web Service)	Continuous; at peak usage, support up to 200 transactions per second	N/A

2.4 Database Description

This section presents a description of the databases used to support the VoteCal System. The section will describe the database product, version, and key product features that will be used to implement and support the VoteCal System. A description of each of the logical database types will be included. The intended use of database objects will be presented. This section will also present how the database will support the security requirements of the VoteCal system.

This section will also present the conceptual data model. The conceptual model will be in the form of an entity relationship diagram (ERD) that will present the entities and their relationships. The section will also contain a preliminary inventory of entities, attributes, and constraints. Subsequent design

phase deliverables will elaborate on this model resulting in the presentation of the logical and physical data models.

2.4.1 General Description

This section presents a description of the databases used to support the VoteCal System. The section will describe the database product, version, and key product features that will be used to implement and support the VoteCal System. A description of each of the logical database types will be included. The intended use of database objects will be presented. This section will also present how the database will support the security requirements of the VoteCal system.

2.4.1.1 Description of the Databases

This section presents a description of the databases, specifically referencing the database product, version, and key product features.

The VoteCal System will utilize a MS SQL Server Enterprise 2008 R2 database to provide for persistent relational data storage and retrieval and reporting functionality. The following specific product components and features will be used to provide the functionality required of the VoteCal System:

2.4.1.1.1 Microsoft SQL Server Reporting Services (SSRS) Enterprise Reporting Engine

Microsoft SQL Server Reporting Services (SSRS) provides a complete, server-based platform designed to support a wide variety of reporting needs enabling organizations to deliver relevant information where needed across the entire enterprise.

2.4.1.1.2 Transparent Data Encryption

Transparent data encryption enables encryption of an entire database, data files or log files, without the need for application changes. It supports search encrypted data using both range and fuzzy searches. Transparent data encryption prevents access to secure data from unauthorized users, and data encryption without any changes to existing applications.

2.4.1.1.3 SQL Server Auditing

SQL Server Auditing provides for the configuration of tracking and logging events that occur on the system. Auditing can be created and managed via DDL while simplifying compliance by providing more comprehensive data auditing. It fundamentally enables the functionality to answer common questions such as “who accessed our data?” “when was the data accessed?” and “what did they have access to?”

2.4.1.1.4 SQL Server Replication Services and Failover Clustering

SQL Server Replication Services and failover clustering provides high-availability support for an entire SQL Server instance. SQL Server failover clusters are built on top of Windows Server failover clusters. A SQL Server failover cluster appears on the network as a single SQL Server instance on a single computer. Internally, only one of the nodes owns the cluster resource group at a time, serving all the client requests for that failover cluster instance. In case of a failure (hardware failures, operating system failures, application or service failures), or a planned upgrade, the group ownership is moved to another node in the failover cluster – this process is called failover. By leveraging the Windows Server failover cluster functionality, SQL Server failover cluster provides high availability through redundancy at the instance level.

SQL Server Replication Services will be applied to support transactional and scheduled replication of VoteCal System data.

- To satisfy HAVA and the general need to access current voter registration data, transactional replication is used to copy the voter table of record to the other servers. Transactional replication means that every update made to the main database will be replicated via network connection to the other servers with minimal delay or latency. Most user actions result in the update of individual records which are replicated between the databases faster than a browser-based user interface could detect using two consecutive page requests. Thus, the latency is imperceptible to the end user and the database copies are always in sync with the table of record.
- Since Vote History is typically collected in batch form and remains static for long stretches of the election cycle, scheduled replication will be used to replicate this lower priority table in larger less-frequent chunks. The replication process can be used to merge county-specific vote history tables into a statewide table.

2.4.1.2 Logical Database Types

This section presents a description of the logical database types. The VoteCal System will be primarily comprised of five logical database types, implemented as distinct database clusters. The separation of databases into logical clusters supports the isolation of various database loads resulting in increased performance.

- **VoteCal Primary Database** – This is the primary database that provides data storage for the core VoteCal System. It supports, for example, county voter registration transactions at the highest performance levels to avoid being a bottleneck for their voter registration business processes.
- **VoteCal Reporting Database** – This database will support report generation via the Microsoft SQL Server Reporting Services component. The database will be generated from replicated (direct copy) or transformed (normalized, de-normalized, or otherwise altered) data from the VoteCal Primary Database as required to support high performance generation of reports.
- **VoteCal Search Index Database** – This database will support the VoteCal Search Service developed by Catalyst. The database will support voter search and matching, specifically providing high performance and capabilities such as advanced search algorithms (fuzzy, soundex, etc.) while also supporting assignment of confidence ratings. The database will be generated from replicated (direct copy) or transformed (normalized, de-normalized, or otherwise altered) data from the VoteCal Primary Database as required.
- **VoteCal Job Processing Database** – This database will support the VoteCal Job Processing Service developed by Catalyst. The database will support the job scheduling and processing capabilities of the VoteCal Job Processing Service described in Section 2.2 General Architecture Design.
- **SQL Reporting Services Database** – This database will support the Microsoft SQL Server Reporting Services product. The database will not be subject to any specific development or modification activities as part of the VoteCal System effort.

2.4.1.3 Intended use of Database Objects

This section presents the intended use of database objects. The following table specifies, for each database object type, the details of how they will be used to support the VoteCal System.

Table 2-1 Intended use of Database Objects

Database Object	Definition	Intended Use
Column	In the context of a relational database table, a column is a set of data values of a particular simple type, one for each row of the table. The columns provide the structure according to which the rows are composed. Also known as a field or attribute.	Used to store relational data attributes
Constraint	A condition that defines valid data when adding or updating an entry in a table of a relational database.	Ensuring the integrity of data
Foreign Key	A foreign key is a field in a relational table that matches the primary key column of another table. The foreign key can be used to cross-reference tables.	Ensuring the integrity of data
Function	Procedural code that executes on data within the database engine. Functions, unlike stored procedures, can be referenced by SQL queries and views.	Efficient processing of large sets of data.
Index	A database index is a data structure that improves the speed of data retrieval operations on a database table. Indexes can be created using one or more columns of a database table, providing the basis for both rapid random look ups and efficient access of ordered records.	Optimize efficient access to data
Locks	Database management systems utilize locks to provide concurrency control. Common uses of locks are to ensure that only one user can modify a record at a time and that data can not be read while it is being modified. Locking mechanisms can be enforced at the row, table or page level.	Ensuring the integrity of data
Primary Key	The primary key of a relational table uniquely identifies each record in the table. It can either be a normal attribute that is guaranteed to be unique (such as Social Security Number in a table with no more than one record per person) or it can be generated by the DBMS (such as a globally unique identifier, or GUID, in Microsoft SQL Server). Primary keys may consist of a single attribute or multiple attributes in combination.	Ensuring the integrity of data
Stored Procedure	Procedural code that executes on data within the database engine.	Efficient processing of large sets of data.
Table	A table is a set of data elements (values) that is organized using a model of vertical columns (which are identified by their name) and horizontal rows. A table has a specified number of columns, but can have any number of rows. Each row is identified by the values appearing in a particular column subset which has been identified as a candidate key.	Used to store relational data records
Transactions	Transactions are a group of database commands which are to be treated as a single atomic event. Transactions are maintained using the two phase commit system.	Ensuring the integrity of data

Database Object	Definition	Intended Use
Trigger	A database trigger is procedural code that is automatically executed in response to certain events (such as insert or update) on a particular table in a database.	Ensuring the integrity of data. Automating history logging.
View	A view consists of a stored query accessible as a virtual table composed of the result set of a query.	Portraying data differently than as stored in the relational tables

2.4.1.4 Database Support of Security Requirements

This section will present the database support of security requirements.

2.4.1.4.1 Control Access to Data Resources

The database security scheme will incorporate authentication and authorization to only provide access to users who need it. Authentication will be implemented through use of a user id and password. Authorization will ensure that users will only have access to the databases and, within each database, the specific objects for which access is required. SQL Server supports providing security-enhanced access to metadata by using catalog views, enabling users to view metadata only for those objects to which they have access.

2.4.1.4.2 Encrypt Sensitive Data

Transparent data encryption enables encryption of an entire database, data files or log files, without the need for application changes. It supports searching encrypted data using both range and fuzzy searches. Transparent data encryption prevents access to secure data from unauthorized users, and data encryption without any changes to existing applications.

2.4.1.4.3 Audit Database Activity

The database will support comprehensive SQL data auditing, implemented by the configurable SQL Server Audit component, which will create an audit trail of what database transactions were performed, when they were executed, and by whom. The audit log will itself be secured from tampering.

2.4.2 Entity Relationship Diagram (ERD)

The preliminary entity relationship diagram (ERD) and corresponding data dictionary is submitted separately from this document due to the specific large format requirements of those design artifacts. Please look to "Deliverable 2.1 Requirements Specification - Addendum ERD v2.0.doc", included with this deliverable as a separate file.

2.5 Processing Function Descriptions

This section discusses how Catalyst will approach the implementation of various levels of functionality in the VoteCal solution through the use of the Microsoft .NET Framework, and with the development of several fully-integrated applications built to function seamlessly as a single system.

2.5.1 .NET Framework

The Microsoft .NET Framework consists of two primary components; a collection of class libraries, and a runtime environment. The class libraries included in the framework implements functionality that provides developers with access to numerous operations common to building any application on the Windows platform. The runtime environment monitors and provides services to application code as it executes. The use of this framework drastically reduces development time by allowing the programming team to concentrate on providing business-type functionality instead of getting bogged down on lower level code necessary for applications to run.

The class libraries are organized into two levels; the Base Class Library (BCL) and the Framework Class Library (FCL). The BCL provides the fundamental core set of classes. The FCL provides a higher level of abstraction and is organized into groups according to their usage.

2.5.1.1 Core Libraries

The BCL provides an interface to functionality that is fundamental to any computing system and includes: reading, writing, and manipulating text; interacting with the file system to work with files stored on disk; error logging and tracing; and globalizing applications to support multiple languages.

2.5.1.2 Data Access

The data access related classes in the .NET Framework are commonly referred to as ADO.NET. ADO.NET primarily provides developers with the ability to interact with relational databases. Aside from providing the ability to read and write data, critical services are also provided by ADO.NET for activities such as transaction coordination. The transaction coordination service provided by ADO.NET allows for developers to create processes that may include several tasks each manipulating several pieces of data in a manner that will cause the process to run as a single atomic unit. This means that if one piece fails, then entire process fails and all data can be restored to its pre-existing state to ensure data quality and integrity.

2.5.1.3 ASP.NET

ASP.NET refers to the set of classes that are used for web application development. Classes from ASP.NET are extended to create web pages. Other classes in ASP.NET are used to create other reusable components of a web application, such as a common page layout, or collections of controls that are used repeatedly. Furthermore, ASP.NET provides security mechanisms to assist with user authentication and authorization, as well as personalization for individual users. Underneath this, ASP.NET provides access to information specific to the protocol (HTTP/HTTPS) level, allowing it to be inspected and modified by code when needed.

2.5.1.4 Windows Communication Foundation

The Windows Communication Foundation (WCF) provides tools that are used in the development of integration interfaces such as XML web services. Standardized mechanisms like SOAP/XML interfaces

allow disparate applications to communicate with one other independent of implementation specifics, and are imperative to the development of an enterprise grade system.

2.5.1.5 Runtime

The Common Language Runtime (CLR) is the environment within which all .NET code executes. When .NET code, written in a language such as Visual Basic or C#, is compiled, it is converted into Common Intermediate Language (CIL). CIL is what is executed by the CLR and is further translated into a form that can be interpreted by a computer's operating system. The use of CIL allows components written in one language to be used by components written in a different one.

The CLR also provides services that are extremely critical to the execution of code. Such services include memory management, thread management, and security. These services allow development time to be focused on business-critical functionality.

2.5.2 VoteCal System Component (non-Platform) Functions

The VoteCal System will be implemented as several stand-alone applications. Each application will be built for a sole purpose with the intention of creating several highly reusable components.

2.5.2.1 Search Service

The VoteCal Search Service will be responsible for processing and returning results for search queries on voter data. The search service will index VoteCal voter data independently from the primary VoteCal database. The service will be exposed through XML web services and will be accessed whenever a search must be executed. The VoteCal Web Application and the EMS Integration Web Service will both leverage the functionality of the search service. The various matching processes will also leverage this service. A confidence rating will be assigned to each result returned by the service.

2.5.2.2 Batch Data Exchange Service

The Batch Data Exchange Service will be a Windows Service application hosting WCF endpoints. This application will be installed in all county data centers and is responsible for executing jobs and sending batch files to VoteCal that are necessary for keeping the systems in sync. This client will communicate exclusively with the Batch Data Exchange Interface.

2.5.2.3 Batch Data Exchange Interface

The Batch Data Exchange Interface will be a Windows Service application hosting WCF endpoints. This service interface will provide information to the Batch Data Exchange Client when invoked and will participate in batch processes from the VoteCal side.

2.5.2.4 EMS Integration Web Service

The EMS Integration Web Service will be an XML web service that will act as the real-time integration interface for local EMS systems. Changes made to local EMS data will be able to be reflected immediately in the VoteCal data through the use of this interface. Not only can changes be pushed

through this interface up to VoteCal, but it will also be a mechanism for local EMS systems to retrieve VoteCal data from.

2.5.2.5 Job Processing Service

The Job Processing Service will be a Windows Service that is responsible for executing long-running processes at a pre-planned time. The Job Processing Service will also have an accompanying web service interface through which applications can integrate with it in order to schedule jobs or retrieve information pertaining to jobs.

2.5.2.6 VoteCal Application

The VoteCal Application will be implemented as an ASP.NET web application. This application will provide the primary user interface through which SOS users will perform functions. This application will be integrated with almost all of the other VoteCal applications through XML web service interfaces. It will provide an interface for working with VoteCal data as well as administrative interfaces for the Search Service and Job Processing Service.

2.5.2.7 VoteCal Public Website

The VoteCal Public Website will be an ASP.NET web application through which any interested party can find information provided by the SOS.

2.6 Integrated Platform Products

This section presents the integrated platform products that will support the VoteCal System. In general, the platform products are pre-existing software pieces that will provide valuable functionality to VoteCal, but from a development perspective will not be altered.

2.6.1 Microsoft Windows Server 2008

The Microsoft Windows Server 2008 operating system is the root piece of software on top of which all other software components will execute. The widespread usage of the Windows operating system will ensure the availability of qualified administrative and support resources over the life of the system. The large market share of the product has also provided an environment for the creation of a number of high quality products and tools available for use.

2.6.2 Microsoft Internet Information Services

Microsoft Internet Information Services (IIS) version 7 is the web server included with the Windows operating system. IIS is responsible for receiving and responding to requests over HTTP and HTTPS. For VoteCal, when IIS receives a request, it will pass it off to ASP.NET for processing and will eventually return the requested resource to the caller after it is generated by ASP.NET.

2.6.3 Microsoft SQL Server 2008

Microsoft SQL Server 2008 is Microsoft's relational database management system. Besides providing a mechanism for the efficient storage of related data and high performance data retrieval, SQL Server

provides many other valuable services. One such service is data replication. Data replication allows for multiple copies of the data to be spread out and made available to various applications in order to incorporate a high degree of scalability or to serve as a mechanism for redundancy and high availability.

2.6.4 Microsoft SQL Reporting Services

Microsoft SQL Reporting Services (SSRS) is a server based report generation tool that is included with SQL Server. Although SSRS provides a web based user interface, VoteCal will forgo that interface and instead provide an interface as part of the VoteCal Web Application. VoteCal will interface with SSRS through a set of web services provided with the product. SSRS reports can be rendered in several formats including: PDF, Excel, CSV, and XML. SSRS also allows for the creation of ad-hoc reports where a user can choose relevant fields from a pre-defined set in order to generate a customized report. Reports can be created and viewed on demand or scheduled for generation and delivery at a later time.

2.6.5 Microsoft Active Directory

Microsoft Active Directory (AD) will be used for user credential storage. Any user authentication services needed by applications throughout the VoteCal system will be provided for by AD. AD implements a standard LDAP interface through which it can be accessed. Along with storing credentials, AD also provides tools for creating, maintaining, and enforcing security policies for things such as password strength and expiration.

2.6.6 VMware vSphere 4

VMware vSphere will be used for datacenter virtualization of non-production VoteCal System environments. VMware vSphere is a bare metal hypervisor, which means that it runs directly on the hardware and not within another operating system. Within vSphere, one or more virtual machines can be created. Each virtual machine, synonymous with a physical server, will have the Windows Server 2008 operating system installed and any other required platform software required for the capabilities of that (virtual) server.

One of the key strengths of datacenter virtualization is the ability to create, remove, refresh, and repurpose virtual servers with relative ease.

2.7 Tools to be Used

This section presents the tools to be used to design and develop the VoteCal solution. In addition to the tools, it incorporates the discussion of specific product options that are utilized. Testing tools will be identified in Deliverable 3.2 VoteCal System Test Plan.

Table 2-2 VoteCal Design and Development Tools

Product	Version	Component	Functionality	Comments
Microsoft Visual Studio (VS)	2008/2010	N/A	Integrated Development Environment (IDE)	Microsoft VS 2008 in the near term, migrating to Microsoft VS 2010 once released (expected April 12, 2010)
Microsoft SQL Server	2008	Report Builder 2.0	Report authoring tool	
Microsoft Team Foundation Server (TFS)	2010	N/A	Automated build management, source control management	Note: Implementing MS TFS 2010 once released (expected April 12, 2010)
SharePoint	2007	Document Management	Maintain project documents	
JIRA	4.0	N/A	Defect management and action item management	
Microsoft FxCop	1.36	N/A	Analyzes managed code assemblies	Code analysis tool that checks .NET managed code assemblies for conformance to the Microsoft .NET Framework Design Guidelines.
IBM Rational RequisitePro	7.0	N/A	Manage project requirements and traceability to design artifacts and testing activities	
Microsoft Office	2003	Excel, Word, Visio	Create and maintain project documentation	
Microsoft Office	2007	Project	Create and maintain project schedule	
Microsoft Visual Studio	2008/2010	Microsoft Report Designer	SSRS Report Design and Development	Report Designer is the report creation tool used for creating SSRS reports and runs inside of Microsoft Visual Studio. Report Designer will be used to define report layouts and data sets and to publish report definitions. Reports published with Report Designer will be available from the Reporting section of the VoteCal Web Application.
Tenable Nessus	4.2.0	N/A	Vulnerability and penetration security testing	

2.8 Configuration and Modification

Most of the design artifacts that are used within the Design Phase deliverables are created using desktop software, e.g., Microsoft Word, Microsoft Visio, and Portable Document Format (PDF). Therefore these artifacts must meet the requirements defined by the approved Document Management Plan (Project Management Plan, Deliverable 1.1) and the approved Configuration Management Plan (Software Version Control and Configuration Management Plan, Deliverable 1.4).

The design of the VoteCal system is in the artifacts, which are maintained as separate entities. The Design Phase deliverables capture these artifacts at a point in time and collectively define the system design at that point. The following table illustrates the types of design artifacts, the repository for each type and the method for managing the configuration for each type.

Table 2-3 Configuration and Repository by Design Artifact Type

Artifact	Type	Repository	Configuration
Activity Diagrams	Visio Document	Catalyst SharePoint	Work Product
API Specifications	Word Document	Catalyst SharePoint	Work Product
Architectural Articles	Word Document	Catalyst SharePoint	Work Product
Business Process Maps	Visio Document	Catalyst SharePoint	Work Product
Class Diagrams	Word Document	Visual Studio	Software Code
Component Diagram	Visio Document	Catalyst SharePoint	Work Product
Data Dictionary	Word Document	Catalyst SharePoint	Work Product
Data Model	Entity Relationship Diagram	SQL Server	Database Schema
Deployment Diagram	Visio Document	Catalyst SharePoint	Work Product
External Interface Specifications	Word Document	Catalyst SharePoint	Work Product
Page Flow Diagram	Vision Document	Catalyst SharePoint	Work Product
Report Specifications	Word Document	Catalyst SharePoint	Work Product
Use Case	Word Document	Catalyst SharePoint	Work Product
User Interface Specifications	Word Document	Catalyst SharePoint	Work Product

The design work products will be maintained as defined in the approved Document Management Plan as described in the following sections. The data model will be maintained through the SQL server schema for the VoteCal System. The class diagrams will be maintained in Visual Studio.

2.8.1 Document Management

The configuration of the documents maintained in Catalyst's SharePoint will be maintained as described in the approved Document Management Plan and will be subject to the Documentation

Standards contained therein, with some exceptions. As defined in the Document Management Plan, the approach to document management includes the following steps:

- Create documents
- Review and approve documents
- Store and control documents

Since these are living artifacts, no baseline is established for these work products.

2.8.2 Document Versioning Scheme

The work products will be subject to the following versioning scheme, consistent with the Document Management Plan:

- Level 0.x – Interim work products being developed by Catalyst team members and under internal quality assurance review.
- Level 1.x – Design artifacts that have been submitted to SOS for review and comment, either directly as a separate document or as part of a VoteCal deliverable.

2.8.3 Document Filenames

The Word and Visio work products will be subject to the filename convention in the Document Management Plan:

{Document Type}{Document Number}{space}{Document Name}{v9.9}.{extension}

For example, a use case file name would be:

UC05.02.01 Modify Printed Notification and Post Card Templates.doc

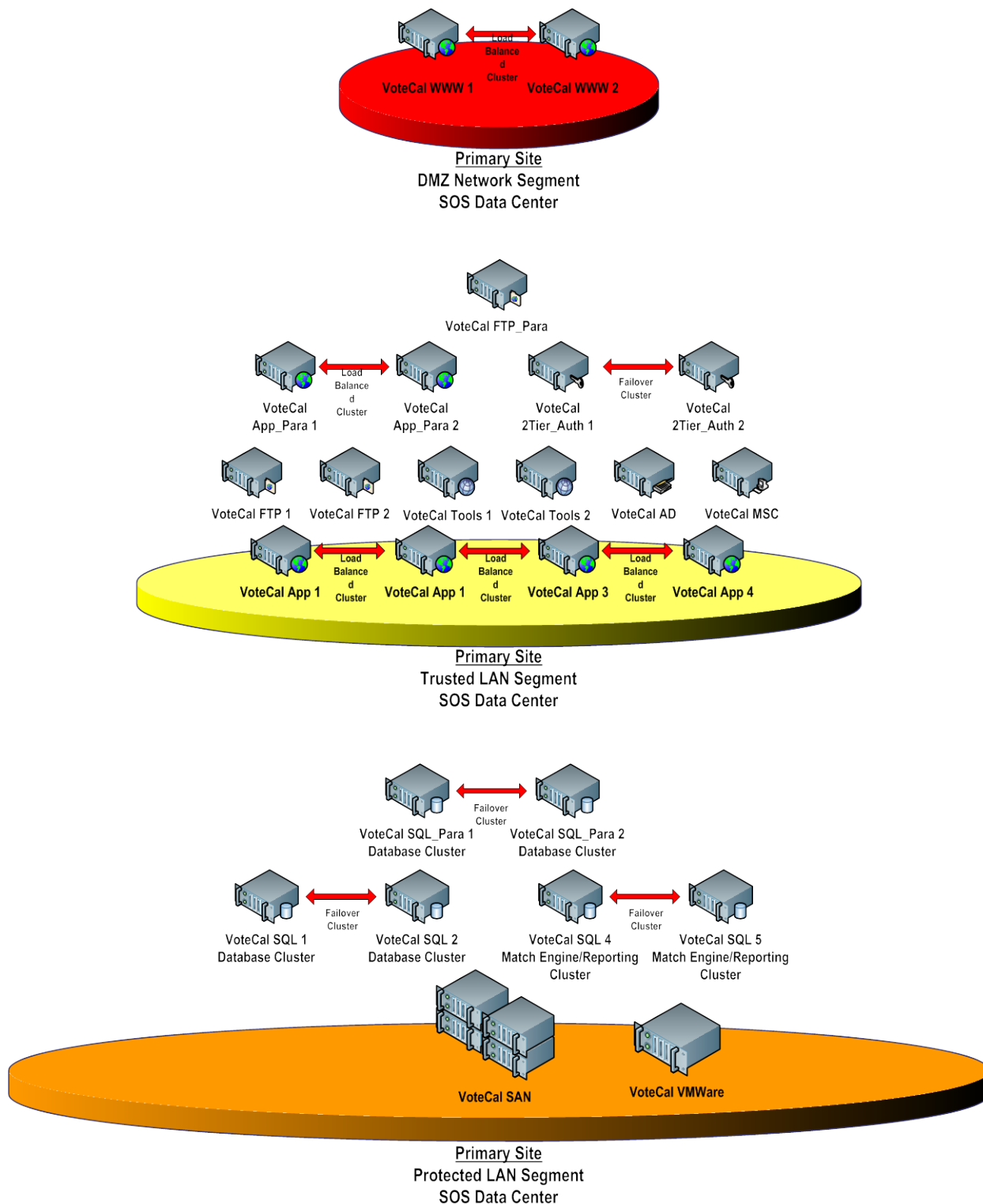
2.9 Environment Specifications

The following section(s) of this document is intended to provide a description of the VoteCal technical environment from both a logical and physical perspective. The VoteCal system is distributed across two redundant data centers to provide fail over capabilities for the system in the event of a site failure. The VoteCal system in its entirety has been configured to facilitate the implementation of seven unique functional environments. The seven unique functional environments are; Production (Primary and Secondary/Backup), Parallel, Development, Test, Staging, Training Development and Training. Each environment and the associated components of that environment will be described in the following sub-sections within section 2.9 of this document. The following diagrams provide an overview of the physical components and systems which make up the VoteCal solution.

2.9.1 Primary Data Center Site Overview

The following diagram provides a high level overview of the VoteCal physical system components which will be installed at the primary data center site.

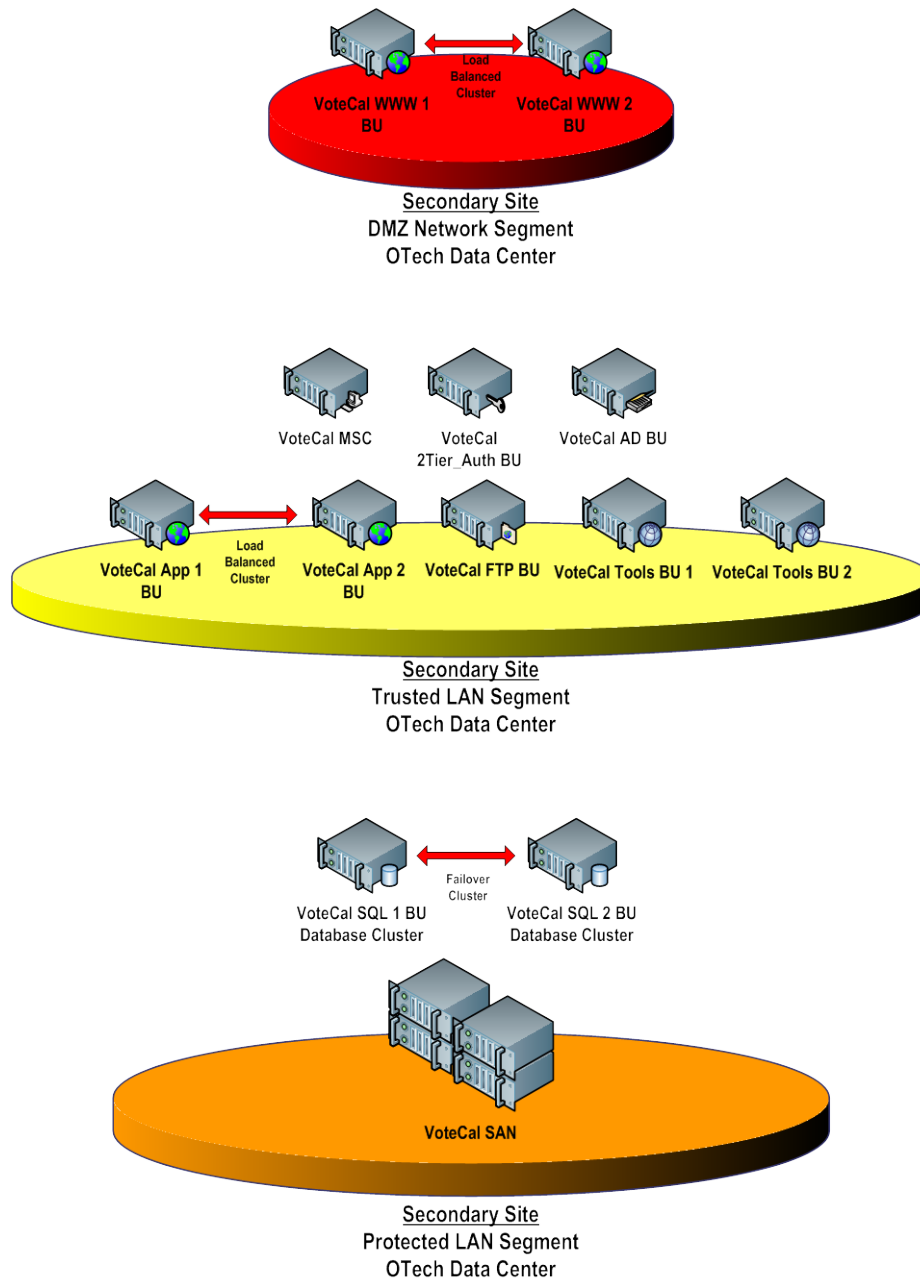
Figure 2-16 Primary Data Center Site Overview



2.9.2 Secondary Data Center Site Overview

The following diagram provides a high level overview of the VoteCal physical system components which will be installed at the secondary data center site.

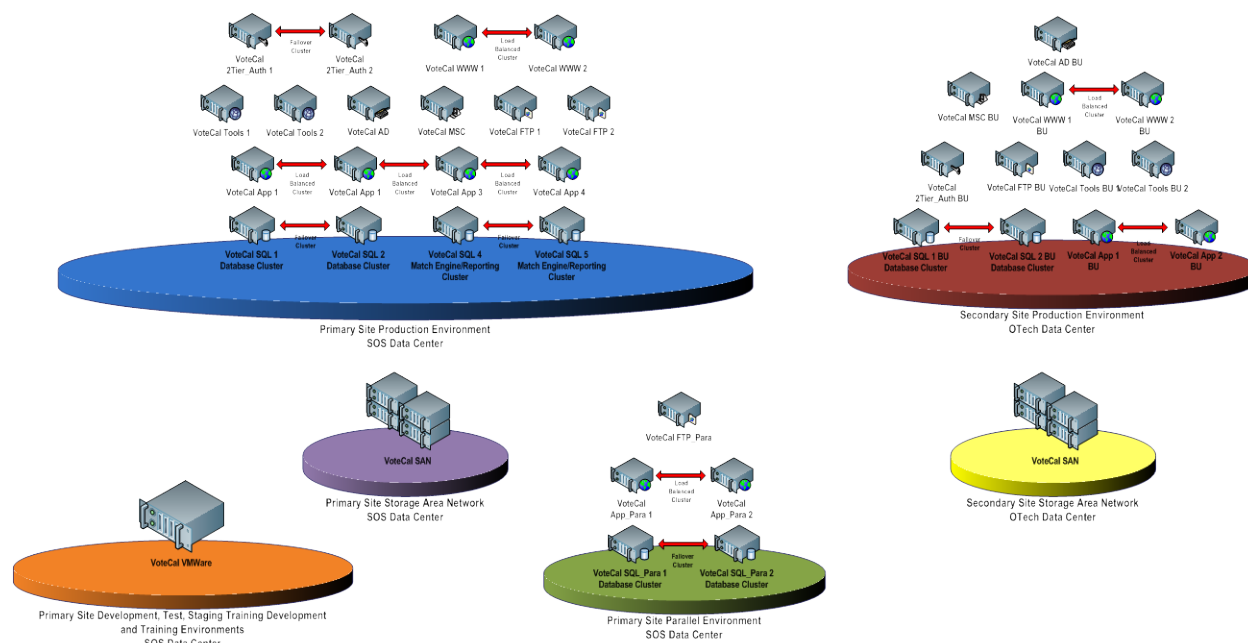
Figure 2-17 2.9.2 Secondary Data Center Site Overview



2.9.3 Environment Overview

The following diagram provides a high level overview of the systems and physical servers which are associated with the various environments required for the VoteCal system.

Figure 2-18 Environment Overview



2.9.4 Complete Hardware and Software Listing

This section of the document provides a detailed listing of the proposed hardware and software components required to run the VoteCal system. The detailed listing for hardware and software components is broken down by primary and secondary data center location so that the lists accurately represent the equipment located at each site. The following bullets describe the distribution of the seven unique environments that will reside within each of the data center sites:

- Primary Data Center Site – Production, Parallel, Development, Test, Staging, Training and Training Development
- Secondary Data Center Site – Production (Backup)

2.9.4.1 Primary Site Hardware and Software Listing

The following table(s) provides an all inclusive list of the hardware and software components that will be utilized for the VoteCal solution at the primary site data center located at the California Secretary of State's Office. The tables referenced are broken down by system category to include the following classifications:

- Storage Area Network (SAN)
- Server Devices
- Network Devices
- Software Applications
- Uninterruptible Power Supply (UPS)

Table 2-4 Primary Site – Storage Area Network (SAN)

Part Number	Description	Quantity
2858-A21	IBM System Storage N6070 Model A21	1
1029	4-Port 4-Gbps FC HBA	6
6051	CIFS	1
6057	SnapMirror	1
6061	SnapRestore	1
6072	NearStore	1
6074	SAN Bundle	1
6075	iSCSI Protocol	1
6082	Adv. Single Instance Storage	1
6098	SnapManager VI – Filer	1
6201	Data ONTAP	1
8052	ONTAP DSM for Windows MPIO	6
8053	ONTAP DSM Win MPIO Media Kit	6
8100	FCP Host Attach Kit – Win	6
8134	SnapManager/VI - Media Kit	1
9000	PDU Power Cord, 42U Rack	1
9557	Num. of FC Target Ports	8
9559	Num. of SATA Storage Loops	3
9560	Dual-path FC Cabling	1
2101-N00	IBM Storage Solutions Rack (36U)	2
7190	Two – iPDUs	2
7192	Two - Additional iPDUs	2
9854	Pwr Cords, 1-ph NEMA L6-30	4
2861-001	IBM System Storage EXN1000 SATA Expansion	3
2010	SFP GBIC	6
2044	5.0 m FC Optical Cable	6
4016	1 TB SATA Drive	42
9000	PDU Power Cord, 42U Rack	3

Part Number	Description	Quantity
2861-001	IBM System Storage EXN1000 SATA Expansion	15
2010	SFP GBIC	30
2042	1.0 m FC Optical Cable	15
4016	1 TB SATA Drive	210
9000	PDU Power Cord, 42U Rack	15
2870-584	IBM System Storage N6040 Licensed Functions 584	1
6051	CIFS	1
6057	SnapMirror	1
6061	SnapRestore	1
6072	NearStore	1
6074	SAN Bundle	1
6075	iSCSI Protocol	1
6082	Adv. Single Instance Storage	1
6098	SnapManager VI – Filer	1
6201	Data ONTAP	1
8052	ONTAP DSM for Windows MPIO	6
8053	ONTAP DSM Win MPIO Media Kit	6
8100	FCP Host Attach Kit – Win	6
8134	SnapManager/VI - Media Kit	1

Table 2-5 Primary Site – Server Devices

Part Number	Description	Quantity
88524YU	IBM eServer BladeCenter(tm) H Chassis with 2x2900W PSU UltraSlim Enhanced Multi-Burner	2
31R3335	IBM BladeCenter(tm) H 2900W AC Power Supply Modules	3
39Y9314	Multi-Switch Interconnect Module for IBM BladeCenter	6
43W4395	Cisco Catalyst Switch Module 3012 for IBM BladeCenter	12
39Y9284	Cisco Systems 4Gb 10 port Fibre Channel Switch Module for IBM BladeCenter	2
39Y9280	Cisco Systems 4Gb 20 port Fibre Channel Switch Module for IBM BladeCenter	2
41Y8596	Cisco Systems 4Gb Short-wave Length 4-pack SFP Module for IBM BladeCenter	3
25R5778	BladeCenter Redundant KVM/Advanced Management Module	3
30L9185	3 Year Onsite Repair 24x7 4 Hour Response	3
25R5785	2.8m, 200-240V, Triple 16A IEC 320-C20	6
44W3981	IBM BladeCenter Open Fabric Manager	3
46C3551	IBM BladeCenter Open Fabric Manager – Advanced	1

Part Number	Description	Quantity
7978B9U	x3550, Xeon Quad Core X5450 120W 3.0GHz/1333MHz/12MB L2, 2x1GB ChK, O/Bay 3.5in HS SATA/SAS, SR 8k-I, PCI-E Riser Card, Ultrabay Enhanced DVD-ROM/CD-RW Combo Drive, 670W p/s, Rack	3
44E5121	Intel Xeon QC Processor Model X5450 120W 3.0GHz/1333MHz/12MB L2	3
46C7418	2 GB (2x1GB kit) Single Rank PC2-5300 CL5 ECC Low Power	3
46C7419	4 GB (2x2GB kit) Dual Rank PC2-5300 CL5 ECC Low Power	3
40K1043	IBM 73GB 3.5in 15K HS SAS HDD	6
42C1780	NetXtreme II 1000 Express Dual Port Ethernet Adapter	3
39Y9566	Remote Supervisor Adapter II Slimline	3
32R2815	x3550 redundant power supply 670W	3
21P2073	3 Year Onsite Repair 24x7 4 Hour Response	3
7995G6U	HS21 XM, Xeon Quad-Core E5450 80w 3.0GHz/1333MHz/12MB L2, 2x512MB, O/Bay SAS	10
43W3996	Intel Xeon QC Processor Model E5450 80W 3.0GHz/1333MHz/12MB L2	10
46C7419	4 GB (2x2GB kit) Dual Rank PC2-5300 CL5 ECC Low Power	20
43W7606	IBM Dual 15.8 GB 2.5-inch Solid State Drive	10
43W6859	Emulex 4Gb Fibre Channel Expansion Card (CFFv) for IBM BladeCenter	10
44W4479	2/4 1GB Port Ethernet Expansion Card (CFFh) For IBM BladeCenter	10
69P9518	3 Year Onsite Repair 24x7 4 Hour Response	10
7995G6U	HS21 XM, Xeon Quad-Core E5450 80w 3.0GHz/1333MHz/12MB L2, 2x512MB, O/Bay SAS	5
43W3996	Intel Xeon QC Processor Model E5450 80W 3.0GHz/1333MHz/12MB L2	5
46C7420	8 GB (2x4GB kit) Quad Rank PC2-5300 CL5 ECC Low Power	20
43W7606	IBM Dual 15.8 GB 2.5-inch Solid State Drive	5
43W6859	Emulex 4Gb Fibre Channel Expansion Card (CFFv) for IBM BladeCenter	5
44W4479	2/4 1GB Port Ethernet Expansion Card (CFFh) For IBM BladeCenter	5
69P9518	3 Year Onsite Repair 24x7 4 Hour Response	5
72332RU	x3850 M2, 2 x Xeon Quad Core E7420 90W 2.13GHz/1066MHz/8MB L3, 4x1GB, O/Bay HS 2.5in SAS, UltraSlim Enhanced SATA CD-RW / DVD-ROM Combo, 2x1440W p/s, Rack	8
44E4252	Memory Expansion Card	16
41Y2768	8GB (2x4GB) PC2-5300 CL5 ECC DDR2 667 LP RDIMM Memory Kit	64
43X0837	IBM Server 73GB 15 K SFF HS SAS HDD	16
43W4280	ServeRAID-MR10k SAS/SATA Controller	8
42C2071	Emulex 4 Gb FC HBA PCI-E Controller Dual Port for IBM System x	8
42C1780	NetXtreme II 1000 Express Dual Port Ethernet Adapter	8
10N3059	3 Year Onsite Repair 24x7 4 Hour Response	8

Part Number	Description	Quantity
72336RU	x3850 M2, 2 x Xeon Six Core X7460 130W 2.66GHz/1066MHz/16MB L3, 8x1GB, O/Bay HS 2.5in SAS, UltraSlim Enhanced SATA CD-RW / DVD-ROM Combo, 2x1440W p/s, Rack	1
44E4473	Intel Xeon Six Core Processor Model X7460 130W 2.66GHz/1066MHz/16MB L3	2
41Y2762	2GB (2x1GB) PC2-5300 CL5 ECC DDR2 667 LP RDIMM Memory Kit	4
41Y2771	4GB (2x2GB) PC2-5300 CL5 ECC DDR2 SDRAM RDIMM Memory Kit	4
43X0837	IBM Server 73GB 15 K SFF HS SAS HDD	2
43W4280	ServeRAID-MR10k SAS/SATA Controller	1
42C2071	Emulex 4 Gb FC HBA PCI-E Controller Dual Port for IBM System x	1
42C1780	NetXtreme II 1000 Express Dual Port Ethernet Adapter	3
10N3059	3 Year Onsite Repair 24x7 4 Hour Response	1
93084EX	IBM 42U Enterprise Expansion Rack	1
93084PX	IBM 42U Enterprise Rack	1
71762MX	IBM Ultra Density Enterprise C19/C13 PDU+ Module (WW)	2
39M2816	IBM DPI C13 PDU+	2
39Y8941	IBM DPI C13 Enterprise PDU w/o Line Cord	4
40K9615	IBM DPI 60a Cord (IEC 309 2P+G)	4
40K9614	IBM DPI 30a Cord (NEMA L6-30P)	4
17233RX	1U 15in Flat Panel Monitor Console Kit w/o keyboard	1
40K5372	IBM Keyboard with Integrated Pointing Device- 3m Cable - Black - USB - US English	1
17353LX	IBM 1x8 Console Switch	1
39M2895	NetBAY 1.5m USB Conversion Option pack	4
25R5559	1U Quick Install Filler Panel Kit	5

Table 2-6 Primary Site – Network Devices

Part Number	Description	Quantity
WS-C3750G-24TS-E1U	Catalyst 3750 24 10/100/1000 + 4 SFP + IPS Image; 1RU	12
CAB-STAC-50CM	Cisco StackWise 50CM Stacking Cable	12
CAB-AC	Power Cord,110V	12
CON-S2P-3750GE1U	SMARTNET 24X7X2 Cat 3750 24 10/100/1000T + 4 SFP En	12
ASA5580-20-8GE-K9	ASA 5580-20 Appliance with 8 GE, Dual AC, 3DES/AES	2

Part Number	Description	Quantity
CAB-US515P-C19-US	NEMA 5-15 to IEC-C19 13ft US	4
CON-S2P-AS82G8	SMARTNET 24X7X2 ASA5580-20-8GE-K9	2
ASA5510-SEC-BUN-K9	ASA 5510 Security Plus Appl with SW, HA, 2GE+3FE, 3DES/AES	4
CAB-AC	Power Cord,110V	4
SF-ASA-8.0-K8	ASA 5500 Series Software v8.0	4
CON-S2P-AS1SBK9	SMARTNET 24X7X2 ASA5510 Sec+ w/150 VPN Prs,5FE,3DES/AES	4
DS-C9124-0-K9	MDS 9124 4Gbps FC switch with 8 ports active	2
DS-9124-KIT-IBM	MDS 9124 Accessory Kit for IBM	2
CAB-9K12A-NA	Power Cord, 125VAC 13A NEMA 5-15 Plug, North America	4
DS-C24-300AC	MDS 9124 Power Supply	2
CON-S2P-91240	SMARTNET 24X7X2 MDS 9124 24-port 4Gbps FC switch	2
M9124PL8-4G=	MDS 9124 Port Activation Lic for 8 4Gbps Ports	4
CON-SAU-91PL8	CISCO SW APP SUP+UPG 91PL8	4
ASA5510-SEC-BUN-K9	ASA 5510 Security Plus Appl with SW, HA, 2GE+3FE, 3DES/AES	58
CAB-AC	Power Cord,110V	58
SF-ASA-8.0-K8	ASA 5500 Series Software v8.0	58
CON-S2P-AS1SBK9	SMARTNET 24X7X2 ASA5510 Sec+ w/150 VPN Prs,5FE,3DES/AES	58
ASR1002	Cisco ASR1002 Chassis,4 built-in GE, Dual P/S,4GB DRAM	1
SPA-2XOC3-POS	2-port OC3/STM1 POS Shared Port Adapters	1
SFP-OC3-SR	OC3/STM1 SFP, Single-mode fiber, Short Reach	1
SASR1R1-AISK9-24SR	Cisco ASR 1000 Series RP1 ADVANCED IP SERVICES	1
ASR1002-PWR-AC	Cisco ASR1002 AC Power Supply	2
CAB-AC-RA	Power Cord,110V, Right Angle	2

Part Number	Description	Quantity
ASR1000-ESP5	ASR1K Embedded Services Processor,5Gbps,Crypto,ASR1002 only	1
SFP-GE-T	1000BASE-T SFP (NEBS 3 ESD)	2
ASR1000-SPA	SPA for ASR1000; No Physical Part; For Tracking Only	1
CON-SNTE-ASR1KESP	SMARTNET 8X5X4 ASR1K Embedded Services Processor,5Gbps	1
CON-SNTE-ASR1002	SMARTNET 8X5X4 Cisco ASR1002 Chassis,4 built-in GE, Dua	1
CON-SNTE-SASR1RA	SMARTNET 8X5X4 Cisco ASR 1000 Serie	1
CON-SNTE-2XOC3	SMARTNET 8X5X4 2-port OC3/STM1 POS Shared	1
CISCO3925/K9	Cisco 3925 w/SPE100(3GE,4EHWIC,4DSP,2SM,256MBCF,1GBDRAM,IPB)	1
S39UK9-15001M	Cisco 3925-3945 IOS UNIVERSAL	1
SL-39-DATA-K9	Data License for Cisco 3925/3945	1
NM-1T3/E3	One port T3/E3 network module	1
SM-NM-ADPTR	Network Module Adapter for SM Slot on Cisco 2900, 3900 ISR	1
PWR-3900-AC	Cisco 3925/3945 AC Power Supply	1
PWR-3900-AC/2	Cisco 3925/3945 AC Power Supply (Secondary PS)	1
CAB-AC	AC Power Cord (North America), C13, NEMA 5-15P, 2.1m	2
3900-FANASSY	Cisco 3925/3945 Fan Assembly (Bezel included)	1
C3900-SPE100/K9	Cisco Services Performance Engine 100 for Cisco 3925 ISR	1
ISR-CCP-EXP	Cisco Config Pro Express on Router Flash	1
MEM-3900-1GB-DEF	1GB DRAM (512MB+512MB) for Cisco 3925/3945 ISR (Default)	1
MEM-CF-256MB	256MB Compact Flash for Cisco 1900, 2900, 3900 ISR	1
SL-39-IPB-K9	IP Base License for Cisco 3925/3945	1
CON-OSE-3925	ONSITE 8X5X4 Cisco 3925 w/SPE100	1
CISCO2901/K9	Cisco 2901 w/2 GE,4 EHWIC,2 DSP,256MB CF,512MB DRAM,IP Base	57
S29UK9-15001M	Cisco 2901-2921 IOS UNIVERSAL	57

Part Number	Description	Quantity
SL-29-DATA-K9	Data License for Cisco 2901-2951	57
HWIC-1DSU-T1	1-Port T1/Fractional T1 DSU/CSU WAN Interface Card	75
PWR-2901-AC	Cisco 2901 AC Power Supply	57
CAB-AC	AC Power Cord (North America), C13, NEMA 5-15P, 2.1m	57
ISR-CCP-EXP	Cisco Config Pro Express on Router Flash	57
MEM-2900-512MB-DEF	512MB DRAM for Cisco 2901-2921 ISR (Default)	57
MEM-CF-256MB	256MB Compact Flash for Cisco 1900, 2900, 3900 ISR	57
SL-29-IPB-K9	IP Base License for Cisco 2901-2951	57
CON-SNTE-2901	SMARTNET 8X5X4 Cisco 2901	57
CAB-CONSOLE-USB=	Console Cable 6 ft with USB Type A and mini-B	2
WAE-674-K9	WAE-674 with 4GB MEM and 3 300GB HDD included	1
WAAS-ENT-APL	Cisco WAAS Enterprise License for 1 WAE Appliance	1
SF-WAAS-4.1-SAS-K9	Cisco WAAS 4.1 s/w image for 674/7341/7371(Separate lic req)	1
RED-PWR-FAN-674	Redundant power and fan option for the WAE-674	1
WAE-INLN-4CG	Cisco WAE Inline Network Adapter	1
CAB-OEM-IBM-AC	AC Power Cord, United States	2
CON-S2P-WAE674K9	SMARTNET 24X7X2 Wide Area Appl Eng WAE-674, HDD Incl	1
CON-SAU-WAASENAP	SW APP SUPP + UPGR Cisco WAAS Enterprise Lic for 1 WAE	1
WAE-512-K9	Wide Area Application Engine 512, 1GB MEM, No HDD Incl.	1
SF-WAAS-4.1-SA-K9	Cisco WAAS 4.1 SATA SW image (separate license required)	1
WAAS-ENT-APL	Cisco WAAS Enterprise License for 1 WAE Appliance	1
DISK-SATA2-80GB	80 GB SATA-II Disk Drive for WAE-512	1
CAB-OEM-IBM-AC	AC Power Cord, United States	1

Part Number	Description	Quantity
CON-S2P-WAE512	SMARTNET 24X7X2 Wide Area Application	1
CON-SAU-WAASENAP	SW APP SUPP + UPGR Cisco WAAS Enterprise Lic for 1 WAE	1
F5-BIG-GTM-1600-4G-R	BIG-IP Switch: Global Traffic Manager 1600 4GB ROHS	1
F5-BIG-LTM-1600-4G-R	BIG-IP Switch: Local Traffic Manager 1600 4GB ROHS	2
F5-SVC-BIG-PRE-L1-3	BIG-IP Service: Premium (Level 1-3) 17% of List	1
F5-SVC-BIG-PRE-L1-3	BIG-IP Service: Premium (Level 1-3) 17% of List	2
CPIS-IPS-M500F-US	Check Point IPS-1 Sensor 500 Fiber	2
CPIS-IPS-SMDF-M500	Check Point SmartDefense Services for IPS-1 Sensor 500 Annual Subscription	1
CPES-SS-PREMIUM	CPES-SS- PREMIUM Enterprise SW Subscription & Premium Support	2

Table 2-7 Primary Site – Software Applications

Part Number	Description	Quantity
LSA-00339	Win Svr Ent w/o Hyper-V Sngl Lic/SA Pack MVL	18
P72-02472	Windows Svr Ent 2008 32-bit/x64 English Disk Kit MVL CD	1
LTA-00197	Win Svr Std w/o Hyper-V Sngl Lic/SA Pack MVL	14
P73-01780	Windows Svr Std 2008 32-bit/x64 English Disk Kit MVL CD	1
R18-00129	Windows Server CAL Sngl Lic/SA Pack MVL Device CAL	2000
228-04538	SQL Svr Standard Edtn Sngl Lic/SA Pack MVL	8
228-03147	SQL Svr Standard Edtn Sngl Lic/SA MVL 1 Proc Lic	2
228-08442	SQL Svr Standard Edtn 2008 English Disk Kit MVL DVD	1
810-04871	SQL Svr Enterprise Edtn Sngl Lic/SA Pack MVL	8
810-04413	SQL Svr Enterprise Edtn Sngl Lic/SA MVL 1 Proc Lic	4
810-07416	SQL Svr Enterprise Edtn 2008 English Disk Kit MVL DVD	1
359-00769	SQL CAL Sngl Lic/SA Pack MVL Device CAL	1
MUY-00214	SysCtr Mgmt Ste Ent Sngl Lic/SA Pack MVL	2
MUY-00014	Sys Ctr Mgmt Ste Ent 2007 English Disk Kit MVL DVD	1
121-00003	VStudioTeamSuiteAllLngLic/SAPackMVLw/MSDNPrem	1
H04-0023	Office SharePoint Server Sngl Lic/SA Pack MVL	1

Part Number	Description	Quantity
76N-02439	SharePoint Enterprise CAL Sngl Lic/SA Pack MVL User CAL	50
MCT0983	Red Hat Enterprise Linux Advanced Platform Premium - Premium Subscription	5
OPM-SCS-PB	Quest Management Xtensions Operations Manager 2007 Edition – license	3
CIS-SCS-PB	Quest Management Pack for Cisco Operations Manager 2007 Edition – license	158
SERV-NES-01	Nessus Annual ProfessionalFeed Subscription	1
4817V72	VMware Infrastructure Standard - 2 Sockets License Only	2
4817T73	Subscription Only VMware Infrastructure Ent - 2 Sockets - 3 Year	2
51J8641	RTS for VMware - Standard 4 Sockets - 3yr	1
D5326LL	IBM Rational RequisitePro Floating User License + SW Subscription & Support 12 Months	5
N/A	JIRA Standard: Commercial License w/36 months of software maintenance starting from date of payment	1
00025795	VERISIGN UNIFIED AUTHENTICATION - OTP SOLUTION	1
00023241	SUPPORT UPGRADE - PLATINUM VERISIGN IDENTITY PROTECTION ENTERPRISE CUST. SUPPORT PLAN - 1 YR	1
00025799	UA IN-PREMISE VALIDATION CD KIT V 6.0	1
-	SECURITY CARD OTP FORM FACTOR	2000
-	SECURITY CARD BRANDING	1
00021367	ACCOUNT SETUP - UNIFIED AUTHENTICATION – III	1
00007436	VERISIGN PROFESSIONAL SERVICES*	1

Table 2-8 Primary Site – Uninterruptible Power Supply (UPS)

Part Number	Description	Quantity
SU80K	UPS battery system with a rating of 80kVA/64KW, input/output 208/120V 3ph, 4w plus ground	1
BP480V140	UPS 480V battery pack for 3-Phase Modular UPS	1
SNMPWEBCARD	SNMP Web Card for remote UPS management	1
ENVIROSENSE	Monitors external temperature and humidity	1
W06-BW1-247	Startup + 1yr onsite warranty for 60-80kVA 3-Phase UPS	1
W06-SCBAS1-1B	Extended Preventive maintenance + 1yr warranty	2
SU80KMBPPDU4X2	TRIPP 80KVA BYPASS PDU 480V INPUT	1

2.9.4.2 Secondary Site Hardware and Software Listing

The following table(s) provides an all inclusive list of the hardware and software components that will be utilized for the VoteCal solution at the secondary (backup) site data center located at the California OTech data center facility. The tables referenced are broken down by system category to include the following classifications:

- Storage Area Network (SAN)
- Server Devices
- Network Devices
- Software Applications

Table 2-9 Secondary Site (Backup Site) – Storage Area Network (SAN)

Part Number	Description	Quantity
2858-A21	IBM System Storage N6070 Model A21	1
1029	4-Port 4-Gbps FC HBA	6
6051	CIFS	1
6057	SnapMirror	1
6061	SnapRestore	1
6072	NearStore	1
6074	SAN Bundle	1
6075	iSCSI Protocol	1
6082	Adv. Single Instance Storage	1
6098	SnapManager VI – Filer	1
6201	Data ONTAP	1
8052	ONTAP DSM for Windows MPIO	6
8053	ONTAP DSM Win MPIO Media Kit	6
8100	FCP Host Attach Kit – Win	6
8134	SnapManager/VI - Media Kit	1
9000	PDU Power Cord, 42U Rack	1
9557	Num. of FC Target Ports	8
9559	Num. of SATA Storage Loops	3
9560	Dual-path FC Cabling	1
2101-N00	IBM Storage Solutions Rack (36U)	2
7190	Two – iPDUs	2
7192	Two - Additional iPDUs	2
9854	Pwr Cords, 1-ph NEMA L6-30	4
2861-001	IBM System Storage EXN1000 SATA Expansion	3
2010	SFP GBIC	6

Part Number	Description	Quantity
2044	5.0 m FC Optical Cable	6
4016	1 TB SATA Drive	42
9000	PDU Power Cord, 42U Rack	3
2861-001	IBM System Storage EXN1000 SATA Expansion	15
2010	SFP GBIC	30
2042	1.0 m FC Optical Cable	15
4016	1 TB SATA Drive	210
9000	PDU Power Cord, 42U Rack	15
2870-584	IBM System Storage N6040 Licensed Functions 584	1
6051	CIFS	1
6057	SnapMirror	1
6061	SnapRestore	1
6072	NearStore	1
6074	SAN Bundle	1
6075	iSCSI Protocol	1
6082	Adv. Single Instance Storage	1
6098	SnapManager VI – Filer	1
6201	Data ONTAP	1
8052	ONTAP DSM for Windows MPIO	6
8053	ONTAP DSM Win MPIO Media Kit	6
8100	FCP Host Attach Kit – Win	6
8134	SnapManager/VI - Media Kit	1

Table 2-10 Secondary Site (Backup Site) – Server Devices

Part Number	Description	Quantity
88524YU	IBM eServer BladeCenter(tm) H Chassis with 2x2900W PSU UltraSlim Enhanced Multi-Burner	1
31R3335	IBM BladeCenter(tm) H 2900W AC Power Supply Modules	1
39Y9314	Multi-Switch Interconnect Module for IBM BladeCenter	2
43W4395	Cisco Catalyst Switch Module 3012 for IBM BladeCenter	6
39Y9284	Cisco Systems 4Gb 10 port Fibre Channel Switch Module for IBM BladeCenter	2
41Y8596	Cisco Systems 4Gb Short-wave Length 4-pack SFP Module for IBM BladeCenter	2
25R5778	BladeCenter Redundant KVM/Advanced Management Module	1
30L9185	3 Year Onsite Repair 24x7 4 Hour Response	1
25R5785	2.8m, 200-240V, Triple 16A IEC 320-C20	2
44W3981	IBM BladeCenter Open Fabric Manager	1

Part Number	Description	Quantity
7978B9U	x3550, Xeon Quad Core X5450 120W 3.0GHz/1333MHz/12MB L2, 2x1GB ChK, O/Bay 3.5in HS SATA/SAS, SR 8k-I, PCI-E Riser Card, Ultrabay Enhanced DVD-ROM/CD-RW Combo Drive, 670W p/s, Rack	3
44E5121	Intel Xeon QC Processor Model X5450 120W 3.0GHz/1333MHz/12MB L2	3
46C7418	2 GB (2x1GB kit) Single Rank PC2-5300 CL5 ECC Low Power	3
46C7419	4 GB (2x2GB kit) Dual Rank PC2-5300 CL5 ECC Low Power	3
40K1043	IBM 73GB 3.5in 15K HS SAS HDD	6
42C1780	NetXtreme II 1000 Express Dual Port Ethernet Adapter	3
39Y9566	Remote Supervisor Adapter II Slimline	3
32R2815	x3550 redundant power supply 670W	3
21P2073	3 Year Onsite Repair 24x7 4 Hour Response	3
7995G6U	HS21 XM, Xeon Quad-Core E5450 80w 3.0GHz/1333MHz/12MB L2, 2x512MB, O/Bay SAS	4
43W3996	Intel Xeon QC Processor Model E5450 80W 3.0GHz/1333MHz/12MB L2	4
46C7419	4 GB (2x2GB kit) Dual Rank PC2-5300 CL5 ECC Low Power	8
43W7606	IBM Dual 15.8 GB 2.5-inch Solid State Drive	4
43W6859	Emulex 4Gb Fibre Channel Expansion Card (CFFv) for IBM BladeCenter	4
44W4479	2/4 1GB Port Ethernet Expansion Card (CFFh) For IBM BladeCenter	4
69P9518	3 Year Onsite Repair 24x7 4 Hour Response	4
7995G6U	HS21 XM, Xeon Quad-Core E5450 80w 3.0GHz/1333MHz/12MB L2, 2x512MB, O/Bay SAS	4
43W3996	Intel Xeon QC Processor Model E5450 80W 3.0GHz/1333MHz/12MB L2	4
46C7420	8 GB (2x4GB kit) Quad Rank PC2-5300 CL5 ECC Low Power	16
43W7606	IBM Dual 15.8 GB 2.5-inch Solid State Drive	4
43W6859	Emulex 4Gb Fibre Channel Expansion Card (CFFv) for IBM BladeCenter	4
44W4479	2/4 1GB Port Ethernet Expansion Card (CFFh) For IBM BladeCenter	4
69P9518	3 Year Onsite Repair 24x7 4 Hour Response	4
72332RU	x3850 M2, 2 x Xeon Quad Core E7420 90W 2.13GHz/1066MHz/8MB L3, 4x1GB, O/Bay HS 2.5in SAS, UltraSlim Enhanced SATA CD-RW / DVD-ROM Combo, 2x1440W p/s, Rack	2
44E4252	Memory Expansion Card	4
41Y2768	8GB (2x4GB) PC2-5300 CL5 ECC DDR2 667 LP RDIMM Memory Kit	16
43X0837	IBM Server 73GB 15 K SFF HS SAS HDD	4
43W4280	ServeRAID-MR10k SAS/SATA Controller	2
42C2071	Emulex 4 Gb FC HBA PCI-E Controller Dual Port for IBM System x	2
42C1780	NetXtreme II 1000 Express Dual Port Ethernet Adapter	2
10N3059	3 Year Onsite Repair 24x7 4 Hour Response	2
93084PX	IBM 42U Enterprise Rack	1

Part Number	Description	Quantity
71762MX	IBM Ultra Density Enterprise C19/C13 PDU+ Module (WW)	2
39Y8941	IBM DPI C13 Enterprise PDU w/o Line Cord	2
40K9615	IBM DPI 60a Cord (IEC 309 2P+G)	2
40K9614	IBM DPI 30a Cord (NEMA L6-30P)	2
17233RX	1U 15in Flat Panel Monitor Console Kit w/o keyboard	1
40K5372	IBM Keyboard with Integrated Pointing Device- 3m Cable - Black - USB - US English	1
17353LX	IBM 1x8 Console Switch	1
39M2895	NetBAY 1.5m USB Conversion Option pack	2
25R5559	1U Quick Install Filler Panel Kit	5

Table 2-11 Secondary Site (Backup Site) – Network Devices

Part Number	Description	Quantity
WS-C3750G-24TS-E1U	Catalyst 3750 24 10/100/1000 + 4 SFP + IPS Image; 1RU	8
CAB-STACK-50CM	Cisco StackWise 50CM Stacking Cable	8
CAB-AC	Power Cord,110V	8
CON-S2P-3750GE1U	SMARTNET 24X7X2 Cat 3750 24 10/100/1000T + 4 SFP En	8
ASA5580-20-8GE-K9	ASA 5580-20 Appliance with 8 GE, Dual AC, 3DES/AES	2
CAB-US515P-C19-US	NEMA 5-15 to IEC-C19 13ft US	4
CON-S2P-AS82G8	SMARTNET 24X7X2 ASA5580-20-8GE-K9	2
ASA5510-SEC-BUN-K9	ASA 5510 Security Plus Appl with SW, HA, 2GE+3FE, 3DES/AES	4
CAB-AC	Power Cord,110V	4
SF-ASA-8.0-K8	ASA 5500 Series Software v8.0	4
CON-S2P-AS1SBK9	SMARTNET 24X7X2 ASA5510 Sec+ w/150 VPN Prs,5FE,3DES/AES	4
DS-C9124-0-K9	MDS 9124 4Gbps FC switch with 8 ports active	2
DS-9124-KIT-IBM	MDS 9124 Accessory Kit for IBM	2
CAB-9K12A-NA	Power Cord, 125VAC 13A NEMA 5-15 Plug, North America	4

Part Number	Description	Quantity
DS-C24-300AC	MDS 9124 Power Supply	2
CON-S2P-91240	SMARTNET 24X7X2 MDS 9124 24-port 4Gbps FC switch	2
M9124PL8-4G=	MDS 9124 Port Activation Lic for 8 4Gbps Ports	4
CON-SAU-91PL8	CISCO SW APP SUP+UPG 91PL8	4
WAE-674-K9	WAE-674 with 4GB MEM and 3 300GB HDD included	1
WAAS-ENT-APL	Cisco WAAS Enterprise License for 1 WAE Appliance	1
SF-WAAS-4.1-SAS-K9	Cisco WAAS 4.1 s/w image for 674/7341/7371(Separate lic req)	1
RED-PWR-FAN-674	Redundant power and fan option for the WAE-674	1
WAE-INLN-4CG	Cisco WAE Inline Network Adapter	1
CAB-OEM-IBM-AC	AC Power Cord, United States	2
CON-S2P-WAE674K9	SMARTNET 24X7X2 Wide Area Appl Eng WAE-674, HDD Incl	1
CON-SAU-WAASENAP	SW APP SUPP + UPGR Cisco WAAS Enterprise Lic for 1 WAE	1
WAE-512-K9	Wide Area Application Engine 512, 1GB MEM, No HDD Incl.	1
SF-WAAS-4.1-SA-K9	Cisco WAAS 4.1 SATA SW image (separate license required)	1
WAAS-ENT-APL	Cisco WAAS Enterprise License for 1 WAE Appliance	1
DISK-SATA2-80GB	80 GB SATA-II Disk Drive for WAE-512	1
CAB-OEM-IBM-AC	AC Power Cord, United States	1
CON-S2P-WAE512	SMARTNET 24X7X2 Wide Area Application	1
CON-SAU-WAASENAP	SW APP SUPP + UPGR Cisco WAAS Enterprise Lic for 1 WAE	1
F5-BIG-GTM-1600-4G-R	BIG-IP Switch: Global Traffic Manager 1600 4GB ROHS	1
F5-BIG-LTM-1600-4G-R	BIG-IP Switch: Local Traffic Manager 1600 4GB ROHS	2
F5-SVC-BIG-PRE-L1-3	BIG-IP Service: Premium (Level 1-3) 17% of List	1

Part Number	Description	Quantity
F5-SVC-BIG-PRE-L1-3	BIG-IP Service: Premium (Level 1-3) 17% of List	2
CPIS-IPS-M500F-US	Check Point IPS-1 Sensor 500 Fiber	1
CPIS-IPS-SMDF-M500	Check Point SmartDefense Services for IPS-1 Sensor 500 Annual Subscription	1
CPES-SS-PREMIUM	CPES-SS- PREMIUM Enterprise SW Subscription & Premium Support	1

Table 2-12 Secondary Site (Backup Site) – Software Applications

Part Number	Description	Quantity
LSA-00339	Win Svr Ent w/o Hyper-V Sngl Lic/SA Pack MVL	6
P72-02472	Windows Svr Ent 2008 32-bit/x64 English Disk Kit MVL CD	1
LTA-00197	Win Svr Std w/o Hyper-V Sngl Lic/SA Pack MVL	6
P72-02472	Windows Svr Ent 2008 32-bit/x64 English Disk Kit MVL CD	1
228-04538	SQL Svr Standard Edtn Sngl Lic/SA Pack MVL	8
228-03147	SQL Svr Standard Edtn Sngl Lic/SA MVL 1 Proc Lic	2
810-07416	SQL Svr Enterprise Edtn 2008 English Disk Kit MVL DVD	1
MUY-00214	SysCtr Mgmt Ste Ent Sngl Lic/SA Pack MVL	1
MCT0983	Red Hat Enterprise Linux Advanced Platform Premium - Premium Subscription	2
OPM-SCS-PB	Quest Management Xtensions Operations Manager 2007 Edition – license	3

2.9.5 VoteCal Physical System Topology

The following section of this document includes a number of diagrams that depict the physical topology of the server and network environment as it relates the VoteCal system. Topology specifics are broken down by primary and secondary data center site in order to display the layout and interconnectivity associated with the interdependent systems that make up the VoteCal system.

2.9.5.1 Primary Site Topology

The primary data center site will host the following VoteCal specific environments:

- Production
- Parallel
- Development
- Test
- Staging
- Training
- Training Development

Figure 2-19 VoteCal Primary Site – Copper Connectivity Topology

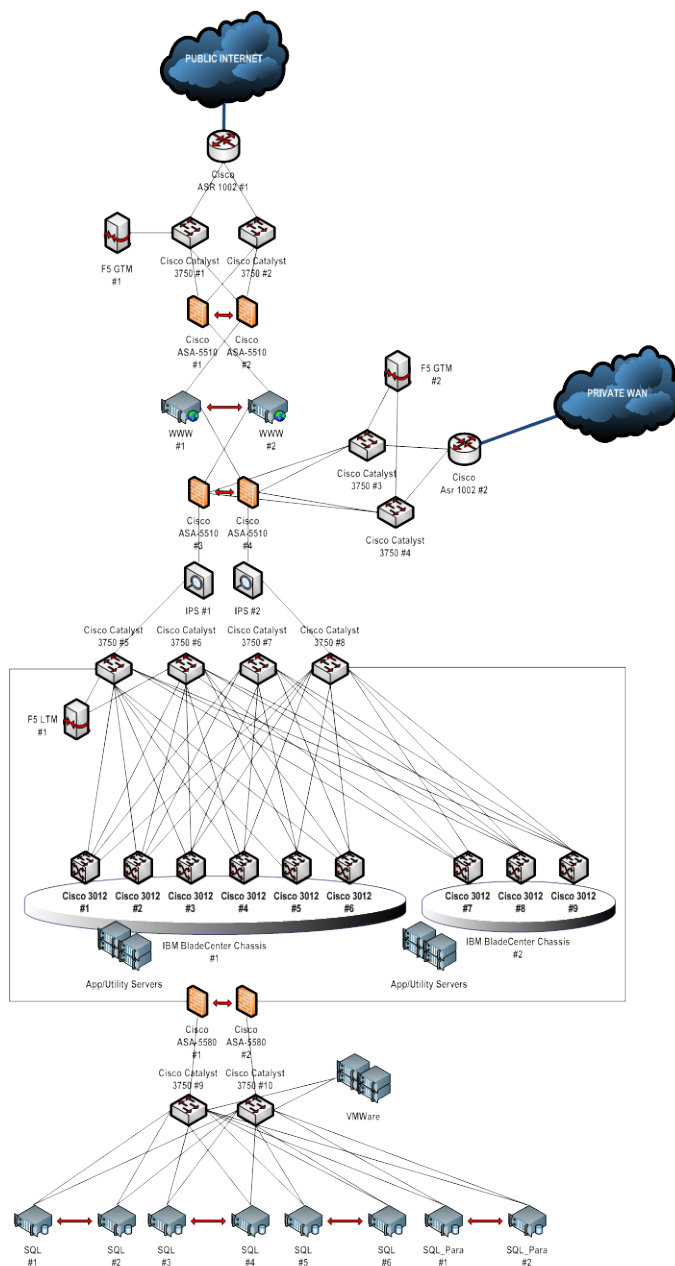


Figure 2-20 VoteCal Primary Site Data Center – Fiber Channel Connectivity Topology

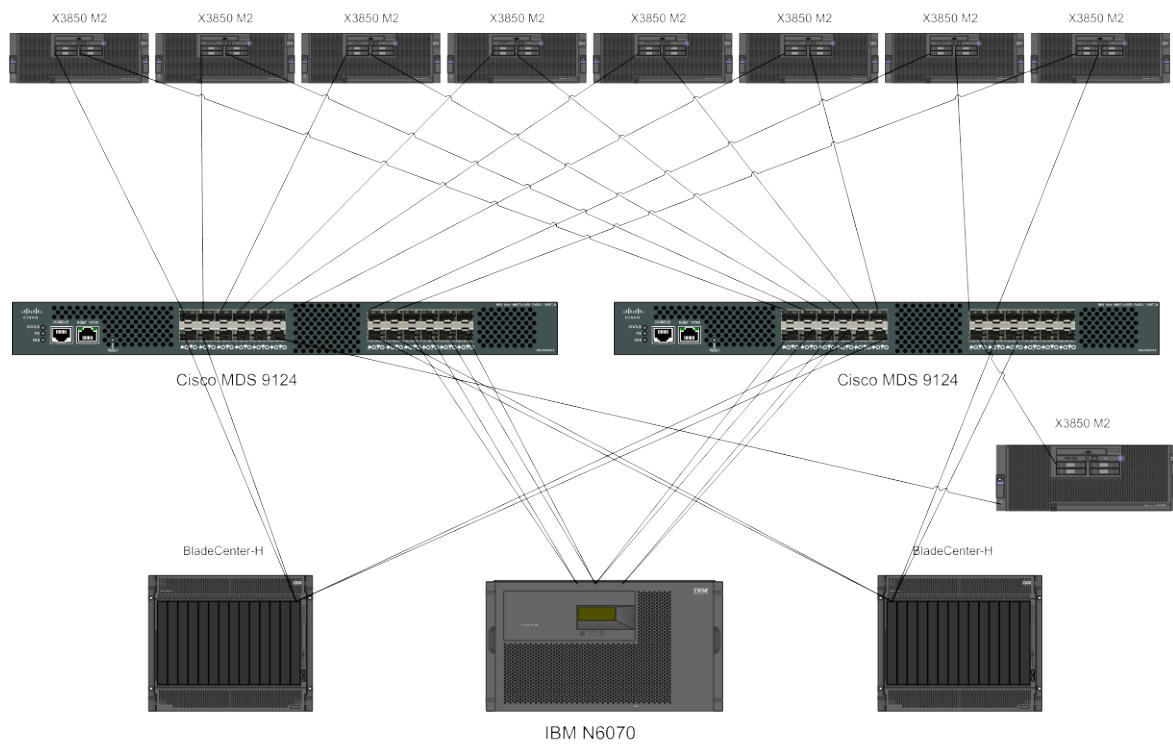


Figure 2-21 VoteCal Primary Site Data Center – Rack 1

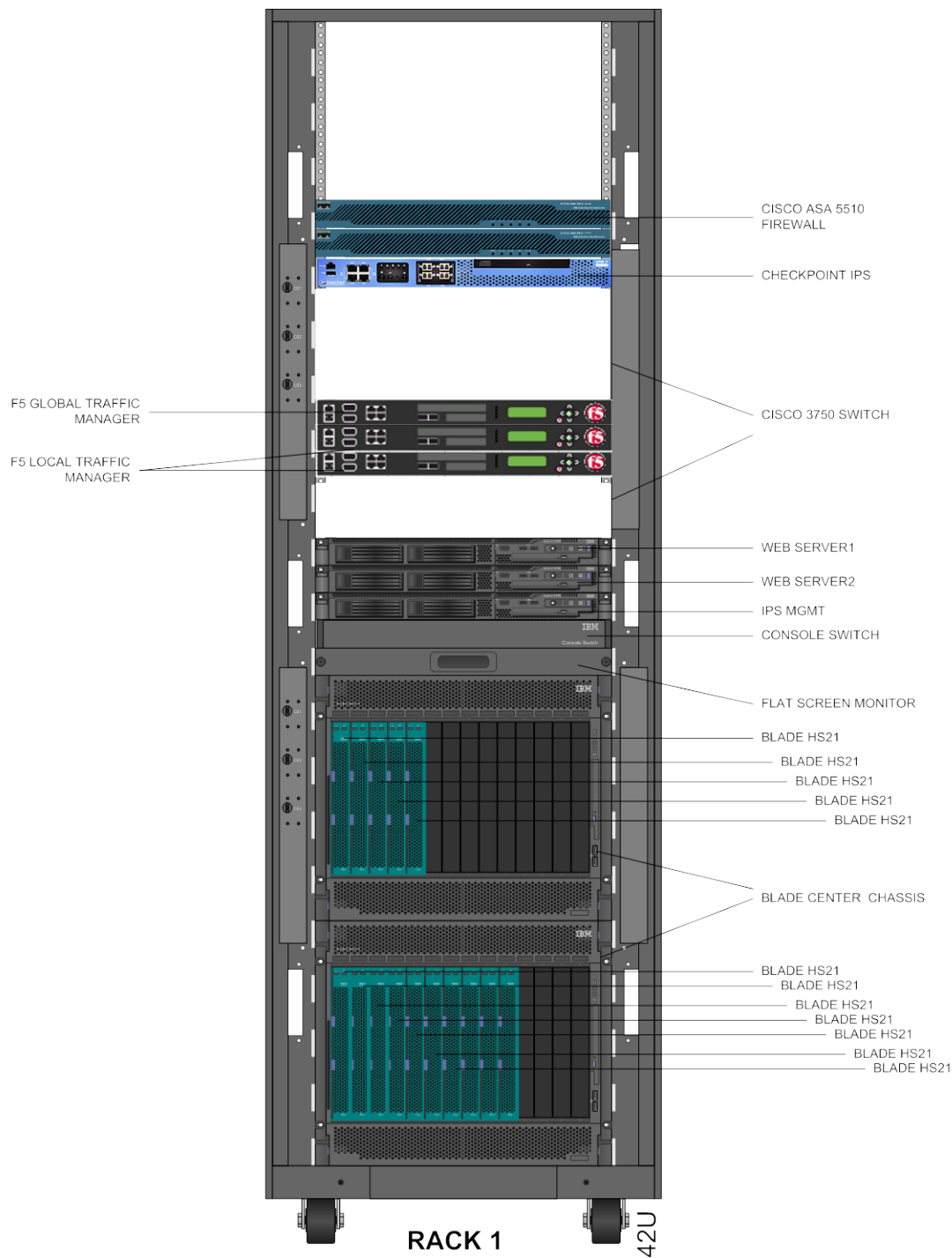


Figure 2-22 VoteCal Primary Site Data Center – Rack 2

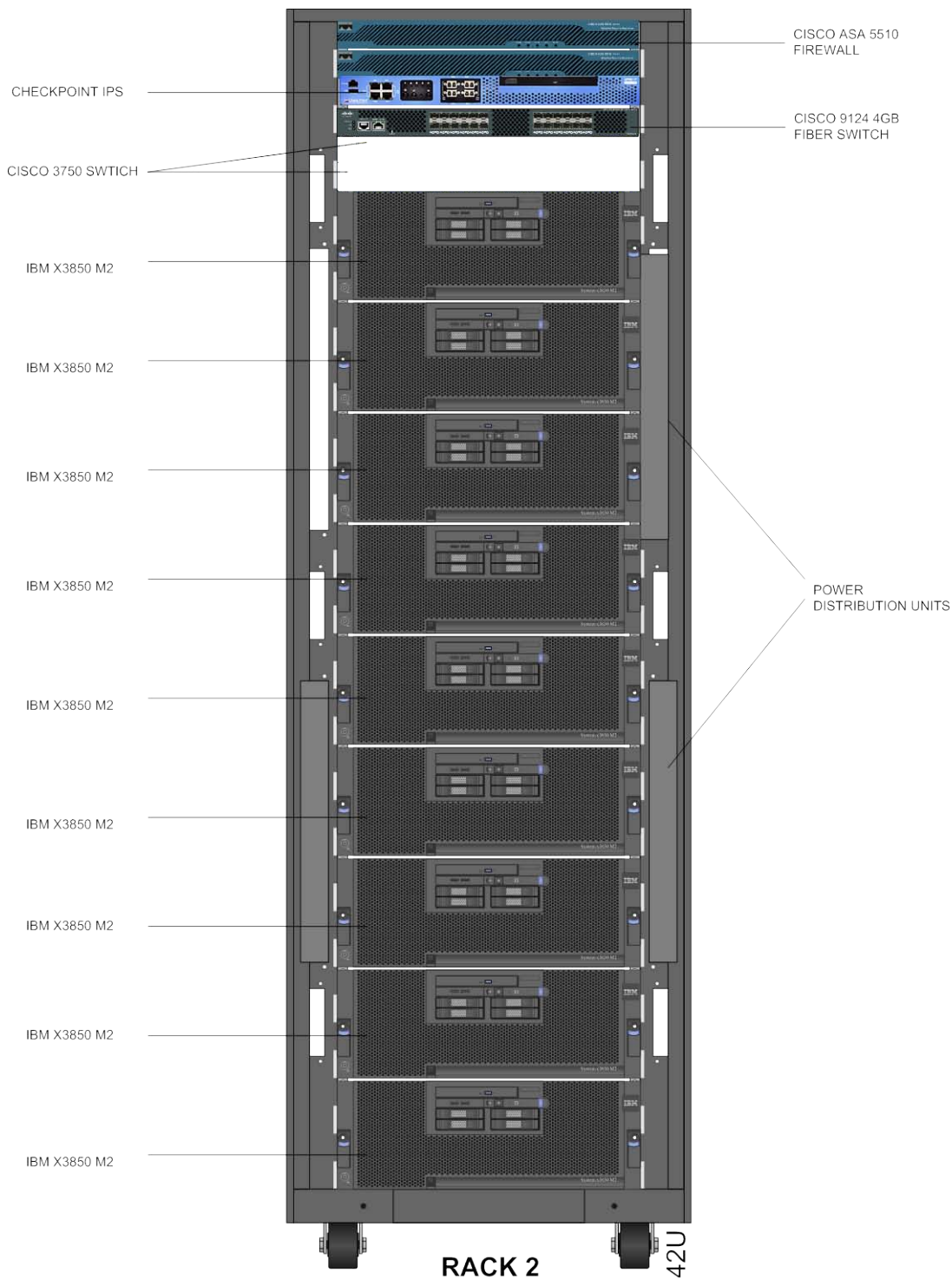


Figure 2-23 VoteCal Primary Site Data Center – Rack 3

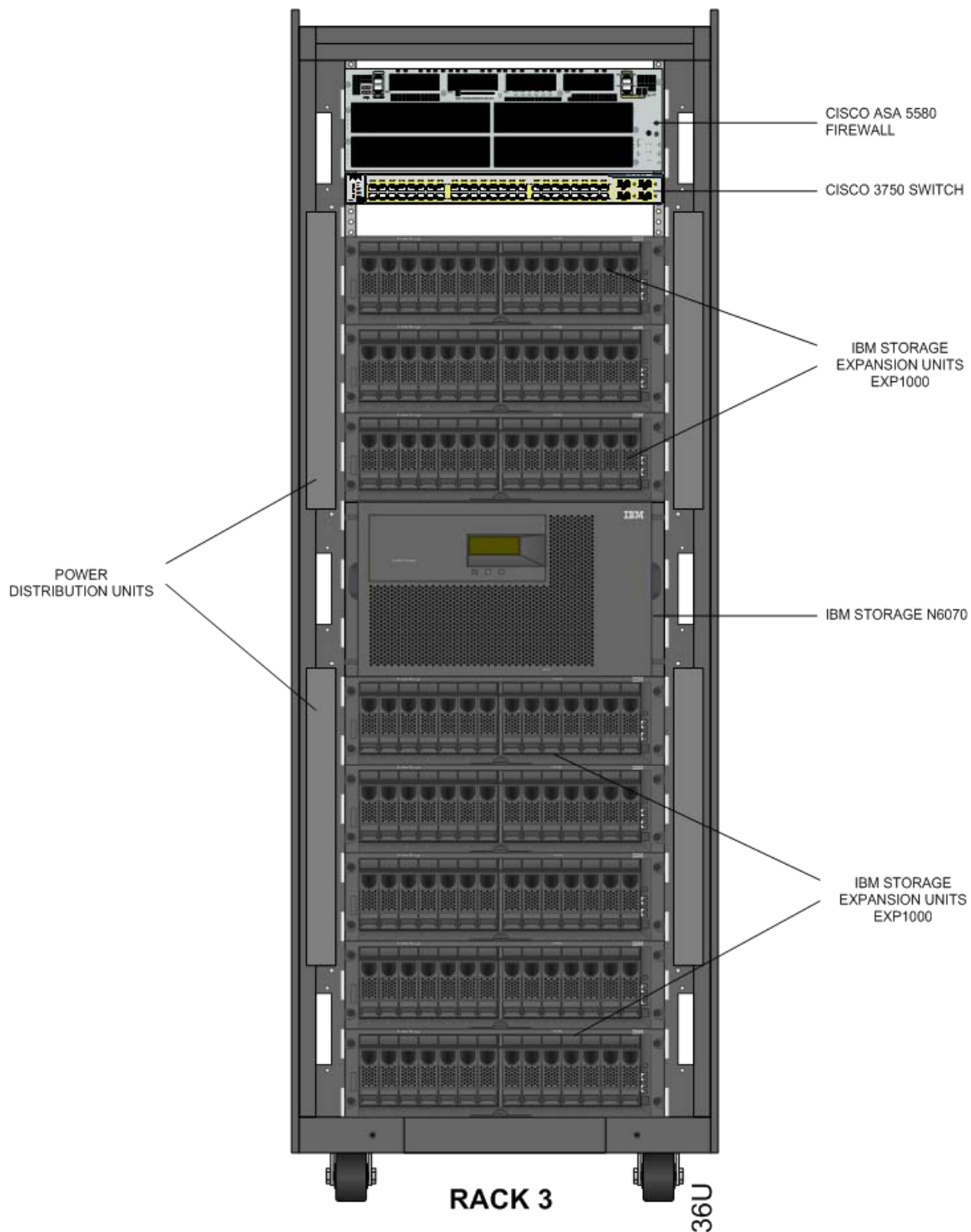
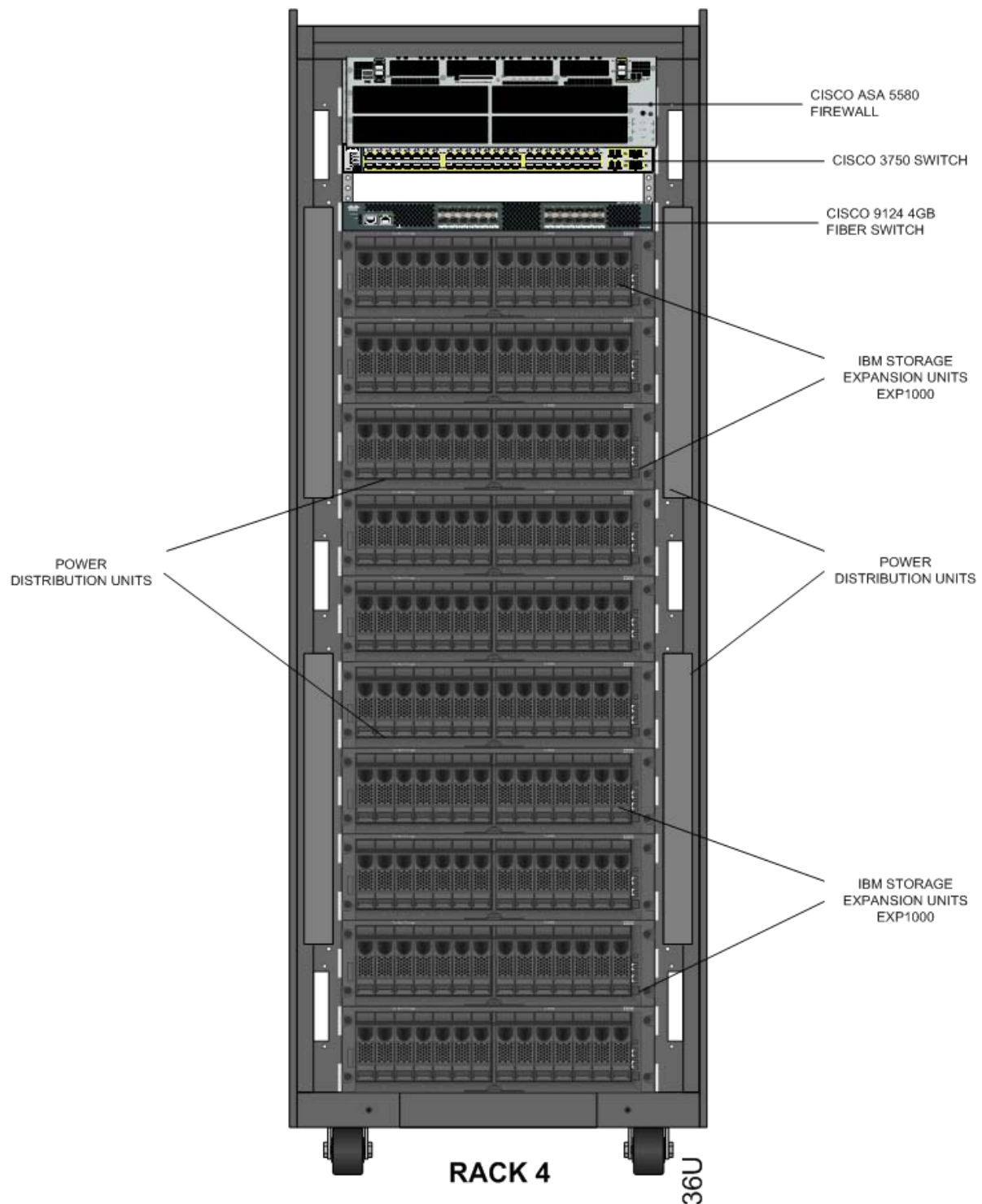


Figure 2-24 VoteCal Primary Site Data Center – Rack 4



2.9.5.2 Secondary Site Topology

The secondary data center site will host the following VoteCal specific environments:

- Production (Backup)

The following diagrams are intended to provide a detailed specification of the physical topology of the secondary data center site VoteCal systems.

Figure 2-25 VoteCal Secondary Site – Copper Connectivity Topology

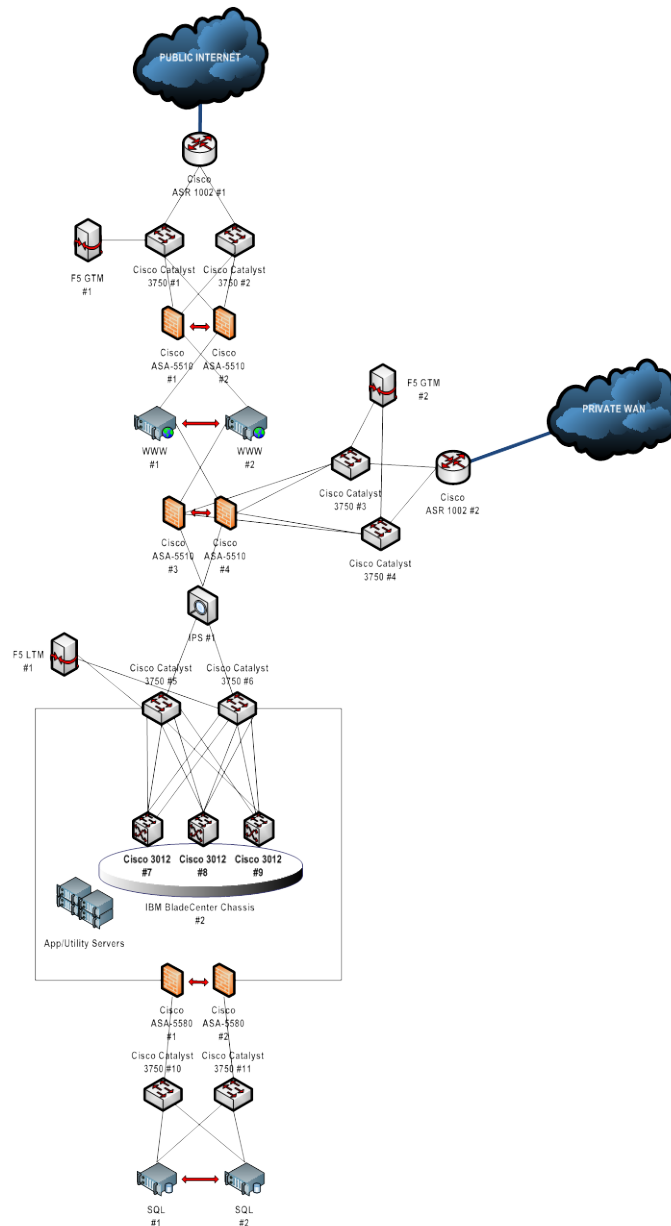


Figure 2-26 VoteCal Secondary Site Data Center - Fiber Channel Connectivity Topology

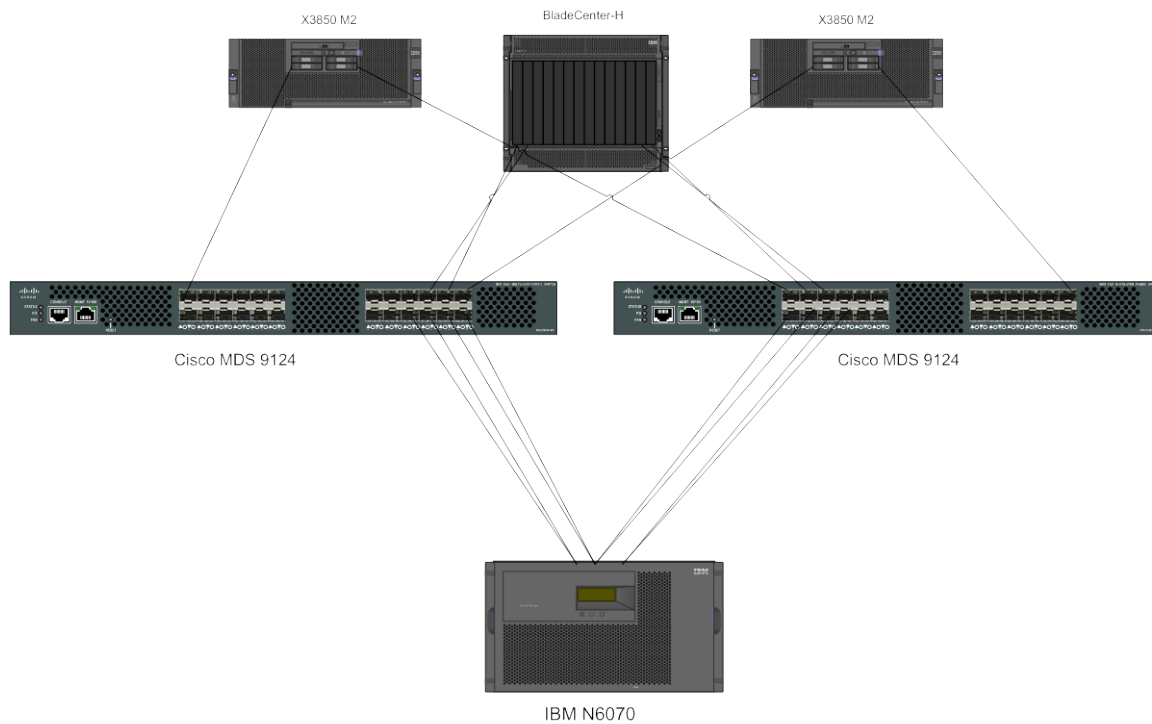


Figure 2-27 VoteCal Secondary Site Data Center – Rack 1

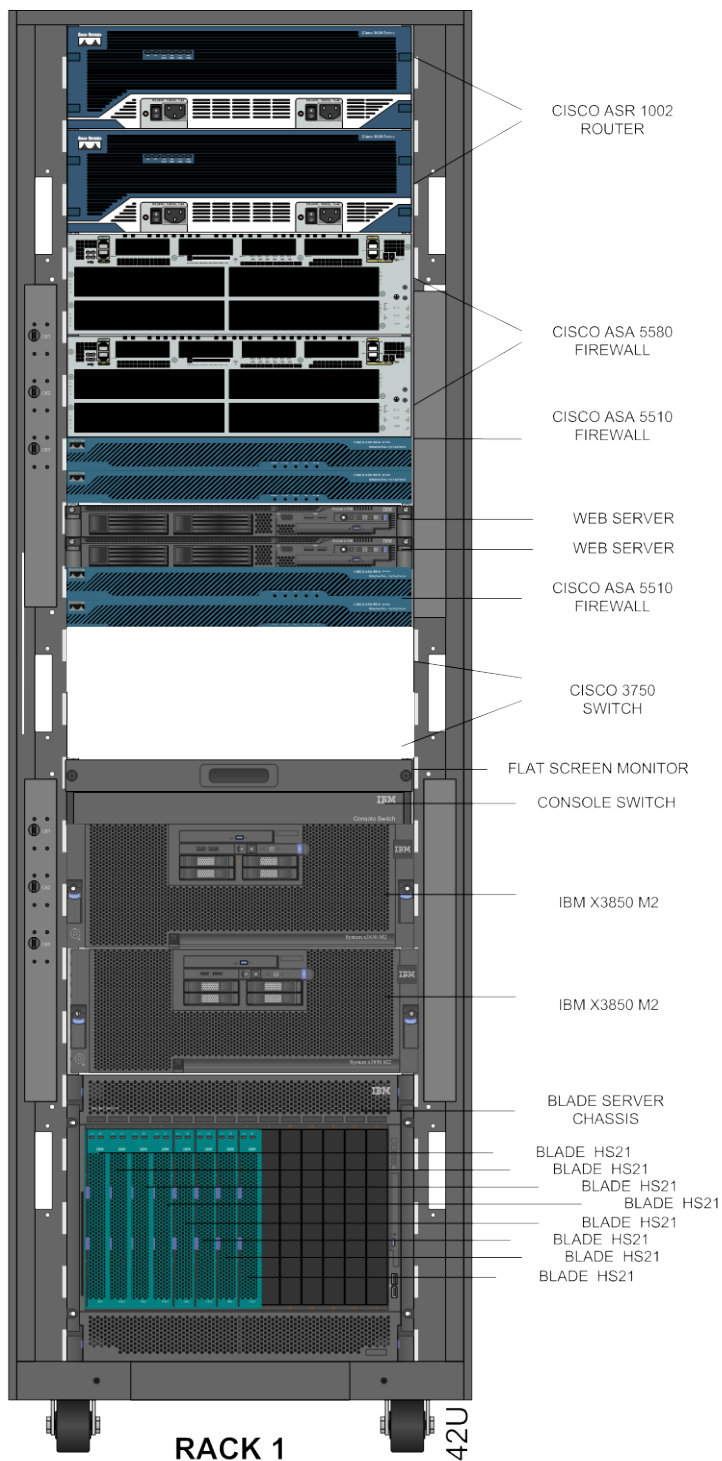


Figure 2-28 VoteCal Secondary Site Data Center – Rack 2

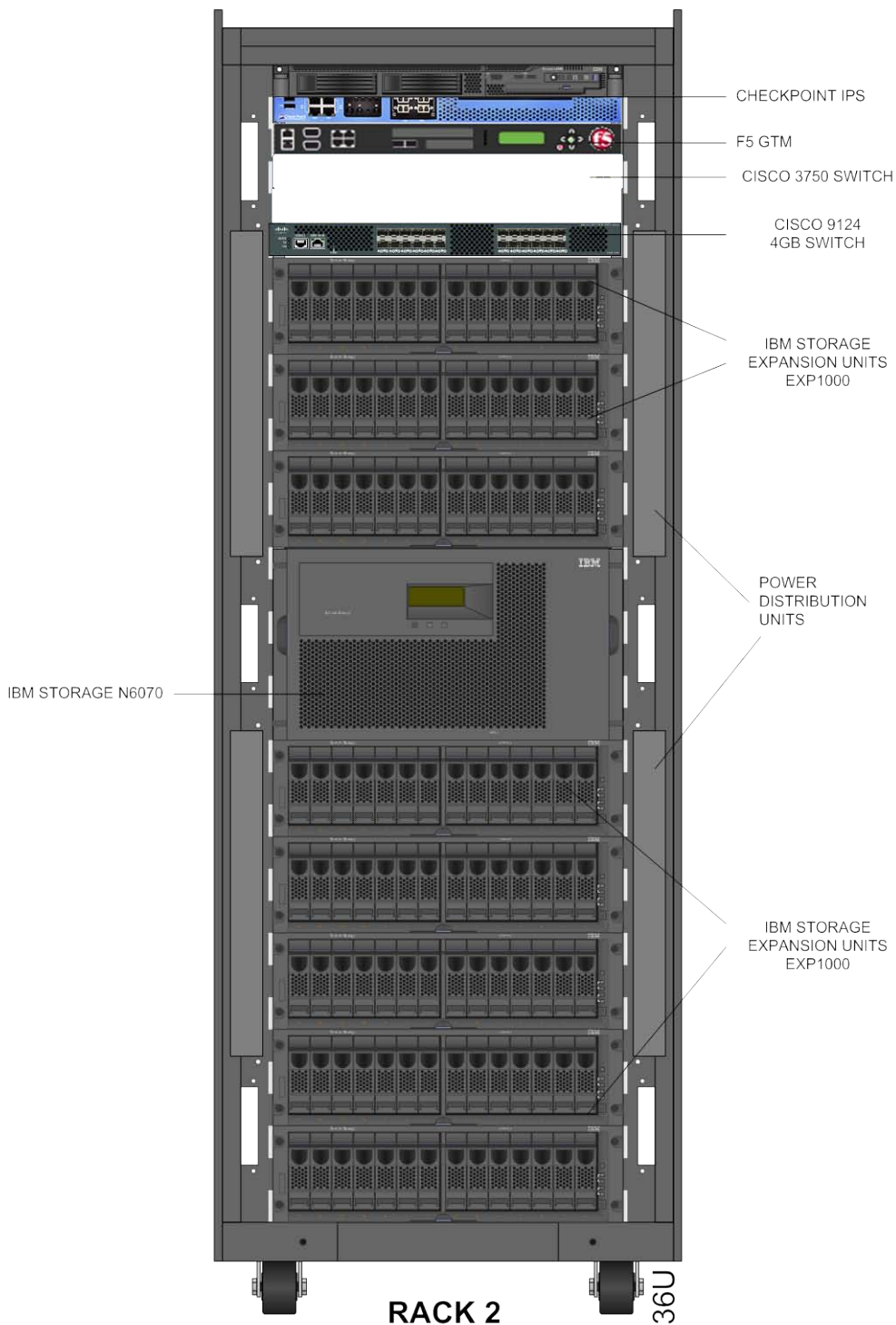
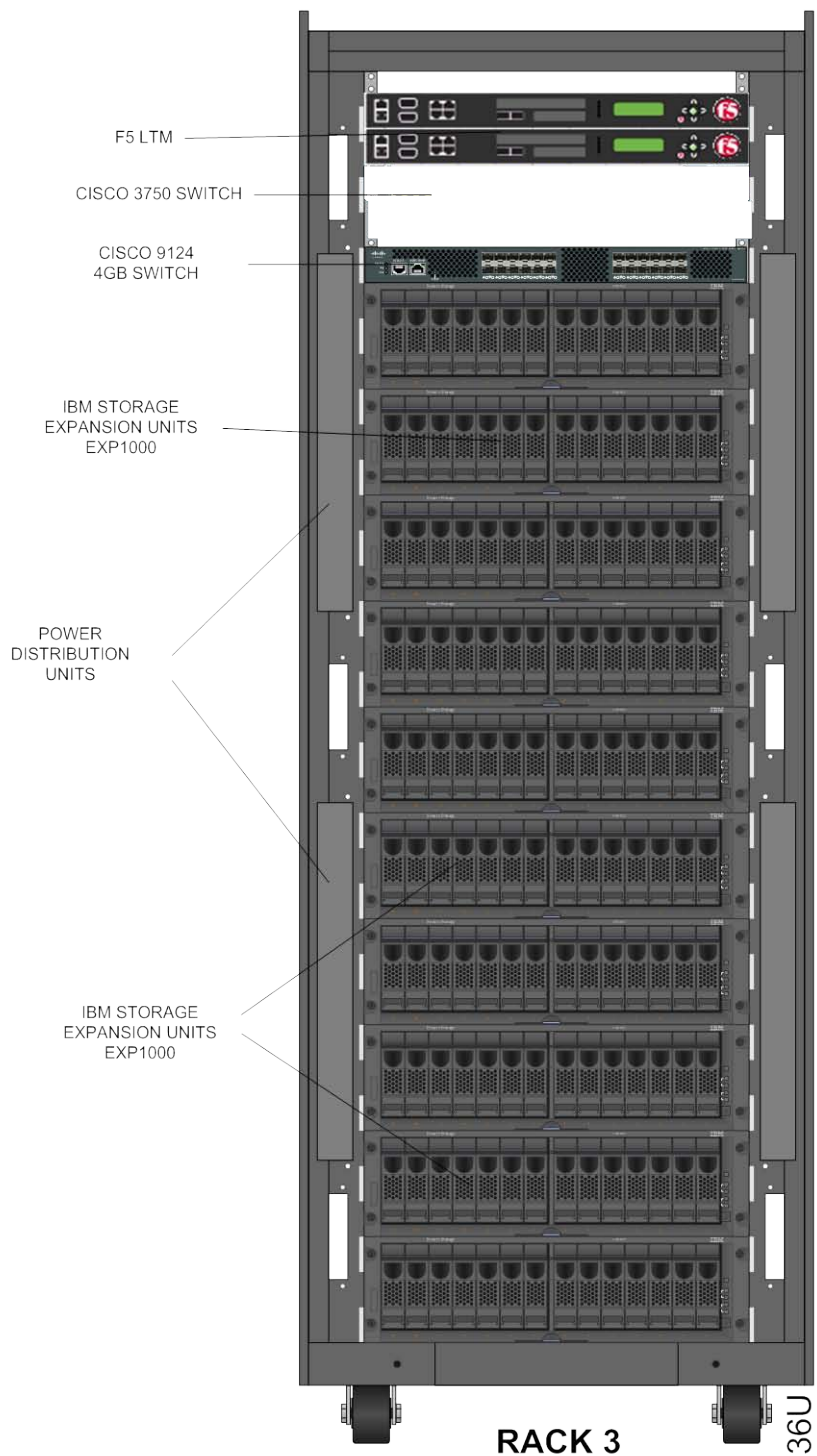


Figure 2-29 VoteCal Secondary Site Data Center – Rack 3



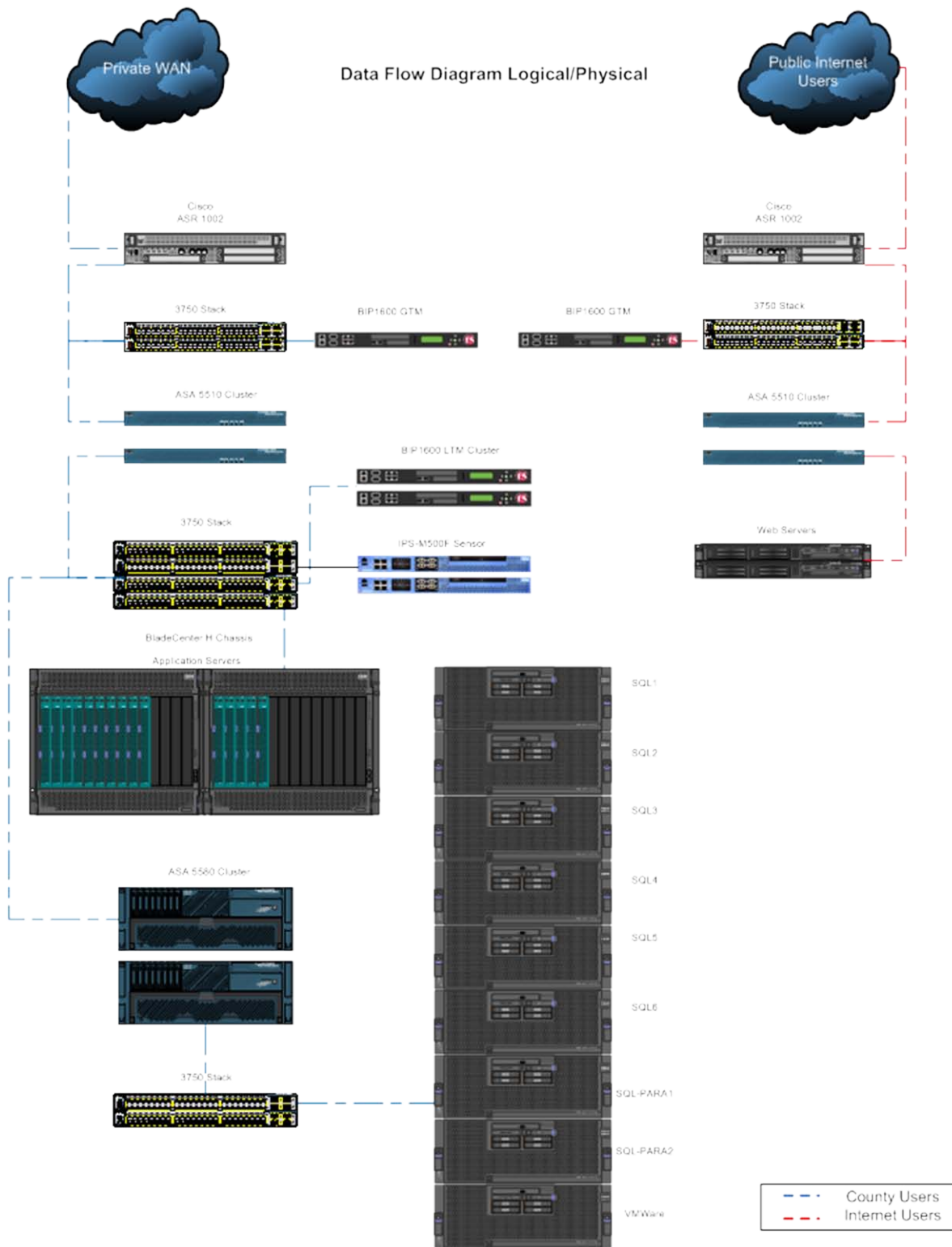
2.9.6 VoteCal Logical Data Flow Diagram

This section of the document is included in order to provide a high level overview of the logical data flow for transactions and user access for the VoteCal system in its entirety.

2.9.6.1 Logical/Physical Data Flow Diagram

The following diagram displays the data flow for the VoteCal system as it relates to the interdependent components of the server, network and security infrastructure for the system. This high level overview is applicable to both the primary and secondary data center environments.

Figure 2-30 Logical/Physical Data Flow Diagram



2.9.6.2 Logical/Physical Data Flow Description

Access by county users of the VoteCal system is provided by a private WAN MPLS cloud, which is operated by the California Secretary of State ITD. The SOS ISP (Verizon) provides the necessary trunking required by the network links at the individual county sites that connect to this WAN and these links then aggregate into an OC-3 that is terminated at the agencies data center via a Cisco ASR1002.

The VoteCal system has been architected to provide four distinct security zones.

The least secure security zone is the path to the public internet. This is protected by an individual pair of Cisco ASA 5510's that only allows access to the web servers in such a way that traffic destined for those web server cannot reach any sensitive information within the lower security zones. This zone is referred to as the "public" zone.

The next security zone is Zone 1. This zone is only accessible by the counties connected to the internal, private VoteCal MPLS cloud. Zone 1 is restricted to only allow access from authorized county users on the MPLS network to the VoteCal system. The county users communicate with the VoteCal system through another separate pair of ASA 5510 security devices. In the event that a user request is destined for the VoteCal application servers that user request must then move on to Zone 2. To pass further than zone 2 you must have specialized permissions granted by active directory, and then traverse the core 5580's which protect zone 3. Zone 3 holds confidential data stored in SQL server databases.

Overarching all of this, all private traffic will flow through a pair of Checkpoint Intrusion Prevention sensors. These allow us to keep updated with any discovered vulnerabilities and even protect against unknown ones. This path of data flow is documented in the above diagram.

2.9.7 VoteCal Physical to Logical Correlation

This section of the document is included to provide a high level overview of the physical to logical correlation between the systems and devices which comprise the VoteCal solution.

2.9.7.1 Primary Site Physical Component Specification

The following table provides a listing of the physical system hardware that is located at the primary data center site and the associated functional specification of that hardware.

Table 2-13 Primary Site Physical Component Specification

VoteCal System	Server Model	Specs
VoteCal WWW 1 VoteCal WWW 2	IBM x3550	2 x Xeon Quad Core 3.0 GHz 8 GB RAM 2 x 73 GB 15K SAS HDD Redundant Power Supply

VoteCal System	Server Model	Specs
VoteCal VMware	IBM x3850 M2	4 x Xeon Six Core 2.66 GHz 24 GB RAM 2 x 73 GB 15K SAS HDD Redundant Power Supply
VoteCal SQL 1 VoteCal SQL 2 VoteCal SQL 3 VoteCal SQL 4 VoteCal SQL 5 VoteCal SQL 6 VoteCal SQL_Para 1 VoteCal SQL_Para 2	IBM x3850 M2	2 x Xeon Quad Core 2.66 GHz 64 GB RAM 2 x 73 GB 15K SAS HDD Redundant Power Supply
VoteCal Tools 1 VoteCal Tools 2 VoteCal AD VoteCal MSC	IBM HS21 XM	2 x Xeon Quad Core 3.0 GHz 8 GB RAM 2 x 15.8 GB 2.5" Solid State Drive Redundant Power Supply
VoteCal App 1 VoteCal App 2 VoteCal App 3 VoteCal App 4 VoteCal App_Para 1 VoteCal App_Para 2 VoteCal FTP 1 VoteCal FTP 2 VoteCal 2Tier_Auth 1 VoteCal 2Tier_Auth 2	IBM HS21 XM	2 x Xeon Quad Core 3.0 GHz 32 GB RAM 2 x 15.8 GB 2.5" Solid State Drive Redundant Power Supply

2.9.7.2 Primary Site Physical System Description

The following table describes the physical system which is located at the primary data center site and is followed by a description of the functional specification that the referenced system will perform as it relates to the VoteCal system as a whole.

Table 2-14 Primary Site Physical System Description

System Name	Function
VoteCal WWW 1	1 of 2 Load Balanced internet facing Web Servers for VoteCal Public Web Site
VoteCal WWW 2	2 of 2 Load Balanced internet facing Web Servers for VoteCal Public Web Site
VoteCal FTP_Para	VoteCal FTP/Batch server for SOS Parallel Environment requirement
VoteCal App_Para 1	1 of 2 VoteCal application servers for SOS Parallel Environment requirement. This server pair is clustered for fail-over redundancy
VoteCal App_Para 2	2 of 2 VoteCal application servers for SOS Parallel Environment requirement. This server pair is clustered for fail-over redundancy
VoteCal 2Tier_Auth 1	1 of 2 VoteCal 2 nd tier authentication Servers running the VeriSign Unified Authentication application. This server pair is clustered for fail-over redundancy
VoteCal 2Tier_Auth 2	2 of 2 VoteCal 2 nd tier authentication Servers running the VeriSign Unified Authentication application. This server pair is clustered for fail-over redundancy
VoteCal FTP 1	1 of 2 VoteCal FTP/Batch Servers for county EMS transmissions
VoteCal FTP 2	2 of 2 VoteCal FTP/Batch Servers for county EMS transmissions
VoteCal Tools 1	1 of 2 utility servers housing support applications for the project team and the VoteCal infrastructure
VoteCal Tools 2	2 of 2 utility servers housing support applications for the project team and the VoteCal infrastructure
VoteCal AD	Microsoft Active Directory server for 1 st Tier authentication
VoteCal MSC	Microsoft System Center server for server and network monitoring
VoteCal App 1	1 of 4 Load Balanced VoteCal application servers for running the VoteCal application. This server pair is
VoteCal App 2	2 of 4 Load Balanced VoteCal application servers for running the VoteCal application
VoteCal App 3	3 of 4 Load Balanced VoteCal application servers for running the VoteCal application
VoteCal App 4	4 of 4 Load Balanced VoteCal application servers for running the VoteCal application
VoteCal SQL_Para 1	1 of 2 VoteCal SQL database servers for SOS Parallel Environment requirement. This server pair is clustered for fail-over redundancy
VoteCal SQL_Para2	2 of 2 VoteCal SQL database servers for SOS Parallel Environment requirement. This server pair is clustered for fail-over redundancy
VoteCal SQL 1	1 of 6 VoteCal SQL database servers for storing VoteCal system data. These servers are clustered for fail-over redundancy.
VoteCal SQL 2	2 of 6 VoteCal SQL database servers for storing VoteCal system data. These servers are clustered for fail-over redundancy.

System Name	Function
VoteCal SQL 3	3 of 6 VoteCal SQL database servers for storing VoteCal system data. These servers are clustered for fail-over redundancy.
VoteCal SQL 4	4 of 6 VoteCal SQL database servers for storing VoteCal system data. These servers are clustered for fail-over redundancy.
VoteCal SQL 5	5 of 6 VoteCal SQL database servers for storing VoteCal system data. These servers are clustered for fail-over redundancy.
VoteCal SQL 6	6 of 6 VoteCal SQL database servers for storing VoteCal system data. These servers are clustered for fail-over redundancy.
VoteCal VMware	VMware virtualization environment for running the Development, Staging, Test, Training and Training Development environments per SOS alternate environment requirements
VoteCal SAN	Storage Area Network for VoteCal system

2.9.7.3 Secondary Site Physical Component Specification

The following table provides a listing of the physical system hardware that is located at the secondary data center site and the associated functional specification of that hardware.

Table 2-15 Secondary Site Physical Component Specification

VoteCal System	Server Model	Specs
VoteCal WWW 1 BU VoteCal WWW 2 BU	IBM x3550	2 x Xeon Quad Core 3.0 GHz 8 GB RAM 2 x 73 GB 15K SAS HDD Redundant Power Supply
VoteCal SQL 1 BU VoteCal SQL 2 BU	IBM x3850 M2	2 x Xeon Quad Core 2.66 GHz 64 GB RAM 2 x 73 GB 15K SAS HDD Redundant Power Supply
VoteCal Tools BU 1 VoteCal Tools BU 2 VoteCal AD BU VoteCal MSC BU	IBM HS21 XM	2 x Xeon Quad Core 3.0 GHz 8 GB RAM 2 x 15.8 GB 2.5" Solid State Drive Redundant Power Supply
VoteCal App 1 BU VoteCal App 2 BU VoteCal FTP 1 BU VoteCal 2Tier_Auth BU	IBM HS21 XM	2 x Xeon Quad Core 3.0 GHz 32 GB RAM 2 x 15.8 GB 2.5" Solid State Drive Redundant Power Supply

2.9.7.4 Secondary Site Logical System Description

The following table describes the physical system which is located at the secondary data center site and is followed by a description of the functional specification that the referenced system will perform as it relates to the VoteCal system as a whole.

Table 2-16 Secondary Site Logical System Description

System Name	Function
VoteCal WWW 1 BU	1 of 2 Load Balanced internet facing Web Servers for VoteCal Public Web Site located at the secondary data center
VoteCal WWW 2 BU	2 of 2 Load Balanced internet facing Web Servers for VoteCal Public Web Site located at the secondary data center
VoteCal AD BU	Microsoft Active Directory server (secondary "DC") for 1 st Tier authentication located at the secondary data center
VoteCal MSC BU	Microsoft System Center server for server and network monitoring at the secondary data center
VoteCal 2Tier_Auth BU	VoteCal 2 nd tier authentication server running the VeriSign Unified Authentication application at the secondary data center
VoteCal FTP BU	VoteCal FTP/Batch servers for county EMS transmissions located at the secondary data center
VoteCal Tools 1 BU	1 of 2 utility servers housing support applications for the project team and the VoteCal infrastructure located at the secondary data center
VoteCal Tools 2 BU	2 of 2 utility servers housing support applications for the project team and the VoteCal infrastructure located at the secondary data center
VoteCal SQL 1 BU	1 of 2 VoteCal SQL database servers for storing VoteCal system data. These servers are clustered for fail-over redundancy located at the secondary data center
VoteCal SQL 2 BU	2 of 2 VoteCal SQL database servers for storing VoteCal system data. These servers are clustered for fail-over redundancy located at the secondary data center
VoteCal App 1 BU	1 of 2 Load Balanced VoteCal application servers for running the VoteCal application located at the secondary data center
VoteCal App 2 BU	2 of 2 Load Balanced VoteCal application servers for running the VoteCal application located at the secondary data center
VoteCal SAN	Storage Area Network located at the secondary data center

2.10 Tools to Manage the VoteCal Solution

The following tools provide management functions for the VoteCal system and its associated hardware and software components:

- Microsoft Management Console (MMC) – A framework that hosts administrative tools, called snap-ins, on Windows operating systems. Specifically, MMC will be used to manage the Microsoft

Windows 2008 Server systems and many of the components that reside on those systems. The MMC component supports an extensive list of snap-in management modules, the following being key examples of those used on this project:

- Microsoft Clustering Services (MSCS) – This MMC snap-in supports the configuration and management of failover and load balancing cluster capabilities.
 - Microsoft SQL Server Enterprise Manager – This MMC snap-in supports the configuration and management of Microsoft SQL Server databases.
 - Internet Information Services (IIS) – This MMC snap-in supports the configuration and management of Internet Information Services web servers.
 - ASP.NET – This MMC snap-in supports fine control over the configuration settings for the ASP.NET applications deployed to the IIS web server.
- Microsoft System Center Operations Manager (including Quest Management Extensions) – This tool will provide a single user interface for analyzing performance and proactive fault monitoring for all VoteCal server, software and network systems.
 - IBM System Director – This tool will provide management functions for the Blade enclosure chassis and a number of other IBM specific hardware components.
 - Checkpoint IPS-1 – This software will manage the Checkpoint intrusion prevention systems and will provide security alerts and real-time security updates for software and hardware vulnerabilities.
 - vSphere vCenter Server – This application will manage all VMware specific virtual machine configurations including but not limited to security, virtual machine physical/virtual relationships and logical networking of virtual resources.
 - Cisco Adaptive Security Device Manager (ASDM) – This software component will manage the security and configuration components for all Cisco ASA's within the VoteCal systems solution.
 - VeriSign Unified Authentication (UA) – VeriSign's Unified Authentication management software will manage the second factor authentication solution which will integrate into Active Directory.
 - NetApp Systems Manager – This software suite will manage the storage area network (SAN) powered by DataONTAP. Management capabilities include provisioning new storage, maintaining production storage areas, performing back-ups powered via the SNAP line of features and other administrative functions for the SAN.
 - Microsoft Active Directory (AD) – This software component will manage user account credentials maintained by Active Directory.
 - Microsoft Authorization Manager (AzMan) – Provides role and permission management services. Using AzMan, administrators will define operations that must be secured and grant permissions to users to access these operations. Developers will use these operation definitions in code and access AzMan programmatically to verify that the user trying to perform an operation has permission to do so. Permissions can be granted to a logical grouping called a role and users can be declared members of a role in order to be granted access to a set of permissions in one single operation.
 - Microsoft SQL Server Management Studio (SSMS) – This software will support the management of the SQL Server databases.