



Primavera Contract Manager Technical Architecture 11.0

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Summary

Contract Manager can be accessed world wide through the Internet or internally through a company's local area network. Contract Manager utilizes the Java (J2EE) architecture and provides Web, application, and database server software. This allows companies to host their own Contract Manager installations. Contract Manager communicates to its clients through the HTTP(S) protocols so companies have complete control over how they provide access to Contract Manager. Contract Manager's own internal security then allows companies to tailor access within Contract Manager.

Contract Manager provides more options to get at your data and to integrate with other systems than ever before.

Contract Manager Integration Options

Integration Point	Description
Contract Manager SDK	XML API with detailed Help and examples for integration with other systems
Import & Export	Uses MS Excel or CSV file formats
E-Mail	E-Mail PDF versions of Contract Manager documents or Contract Manager Letters in MS Word format.
MS Word	Seamlessly create Contract Manager Letters in MS Word
MS Excel	Create WYSIWYG spreadsheets in Excel from any Contract Manager log
Primavera Project Planner Professional	Provide access to your schedule data in Contract Manager
Primavera Project Manager	Provide access to your schedule data in Contract Manager
Brava integration	Redline your Contract Manager Attachments

To get the most out of your data Contract Manager ships with Sybase's InfoMaker software for all of your reporting needs. You will now be able to view your reports and forms through the Internet in a secure manner. Contract Manager can use the InfoMaker reports you have created in previous versions of Contract Manager.

Contract Manager expands the global computing capabilities of the product by supporting Chinese, Russian, U.K., and U.S English languages. Contract Manager running with an Oracle/MSSQL database is UTF-8 compliant to fully handle multi-byte languages.

This document provides details on the architecture behind Contract Manager, and requirements and guidelines for setting up Contract Manager in your company.

Contract Manager Architecture

ARCHITECTURAL CHANGES FOR VERSION 11.0

Architecture Changes for Contract Manager 11.0

- Contract Manager 11.0 ships with JBoss 4.0.4 integrated with Tomcat Web server 5.5. Contract Manager 10.0 shipped with JBoss 3.2.5 integrated with Tomcat Web server 5.0. The installer will take care of all of the details of setting up the Tomcat server.
- Contract Manager 11.0 ships with Sybase's InfoMaker 10.5 for your reporting needs. The reports can be viewed and printed as .pdf documents. Contract Manager 11.0 no longer supports viewing and printing reports using Applets/ActiveX.
- Contract Manager 11.0 supports MSDE 2000 SP3, SQL Server 2005 Express, SQL Server 2000 SP4, SQL Server 2005 (32 bit) database types. Previous versions supported just Oracle and Sybase Adaptive Server Anywhere.
- Contract Manager 11.0 now adds IE 7.0 as one of the supported browsers.

COMPONENT SUMMARY

Here is a summary of the components that make up the Contract Manager software system:

Component Summary

- Database repositories on Oracle or Sybase Adaptive Server Anywhere and MS SQL Server.
- An integrated Tomcat Web server and JBoss application server.
- The Contract Manager application and the Contract Manager Administration application.
- Sybase InfoMaker reporting software.
- The Contract Manager SDK that provides an XML interface to other systems.

CONFIGURATIONS

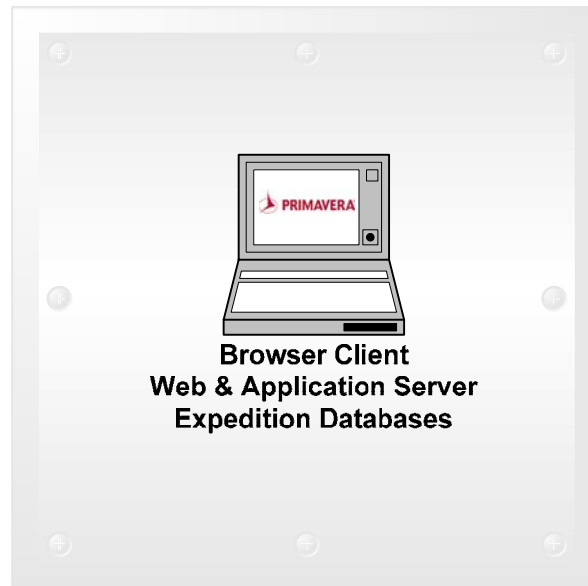
Contract Manager can be installed in a number of different configurations:

Configurations

- Single Machine Standalone.
 - Server with Separate Local Clients
 - Single Server with Separate Distributed Clients
 - Separate Web/Application and Database Servers with Distributed Clients
-

SINGLE MACHINE STANDALONE

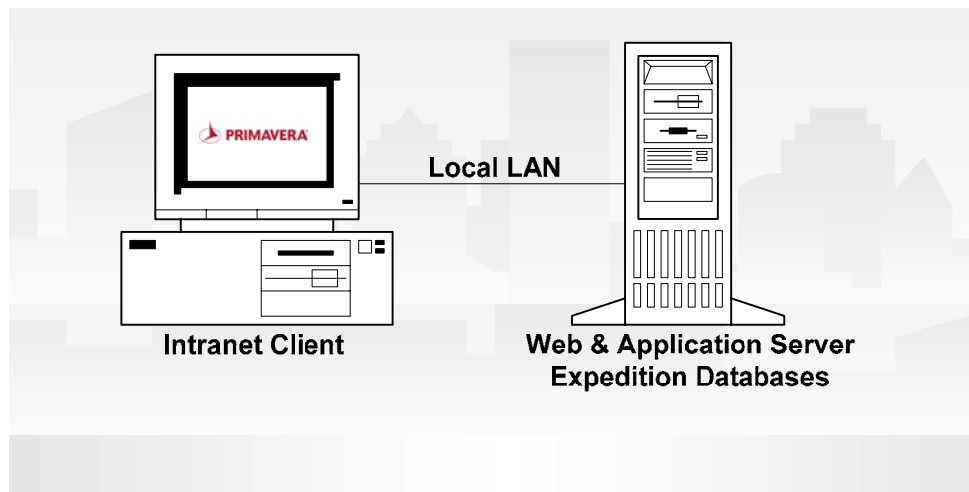
In this configuration all Contract Manager components are installed and run on one machine. All installations require at least 512 MB of RAM of memory on the Web/Application server machine. Beyond that minimum requirement, Contract Manager is supported to run on any Windows 2000 or Windows XP machine. Usability will benefit with a CPU of 2 GHz or higher. Performance will not be optimal with this configuration because of all of the components running on the same machine sharing the same system resources.



SINGLE SERVER WITH LOCAL CLIENTS

In this configuration the Web/Application servers and the database server are run on one machine and all clients are run on separate machines. This configuration will have better performance than the standalone configuration, but not as good as the separate server configuration.

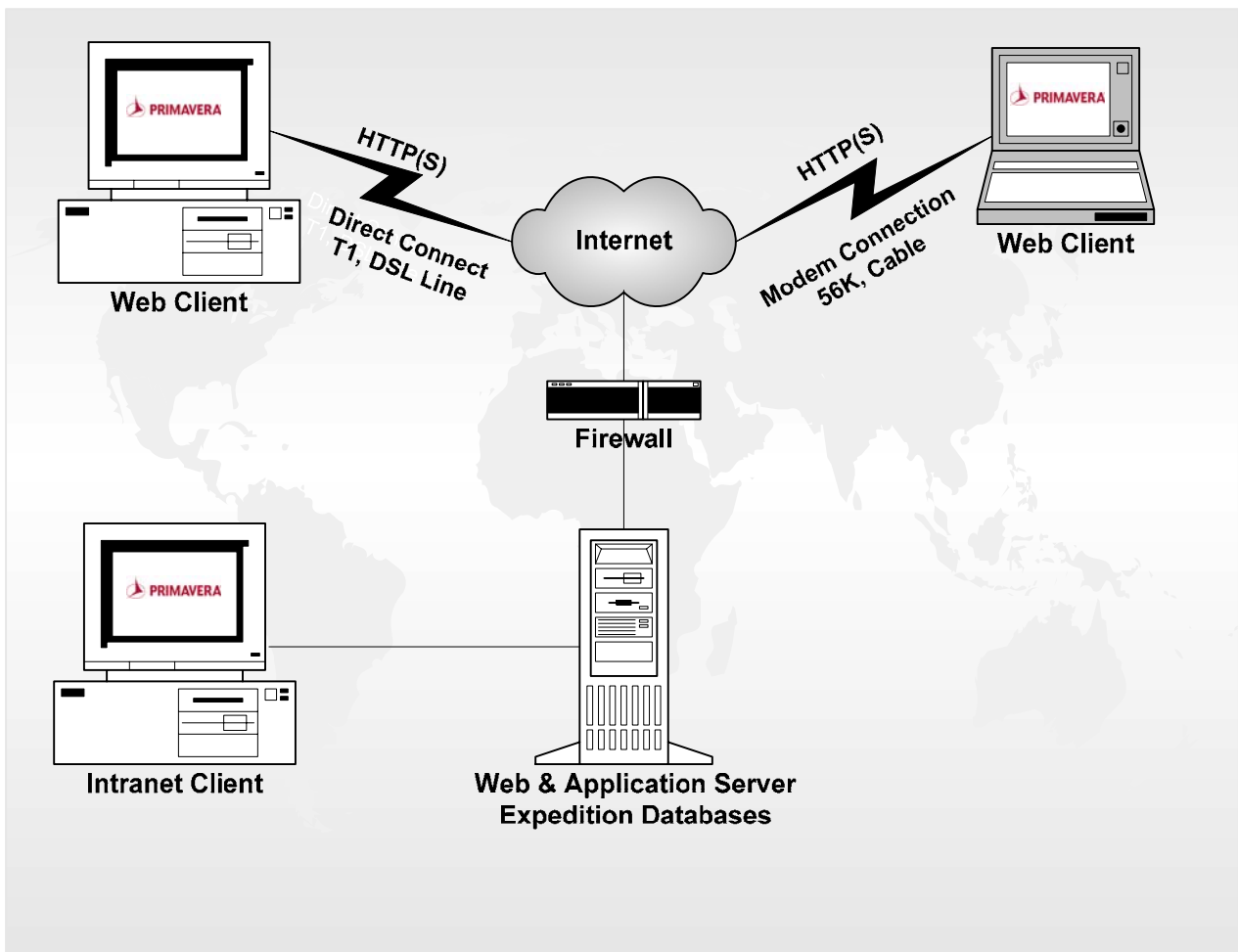
In order to determine the server machine requirements for this configuration, look up the server requirements in The Basic Technical Architecture section later in this document. Then add the memory requirements for the Web/Application server with the memory requirements for the database server.



SINGLE SERVER WITH DISTRIBUTED CLIENTS

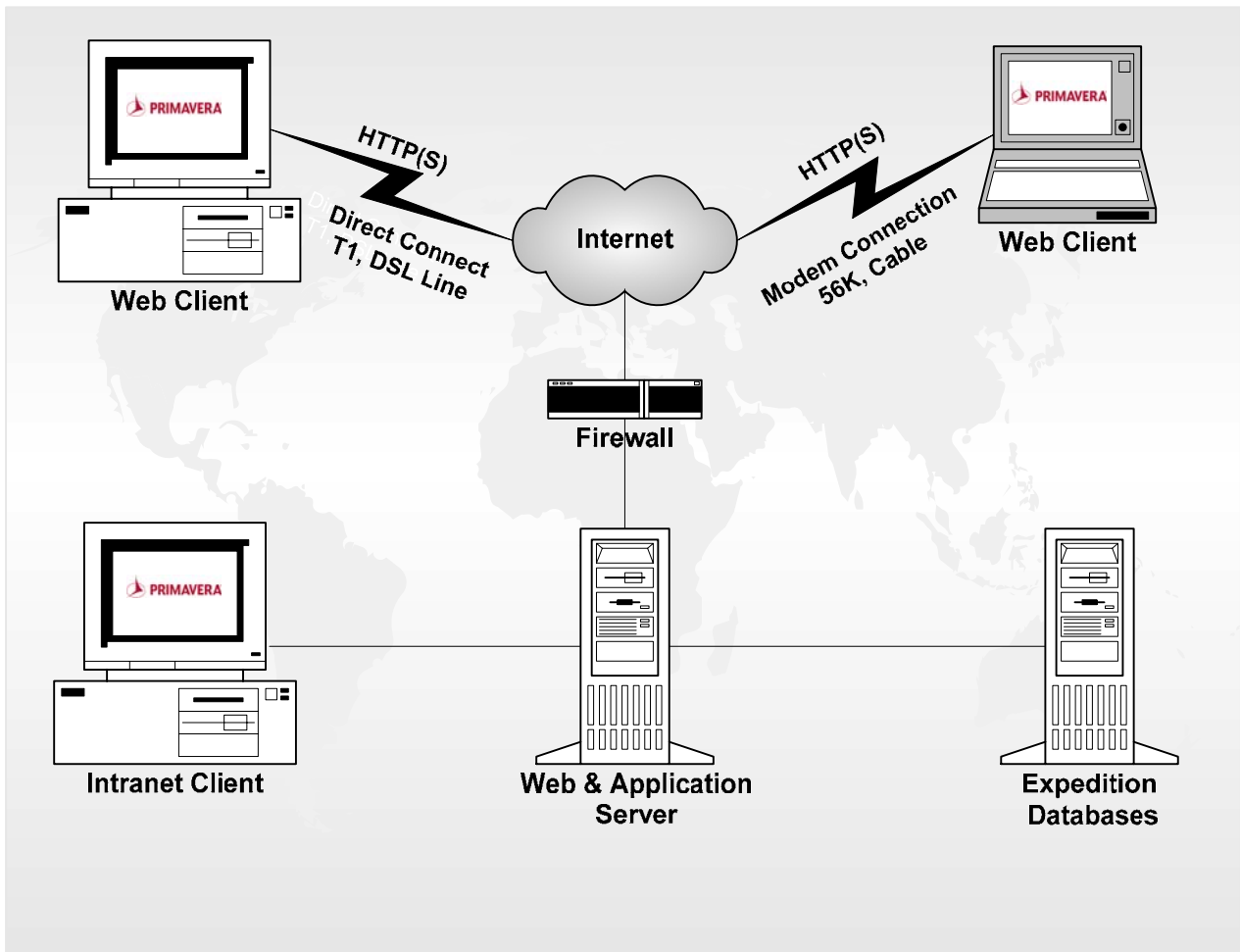
This configuration is basically the same as the Single Server with Local Clients except under this configuration your Web Server can be accessed through the Internet. This is not the optimal configuration for an Internet application because your database is running on the same machine as the Web Server. The next configuration, Separate Servers with Distributed Clients, addresses this by putting the database on a separate machine from the Web Server.

In order to determine the server machine requirements for this configuration, look up the server requirements in The Basic Technical Architecture section later in this document. Then add the memory requirements for the Web/Application server with the memory requirements for the database server.



SEPARATE SERVERS WITH DISTRIBUTED CLIENTS

This is the recommended configuration and is fully tested and supported. Performance will be optimal under this configuration. See the Basic Technical Architecture section later in this document for details on machine requirements



INSTALLATION

Instructions for installing Contract Manager on separate servers with distributed clients, configuration number 4 above, are given in detail in the Contract Manager Install manual. Instructions for installing the other two configurations are provided in a separate document.

By default Contract Manager installs the Web server to listen on port 80. If you are already using port 80 for another application you can change the port number for the Contract Manager Web server. Instructions on how to do this are provided in the Readme file on the Contract Manager CD.

COMPONENT DEFINITIONS

Contract Manager – A browser based version of the world's leading contract management and document control solution. Contract Manager provides you with proactive cost control and document management to ensure your projects and your programs are successfully executed and completed on time and on budget. With more than ten years of development, real-world experience and feedback from thousands of users - Contract Manager clearly stands out as the industry standard for complete project control.

Contract Manager Administration – This application provides the ability to securely administer your Contract Manager system across the Web. It is where all of the users and user's rights are defined as well as some server configuration options. This browser based application is accessed through a different URL from the Contract Manager system. Special "admin" rights are required to access the Administration application.

Web Client – This is simply a user's browser accessing the Contract Manager or Contract Manager Administration application. The client makes all of its requests to the Tomcat Web Server through HTTP(S) requests. The responses are returned as HTML pages with JavaScript code and in a few cases a Java applet contained in it. The Web client only communicates with the Tomcat Web Server, which has no access to the database. So access to the database and its data is protected.

Intranet Client – This is very similar to the Web client. The difference is it the user is accessing the Tomcat Server through a companies internal intranet. Like the Web client the intranet client does not have any access to the Contract Manager database.

JBoss – This is a high quality open source application server from the JBoss Group. JBoss is quickly becoming a dominant player in the application server market, winning Best Application Server from Java World Magazine in 2002. The Contract Manager installer will walk you through the process of installing this server. The application server pools database and system resources and provides a security layer so clients do not have direct connections to the database. The application server also enforces a large percentage of Contract Manager's business rules and security settings ensuring the integrity of the data.

Tomcat – This is a high quality open source Web server from the Apache organization. The Contract Manager installer will install a version of Tomcat that is integrated with the JBoss server. This means the Web & application servers run in the same Java Virtual Machine (JVM). This improves performance because it eliminates the overhead encountered when the Web & application servers run in separate JVMs. Because of this the Web and application servers have to be installed on the same physical machine.

The Web server accepts HTTP(S) requests and supplies HTTP(S) responses. It routes requests to the proper Java Servlet, which processes the request and passes it to the appropriate resource in the application server. The response from the application server is sent back to Tomcat and is directed to the appropriate Java Server Page (JSP). Tomcat uses the JSP and the data from the response to create the HTML page that is sent back to the requesting client.

Contract Manager Databases – There are two types of Contract Manager databases. The Administration database and project databases, also referred to as groups. For a given Contract Manager installation there will be one Administration database and there will be one or more Groups defined. The Groups allow companies to organize their projects into separate databases. When you are logged into Contract Manager you are connected to both the Admin database and one Group. All of the multi-project summarization that Contract Manager provides via the Project Center and in reports is done at the Group level.

Contract Manager SDK – The Contract Manager SDK is distributed on the Contract Manager Install CD. It provides documentation and examples on how to use the Contract Manager XML API. The XML API is a way for other systems to communicate with the Contract Manager system. The API ensures all of Contract Manager's security and business rules are enforced. The XML requests are communicated to a Servlet through an HTTP(S) request. The XML response is returned in an HTTP(S) response. This enables distributed systems to seamlessly communicate with Contract Manager.

InfoMaker – Primavera supplies Sybase's InfoMaker reporting tool with Contract Manager. Primavera distributes a large number of standard reports with Contract Manager. InfoMaker allows users to customize the standard reports or create entirely new reports. InfoMaker makes a direct ODBC connection to the database when the reports are being defined. Once the reports are defined and published they are available to Contract Manager users through the client applications. The reports are downloaded to the client browser in the form of pdf documents. Adobe Acrobat Reader is required for viewing these documents.

Secure Communications – Contract Manager supports both HTTP and HTTPS communications between the server and its clients. HTTP is the default protocol. HTTPS can be enabled for a site if it is deemed necessary to encrypt the requests and responses being sent between the server and its clients.

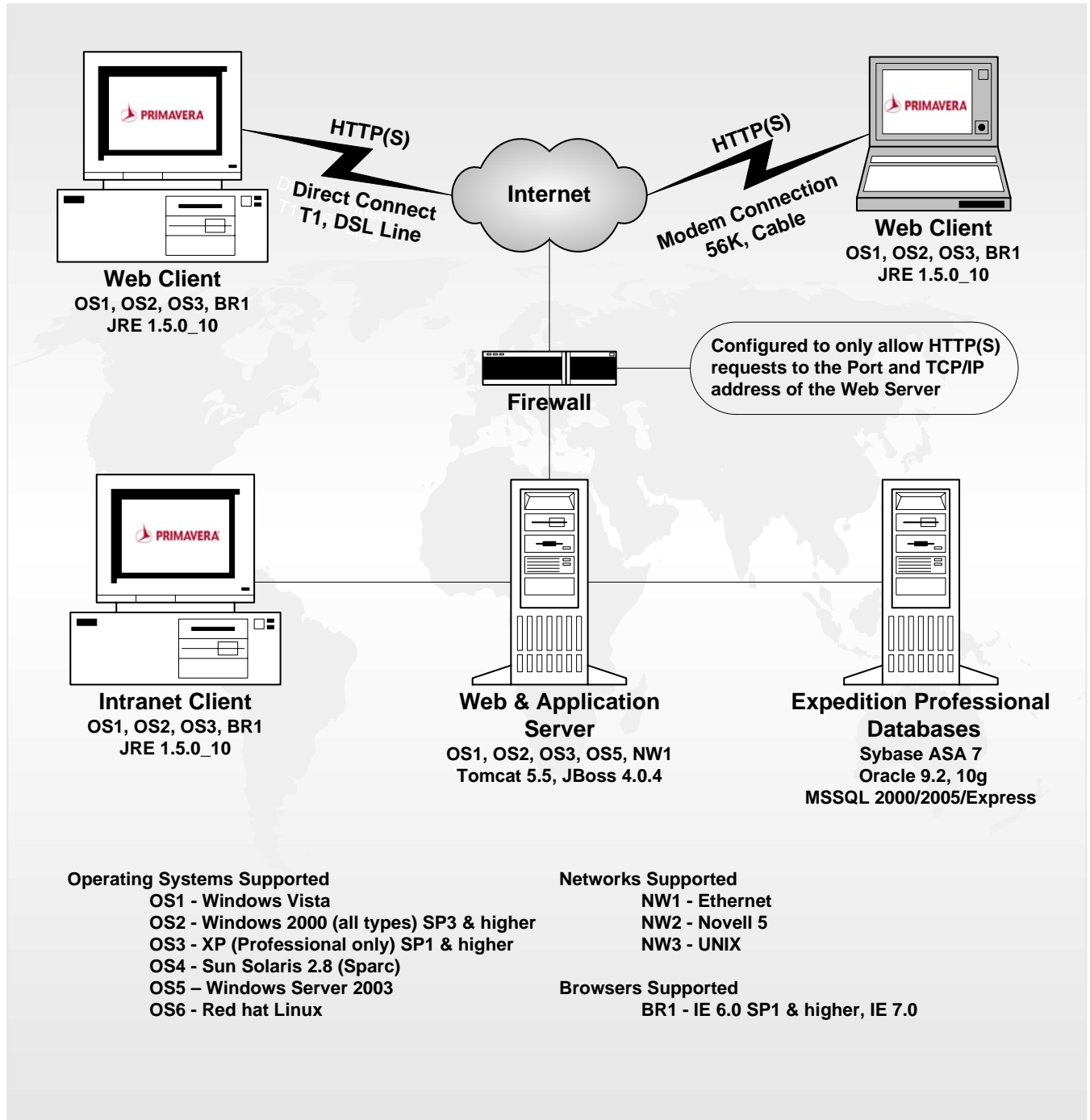
Firewall – A firewall is not part of the Contract Manager system; it is part of a company's own network. The main purpose of a firewall is to restrict and filter the traffic between your company's network and the Internet.

A firewall is usually installed at the point where your network connects with the Internet. All traffic between your company's network and the Internet would go through the firewall. There are many ways to configure a firewall. How your company does depends on a site's particular security policies, budget, and overall operation. This document does not attempt to describe all of the intricacies involved with configuring a firewall.

In order for the Contract Manager system to function properly your firewall needs to allow HTTP(S) requests and responses to be made to and from the TCP/IP address and port number of your Tomcat Web server.

The Basic Technical Architecture

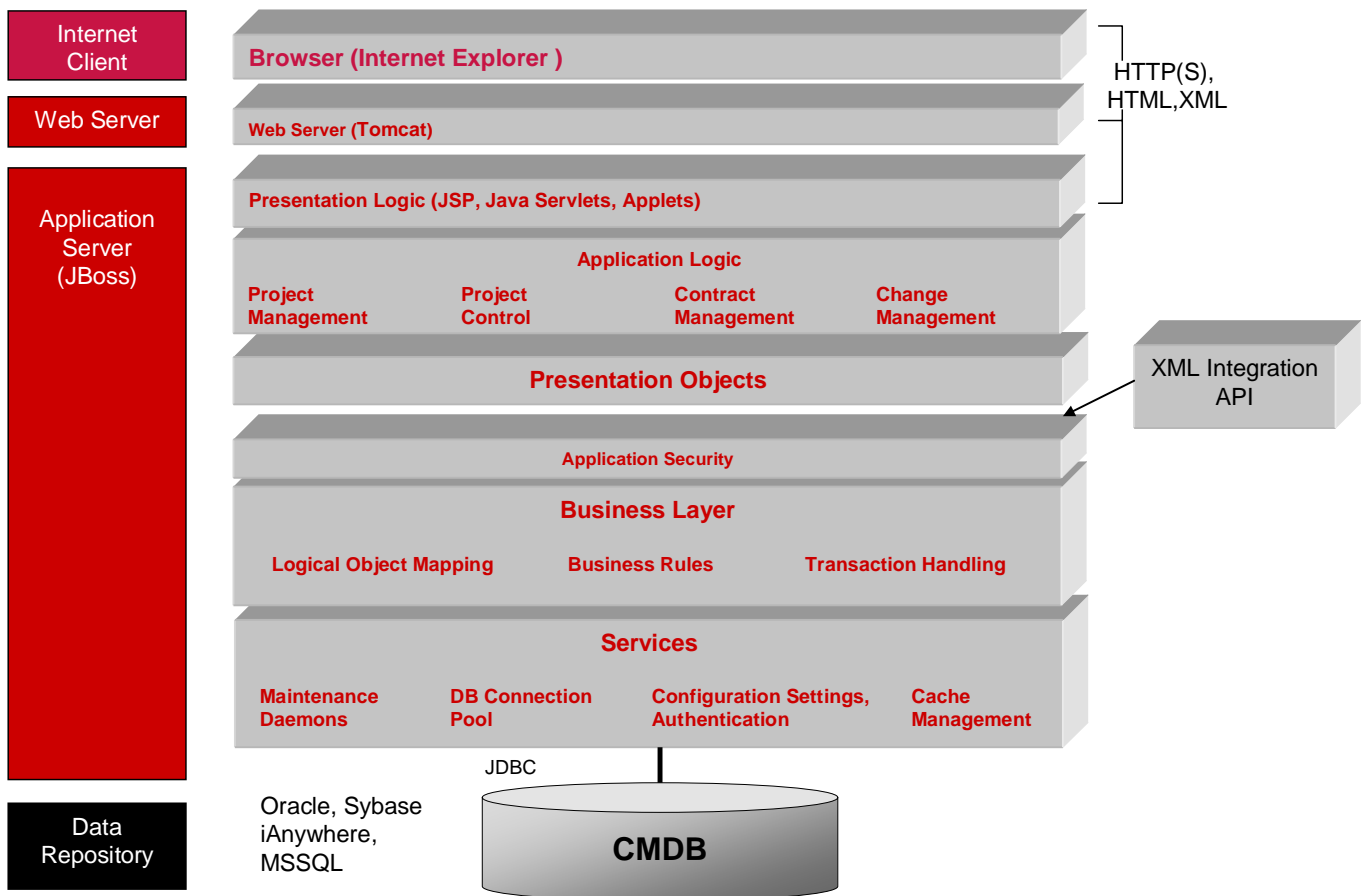
This section gives more details on the requirements and specifications for the different components in the Contract Manager system.



N-Tiered Architecture

This diagram shows the layers of separation that are used to make the Contract Manager architecture as flexible as possible. This n-tiered approach towards architecture allows Contract Manager to easily adapt to the ever-changing technical landscape.

Primavera Contract Manager Current Architecture



Database Requirements

Contract Manager is designed to work with the following Oracle or Sybase Adaptive Server Anywhere databases.

Oracle Database Support				
Oracle Version	Contract Manager Version	Windows 2000/ XP	Unix	JDBC Driver
Oracle 9.2 Standard or Enterprise Edition	10.0 & 11.0	Yes	Yes	Oracle ThinDriver
Oracle 10g Enterprise Edition Release 10.2.0.1.0	11.0	Windows 2003 SP1	Sun Solaris 10 (Sparc), Red Hat Linux 4	Oracle Thin Driver

Sybase Adaptive Server Anywhere			
	Windows 2000/ XP	Unix	JDBC Driver
ASA 7	Yes	No	Sybase JConnect

MS SQL Server			
Version	Windows 2000/ XP	Unix	JDBC Driver
MSSQL 2000 SP3	Yes	No	Microsoft SQL Server JDBC Driver
MSSQL 2005/ Express	Windows 2000/2003 server/Vista	No	Microsoft SQL Server JDBC Driver

Database Server Specification

The database server process places the heaviest load on the disk I/O (input/output) and CPU. An optimized database setup with a SCSI interface in a RAID configuration for fast disk access can increase data access on the database server and increase overall performance more than an increase in CPU speed. The RAM in the database server is used for database cache. The database cache is an area of memory used by the database server to store database pages for repeated fast access. The more pages that are accessible in the cache, the fewer times the database server needs to read data from disk. The recommended amount of RAM depends on the size of the database files.

Database Server				
Total Database Group File Size	< 250 MB	250 MB – 750 MB	750 MB – 1.25 GB	> 1.25 GB
RAM	256 MB	512 MB	768 MB	1 GB (at least)
Processor Speed	500 MHz	1 Ghz	1.5 Ghz	2 Ghz

Web & Application Server Requirements

Contract Manager 11.0 installs an integrated Web & application server on one machine.

Web & Application Servers

	Windows 2000/ XP/2003 Server	Unix
Tomcat 5.5	Yes	No
JBoss 4.0.4	Yes	No

Web & Application Server Specifications

The application server process places the heaviest load on the system memory, RAM. The number of active users or total projects in all active groups can strain the system if undersized. Scaling tests have shown the following variables, active users and total number of projects, are satisfied when the corresponding amount of RAM is installed.

Web & Application Server Scaling				
Number of Concurrent Users *	Total Number of		Recommended CPU	
	Projects	Required RAM	Speed	Number of CPUs
1 - 10	< 100	512 MB	2 Ghz	1
1 - 10	100 – 750	768 MB	2 Ghz	1
1 - 10	750 - 1500	1 GB	2 Ghz	1
1 - 10	> 1500	1.25 GB or more	2 Ghz	1
11 - 50	< 100	768 MB	2.5 Ghz	1 or 2
11 - 50	100 – 750	1 GB	2.5 Ghz	1 or 2
11 - 50	750 – 1500	1.25 GB	2.5 Ghz	1 or 2
11 - 50	> 1500	1.5 GB or more	2.5 Ghz	1 or 2
51 - 100	< 100	1 GB	2.8 Ghz	2
51 - 100	100 – 750	1.25 GB	2.8 Ghz	2
51 - 100	750 – 1500	1.5 GB	2.8 Ghz	2
51 - 100	> 1500	1.75 GB or more	2.8 Ghz	2

* A note on Concurrent users. The number of concurrent users means the number of people actively using the system at any one time.

Client Machine Requirements

On the client machines, Contract Manager systems run entirely through a browser interface. The majority of pages are HTML with JavaScript code in them. There are a few applets that require the Java JRE. There is an optional ActiveX control for higher quality printing of reports and forms.

Operating Systems

- Windows 2000 All Types SP3 & SP4
- Windows XP Professional SP1 & SP2
- Windows Vista

Browser

- IE 6.0 SP1 & Higher
- IE 7.0

Other Client Requirements

- Java Run-Time Engine 1.5.1_10 (The Contract Manager installer will load this on your server. Clients will automatically download it from your server. Windows users must have installation rights [Power User or Administrator] to install the JRE. Once installed, Windows user rights can be reduced.)
- MS Word 2000 or greater (for the Letters module)
- MS Excel XP or greater (for Send to Excel feature)

Client Machine Specifications

The client workstation requires enough available RAM to properly display all of the data returned to the browser. Variables to consider; operating system resource requirements, number of projects contained in the active group, report and form sizes, other processes active outside of Contract Manager requirements. The varying size of report and form processing will increase the RAM requirement. Additionally, each project listed in a project tree requires additional RAM to display. As the number of projects increase, so too does the memory requirements for the client.

Client Machine		
Greatest number of projects in a Group	Required RAM	Minimum CPU Speed
1 – 1500	128 MB	300 Mhz
> 1500	256 MB	400 Mhz

E-Mail Protocol

E-Mail protocol tested on the following operating systems

E-Mail Protocols		
	Win 2000 SP4	Solaris 2.8
SMTP (Internet)	Yes	Yes

HTTPS

To enable Secure Socket Layer (SSL) communications the user needs a set of public and private keys and a certificate. The keys are provided by the SSL implementer, which is installed with Contract Manager. The certificate can be a signed certificate from a third party like Verisign or the user can generate an unsigned certificate with the tool provided.

HTTPS	
HTTPS Resource	Provided with Contract Manager
SSL Implementer	javax.net.ssl.SSLServerSocket
Key & Certificate Management Tool	Keytool from Sun