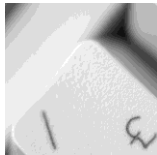
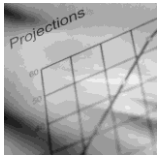


Sapphire Systems plc



Document: SunSystems (5.4) Server Sizing

Client:

Prepared By: Shahid Raja

Date: Nov. 10

Version: 3.6

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1 Introduction

This document gives a description of the SunSystems 5.4 architecture and includes recommended sizing specifications for the latest Sun and Vision versions.

In addition this document also includes sizing for Time@ Works. The web server function can be placed on it's own server, if required.

This document is based on a LAN environment. If SunSystems is to be used in a hosted or WAN environment then an additional server is required, Terminal/Citrix Server. Additional sizing can be provided on request.

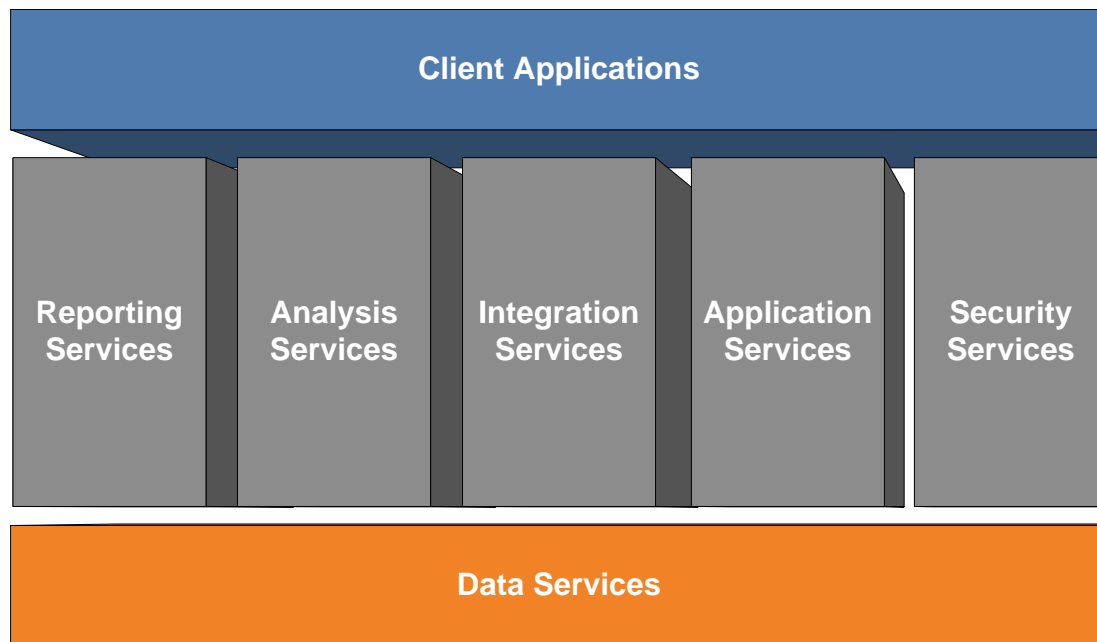
2 SunSystems v5 Architecture

2.1 Introduction

SunSystems v5 is a multi-tier application suite that is designed to be flexible enough to meet a wide variety of implementation scenarios. SunSystems v5 can be deployed anywhere from a stand-alone installation to a complex enterprise solution; these are covered in more detail in the deployment section.

Although an installation can be attempted without extensive knowledge of the products, you should become familiar with the internal architecture of SunSystems v5 and how it is designed in order to better understand the possible deployment options.

From a logical perspective, the SunSystems suite of applications can be depicted as a set of services. These services interact to provide a rich set of functionality, presented through a variety of client applications both rich and web based.



A typical SunSystems solution consists of most if not all of these services. When planning a deployment, the required functionality is mapped against factors, such as the number of users and the volume of transactions, to determine the correct physical implementation.

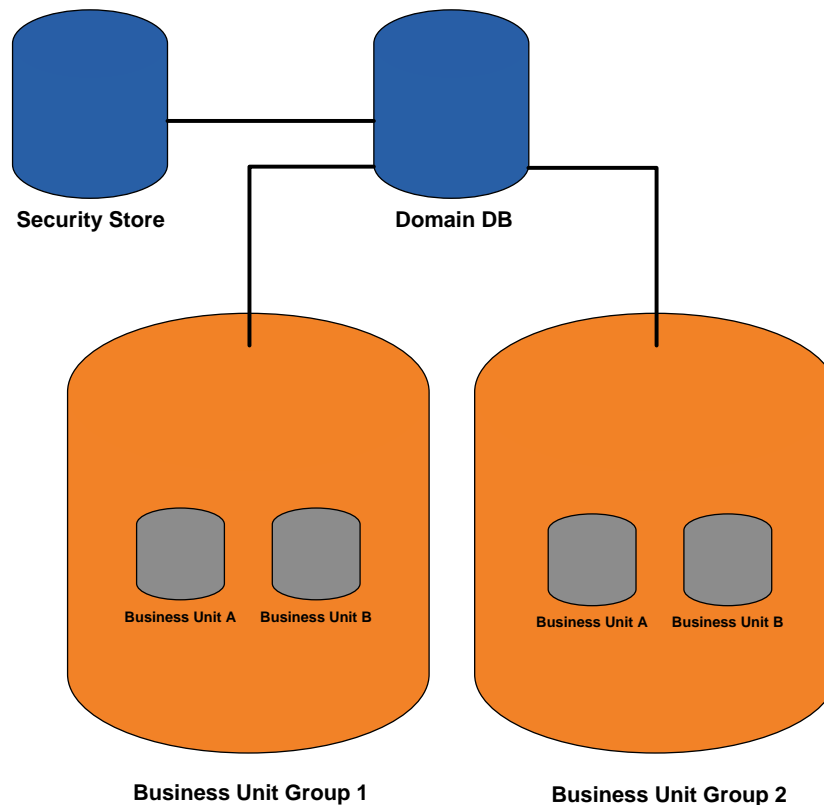
The following pages explain the architecture of the core components and highlight the key factors for consideration when implementing the software and planning for on-going maintenance and future capacity.

2.2 Database Services – RDBMS Implementation

SunSystems currently supports Microsoft SQL Server and Oracle, and although they are different in terms of implementation, the same logical constructs are used in both. For simplicity, the diagrams within this document are based on SQL Server concepts; for example, they refer to Database rather than the Oracle equivalent of Schema. For specific details about installing on an Oracle platform, refer to the Oracle installation guide.

Central to a SunSystems installation are the SunSystems domain and security databases. The Domain database stores system-wide configuration information and certain common data; the security database holds user, group, and other security-related data.

Business data is organised in Business Units, which is a logical reference to a trading entity against which transactions and static data are held. A physical database can hold one or more business units and is referred to as a Business Unit Group.



An organisation might have more than one SunSystems Domain database, but each database will require separate serialisation unless it is being used as a temporary location to test upgrades or as part of a disaster recovery strategy.

A domain database can administer databases local to its server and those that are located on a separate server. This separation of a database to another server can be useful as a means of scaling out by dispersing the load on the database tier across several different servers. For more detailed configuration instructions, refer to the section on configuring linked servers in the installation guide.

2.3 Server Files

SunSystems uses the file system to store user forms and other common elements, which are located in a local directory on the application server or, for a multi-application server environment, stored in a shared location, usually the database server.

2.4 Security Services

The security service and its associated components are referred to as SunSystems Security and provide essential services, such as authentication, authorisation, and user management. SunSystems security integrates with the operating system and the SQL Server to provide a robust and flexible way of implementing a secure environment for SunSystems applications. On Oracle, SunSystems security uses the operating systems authentication model.

Although a section covers security in this document, more in depth information can be obtained from the separate SunSystems Security Installation Guide.

2.5 Application Services

At the core of SunSystems is a robust session-based application with a variety of clients, tools, and designers that utilises the services provided. The primary components are the Session Manager Service and the Navigator front end.

2.6 Navigator

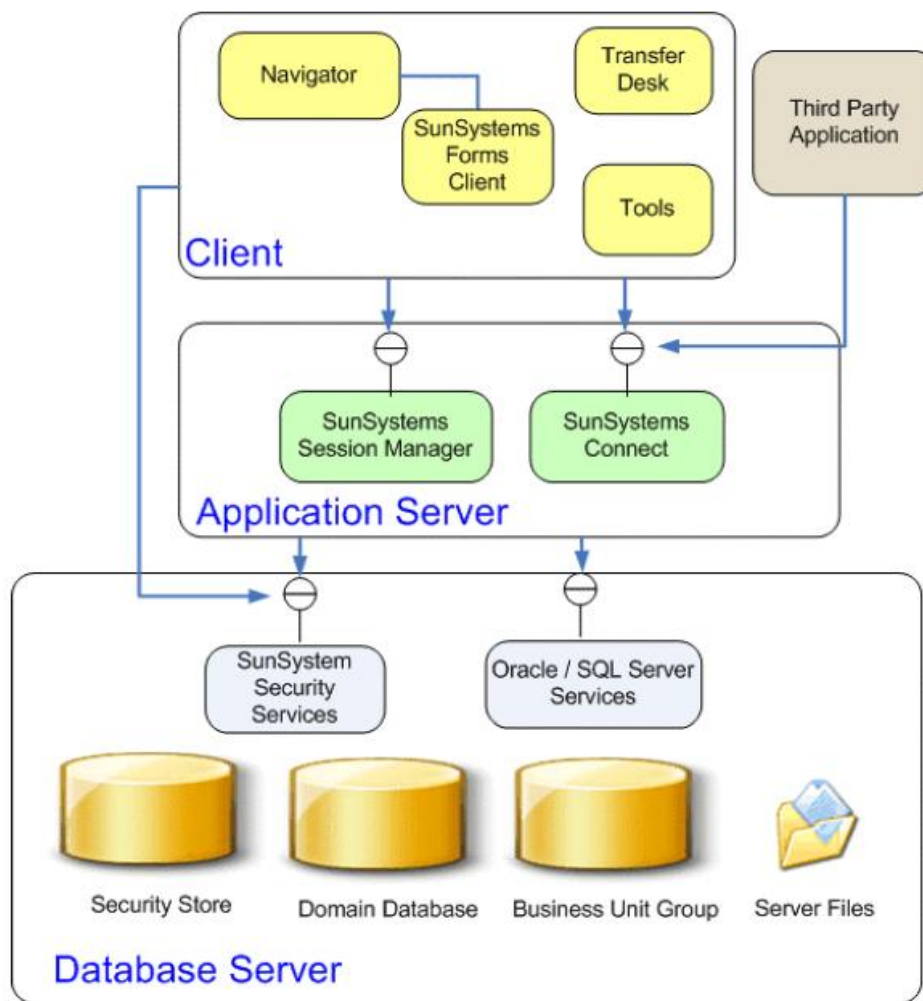
Navigator provides the initial user interface when using SunSystems. Navigator is a flexible, menu-driven client that allows customisation of content at a user level and it is from here that users can invoke functions, execute reports, and access other SunSystems components. The interface allows up to nine SunSystems functions to be launched simultaneously and also multiple reports and designer tools. If required, third party applications can also be referenced and added to a user's menu.

2.7 Session Manager Service

The Session Manager Service manages the invocation of user sessions when requested from Navigator. The Session Manager Service uses a process-based model, which results in a dedicated process being created to service each user session. In the unlikely event of one user session crashing, others would remain isolated and short of a full system or hardware failure would not be affected.

2.8 Integration Services – SunSystems Connect Service

SunSystems Connect (also known as SSC) provides an XML-based and SOAP-based web service that allows both SunSystems clients and third party applications to interact with SunSystems programmatically. The primary SunSystems tool that utilises this interface is Transfer Desk, which provides powerful import/export and transformation capabilities. Many customers have also exploited this interface to extend the functionality of SunSystems and to integrate seamlessly with other applications.



2.9 Reporting Services

The operational reporting and commercial document production capability of SunSystems v5 is delivered through the SunSystems v5 Report Writer Facility (RWF), which is a client-based reporting solution, based on Actuate eReporting components. An optional server-based reporting solution, SunSystems Report Server, based on Actuate iServer can also be deployed.

Irrespective of the reporting model implemented, SunSystems provides a Report Manager application which is used to invoke, view, and print reports. The implementation of Report Server provides extensive additional capabilities, such as web-based access, off-line scheduling and greater scalability.

SunSystems v5 Report Writer Facility and SunSystems Report Server include certain reporting applications owned by Actuate, which can be used only with data primarily generated, that is, at least 80 percent generated in the aggregate, by SunSystems v5.

NOTE: To ensure correct UI display, Arial Unicode MS font, ARIALUNI.TTF, must be installed on computers where RWF is to be run.

3 Deployment

Central to SunSystems' design is built-in flexibility to fit a variety of scenarios, from the simple stand-alone installation to a full enterprise deployment. Each tier of a solution has the option of scaling out its load across several servers and also taking advantage of additional processing power should scaling up be required.

To depict the various deployment options available, it is useful to group the logical functions together, into what would normally constitute a physical server.



Database Server
Microsoft SQL / Oracle Server
Security Services



Application/integration Server
SunSystems Session Services
SunSystems Connect Services
Windows 2003 / 2008 Server



Report/Web Server (Optional)
SunSystems Report Server
Actuate iServer
Windows 2003 / Vista Enterprise / XP Pro



Terminal/Citrix Server
Citrix Presentation Services
Microsoft Terminal Services
SunSystems Client applications
Windows 2003 / 2008 Server

The following sections describe stand-alone, two-tier and three tier deployments; also, scenarios for scaling your implementation, and incorporating equipment redundancy into your deployment to help cover in the event of hardware failure.

NOTE: For the purposes of the scenarios shown, it is assumed that the Security service is located on the database server, but not shown on the diagrams, and Server files are located on the database server.

3.1 Stand-alone

All components, both server-side and client-side are installed locally. Locating all the software locally is only for demonstration purposes or where a single user installation is required.

Hardware specification is important to ensure satisfactory performance. Operating system and application software requirements must also be observed across all products to be deployed.

Achieving a Stand-alone Deployment

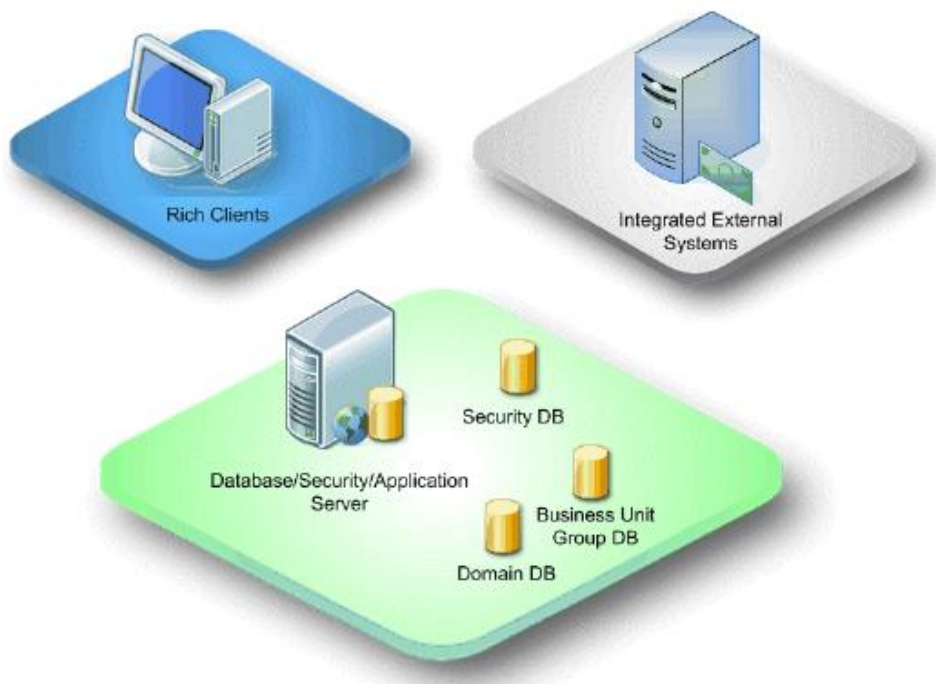
To achieve a standalone deployment, on the same computer, complete the procedures that are detailed in the following sections of the appropriate installation guides:

- ▶ SunSystems Security Installation Guide >> Installing SunSystems Security
- ▶ SunSystems v5 Installation Guide >> Database Installation
- ▶ SunSystems v5 Installation Guide >> Application Server Installation
- ▶ SunSystems v5 Installation Guide >> SunSystems Client Installation.

3.2 Two-Tier

All server components are installed on a single server. Client software is deployed on each client in the network. If required, web-based access can also be enabled to widen the reach up to the capacity of the hardware.

A two-tier solution is often ideal for the small office environment; it is also easy to split out any or all of the server components to meet the demand for application resources. For sizing advice, contact your regional office.



Achieving a Two-Tier Deployment

To achieve a two-tier deployment:

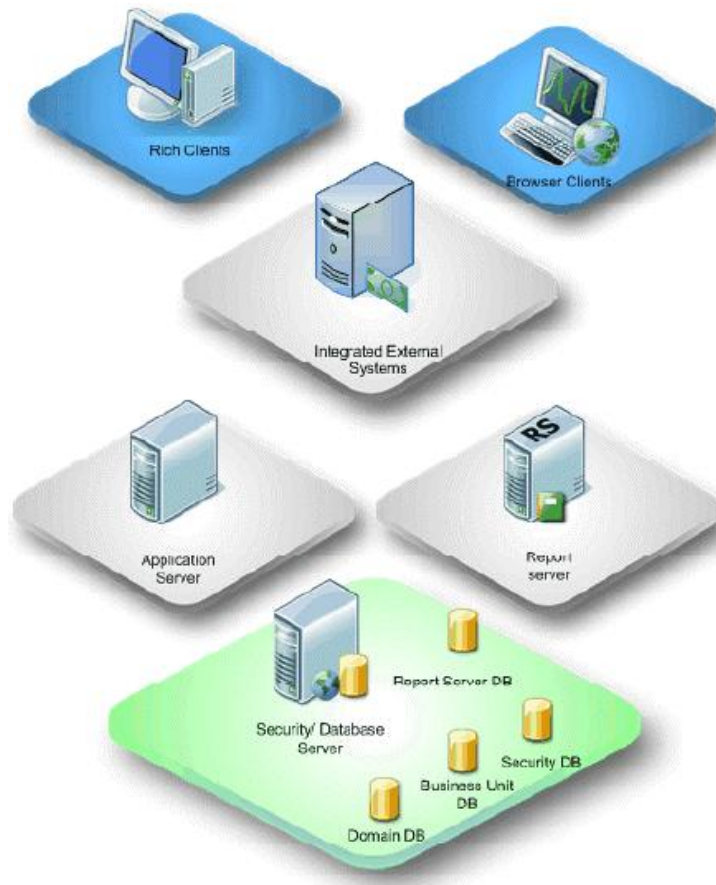
1. On the computer that is to be used as the database/application server, complete the procedures that are detailed in the following sections of the appropriate installation guides:

- ▶ SunSystems Security Installation Guide >> Installing SunSystems Security
- ▶ SunSystems v5 Installation Guide >> Database Installation
- ▶ SunSystems v5 Installation Guide >> Application Server Installation.

2. On the computer(s) that is (are) to be used as the client(s), complete the procedures detailed in the SunSystems v5 Installation Guide >> SunSystems Client Installation.

3.3 Three-Tier Configurations

Three-tier deployments open up a range of deployment configurations and offer the greatest flexibility in terms of organising the services and hardware needed to implement a SunSystems solution. Three-tier solutions are implemented for the larger office environment and can be extended to scale even further.



Achieving a Three-Tier Deployment

To achieve a three-tier deployment:

1. On the computer that is to be used as the database server, complete the procedures that are detailed in the following sections of the appropriate installation guides:

- ▶ SunSystems v5 Installation Guide >> Database Installation
- ▶ SunSystems Security Installation Guide >> SunSystems Security Installation.

2. On the computer that is to be used as the application server, complete the procedures that are detailed in the SunSystems v5 Installation Guide >> Application Server Installation section.

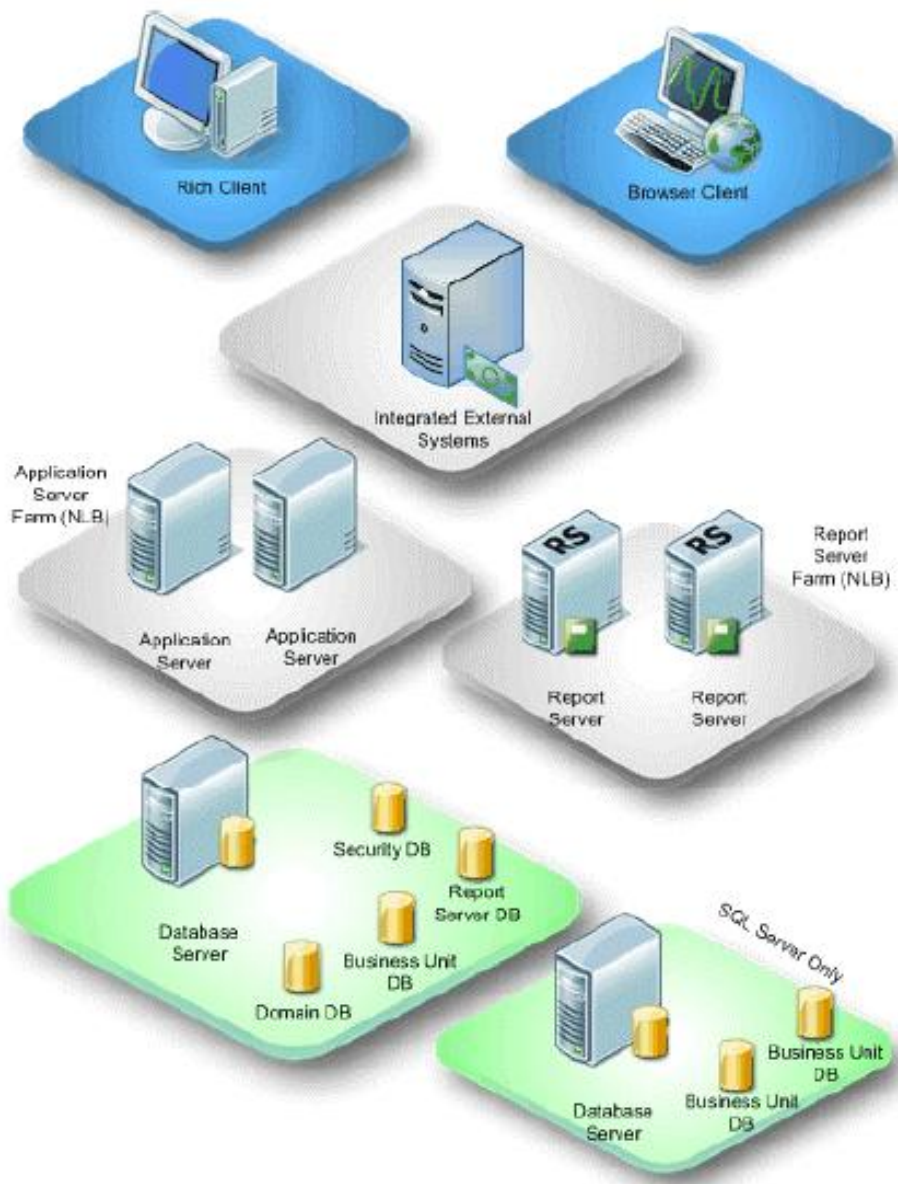
3. On the computer(s) that is (are) to be used as the client(s), complete the procedures that are detailed in the SunSystems v5 Installation Guide >> SunSystems Client Installation section.

4 Scalability

As the demands on the system increase, in terms of user numbers or high throughput, the capacity of a straightforward three-tier implementation will eventually reach a point where performance starts to suffer. Although replacing a server with a more powerful server is always an option, this is usually not the most cost-effective or practical approach. Several different factors influence the hardware required, not least of which is the predicted growth rate in terms of users and processing load.

The only effective way to manage such a dynamic environment is to avoid placing limitations on deployment configuration. SunSystems approach is to embrace a scale-out model, whereby additional servers can be added to a given tier in order to add capacity.

NOTE: SunSystems installation on Oracle does not support multiple databases.



Each tier has different ways to scale; the database server scales through the introduction of additional database servers. Applications request the location of the Business data that they need to access and, subject to the security constraints applied, can then connect directly to the correct business unit; this is because the domain database that is used by SunSystems maintains a central list of databases.

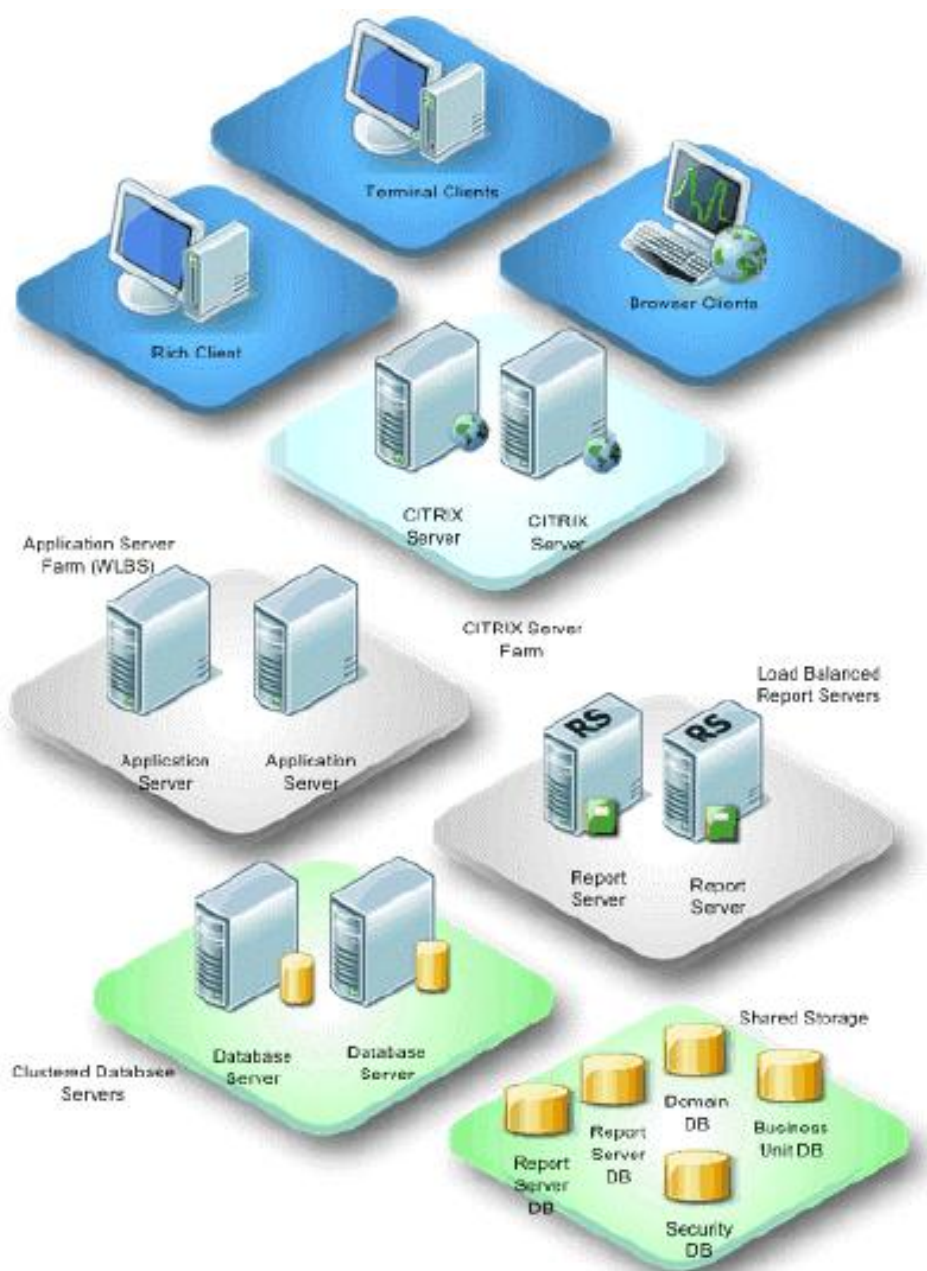
An application server can be cloned as many times as necessary to provide several identical servers that provides the same services. These are then linked together using Windows Network Load Balancing (NLB) to create a virtual server address that can be referenced by the clients. After this has been configured, servers can be added and removed from the server farm without the need to change the configuration of clients or other servers that make up the implementation. The SunSystems Connect web service gateway can also be load balanced in the same way.

SunSystems Report Server supports distributing requests to multiple servers that handle load balancing in a server cluster.

5 Redundancy

All tiers of a SunSystems solution have options to scale to meet user demand; however, this might not be the only reason why additional servers are introduced. Using WLBS offers scalability but also redundancy. As long as one of the servers in a farm is available, the system can function, albeit at a reduced capacity. Other techniques, such as keeping standby servers, are also valid although there would be a time lag before access to services could be resumed in the event of a failure.

Database server resilience can be increased through the use of Clustering. SunSystems is not a cluster-aware application, so it cannot detect and handle failover; however, it can still take advantage of the greater availability that clustering offers.



The previous diagram shows several supported possibilities:

- ▶ More than one load balanced farm, one being for application services and one being for reporting servers.
- ▶ A load balanced Citrix tier.
- ▶ Clustered data server.

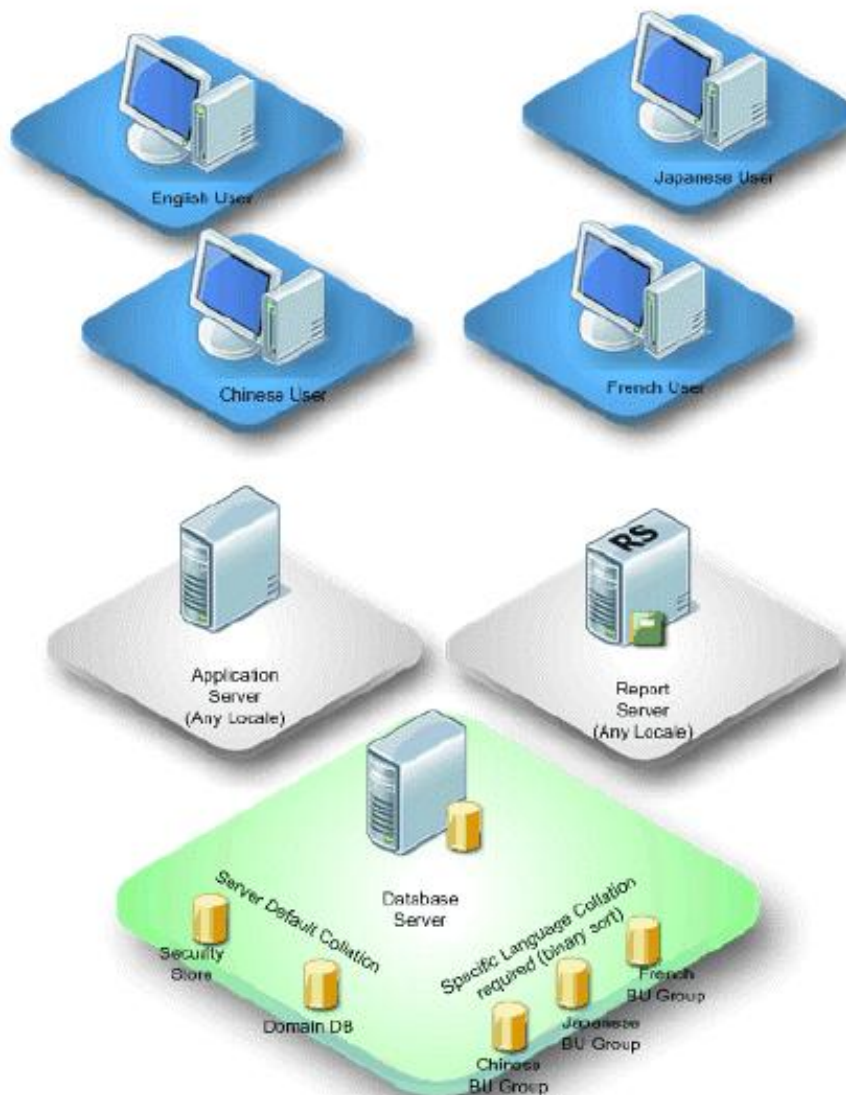
SunSystems supports the use of terminal services or Citrix to expose the client interfaces in scenarios where the standard model is inappropriate. For example, SunSystems supports non-Windows based clients where strict centralised management is being enforced, or to deliver the rich forms-based interface through a browser. For large user communities, multiple Citrix servers are required and these can be load balanced using the tools available with Citrix.

6 Multilingual Configurations

SunSystems supports a wide range of languages, both in terms of user interface and stored multilingual data. If implementing a mixed language solution, it is important to understand the way in which data is managed at each tier because it might influence the system architecture.

SunSystems multilingual settings depend upon the following three areas:

- ▶ SunSystems Database Codepage, language installation on application server and client. All the required languages must be serialized.
- ▶ User language setting in User Manager.
- ▶ Multilingual SunSystems Installation on the Citrix Server.

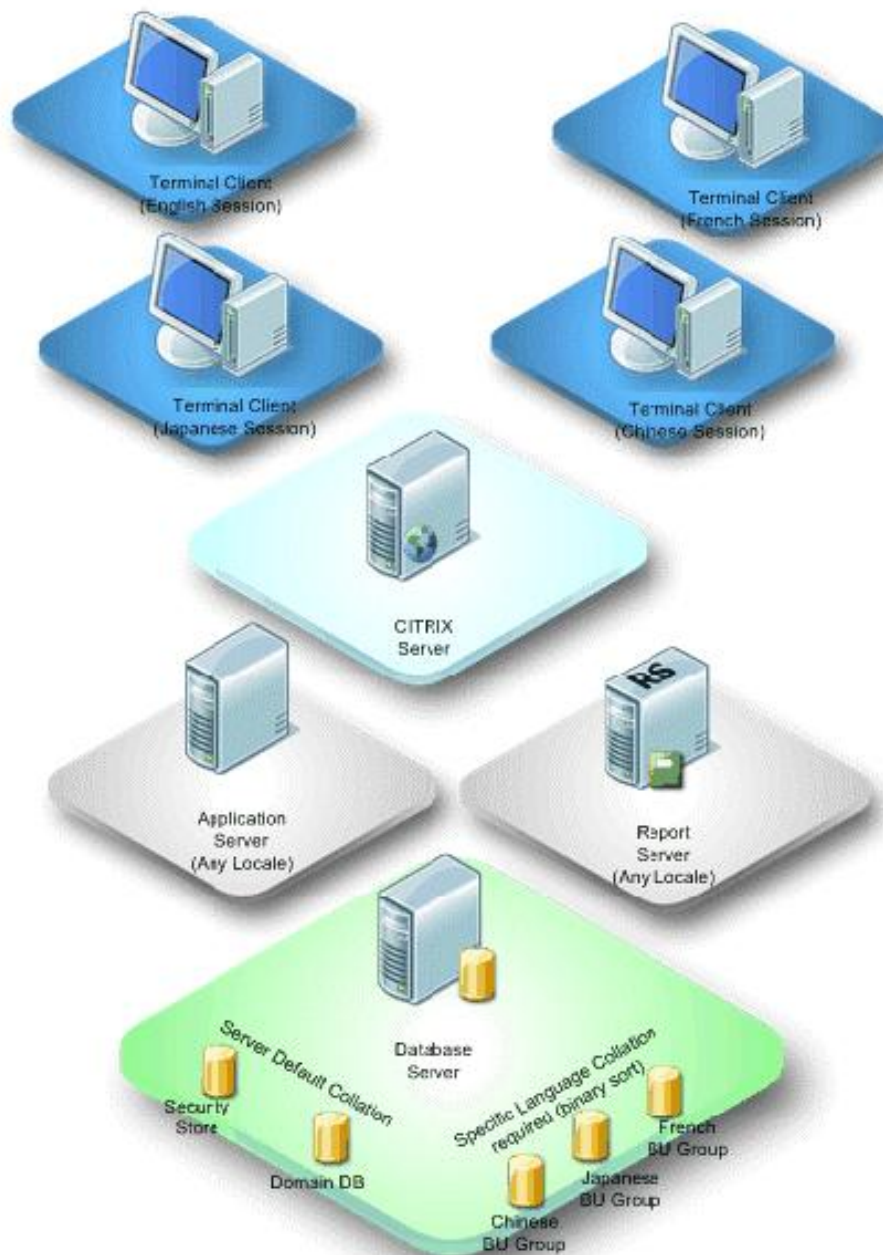


The SunSystems Domain and Security databases are language neutral, because the data is stored using Unicode. Business Unit Group databases, which might contain more than one Business Unit, must be created using the collation that corresponds to the data that will be held within. Therefore, Western European language Business Units could all reside in a single Business Unit Group because they share the same collation, but Chinese and Japanese Business Units would need to have their own Business Unit Group databases because their collations differ.

Client, Application, Integration, and Reporting servers are language neutral and do not impose any specific multilingual requirements, as long as the required language is installed as part of the installation, and the host operating system supports the required language.

7 Multilingual Configuration with Citrix

SunSystems multilingual configuration can also be achieved using Citrix. For this to work, SunSystems client software that is published from a Citrix server must be installed with all required languages. The Citrix Server must have the multi-lingual support for each desired codepage to be used and the user should then be configured such that their locale matches that of the SunSystems database being accessed. Every SunSystems user in SunSystems security must also be configured for the required language. This setup will make the SunSystems deployment easy and all the languages will be available from a single point of access



8 SunSystems Database Codepage

The SunSystems database codepage should be suitable for the required language, for example, SQL Server collation 'Chinese_PRC_Bin' should be used for simplified Chinese language. SunSystems database installer includes this check for SunSystems standard languages. If the target language is not SunSystems standard language, then this is responsibility of database administrator to select the correct codepage for the language.

When selecting multiple languages during the SunSystems database installation, please select one of these languages as 'Base Language'. The codepage selected during the installation should be suitable for additional languages.

Note: SunSystems supports only the binary collations in SQL Server. SQL Server localization (e.g. SQL Server in German) is neutral for database codepage.

SunSystems for Oracle does not support multiple Oracle database instances linked to a single SunSystems Domain Database. The character set of the Oracle database instance should be suitable for the character data you intend to store in it, for example, use 'WE8MSWIN1252' for Western European languages.

9 SunSystems Application Server and SunSystems Security

During the SunSystems application server installation, you must select the required languages to be supported by SunSystems. All the languages selected during the installation should be consistent with SunSystems serialization. The base language on SunSystems application server should be same as the base language on SunSystems database server.

SunSystems Security has two different language settings as follows:

- ▶ User Language
- ▶ Operator Language.

SunSystems Security User Language is used in User Manager only. SunSystems Operator language is the language used in SunSystems v5.

SunSystems Operator language setting is used by SunSystems to show on the forms, reports and SunSystems user interface. The only exception is the first login screen where SunSystems has no information of who is logging in. The login screen derives its language from Windows User Locale.

Note: SunSystems does not support double byte file names, for example, the output file name in Japanese. Use a single byte language for file names.

10 SunSystems Client and Citrix Server

To publish SunSystems client via Citrix, it must be installed on the Citrix server. During the SunSystems Client installation, select the desired languages. The languages selected during the installation should be consistent with the serialization.

When SunSystems is run on a client machine, SunSystems uses the Windows User Locale from “Regional and Language Options” for the login screen language.

After a user has successfully logged in, SunSystems will drive its language setting from SunSystems Operator language setting in User Manager.

To set up multilingual SunSystems on Citrix server, carry out the following steps:

1. Create a user in SunSystems security and select the required operator language. Ensure the user has required privileges to run SunSystems. The Business Unit selected for the user should be consistent with the selected language.

2. Citrix users who want to use a specific language should have their Windows User Locale set as that language, for example, Chinese. This can be achieved by either:
selecting the required language in “Regional and Language Options” on the Citrix server for every Citrix user or running Windows logon scripts and setting the registry key “HKCU\Control Panel\International” to the required language settings on the Citrix Server.

Publish the SunSystems Client and give access to the Citrix user(s) configured above.

11 Printing

SunSystems 5 is compatible with the Microsoft Windows printing software and the printer used should be capable of printing at least 132 characters per line.

12 Virtualisation

Virtualisation software, such as VMware or Microsoft's Hyper-V, provides an abstraction layer between the operating system and the physical machine environment. It enables an operating system and dependent applications to run within an isolated virtual machine, making it possible to run multiple operating systems simultaneously on a single physical server, or to encapsulate the

Operating System configuration and application software so that it can easily be moved from one physical environment to another, or restored to a known state.

What is Infor's recommendation in relation to running Infor FMS SunSystems on virtualisation software?

Historically, virtualisation has generally been used to enable multiple SunSystems environments to exist on a single machine (for example to facilitate testing), and this has only been supported for non-production environments. However, in light of advancements in virtualisation technology and a better understanding by implementers of the implications of virtualisation, Infor has now revised this position.

SunSystems is specifically tested and supported on a variety of operating systems. The use of virtualisation software does not change the operating systems supported – rather, the virtualisation software guarantees to provide a transparent layer in which the hosted operating system can function. It is therefore the responsibility of the virtualisation software to ensure the operating system level compatibility that SunSystems is dependent upon.

So, from a purely functional perspective hosted software will work in the same way. However, certain technical and configuration considerations need to be taken into account especially where they affect the behaviour of the virtualisation software. Issues such as the amount of CPU power and memory available, the configuration of the disk I/O subsystem and the network infrastructure can all influence the deployment. In cases where multiple virtual instances are hosted together, further allowances must be made to ensure that the virtual layer has the necessary resources to provide a satisfactory user experience.

Any adoption of virtualisation software needs to be underpinned by a sound understanding of the benefits versus the costs. There are both advantages and disadvantages in using this technology but if used correctly can greatly enhance the flexibility and utilisation of an organisation's IT infrastructure. Infor therefore recommends that such an important deployment decision be planned thoroughly if necessary in consultation with professional services from your system provider.

What is Infor's policy in terms of supporting installations running on virtualisation software?

Given that an implementation using virtualisation software has been correctly sized to provide adequate system resources we will fully support SunSystems deployed in this environment for both test and production environments.

We will not directly support the virtualisation technology used; this is the responsibility of the relevant vendor.

Reported support issues will be investigated in the normal way but we reserve the right to ask a customer to reproduce the issue outside of a virtual environment if we believe that the issue may result from a failure of the abstraction layer, or its configuration, to provide a suitable application environment.

13 Hardware Recommended Specification

The following section highlights the optimal recommended hardware specifications for application/database servers, thin client delivery servers (Terminal servers/Citrix servers) and local installation 'Thick' clients.

13.1 Peripheral Hardware Requirements

- ▶ Network Software/Adapter, a 100/1000 Mbps Ethernet network adapter is recommended.
- ▶ Graphics Card, a video card and a monitor supporting 256 colours are required. The settings for the screen area should be set to at least 800x600 pixels. This ensures the SunSystems 5 forms are displayed on the screen in their entirety.
- ▶ Printing, SunSystems 5 is compatible with the Microsoft Windows printing software and the printer used should be capable of printing at least 132 characters per line.

13.2 Software Requirements

SunSystems 5 is compatible with most versions of Microsoft operating systems. The tables below show the recommended operating systems to use:

NOTE the stated operating systems are purely based on SunSystems and would need to be confirmed based on additional third party modules.

Installation Type	Layers	Version of Windows Recommended
Stand Alone	All	Windows XP Professional (SP2), Windows Vista (SP1), Windows 7, Windows 2003 Server, Windows 2008 Server, Microsoft SQL Server 2005 (SP3), Microsoft SQL Server 2008 (SP1)
Two Tier	Client	Windows XP Professional (SP2), Windows Vista (SP1), Windows 7 (all editions)
	Application/ Database Server	Windows 2003 Server R2, Windows 2008 Server R2, Microsoft SQL Server 2005 (SP2), Microsoft SQL Server 2008 (SP1)
Three Tier	Client	Windows XP Professional (SP2)
	Application Server	Windows 2003 Server R2, Windows 2008 R2
	Database Server	Windows 2003 Server R2, Windows 2008 Server R2, Microsoft SQL Server 2005 (SP2), Microsoft SQL Server 2008 (SP1)

13.3 Users and Modules

The following table highlights the total number of users to be used for each module.

Module	Number of Concurrent Users
SunSystems 5.4	10
Infor PM QA 10.0.3 (Vision)	10
Time @ Works	200

13.4 Database Server Hardware Recommendations

This server will support,

- SunSystems Databases
- Time @ Works database

Component	Recommended Specifications
Operating System	Microsoft® Windows Server 2008 R2 – 64 bit
Processor (CPU)	2 x Intel® Xeon 2.66 GHz Quad Core or equivalent AMD Processor. (Expansion slot recommended). Quad Core processors are supported
Memory (RAM)	8GB (Expansion space recommended)
Disk Configuration	RAID 1 50 GB 15K System partition RAID 5 150-200GB 15K Data Partition
LAN	100/1000 mbps
Additional Software	Microsoft® SQL Server 2008 R2/SQL Server 2005 SP3 Standard Edition – 64 bit Microsoft® Data Access Components 2.8 + Microsoft® IIS 6.0 Microsoft® .NET Framework 1.1 Microsoft® .NET Framework 2.0 Microsoft® .NET Framework 3.5 SP1

Notes:

- i). The server should not be a PDC or BDC – Domain controller
- ii). This setup can setup with two servers(DB and App separated out.
- iii). Novell is not supported
- iv). Workgroup implementations are not supported

13.5 Application Server Hardware Recommendations

This server will support,

- SunSystems Application layer
- Time @ Works Web Server

Component	Recommended Specifications
Operating System	Microsoft® Windows Server 2008 R2 – 64 bit
Processor (CPU)	1 x Intel® Xeon 2.66 GHz Quad Core or equivalent AMD Processor. (Expansion slot recommended). Quad Core processors are supported
Memory (RAM)	6 GB (Expansion space recommended)
Disk Configuration	RAID 1 100 GB 15K System partition
LAN	100/1000 mbps
Additional Software	Microsoft® SQL Server 2008 R2/SQL Server 2005 SP3 Standard Edition – 64 bit Tools Microsoft® Data Access Components 2.8 + Microsoft® IIS 6.0 or 7.0 Microsoft® .NET Framework 1.1 Microsoft® .NET Framework 2.0 Microsoft® .NET Framework 3.5 SP1

Notes:

- i). The server should not be a PDC or BDC – Domain controller
- ii). This setup can setup with two servers(DB and App separated out.
- iii). Novell is not supported
- iv). Workgroup implementations are not supported

13.6 Sun & Vision Client PC Hardware Recommendations

The following settings highlight the minimum recommended client specifications for a client running the SunSystems Navigator locally.

Component	Recommended Specifications
Operating System	Microsoft® Windows XP Professional (SP3) Microsoft® Windows 7
Processor (CPU)	1 x Intel® Xeon, 2.8 GHz or equivalent AMD Processor. Dual core is supported.
Memory (RAM)	2 GB (Expansion space recommended)

Component	Recommended Specifications
Disk Configuration	5 GB free
LAN	100/1000 mbps
Additional Software	Microsoft® Data Access Components 2.8 + Microsoft® .NET Framework 1.1 Microsoft® .NET Framework 2.0 Microsoft® .NET Framework 3.5 SP1 Microsoft® Office 2003/2007 Microsoft IE 6.02, 7.0/8 Office 2003/2007

NOTE the application server must not be running as a Domain Controller.

NOTE for users using more than 4GB RAM and not in a x64 environment then Enterprise Edition of Windows must be used to make use of all available memory.

13.6 Licenses

In addition to application licenses (SunSystems, Infor PM QA or additional 3rd party products) the following additional licenses will be required:

- ▶ Windows 2003/2008 Client access licenses (CAL)
- ▶ Microsoft SQL Server CALs.
 - It may be better to get a CPU CAL due to the Time @ works users