Sage ERP X3 version 7
Architecture Guide

July 15, 2014

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1.0 Architecture introduction

1.1 General Overview

The following application software is developed using the technological platform **SAFE X3 version 7** (**S**age **A**rchitecture **F**or the **E**nterprise):

- Sage HR Management
- Sage ERP X3
- Sage Geode
- Sage FRP Fixed Asset

The software is created using a technical architecture organized in layers and designed to:

- Separate the layers of data management, process execution, and the presentation (3-tier architecture)
- Spread the load across one or more servers once the application is intended for a large number of users (scalability objective)
- Provide an implementation choice of different technical platforms and databases
- Allow a transactional use through graphical interfaces available for PC workstations (Windows & Mac), tablets, smartphones, and industrial terminals (radio frequency).

1.2 Folder concept

A folder is a repository base; it is likely to contain both the management rules, parameters, and the data for one or more companies.

A folder consists of both a directory tree on hard disk and tables stored in the database.

Folders are installed under two resources of the architecture:

- the application server
- the database server

When installing Sage ERP X3 Application Software, usually 4 folders are created:

- a reference folder also called 'parent folder', which contains the programs of the software itself

- a pseudo-folder named X3_PUB containing the publication objects (like: screens, windows, menus, menus profiles) used by the two types of Web and C/S interface
- a pseudo-folder named SERVX3 used for the management of batch server (it is not installed in the same subdirectory as the other folders)
- a demonstration folder named SEED to serve as a model folder from which it will be possible to create new folders by duplication

The administration needs are to:

- create new folders
- duplicate folders from a model
- remove some unnecessary folders
- backup folders

2.0 Components Description

All the resources described here under are logical components, which can be all installed under the same computer or distributed across several machines according to the number of users to be connected, the size of the database and the number of transactions to be treated. This model of distributed architecture offers an intrinsic high level of scalability.

2.1 Servers of the Application Solution

2.1.1 Database server

The database server stores both the application data and the description data for this application (dictionary).

This database is organized as a hierarchy of folders, where the root folder is the image of the standard delivery and the other folders are the "customer" folders, generated from the root folder and each representing an application.

SAFE X3 technological platform products are developed according to the database editor recommendations, which guarantee the integrity and the coherence of the data stored into the database.

There is no limit of size for the database. The average size for the database can reach 20 to 30GB and over 100GB for the larger databases. To reduce the size of the database, there are some functions that can be used for purging or archiving the biggest tables.

2.1.2 Application & Main Processing server

Gives access to all the elements (processes, screens, reports...) that make up Sage ERP X3. These elements are organized in directories by folder and are not repeated from parent folder to child folder except when they truly belong to the child folder, otherwise it is the element from the parent folder that is used, remembering that only 3 folder levels are managed in this way.

It’s also on the Application & Main Process Server under which is running the Sage ERP X3 Batch Service in charge of batch processes launching and execution.

2.1.3 Additional Processing Server

These servers are in charge of carrying out treatments, to the exclusion of all that is "presentation", which is directly supported by the front-end Web Server.

We distinguish the main processing server and additional processing servers:

- The main processing Server: is mandatory and is located on the same machine as the application server. It is on that server that is running the batch task and treatments launched in batch mode via the Task Scheduler.
- The additional processing servers: are optional. They are used to distribute the load (CPU and memory), knowing that the user must specify in their URL the connection/process server name that they plan to use.

2.2 Other Technology Components

2.2.1 Print Server

This server is hosted by a machine running a Windows operating system. There can be multiple print servers in a solution depending on volume requirements for printing.

This is the server that supports all print requests from interactive sessions as well as batch submissions and redirects the result in various forms (pdf, doc, xls, prn ...) to the device destination: printer, disk file, or messaging.

A Windows service is started on the computer that hosts the Print Server, this service is listening to any submission of print jobs from clients or batch server tasks. The service is listening on port number 1890 by default, but it can be customized at during installation step. This service supports multiple simultaneous output print queues and a waiting queue.

The report files are transferred using the internal communication protocol SADFSQ, the Print Server has a client SADFSQ able to address and communicate with a server SADFSQ present under the Application & Main Processes Server.

2.2.2 Web Server

Web Server is a frontal server to be addressed by the end-users to open a session in Sage ERP X3 application through their Internet browser. (Note: This may be referred to as Syracuse during installation)

It works in asynchronous mode based on the software platform **Node.js** which contains a built-in HTTP server library, making it possible to run a web server without the use of external software, such as Apache.

Every page has its own URL and sends back to the client Java Script feeds (JSON format) that are SData normalized.

Operating data (windows customization, dashboard, endpoints, management roles, user information and even some electronic documents that users can register via their storage area), are stored locally in a document-oriented database system in MongoDB.

2.2.3 Web Services & Automated Data Collection (ADC) Server

It is a technical server used to manage the communication, with:

- the Automated Data Collection devices

- Web services

This technological Sage component encapsulates Apache HTTP and Apache Tomcat (web servlet container).

2.2.4 Java Bridge Server

It is the bridge server which could be used for publishing some external functions to the Sage ERP X3 Application Server. Those external functions are based on framework OSGI Equinox and can be used to extend the standard available functions by developing new OSGI plug-ins.

This component allows also to call External Web Services (SOAP, REST) and to send Rich Mail (including pictures, attached documents, etc…), from Sage ERP X3 Application Software.

This technological Sage component encapsulates Apache HTTP and Apache Tomcat (web servlet container).

2.2.5 Business Objects Server

It is the server hosting the Application Software Business Objects Enterprise XI and eventually the data warehouse. The function of the data warehouse is to consolidate information from the Sage ERP X3 production database to provide a context for reporting on, requesting and analyzing.

The Business Object Server can be deployed on Windows 2003 and above.

If the data warehouse is stored under another machine, it will be mandatory to install on the BO Server an Oracle Client Net 11 or an ODBC Driver for SQL Server.

Availability of this component expected from version 7.1 Patch 6.

2.2.6 Configuration Console

The Configuration Console is a tool developed in. NET used to install and administer the components of the technology platform SAFE X3. The Console configures the components and links them to define a solution (work environment).

The Console also harmonizes the methodology for installation on Unix, Linux, Windows, Oracle, and SQL Server

The Console uses different XML configuration files that are generated on each server when copying the component.

It can be installed on a workstation, but we recommend that you install it on one of the servers that make up the hosting infrastructure of Sage ERP X3.

2.2.7 Mail Server or SMTP Bridge

A Mail Server is a computer program or software that transfers electronic mail messages from one computer to another. Mail servers move and store mail over corporate networks, via LANs and WANs and across the Internet.

Sage ERP X3 users are not directly in contact with the Mail Server but used a mail client application (like: Outlook), or another binary program in charge of contacting the Mail Server to send electronic mail messages. SMTP is a relatively simple, text-based protocol used by the client to communicate with the Mail Server.

In the daily usage of the Sage ERP X3, the existence of a Mail Server is strongly recommended for the good working of the Workflow functionality. The supply and installation of this server does not fall within the functions of Sage or the details of this architecture.

2.2.8 Search Engine

In version 7, integrates Elastic Search, which is a free search engine (open source) based on the technology of the Lucene engine 100% Java under the Apache License 2.0 (there is no additional database engine to be installed).

This option allows indexing and search for some text in the application.

2.3 Client Workstations

2.3.1 Web PC Workstation

This workstation allows access to Sage ERP X3 Applications via a Web browser.

Usage:

- The application runs on the application server, the user is using its Internet browser to enter a URL for accessing a default portal or another portal if several are available for him
- Displays, keystrokes and mouse movements are exchanged with the customer according to the http/https protocol.
- Running the Internet browser requires a minimum of CPU power and memory on the client Workstation

Several versions of Web browsers can be used:

- Workstation under : Windows 7, Windows 8, Windows 2012 Server
  - Internet Explorer version 10 and 11
  - Chrome version 33 or higher
  - Firefox version 28 or higher
  - Opera version 20 or higher
- Workstation under : Mac OS X
  - Safari version 6 or higher

2.3.2 Web Smartphones and Tablets

Other devices can also provide access to Sage ERP X3 Applications (subject to certain conditions of display).

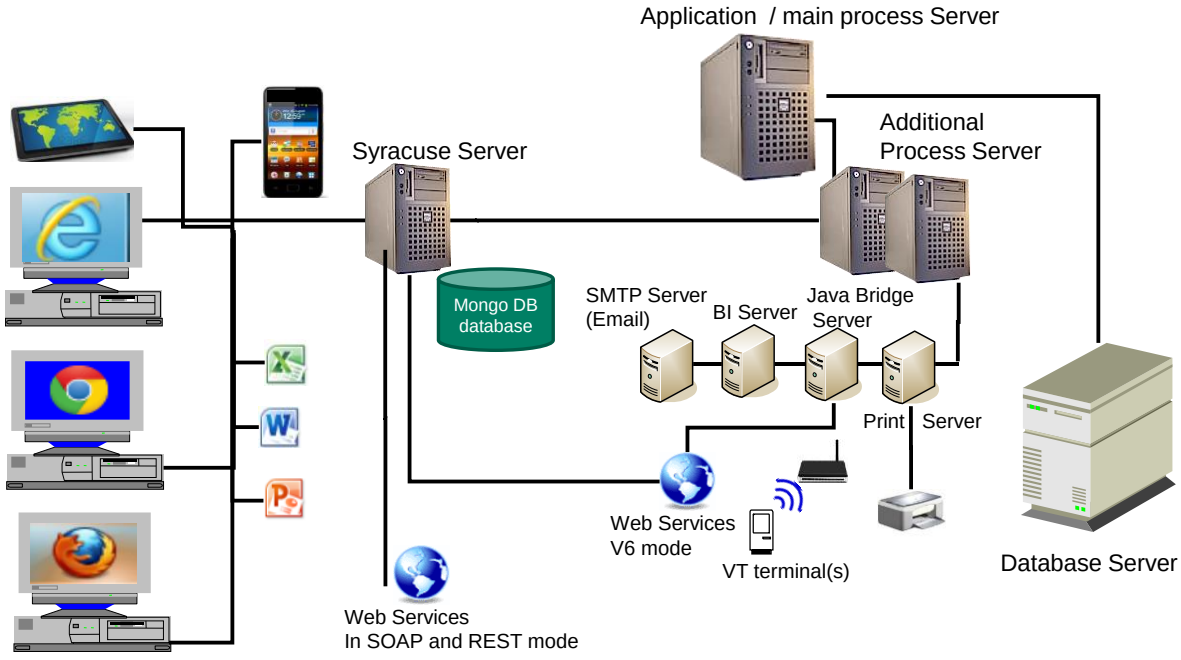
Different kinds of devices have been tested for compatibility:

- Smartphone
  - Apple iPhone 4 and 5 running IOS 7.0 or higher
  - Android Phones running Android OS 4.2 or higher
- Tablet
  - Apple iPad (2, Air, mini) running IOS 7.0 IPAD or higher
  - Android running Android OS 4.2 or higher
  - Microsoft Surface running Windows RT

2.4 Development platform

- development Workbench : Safe X3 Framework
- development language for the Web Interface : JavaScript, HTML5
- development language for the application software : Sage X3 4GL
- the exchange protocol between the Client and the Web Server is pure HTTP (according to the HTML 5.x specification) and Sage Web application interface is built on a technology like Ajax
- Tool for packaging applications : IzPack (Opensource on the Java platform)

2.5 General schema of the technical architecture



3.0 Network & Bandwidth

3.1 Network requirements

A Gigabit link is necessary between the different servers which will host the Sage applications.

These servers must all be part of an Active Directory Domain, and be part of the same branch (same IP address range). Only exception: the frontal servers: Web (Sage), Microsoft Terminal Service or Citrix XenApp, which can be part of a DMZ-type sub-network.

- When some machines on the internal network need to be accessible from the outside, it is often necessary to create a new interface to a separate network, accessible both from the inside and from the outside, without putting the whole enterprise security at risk. "DMZ" or Demilitarized Zone designates this isolated area, which hosts applications accessible to the public.

The different servers must also be registered in a DNS domain, allowing the different machines to recognize their FQDN (fully qualified domain name) including that of Unix-Linux machines.

The servers under which will be installed the Sage components should not be used as Windows Domain Controller (DC) as well as Primary or Backup Domain Controller.

The Safe X3 components talk to each other through sockets. In case of timeout or disconnection due to security components like firewalls, some Sage components are able to retrieve the socket connection for some other components, the Sage parameters needs to be modified in order to synchronize the timeout of the user's connection with the firewall rules. If you are in this case, we suggest you check first if everything is working properly, otherwise change the firewall rules so that sockets are not disconnected or closed.

We also strongly advise the enforcement of the same values for speed and transfer modes between the network card(s) installed on the servers and the ports of the switch(es).

3.2 Network bandwidth between workstation and front-end Servers

Workstation	**Front-end Server**	**Bandwidth** *without printing and BO requesting*
Web Client	Web Server (Sage)	40 Kb/s per user
Web Client via RDP protocol	Terminal Service (Microsoft)	24 Kb/s per session

Web Client via ICA protocol	XenApp Server (Citrix)	12 Kb/s per session
ADC client	Web Server (Sage)	20 Kb/s per device

3.3 Antivirus

There is no contraindication to install antivirus software on the servers, however we recommend for performance problems to disable real time protection and favor instead a review of files at night when there is little or no user logged in.

Directories to be excluded from the real time protection if it is active:

- The directory that is on the application server "... \Folders" and all its subdirectories must be excluded from the scan disk
- The directory "... \Runtime" which is on the application server and contains many trace files

3.4 Microsoft Update

We recommend taking all necessary precautions when passing Microsoft Updates because even if we did almost never met, there is always a risk that they may alter the functioning of the system environment on which run Sage applications.

We therefore recommend testing the installation of Microsoft updates previously in a Pre-production and verification of the continuity of operation Sage applications prior to their installation into the production environment.

Before applying these updates either in the production environment or pre-production, we also urge companies to conduct a full system backup to easily turn back in case of a serious anomaly detected.

If an incident is encountered in the use of Sage applications following the implementation of a Microsoft update, we will strive to give you all of the necessary assistance to identify the problem with the objective of resolving the situation as quickly as possible.

FYI: Sage integrates many of the global Windows patches on our own network and qualification environments. Because an update works well at Sage that does not guarantee it will work in all environments; based of this we recommend to follow the best practices above.

We also alert your attention concerning the updates of Microsoft Internet Explorer that sometimes modify the security zone of "trusted sites". If upgrading to IE, we recommend checking that the browser settings still meet Sage prerequisites.

3.5 Virtualization

The estimates provided within this document are based upon physical hardware. However, there is no contraindication deploying the solution within a virtualized environment like VMware Infrastructure 3, VMware vSphere 4 or Hyper-V.

Most Sage ERP X3 components can be deployed within virtualized machines, you will find the list below:

- Application & Main processing Server
- Additional processing Server
- Print Server
- Web Syracuse Server
- Elastic Search Server
- Web Services & RF Server
- Java Bridge Server

However, we wish to draw your attention to the fact that when we decided to virtualize its architecture, it must acquire and develop physical infrastructure adapted to the world of virtualization for getting optimum performance. It is recommended that you do not share resources but have dedicated resources assigned to your environment.

This architecture must be composed of Blade Center with multiple blades with an external storage device type SAN array secure. Also provide tools to acquire adequate backup so that you can save online virtual machines and possibly consider a redundancy of the bay and physical blades.

Prerequisites sizing of virtual machines hosting the Sage ERP X3 components remain unchanged from the pre-requisite standards. Overall, we can estimate the order of 5 to 15% lower performance of a virtual architecture compared to a physical architecture. It will then size the physical servers running virtual machines accordingly.

For project environments (like development, roll-out, training, recovery, etc.), deploying the database within a virtual infrastructure is possible because the performance is not a major issue.

For production environment, we recommend that the database component be installed on a physical server to a better control of performance. However, if Customer decides to install this component on a virtual infrastructure, the Editor Sage cannot predict the performance of their applications software that has not been implemented in a system enabling optimum performance.

4.0 Configuration of the resources

4.1 List of the Operating System available

Resources	Operating System versions
Database Server	Windows Server 2008 (R2) x64, 2012 (R2) x64 Red Hat Enterprise Linux AS x64 release 6.4 Oracle Enterprise Linux 6.4 x64 IBM Aix 7.1
Application & main processing Server	Windows Server 2008 (R2) x64, 2012 (R2) x64 Red Hat Enterprise Linux AS x64 release 6.4 Oracle Enterprise Linux 6.4 x64 IBM Aix 7.1
Additional processing Server	Windows Server 2008 (R2) x64, 2012 (R2) x64 Red Hat Enterprise Linux AS x64 release 6.4 Oracle Enterprise Linux 6.4 x64 IBM Aix 7.1
Print Server	Windows Server 2008 (R2) x64, 2012 (R2) x64
Web Server	Windows Server 2008 (R2) x64, 2012 (R2) x64 Red Hat Enterprise Linux AS x64 release 6.4 Oracle Enterprise Linux 6.4 x64
Elastic Search Server	Windows Server 2008 (R2) x64, 2012 (R2) x64 Red Hat Enterprise Linux AS x64 release 6.4 Oracle Enterprise Linux 6.4 x64
Web Services & ADC Server	Windows Server 2008 (R2) x64, 2012 (R2) x64
Java Bridge Server	Windows Server 2008 (R2) x64, 2012 (R2) x64
Business Objects Server	Windows Server 2008 (R2) x64, 2012 (R2) x64
Web Client Workstation	Windows 7 and 8 (x86, x64) Windows Server 2008 (R2) x64 / 2012 (R2) x64 Mac OS X

4.2 List of the database versions

Operating System	Database versions
Windows Server 2008 (R2) x64 Windows Server 2012 (R2) x64	Oracle Database 11g R2 (11.2.0.4) 64-bit Standard & Enterprise SQL Server 2012 SP1 Standard & Enterprise Named instance Binary sort order mixed mode authentication (SQL Server & Windows)

All Unix and Linux platforms	Oracle Database 11g R2 (11.2.0.4) 64-bit Standard & Enterprise

4.3 Distribution of components 2-tier Architecture

Resources	Processes	Process origin
DATABASE & APPLICATION MAIN RUNTIME WEB SERVER SEARCH ENGINE PRINT SERVER	1 x oracle.exe / instance 1 x sqlserver.exe / instance 1 x adxdsrv.exe / solution 2 x n x adonix.exe n x sadora.exe / sadoss.exe 1 x node.exe + mongodb.exe 1 x ElastSch.exe 1 x adxsrvimp.exe	engine SGBD Oracle engine SGBD SQL Server X3 main engine X3 process X3 process http Server Search engine Sage print server
CLIENT WORKSTATION	iexplore.exe, firefox.exe, chrome.exe, safari.exe	Internet browser

4.4 Distribution of components 3-tier Architecture

Resources	Processes	Process origin
DATABASE	1 x oracle.exe / instance or 1 x sqlserver.exe / instance	engine SGBD Oracle engine SGBD SQL Server
APPLICATION MAIN RUNTIME WEB SERVER SEARCH ENGINE PRINT SERVER	1 x adxdsrv.exe / solution 2 x n x adonix.exe n x sadora.exe / sadoss.exe 1 x node.exe + mongodb.exe 1 x ElastSch.exe 1 x adxsrvimp.exe	X3 main engine X3 process X3 process http Server Search engine Sage print server
CLIENT WORKSTATION	iexplore.exe, firefox.exe, chrome.exe, safari.exe	Internet browser

4.5 Distribution of components > 3-tier Architecture

Resources	Processes	Process origin
DATABASE	1 x oracle.exe / instance or 1 x sqlserver.exe / instance	engine SGBD Oracle engine SGBD SQL Server
APPLICATION MAIN RUNTIME	1 x adxdsrv.exe / solution n x sadfsq.exe	X3 main engine X3 process
ADDITIONAL RUNTIME	1 x adxdsrv.exe / solution 2 x n x adonix.exe n x sadora.exe / sadoss.exe	X3 additional engine X3 process X3 process
WEB SERVER	1 x node.exe + mongodb.exe	http Server

	1 x ElastSch.exe	Search engine
PRINT SERVER	1 x adxsrvimp.exe	Sage print server
CLIENT WORKSTATION	iexplore.exe, firefox.exe, chrome.exe, safari.exe	Internet browser

(n) = number of concurrent users
1 Adonix in syracuse mode that is shared between landing pages and navigation syrapedia
1 Adonix convergence mode that is created when you open a convergence function and is retained for reuse later

4.6 Size occupied in memory by Sage X3 processes

Resources		Processes	Physical memory	Virtual memory(1)
SERVER	DATABASE	1 x oracle.exe / instance 1 x sqlserver.exe / instance	2 to 4 Gb	2 to 4 Gb
	APPLICATION MAIN RUNTIME	1 x adxdsrv.exe / solution 2 x n x adonix.exe n x sadora.exe or sadoss.exe n x sadfsq.exe	5 Mb 30 Mb 25 Mb 4 Mb	3 Mb 30 Mb 25 Mb 4 Mb
	ADDITIONAL RUNTIME	1 x adxdsrv.exe / solution 2 x n x adonix.exe n x sadora.exe ou sadoss.exe	5 Mb 30 Mb 25 Mb	2 Mb 30 Mb 25 Mb
CLIENT WORKSTATION		iexplore.exe, firefox.exe, chrome.exe, safari.exe	100-200 Mb	100-200 Mb

(n) = number of concurrent users
(1) Virtual memory (or swap) is a virtual file created by the operating system on the hard disk of the computer to simulate the presence of additional physical memory

4.7 Other Sage ERP X3 Processes distribution

Resources	Processes	Process origin
Application Server	ApacheMonitor.exe	on-line help publishing
	ElastSch.exe	Search engine
Web Server	Node.exe Mongod.exe	HTTP Server
Web Services & ADC Server	Apache.exe Tomcat.exe	HTTP Apache software Web Services container
Java Bridge Server	Apache.exe Tomcat.exe	HTTP Apache software Java Bridge container
Print Server	AdxSrvImp.exe	Safe X3 Print engine
Business Objects Server	n/a	

Client Workstation	iexplore.exe, firefox.exe, chrome.exe, safari.exe	Internet browser

(n) = number of concurrent users

4.8 List of additional Software to be installed

Software	Version	Resources under which the software must be installed
JRE (Java Runtime Environment)	7	All Servers
Database engine	Oracle / SQL Server	Database Server
Apache http Server	2.2	Application Server
(*) Elastic Search		Application Server
JDK (Java Development Kit)	7	Server running Elastic Search engine
(*) Node.js	0.10.20	Web Syracuse Server
MongoDB	2.4	Web Syracuse Server
(*) Business Objects Enterprise	n/a	Business Objects Server
(*) Apache Tomcat	6.0.18	Web Services or Java Bridge Server
(*) Apache http Server	2.2	Web Services or Java Bridge Server
Oracle Client 64-bit	11gR2	Application Server (*only if the database is detached*) Additional Processing Server Business Objects Server
Microsoft Office (optional)	2010, 2013	Workstation
Adobe Flash Player	10 or >	Workstation
Adobe Reader (230MB)	XI or >	Workstation

(*) = component delivered in the Sage X3 Installation DVD-ROM for Windows

5.0 Remote connection

The connection mode required is the VPN connection through the public internet network.

The VPN connection can be establish by using one of the most standard VPN Software of the market: Microsoft VPN Client, Cisco or any other editor.

To facilitate the remote connection to your site you will have to provide us all the instructions regarding installation and configuration (list of port tcp/udp #) of the appropriate VPN Software.

6.0 Sizing Requirements

6.1 General prerequisites for database & application

Platform	Windows			IBM-Aix / Linux Red Hat		
Material	PC 100% compatible Quad Core Intel Xeon 2.66GHz or ↗			Linux X86-64 (Quad Core Intel Xeon 2.66GHz or ↗)		
Operating System	Windows Server 2008 (R2) x64 Windows Server 2012 (R2) x64			Red Hat Enterprise Linux AS x64 release 6.4 Oracle Enterprise Linux 6.4 x64		
Freeware Components (1)	Java Runtime Environment 7 Java Software Development Kit 7 Apache HTTP Server 2.2					
RAM memory	2 Gb (for the Operating System) + 2 to 6 Gb (per instance of database) + 60 MB per user connected under a Windows Server + 80 MB per user connected under a Unix or Linux Server					
Virtual space	Virtual memory 2 x the size of the RAM memory			Swap disk 1.5 to 2 x the size of the RAM memory		
Processor	1 core by range of 40 users			1 core by range of 40 users		
Database (2)	Oracle Database 11g R2 (11.2.0.4) 64-bit Standard & Enterprise SQL Server 2012			Oracle Database 11g R2 (11.2.0.4) 64-bit Standard & Enterprise		
Disk space (GB)	Windows		= 40	Unix		= 20
	Oracle 11g R2		= 5	Oracle 11g R2		= 5
	SQL Server 2012 + SP1		= 3			
	X3 Geode Payroll & HR	X3+SEED GX+DEMOGX PAYE+PAYEDEMO	= 12 = 6 = 6	X3 Geode Payroll & HR	X3+SEED GX+DEMOGX PAYE+PAYEDEMO	= 12 = 6 = 6
	Database files		> 10	Database Files		>10
RAID (optional)	RAID 1	Mirroring		Security		>= 2 disks
	RAID 5	Mirroring with parity control		Security at low cost		>= 3 disks
	RAID 1+0	Mirroring + stripping		Security & performance		>= 4 disks

<table>
<tr><td>Disk Architecture</td><td colspan="4">2 x 72 GB 15k/tpm RAID 1, for the Operating System and the database engine
4 x 140 GB 15k/tpm RAID 10, for the application and the data files
2 x 140 GB 15k/tpm RAID 1, for the Oracle Archive Log Files or the SQL Server Transactions Logs
➔ under Windows Operating System the disk must be formatted with NTFS File System</td></tr>
<tr><td>Network</td><td colspan="4">Ethernet Card 100 Mbps minimum or 1 Gbps recommended</td></tr>
<tr><td rowspan="4">User Accounts</td><td>User account</td><td>Group</td><td>User Accounts</td><td>Group</td></tr>
<tr><td>Oracle :
sqlserver :
sagex3 :</td><td>ORA_DBA

Administrators</td><td rowspan="3">Oracle
sagex3</td><td rowspan="3">oinstall, dba
sagex3</td></tr>
<tr><td colspan="2">User Rights Assignment</td></tr>
<tr><td colspan="2">Act as part of the operating system
Log on as a service</td></tr>
</table>

Only the Windows components are delivered on the Sage X3 DVD-ROM
Oracle 11g installation requires **400 MB** of disk space available in the temporary file-system under Unix and Linux hardware platforms

6.2 Database & Application Server

The limits:

- The Server(s) is(are) dedicated to Sage ERP X3
- Only one Sage production environment is present on the machine(s)
- Only two database instances are stored on the database server for the production and the data warehouse
- Only Sage database & application resources are installed on the machine(s)
- If necessary, forecast additional machines :
  - To install other resources: Business Objects engine, Web Server, Print, Citrix-TSE, etc.
  - To implement additional environments: development, test, training …

6.2.1 Deployment Single-tier Architecture (physical server)

Resources	Sizing recommendations
Windows Server 2008 (R2) / 2012 (R2) Red Hat Enterprise Linux AS x64 release 6.4 Oracle Enterprise Linux 6.4 x64 Up to 40 users	Single processor Intel Quad Core (X5500) 2.8GHz RAM Memory 12 Gb *(2GB for the OS, 3GB for 50 X3 users, 3GB production database instance, 2GB data warehouse instance + 2GB free)*
Windows Server 2008 (R2) / 2012 (R2) Red Hat Enterprise Linux AS x64 release 6.4 Oracle Enterprise Linux 6.4 x64 From 50 to 100 users	Single processor Intel 6 Core (X5650) 2.66GHz RAM Memory 16 Gb *(2GB for the OS, 6GB for 90 X3 users, 4GB production database instance, 2GB data warehouse instance + 2GB free)*

Windows Server 2008 (R2) / 2012 (R2) Red Hat Enterprise Linux AS x64 release 6.4 Oracle Enterprise Linux 6.4 x64 From 100 to 250 users	Dual processor Intel 6 Core (X5650) 2.66GHz RAM Memory 32 Gb *(2GB for the OS, 15GB for 250 X3 users, 8GB production database instance, 4GB data warehouse instance + 3GB free)*

6.2.2 Deployment Multiple-tier Architecture (mixed)

Resources	Sizing recommendations
Windows Server 2008 (R2) / 2012 (R2) Red Hat Enterprise Linux AS x64 release 6.4 Oracle Enterprise Linux 6.4 x64 From 100 to 250 users	Database & Application-main processing Server : (physical machine) Single processor Intel 6 Core (X5650) 2.66GHz RAM Memory 20 Gb *(2GB for the OS, 6GB production database instance, 4GB data warehouse instance + 2GB Sage software + 6GB free)* Additional Processing Server : (physical or virtual machine) Single processor Intel 6 Core (X5650) 2.66GHz or 6 vCPU 2.66GHz RAM Memory 20 Gb *(2GB for the OS, 15GB 250 users + 3GB free)*
Windows Server 2008 (R2) / 2012 (R2) Red Hat Enterprise Linux AS x64 release 6.4 Oracle Enterprise Linux 6.4 x64 From 250 to 500 users	Database & Application-main processing Server : (physical machine) Single processor Intel 6 Core (X5670) 2.9GHz RAM Memory 32 Gb *(2GB for the OS, 10GB production database instance, 6GB data warehouse instance + 6GB Sage software + 8GB free)* 2 x Additional Processing Servers : (physical or virtual machine) Single processor Intel 6 Core (X5650) 2.66GHz or 6 vCPU 2.66GHz and 20Gb of RAM Memory

6.3 Front-end Servers

Resources	Sizing recommendations (Physical)	Sizing recommendations (Virtual)
Print Server	Intel Xeon 2.66 GHz / 2 Gb RAM memory / disk 36 GB 10ktpm / Ethernet card Gigabit	1 vCPU 2.66 GHz / 2 Gb RAM memory / disk 72 GB 10ktpm
	➔ *Forecast a working area on disk 10 GB minimum*	
Web Server	1 Core Xeon 2.66 GHz / 3 Gb RAM	1 vCPU 2.66 GHz / 3 Gb

- for 30 users (1 node.js process)	memory / disk 2 x 72 GB 10ktpm in RAID-1 / Ethernet card Gigabit	RAM memory / disk 72 GB 10ktpm
Frontal Server Citrix XenApp Microsoft TS - for 30 connections	Intel Xeon Quad Core 2.66GHz / 8 Gb RAM memory / disk 2 x 72 GB 15ktpm in RAID-1 / Ethernet card Gigabit	1 vCPU 2.66GHz / 8 Gb RAM memory / disk 72 GB 15ktpm
- for 60 connections	Intel Xeon Quad Core 2.66GHz / 16 Gb RAM memory / disk 2 x 72 GB 15ktpm in RAID-1 / Ethernet card Gigabit	1 vCPU 2.66GHz / 16 Gb RAM memory / disk 72 GB 15ktpm
- for 100 connections	Intel Xeon Quad Core 2.66GHz / 22 Gb RAM memory / disk 2 x 72 GB 15ktpm in RAID-1 / Ethernet card Gigabit	2 vCPU 3.20GHz / 22 Gb RAM memory / disk 72 GB 15ktpm
	➔ *Forecast a working area of 250MB per user* ➔ *To increase security : we recommend to implement several machines configured in Load Balancing*	

6.4 Additional Processing Server

Resources : Additional Process Server	**Sizing recommendations (Physical)**	**Sizing recommendations (Virtual)**
Windows - for 150 users	Single processor Quad Core Intel Xeon 2.66GHz / 10 Gb RAM memory	4 vCPU 2.66GHz / 10 Gb RAM memory / disk 72 GB 10ktpm
- for 300 users	Dual processor Quad Core Intel Xeon 2.66GHz / 20 Gb RAM memory	8 vCPU 2.66GHz / 20 Gb RAM memory / disk 72 GB 10ktpm
Linux - for 150 users	Single processor Quad Core Intel Xeon 2.66GHz / 10 Gb RAM memory	4 vCPU 2.66GHz / 10 Gb RAM memory / disk 72 GB 10ktpm
- for 300 users	Dual processor Quad Core Intel Xeon 2.66GHz / 20 Gb RAM memory	8 vCPU 2.66GHz / 20 Gb RAM memory / disk 72 GB 10ktpm
IBM-Aix - for 300 users	IBM POWER 6 4 cores 4GHz 24 Go memory RAM	
- for 600 users	IBM POWER 6 8 cores 4GHz 48 Go memory RAM	

6.5 Workstations

Resources	Sizing recommendations
Web Workstation	Intel Pentium/Celeron/Centrino/Core iN/Core 2 Duo or AMD Athlon 2.4 GHz 2 Gb RAM memory minimum (4 GB recommended) Display super VGA 1024x768 pixels color 16-bits