

sage X3

# Architecture and system requirements



Version 11

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**This document provides information on system requirements and setup for Sage Architecture for the Enterprise (SAFE X3) Version 11. SAFE X3 is a common technological platform for developing application software.**

## **Audience**

This document is intended for systems architects, systems engineers and experienced developers who need to provision resources for installing or upgrading Sage X3. The information in this document is intended for physical hardware. However, you can deploy the solution in a virtual environment like VMware vSphere, Hyper-V, RedHat KVM, Citrix XenServer or Oracle VM. See the section on [Virtualization](#) for details.

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The following application software is developed using the SAFE X3 technological platform:

- Sage X3 (ERP)
- Sage X3 People (HRM)
- Sage X3 Geode (WMS)

The technical architecture is organized in layers and designed to:

- Separate layers of data management, process execution, and presentation in a multiple-tier architecture;
- Leverage load across several servers to ensure scalability when the application is deployed for many users;
- Provide multiple implementation options on different technical platforms and database engines;
- Provide access from various user devices including Windows and Apple computers, tablets, smartphones, and industrial terminals (radio frequency).

## X3 Folders

A folder is a repository that contains management rules, parameters, and data for one or more business entities. It consists of a directory tree set on the Application Server containing programmatic objects (programs, screen definitions, reports, etc.) and tables stored in a dedicated schema within the associated Oracle or SQL Server database.

When installing Sage X3 (or Sage X3 People or Sage X3 Geode), two folders are typically created:

- An X3 reference (or “parent”) folder: The reference folder that contains all the “standard” software programs, screens, reports, etc.
- SEED: A demonstration folder that can also serve as a model folder from which new folders can be created by parameters (and possibly partial data) duplication.

Folders administration tasks include:

- Creating new folders
- Duplicating folders from a model or a running folder (for instance: training folder)
- Removing unneeded folders (for instance, after training is finished)
- Creating backup folders

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All the resources described herein are logical components. You can install them on 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 processed. This model of distributed architecture offers a high level of scalability.

## Mandatory components

### Database server

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

SAFE X3 products are developed according to the database editor recommendations, which guarantees the integrity and the coherence of the data stored in the database.

There is no limit to the size of the database. Most customers are below 100 GB for data size, however some large Sage X3 installations use several terabytes. To reduce the size of the live database, you can purge large tables or archive them in a special archive folder that may use another database server.

#### Definition

##### APPLICATION DATA

Tables and indexes that store information recorded by application users such as suppliers, customers, products, inventory, sales, production, accounting, etc.

### Application and Main process server(s)

This/these server(s) provides access to all the elements that make up Sage X3 including processes, screens, reports, etc. 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. Three folder levels are managed in this way.

The application 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.

From Version 11, it is possible to have several application servers (but only through a manual set-up at current time). In this type of implementation, multiple application servers will use common files in a single location, typically on a shared file system provided by redundant servers or NAS. Setting up multiple application servers eliminates a single point of failure.

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## Web presentation server

The Web presentation server is a front-end server that end users access to open a Sage X3 session through their internet browsers.

During installation, especially in documents and screens, Web presentation server can also be referred to as Syracuse.

It works in asynchronous mode based on the Node.js software platform, which contains a built-in HTTP server library which is used to provide a web publication server.

Each X3 function has its own URL and sends normalized (SData) Java Script feeds in JSON format to the client (web browser on user's workstation or web services client).

Operating data, such as Windows customization, dashboard, endpoints, management roles, user information, and electronic documents that users can register via their storage area, are stored in a document-oriented MongoDB database.

The Syracuse Web Server can be clustered to ensure scalability when a high number of concurrent interactive connections and/or web services are needed.

This Syracuse Web Server also manages:

- Workflow links
- Incoming and outgoing SOAP and REST Web Service

### Definitions

#### JSON

JavaScript object notation: a textual data format for structuring information with tags.

#### MONGODB

A document-oriented database classified as a NoSQL database.

#### SADFSQ

An X3 internal communication protocol executable.

## MongoDB server

MongoDB is a free open source NOSQL database. It is used to store all configuration and customization parameters for the Syracuse Web Presentation server and can also be used to store documents attached to business processes (for instance, scanned orders or invoices).

MongoDB can be clustered on multiple servers to ensure scalability and redundancy.

## ElasticSearch® Search Engine

ElasticSearch®, is a free, open source search engine based on the 100% Java Lucene engine under Apache License 2.0. There are no additional database engines to be installed.

ElasticSearch® provides real-time text-based search on the application data and metadata that have been setup to be indexed.

ElasticSearch® can be clustered on multiple servers to ensure scalability.

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## **Print server**

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

The Print server supports all print requests from interactive sessions as well as batch submissions and sends the files to the appropriate print destination (printer, file, PDF, FAX, etc.).

A Windows service is started on the computer that hosts the Print server. This service is on port number 1890 by default, but it can be customized during installation. The print service manages an output queue of the requests submitted, and the execution of these reports can be dispatched on several editing processes or threads. The number of editing processes can be customized in the Configuration Console and must be adapted to the size of the server.

The Print server communicates with two other servers in your environment: the Application server that hosts the printing model and the Database server that hosts the tables via an ODBC connection.

The report files are transferred using the SADFSQ internal communication protocol. The print server embeds a SADFSQ client able to address and communicate with a SADFSQ server running on the Application and Main Process server.

Reports are designed using Crystal Reports 2008, (version 12.x) or Crystal Reports 2013 (version 14.1).



## Additional components

### Additional Process servers

These servers manage processes when scalability is required. They can run processes linked to interactive sessions as well as web services sessions and batch processes (batch process support on additional process servers was not possible in Sage X3 previous versions).

Differences between the Main Process server and Additional Process servers are as follows:

- At least one Main Process server is mandatory and runs on the same machine as the Application server.
- Additional Process servers are optional and are used to load-balance among multiple resource processes related to X3 users sessions.  
Additional Process servers load balancing is automatically managed by the front-end Syracuse Web Presentation server(s), and can be done according to multiple rules (X3 groups tagging, Web Services pools, Batch capability definition)

### Legacy Web service and Automated Data Collection (ADC) servers

It's a technical server that manages communication with:

- Automated Data Collection devices (typically RF hand-held terminals)
- Incoming SOAP Web Service in "legacy" mode

This component embeds Apache HTTP and Apache Tomcat (web servlet container).

This component will be deprecated in future versions of Sage X3 and replaced by Syracuse Web Server new modules.

It should normally be installed only to provide the following functionalities:

- Automated Data Collection devices (typically hand-held RF terminals)
- Sage X3 People Employees portal

### Legacy Java Bridge server

The Java Bridge Server is a deprecated component. However, it can still be installed to support legacy outgoing web services (SOAP) and some other specific extensions.

### Business Objects Server

The Business Objects (BO) server hosts Business Objects Enterprise XI. The data warehouse database can be hosted on this server and updated daily from the production database.

The Business Objects Server can only be deployed on Windows 2012 R2.  
The data warehouse database can be stored on another server.

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## Auxiliary components

### Configuration console

The Configuration Console is a tool used to install and manage SAFE X3 components. The Console configures the components and links them to define a “solution” or work environment.

The Console uses different XML configuration files that are generated on each server when installing the various components.

SAFE X3 Configuration console can be installed on any workstation running Windows 7 or higher, and/or on any Windows servers involved in the Sage X3 infrastructure.

A Sage X3 environment (or “solution”) can be managed by several users from different workstations or servers where the Safe X3 configuration console is installed.

### Mail server or SMTP Gateway

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

A Mail server or SMTP Gateway is mandatory for using workflow functionalities. Supplying and installing this server is not within Sage’s function and is not described in this document.

### Batches management

From SAFE X3 V11, the Sage X3 Batch Server (which launches and monitors batch tasks) runs within the Syracuse Web Presentation server.

From V11, X3 batch tasks can be now run on any process server, which provides full scalability for background tasks.

Each process server (including the Main one) is “tagged” with the maximum number of batch tasks it can run simultaneously, from 0 to any (reasonable) number.

When a batch task is to be run, the Sage X3 Batch scheduler will launch the task on a Process server where a “batch slot” is available, or wait for a batch slot to become available on any of the batch-enabled Process server(s).

#### Definitions

##### BATCH SERVER

The SAFE X3 framework embeds a deferred (batch) tasks scheduling and monitoring function with a comprehensive parameters management for these processes.

##### BATCH TASK

Unlike an interactive session, a batch task is a process launched in background mode and monitored by the task scheduler (batch server).

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# Client workstations

## Desktop or laptop

Users can access Sage X3 applications on the Application server via a web browser from their workstations.

### Web browsers and versions certified with Sage X3

- Microsoft Windows desktop OS: Windows 7, 8, 10
  - Internet Explorer version 11
  - Edge (on Windows 10)
  - Chrome version 53 or higher
  - Firefox version 48 or higher
  - Opera version 37 or higher
- Apple Mac OS X workstation:
  - Safari version 9 or higher
  - Chrome version 53 or higher
  - Firefox version 48 or higher
  - Opera version 37 or higher

### Other web browsers or versions compatible but not certified

- Linux workstation:
  - Chrome version 53 or higher
  - Firefox version 48 or higher
  - Opera version 37 or higher

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## Smartphones and tablets

Other web-enabled devices can provide access to Sage X3 and Sage X3 People Applications, subject to certain display conditions.

These devices have been tested for compatibility:

- Smartphones:
  - Apple iPhone 4, 5 and 6 running IOS 9 or higher:
    - Safari 9+
    - Chrome 53+
  - Android OS 4.3 or higher:
    - Chrome 53+
    - Firefox 48+
  - Microsoft Windows Phone 8.1 or higher:
    - Internet Explorer 11
- Tablets:
  - Apple iPad (2,3,4, Air, Mini, Retina) running IOS 9 or higher:
    - Safari 9+
    - Chrome 53+
  - Android OS 4.3 or higher:
    - Chrome 53+
    - Firefox 48+
  - Microsoft Surface running Windows RT 8.1 or higher:
    - Internet Explorer 11

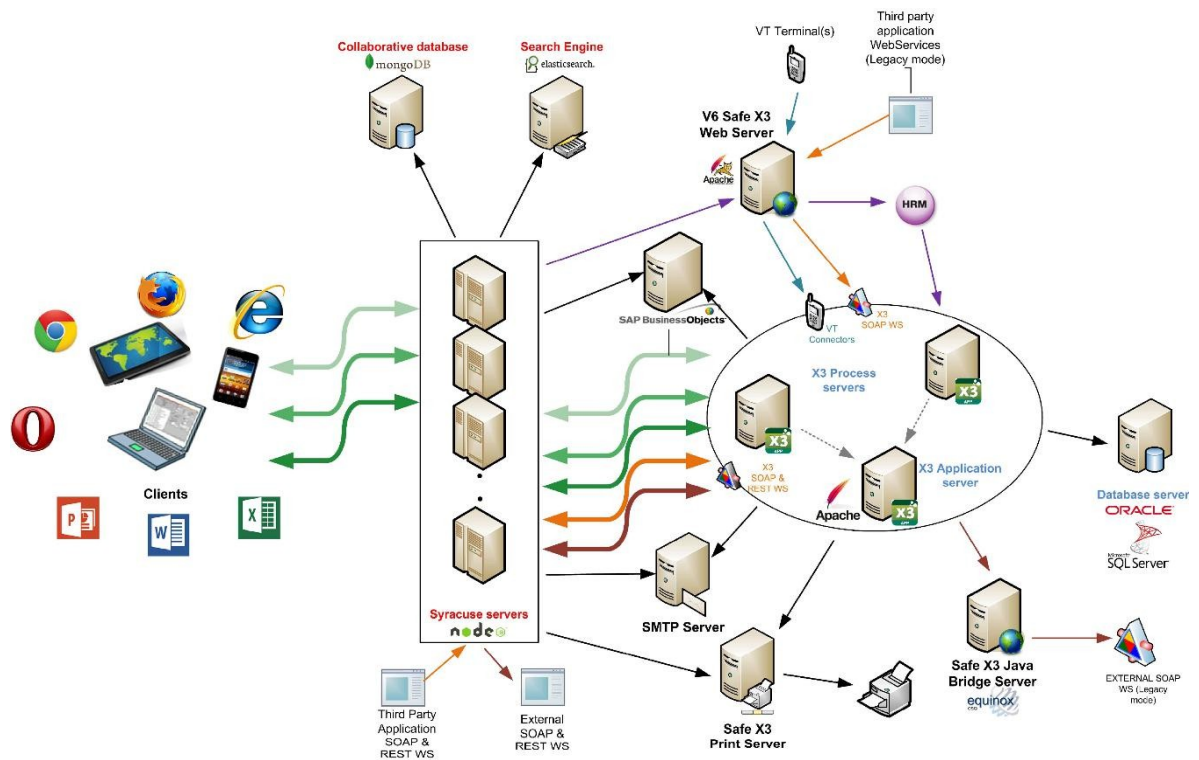
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# Technology

## Development platform

- Development Workbench: SAFE X3 Framework
- Development language for the application software: Sage X3 4GL
- Development language for the Web server: JavaScript, HTML5
- Exchange protocol between the Client and the Web server: pure HTTP (according to the HTML 5.x specifications) and Web application interface built on a technology like Ajax
- Tool for packaging Sage X3 components: IzPack, open source software built on the Java platform

## Global schema of the technical architecture



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# Network and bandwidth requirements

## Network requirements

A Gigabit (or better, 10 Gbit/s) link is necessary among the different process servers and the database server hosting the Sage X3 folders' data.

For other X3 components, a Gigabit link is recommended but it can work with lower bandwidth and higher latency.

When X3 server components are installed on a Windows platform, it is highly recommended that there are members of an Active Directory (AD) Domain and belong to the same AD Branch. However, Syracuse Web presentation servers can be hosted in DMZ-type sub-networks.

The different servers must also be properly registered in their domain's DNS, allowing all server involved in a given X3 environment to mutually resolve other servers' fully qualified domain name (FQDN) in standard and reverse mode.

The servers on which Sage components are installed should not be used as an Active Directory Domain Controller (DC).

### Definitions

#### ACTIVE DIRECTORY

Centralized system of identification and authentication services to a network of computers using the Windows operating system. The Active Directory lists user accounts, servers, workstations, shared folders, printers, etc.

#### DEMILITARIZED ZONE (DMZ)

A computer host or small network inserted as a neutral zone between a company's private network and the outside public network. It prevents outside users from getting direct access to a server that has company data.

#### DOMAINE NAME SYSTEM (DNS)

Service used to match an IP address with a host and domain name in both ways.

#### FULLY QUALIFIED DOMAINE NAME (FQDN)

It indicates the absolute position of a node in the DNS tree, showing all domains up to the top-level (root).

## Network bandwidth between front-end servers and workstations

X3 connection method	Front-end server	Bandwidth without printing or BO requesting
Web browser on user workstation	Syracuse Web Server (Sage)	60 Kbit/s per session 50 Kbit/s Web server > Browser 10 Kbit/s Browser > Web server
Web browser on remote desktop via RDP protocol	Remote Desktop Service (Microsoft)	24 Kbit/s per session
Web browser on remote desktop via ICA protocol	XenApp Server (Citrix)	12 Kbit/s per session
ADC client (typically hand-held RF terminal)	ADC Server (Sage)	20 Kbit/s per device

## Antivirus

If you install an antivirus protection on Sage X3 servers, we recommend disabling real-time protection on some parts of the Application/Main Process server and Additional Process servers for best performance. Perform scheduled scans on real-time scanning excluded areas overnight when there are few or no users logged on.

Exclude the following directories from real-time protection if active:

- The <X3root>\folders directory on the Application server(s) and all its subdirectories (X3 objects, temp files, trace files, etc.);
- The <X3root>\runtime directory and its subdirectories (runtime engine, temp files, trace files) on all Process servers (including Main one).

## Windows Updates

If you encounter a problem with Sage applications after a Microsoft Windows Update is applied, Sage will try to give you all the needed assistance to identify the problem and provide a solution as quickly as possible.

### Tips and Tricks

Disable antivirus real-time protection on some parts of X3 installation to avoid performance issues.

Run antivirus scans overnight on excluded areas.

Perform a full backup before applying Windows Updates.

Test Windows Updates in a pre-production environment.

**Important!** Sage installs most of the global Windows patches on our own servers and qualification environments. However, a Windows Update that worked well on Sage's environments is not guaranteed to work in all customers' environments.

## Virtualization

The information in this document is intended for physical hardware. However, you can deploy the solution in a virtual environment like VMware vSphere, Hyper-V, RedHat KVM, Citrix XenServer or Oracle VM.

Most Sage X3 components below can be deployed on virtual machines.

- Application and Main process server(s)
- Additional process server(s)
- MongoDB server(s)
- Elastic Search server(s)
- Syracuse Web server(s)
- Print server(s)
- Legacy Web Services / ADC server(s)
- Legacy Java Bridge server(s)

If you decide to virtualize your architecture, you must build a physical infrastructure adapted to a virtual environment for optimum performance. We recommend dedicated resources assigned to your X3 environment, rather than sharing resources.

A production virtualization architecture is usually built with multiple physical hosts, and relies on a shared storage system (SAN) providing high availability and adequate performance to cope with the I/O and throughput needs of all hosted VMs and applications.

Apart from development / test or small production environments, it is not recommended to run the RDBMS (SQL Server or Oracle) in a virtualized environment. However if you decide to run RDBMS in a virtual machine, you must take all precautions to ensure this virtual machine will be able to run at full throttle any time, and not suffer from bottlenecks on CPU, memory or storage I/Os due to resource overprovisioning in the virtualization platform.

To help determine the quality of an infrastructure regardless of its nature (physical or virtual, single or multi-tier, Oracle or SQL Server, Unix- Linux or Windows, etc.), Sage can provide a test program to meter X3's performance by performing a set of data I/O operations of the reference folder to simulate some high-demand transactions.

The results of this program can help to compare metered performance to known reference systems and feedback from other customers' production infrastructures.

## Security considerations

Plan to acquire adequate backup tools so that you can save online virtual machines.  
Ensure redundancy for physical servers and storage systems.

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## Important sizing considerations for virtualization

Keep virtual machines small!  
Huge virtual machines won't work properly, unless they run in a dedicated virtualization environment where there is NO overprovisioning at all (which removes most benefits from virtualization).

A full Sage X3 environment you would put in a physical, dual-socket 24-core server will NOT run properly in a "big" 24-vCPU VM in most cases, and MUST be split on several smaller VMs.

4 to 6 vCPUs per VM is considered a "reasonable" upper limit. This number may be raised to higher values if virtualization platform consists of servers with a high core count AND there is no or "moderate" CPU overprovisioning.

## Virtualizing MongoDB, Elasticsearch and Syracuse: good practice

On PRODUCTION systems, do NOT deploy Syracuse (node.js), MongoDB and Elasticsearch together in the same VM, deploy them in separate VMs.

This makes it much easier to tune the configuration because different components will not be competing for the same resources (memory, CPU, disk I/O) inside a single VM. It also makes it easier to modify the deployment if you identify a performance bottleneck in one of the components.

**MongoDB** usually requires less CPU and memory than the node.js component. You can start with a smaller VM configuration. Ideally you should set up a cluster (replica set) with an odd number of nodes (3 is a good start). There are many resources on the Internet about tools and techniques to tune MongoDB deployment. Don't oversize/over-architect it unless you see that Mongo is your performance bottleneck. Mongo is designed to handle very large datasets and very high transaction rates and Sage X3 is stressing it very little in comparison to some of the larger web apps/sites that use Mongo.

**ElasticSearch** uses more memory and CPU than MongoDB but usage varies widely. You can start with the same configuration as MongoDB and then scale up if necessary. Some interesting facts about the ElasticSearch component: It is decoupled from the rest so if you have a performance issue in this layer it does not impact the rest of the application, just the search function. It is easy to redeploy on a larger VM because it does not hold critical data. It is only an index that can be rebuilt from data in a MongoDB or Sage X3 database (SQL or Oracle). It can be clustered and you'll find resources on the Internet about cluster deployment.

**Node.js (Syracuse server)** is the most difficult of the three to configure and the most likely to be responsible for poor performance.

## Helpful ideas for Syracuse web server virtualization

Give Syracuse more VM power than for MongoDB or ElasticSearch (4 times more CPU and memory than what you allocate to MongoDB).

Size the Syracuse VM with at least 2GB RAM per core (so at least 8GB for 4 cores). Node.js is single threaded so if you have 4 cores and a node.js process is taking 25% of overall CPU it means it is actually saturating its CPU thread - not good.

A healthy node.js process should take less than 1GB of RAM. If it goes above, it starts to garbage collect aggressively and that's usually when it starts to saturate its CPU thread. It is important to keep the individual node.js processes below 75% of 1 CPU (20% of overall CPU on a 4-core VM) and below 1GB.

The number of node.js processes can be changed via the "host" entity in Syracuse admin (for interactive sessions as well as for web services sessions). As a starting point, you should set the number of node.js processes to 1.5 times the number of cores (6 node.js processes on 4 cores). Then you should observe overall memory usage while the app is running and bump the number of node processes until overall memory usage reaches 75-80%.

If some node.js processes are still saturating the CPU when you reach that limit it means that you need either a larger VM or a cluster for the Syracuse server. The host entity also lets you configure several processes for web service requests. This setting depends heavily on the activity of your web services.

If a significant part of your transactions to go through a web service, you should deploy a node.js cluster and dedicate one or more nodes of your cluster to web services.

In this case, do not mix web services and interactive sessions on the same cluster node(s).

The Syracuse server does very little I/O. Save the high-end disks for MongoDB and Elastic Search.

# Remote connection for support

This requirement is important if Sage support services need, upon your request, to connect on your system to perform troubleshooting.

A remote connection requires a Virtual Private Network (VPN) connection through an internet connection.

The VPN connection can be established by using any of the standard VPN applications available like Microsoft VPN Client, Cisco, Juniper or others.

To facilitate establishing the remote connection to your site, you should provide Sage support with all information regarding installation and configuration (VPN software vendor and version, list of TCP/UDP ports #, public IP address of VPN server, credentials) for your VPN access.

## Definition

### VPN

Virtual private network (VPN): a system that creates a direct secured network link between remote computers through public networks (internet).

# Resource Configuration

## Supported Operating Systems

### Supported Operating Systems for servers

Resources	Operating System vendors and versions
<b>Requirements for fresh installations (new customers, upgrade from V6 or earlier versions)</b>	
<b>Database server (creation managed by X3 console)</b>	Microsoft Windows Server 2012 R2 x64 Microsoft Windows Server 2016 x64 <i>(from 11.0.2 GA only)</i> Red Hat Enterprise Linux AS v 7.1 and later 7.x x86_64 Oracle Enterprise Linux v 7.1 and later 7.x x86_64 IBM Aix 7.1
<b>Database server(s) (externally managed)</b>	Any platform supporting Oracle 12c (12.1.0.2) Standard Edition Two or Enterprise Edition (SE2 or EE (for instance Solaris)
<b>Application and Main process server(s)</b>	Microsoft Windows Server 2012 R2 x64 Microsoft Windows Server 2016 x64 <i>(from 11.0.2 GA only)</i> Red Hat Enterprise Linux AS v 7.1 and later 7.x x86_64 Oracle Enterprise Linux v 7.1 and later 7.x x86_64 IBM Aix 7.1 (deprecated in next version)
<b>Additional process server(s)</b>	Microsoft Windows Server 2012 R2 x64 Microsoft Windows Server 2016 x64 <i>(from 11.0.2 GA only)</i> Red Hat Enterprise Linux AS v 7.1 and later 7.x x86_64 Oracle Enterprise Linux v 7.1 and later 7.x x86_64 IBM Aix 7.1 (deprecated in next version)
<b>Print server(s)</b>	Microsoft Windows Server 2012 R2 x64 Microsoft Windows Server 2016 x64 <i>(from 11.0.2 GA only)</i>
<b>Syracuse Web server(s)</b>	Microsoft Windows Server 2012 R2 x64 Microsoft Windows Server 2016 x64 <i>(from 11.0.2 GA only)</i> Red Hat Enterprise Linux AS v 7.1 and later 7.x x86_64 Oracle Enterprise Linux v 7.1 and later 7.x x86_64
<b>MongoDB server(s)</b>	
<b>ElasticSearch server(s)</b>	
<b>Legacy Web Services and ADC server(s) Legacy Java Bridge</b>	
<b>Business Objects server(s)</b>	



Resources	Operating System vendors and versions
<b>Older operating system versions supported only when performing an in-place upgrade from V7, PU8, or PU9</b>	
<b>Database server (managed by console)</b>	Red Hat Enterprise Linux AS v 6.2 and later 6.x x64 Oracle Enterprise Linux v 6.2 and later 6.x x64
<b>Database server(s) (externally managed)</b>	Any platform supporting Oracle 11gR2 (11.2.0.4) Standard Edition or Enterprise Edition (SE or EE) Any platform supporting Oracle 12c (12.1.0.1) Standard Edition or Enterprise Edition (SE or EE)
<b>Application and Main Process server(s)</b>	Red Hat Enterprise Linux AS v 6.2 and later 6.x x64 Oracle Enterprise Linux v 6.2 and later 6.x x64
<b>Additional Process server(s)</b>	
<b>Syracuse Web server(s)</b>	
<b>MongoDB server(s)</b>	
<b>ElasticSearch server(s)</b>	
<b>Legacy Web Services and ADC server(s)</b>	
<b>Legacy Java Bridge server(s)</b>	

**Warning!** Operating Systems versions listed in above table might not be supported on future versions of Sage X3.

### Supported Operating Systems for user workstations

Resources	Operating Systems vendors and versions
<b>Web client workstations</b>	Microsoft Windows 7, 8, 8.1, 10 (x86, x64) Remote desktop on Microsoft Windows Server 2008 R2, 2012 (R2), 2016 x64 Apple Mac OS X* Linux*

\*Microsoft Office plugin not available on these platforms.

### Supported Operating Systems for Mobile Client

Operating system	Version(s)
Apple iOS	9 and above
Google Android	4.3 and above
Microsoft Windows Phone	8.1 (IE11)
Microsoft Windows RT	8.1 and above (IE11)
Microsoft Windows	Windows 8.1 and above (IE11+) Windows 10 (Edge)

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## Supported Database vendors and versions

Operating System	Database vendors and versions
<b>Requirements for fresh installations (new customers, upgrade from V6 or earlier version)</b>	
Windows Server 2012 R2 x64 Windows Server 2016 x64 <i>(from 11.0.2 GA only)</i>	Oracle Database 12c (12.1.0.2) 64-bit in Standard Edition Two & Enterprise Edition (SE2 & EE)  Microsoft SQL Server 2014 SP1 64-bit Standard & Enterprise Editions Microsoft SQL Server 2016 64-bit Standard & Enterprise Editions <i>(from 11.0.2 GA only)</i> ✓ Named instance ✓ Binary sort order ✓ Mixed mode authentication (SQL Server & Windows)
All supported Unix and Linux platforms for fresh installations	Oracle Database 12c (12.1.0.2) 64-bit in Standard Edition Two & Enterprise Editions (SE2 & EE)
<b>Older RDBMS versions supported when performing in-place upgrade from V7, V8, or V9</b>	
Windows Server 2012 R2 x64	Oracle Database 11g R2 (11.2.0.4) 64-bit Standard & Enterprise Editions (SE & EE) or Oracle Database 12c (12.1.0.1) 64-bit Standard & Enterprise Editions (SE & EE)  Microsoft SQL Server 2012 SP2 64-bit Standard & Enterprise Edition ✓ Named instance ✓ Binary sort order ✓ Mixed mode authentication (SQL Server & Windows)
All supported Unix and Linux platforms for on-site upgrade	Oracle Database 11g R2 (11.2.0.4) 64-bit Standard & Enterprise Edition (SE & EE) or Oracle Database 12c (12.1.0.1) 64-bit Standard & Enterprise Edition (SE & EE)

**Warning!** Database versions listed in “Older RDBMS versions” section of the above table might not be supported on future versions of Sage X3.

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## Processes distribution - Windows single-server architecture

Resources	Processes	Process origin
<b>Database server</b>	1 x oracle.exe / instance or 1 x sqlserver.exe / instance	Oracle RDBMS or SQL Server RDBMS
<b>Application &amp; Main Process server</b>	1 x adxdsrv.exe / solution 2 x $n$ x adonix.exe 2 x $n$ x sadora.exe or sadoss.exe	X3 connection service X3 sessions processes
<b>Syracuse Web server</b>	$(N + W + 1)$ x node.exe	Web presentation Server node.js workers, 1 for batch scheduler.
<b>MongoDB server</b>	1 x mongod.exe	Technical parameters database + attachments
<b>Search Engine server</b>	1 x ElastSch.exe	ElasticSearch engine
<b>Print server</b>	1 x AdxSrvImp.exe $P$ x AdxImpNet.exe	Sage Print server daemon and workers
<b>Client workstations</b>	iexplore.exe or firefox.exe or chrome.exe or another supported browser executable	Internet browser

$n$  = global number of user sessions.

Per user session:

- 1 Adonix in Syracuse mode shared between landing pages and read-only pages;
- 1 Adonix in classic page mode created when you open a Classic Page function and retained for later reuse.

$N$  = number of node.js processes set up for interactive sessions on Syracuse Web server

$W$  = number of node.js processes set up for interactive sessions on Syracuse Web server

$P$  = max number of worker processes for print jobs; 5 by default, configurable parameter.



## Processes distribution - Multi-tier architecture

Resources	Processes	Process origin
<b>Database server</b>	1 x oracle.exe / instance or 1 x sqlserver.exe / instance	Oracle RDBMS or SQL Server RDBMS
<b>Application &amp; Main Process server(s)</b>	1 x adxdsrv.exe / solution 2 x <i>n</i> x adonix.exe 2 x <i>n</i> x sadora.exe or sadoss.exe 2 x <i>m</i> x sadfsq.exe	X3 connection service X3 sessions processes
<b>Additional Process server(s)</b>	1 x adxdsrv.exe / solution 2 x <i>p</i> x adonix.exe 2 x <i>p</i> x sadora.exe or sadoss.exe	X3 additional engine X3 sessions processes
<b>Syracuse Web server(s)</b>	( <i>N</i> + <i>W</i> ) x node.exe + 1 node.exe on one of Syracuse Web servers for batch scheduling	Web presentation Server node.js workers
<b>MongoDB server(s)</b>	1 x mongodb.exe	Technical parameters database + attachments
<b>Search Engine server(s)</b>	1 x ElastSch.exe	ElasticSearch engine
<b>Print server(s)</b>	1 x AdxSrvimp.exe  <i>P</i> x AdxImpNet.exe	Sage Print server daemon Print Server workers
<b>Client workstations</b>	iexplore.exe or firefox.exe or chrome.exe or another supported browser executable	Internet browser

*n* = number of user sessions on the Main Process server.

*m* = number of user sessions on ALL Additional Process server(s).

*p* = number of user sessions on THIS Additional Process server.

Per user session:

- 1 Adonix in Syracuse mode shared between landing pages and read-only pages;
- 1 Adonix in classic page mode created when you open a Classic Page function and retained for later reuse.

*N* = number of node.js processes for this Syracuse Web server set up for interactive sessions

*W* = number of node.js processes for this Syracuse Web server set up for web services sessions

*P* = max number of worker processes for print jobs; 5 by default, configurable parameter

## Memory used by Sage X3 processes

Resources		Processes	Memory
Server(s)	<b>Database server</b>	1 x oracle.exe / instance or 1 x sqlserver.exe / instance	Recommended: 1 GB minimum + • 12% of data + index size <i>if &lt; 80GB</i>  • 10% of data + index size <i>if between 80 and 150GB</i>  • 8% of data + index size <i>if &gt;150GB</i>
	<b>Application &amp; Main Process server(s)</b>	1 x adxdsrv.exe / solution 2 x <i>n</i> x adonix.exe 2 x <i>n</i> x sadora.exe or sadoss.exe 2 x <i>m</i> x sadfsq.exe	5 MB 60 MB 50 MB 10 MB
	<b>Additional Process server(s)</b>	1 x adxdsrv.exe / solution 2 x <i>p</i> x adonix.exe 2 x <i>p</i> x sadora.exe or sadoss.exe	5 MB 60 MB 50 MB
	<b>Syracuse Web server(s)</b>	( <i>N</i> + <i>W</i> ) x node.exe + 1 node.exe on one of Syracuse Web servers for batch scheduling	Max 1 GB per node.js process, but depends of # of sessions and context.
	<b>MongoDB server(s)</b>	1 x mongod.exe	40 to 200 MB for mongod.exe
	<b>Search Engine server(s)</b>	1 x ElastSch.exe	Minimum 800 MB for Elastic Search memory usage can reach several GB when indexing big folders and intensive usage of search functions.
	<b>Print Server(s)</b>	1 x AdxSrvimp.exe <i>P</i> x AdxImpNet.exe	5 MB 60 MB to 1 GB per worker (depends on report's complexity)
		iexplore.exe or firefox.exe or chrome.exe or another supported	100 to 200 MB (depends on browser and

*n* = number of user sessions on the Main Process server.

*m* = number of user sessions on ALL Additional Process server(s).

*p* = number of user sessions on THIS Additional Process server.

Per user session:

- 1 Adonix in Syracuse mode shared between landing pages and read-only pages;
- 1 Adonix in classic page mode created when you open a Classic Page function and retained for later reuse.

*N* = number of node.js processes for this Syracuse Web server set up for interactive sessions

*W* = number of node.js processes for this Syracuse Web server set up for web services sessions

*Pf* = max number of worker processes for print jobs; 5 by default, configurable parameter

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## Other Sage X3 processes distribution

Resources	Processes	Process origin
Application Server(s)	Apache.exe	Internal X3 publication for Syracuse
ADC Server(s) Java Bridge Server(s)	Apache.exe Tomcat.exe	HTTP Apache server Web Services container
Business Objects Server	sia.exe	SAP Business Objects

## List of software to be installed prior to Sage X3 new installation

Software	Version(s)	Needed on
JRE (Java Runtime Environment) (64-bit)	Supported: JRE 7 Recommended: Latest JRE 8	All Servers (except Server running Elastic Search engine)
JDK (Java Development Kit) (64-bit)	Supported: JDK 7 Recommended: Latest JDK 8	Server running Elastic Search engine
Database Engine	Oracle 12c (12.1.0.2) 64-bit or SQL Server 2014 64-bit or SQL Server 2016 64-bit <i>(from 11.0.2 GA only)</i>	Database Server
SQL Server Client	SQL Server 2014 64-bit or SQL Server 2016 64-bit <i>(from 11.0.2 GA only)</i>	Additional Process Server(s) <i>(when running with SQL Server)</i>
Apache http Server	2.2.25 or later*	Application Server(s)
SAP Business Objects**	XI 4.1 SP3 Patch 1	Business Objects Server
Oracle Client (optional)	12c (64-bit)	Business Objects Server <i>(when running with Oracle database)</i>
Microsoft Office 32- and 64-bit	2010, 2013 and 2016, but also 2010, 2013 and 2016 shipped with Office 365	Workstation, if required
Adobe Flash Player	10 or >	Workstation
Adobe Reader	XI or >	Workstation

\* Apache http server version 2.4 requires a very simple manual extra configuration

\* Component delivered on the Sage BO for X3 Installation DVD-ROM for Windows

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## Add-ons and optional tools on client workstation

Component	Version(s)
Microsoft Office (32- and 64-bit editions). <i>Requires IE10 or above installed</i>	2010, 2013, 2016
Microsoft Office as part of Office 365 (32- and 64-bit editions) installed on workstation. No support for Office online. <i>Requires IE10 or above installed</i>	2013, 2016
Microsoft Outlook (32- and 64-bit editions).	2010, 2013, 2016
Microsoft Outlook as part of Office 365 (32- and 64-bit editions) installed on workstation. <i>No support for Office online.</i>	2013, 2016
Ilog	On Windows 7, 8.1 & 10
Crystal Reports Designer	CR2013 Also required on Print Server(s) to get latest ODBC drivers when using Oracle 12c database (not needed for SQL server)

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# Sizing requirements

## General prerequisites for Database and Application

	Windows OS	Unix / Linux OS
<b>Processor type</b>	Quad Core Intel Xeon 2.0GHz or ↗	Linux x86-64: Quad-core Intel Xeon 2.0GHz or ↗  IBM Power System: POWER7/POWER8 3.6GHz or ↗
<b>Operating System</b>	Windows Server 2012 R2 64-bit Windows Server 2016 64-bit <i>(from 11.0.2 GA only)</i>	Linux x86_64: RHEL 6.2 & later 6.x x64 or OEL 6.2 & later 6.x x64 (on-site upgrades)  RHEL 7.1 & later 7.x x64 or OEL 7.1 & later 7.x x64 (fresh install)  IBM Power System: IBM AIX 7.1 TL3
<b>Freeware Components</b>	Java Runtime Environment 7 or 8, Java Software Development Kit 7 or 8 Apache HTTP Server 2.2.25 or later	
<b>RAM</b>	2 GB (for Operating System) + 4 GB minimum (per instance of database, more is better) + 85 MB per user connected (Windows Server) or + 105 MB per user connected (Unix or Linux Server)	
<b>Virtual space</b>	Virtual memory: 1.5 to 2 x RAM size	Swap disk: 1.5 to 2 x RAM size
<b>Processor</b>	2 cores minimum for DB engine + 1 core by range of 40 X3 users	2 cores minimum for DB engine + 1 core by range of 40 X3 users
<b>Database</b>	Oracle 11gR2 (11.2.0.4) 64-bit <i>(on-site upgrade from V7, PU8, or PU9 only)</i> Oracle 12c (12.1.0.2) 64-bit SE2 & EE  SQL Server 2012 SP2 64-bit <i>(on-site upgrade from V7, PU8, or PU9 only)</i> SQL Server 2014 SP1 64-bit SQL Server 2016 64-bit <i>(from 11.0.2 GA only)</i>	Oracle 11gR2 (11.2.0.4) 64-bit <i>(on-site upgrade from V7, PU8 or PU9 only)</i> Oracle 12c (12.1.0.2) 64-bit SE2 & EE  On Unix / Linux platforms, Oracle installation requires at least 400 MB of available disk space in the temporary file system.

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	Windows OS			Unix / Linux OS		
<b>Disk space (GB)</b>	Windows		= 60	Unix		= 30
	Oracle		= 6+	Oracle		= 6+
	Or SQL Server		= 4+			
	X3 ERP	X3 + SEED	= 12	X3 ERP	X3 + SEED	= 12
	X3 People	PAIE + SEEDxxx*	= 6	X3 People	PAIE + SEEDxxx*	= 6
	X3 Geode	GX + SEED	= 6	X3 Geode	GX + SEED	= 6
	Database files		> 10	Database Files		>10
Virtual Memory		1.5 to 2 x RAM	Swap space		1.5 to 2 x RAM	
Any OS						
<b>RAID (recommended)</b>	<i>RAID type</i>	<i>Technology</i>	<i>Benefits</i>			<i># of disks</i>
	RAID 1	Mirroring	Security			2
	RAID 5	Striping + parity	Security at low cost, <u>poor write performance</u> <b>*NOT FIT FOR DATABASE STORAGE*</b>			>= 3
	RAID 1+0 (RAID-10)	Mirroring + striping	Security & high performance <b>*RECOMMENDED FOR DATABASE STORAGE*</b>			>= 4, even count
<b>Recommended Disk Architecture on single-tier</b>	<p>2 x 72 GB 15krpm, RAID 1, for Operating System and Database engine</p> <p>4 x 140 GB 15krpm, RAID 10, for Application and Database Data files, (more drives gives better performance)</p> <p>2 x 140 GB 15krpm, RAID 1, for Oracle Archive Log files or SQL Server Transactions logs</p> <p>On Windows Operating System, disks must be formatted with NTFS File System</p>					
<b>Networking</b>	<p>Ethernet Adapter, 1 Gbit/s <u>minimum</u></p> <p>10 Gbit/s highly recommended when Database not in same tier as Application / Main Process server (or Additional Process Server(s))</p>					
	Windows OS			Unix / Linux OS		
<b>User Accounts</b>	<i>User accounts</i>	<i>Group (local)</i>		<i>User Accounts</i>	<i>Group</i>	
	oracle (Oracle DB)	ORA_DBA		oracle	oinstall, dba	
	SQL server	Administrators		sagex3	sagex3	
	sagex3	Administrators				
	<i>User Rights Assignment</i>					
Log on as a service						

\*SEEDxxx: xxx depends from legislation (for example SEEDFRA, SEEDPOR, SEEDZAF...)

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## Workstations

Resources	Sizing recommendations
Web workstation (desktop, laptop)	Intel dual-core Pentium, Core i3, i5, i7 or equivalent from AMD
	Minimum: 2 GB RAM memory, recommended: 4 GB or more
	Display: 1280 x 768 pixels or higher, 32-bit color or higher

## Single-tier Physical Database & Application server

You may install small to medium X3 environment in single-tier mode on a single physical server at the following conditions:

- The server is dedicated to Sage X3 (or X3 People or X3 Geode)
- Only one Sage production environment is present on the machine.
- Only two database instances are stored within the database server component: first one for X3 (or X3 People or X3 Geode) production data, second one for Data Warehouse if Business Object is used.
- Only the Sage X3 database and Sage X3 resources are installed on the server. No other business application and/or resource-consuming software is installed in the server.

Additional servers are needed:

- To install other resources: Business Objects engine, Citrix-TSE, etc.
- To implement additional environments: development, test, and training.

### Definitions

#### SINGLE-TIER ARCHITECTURE

Architecture model where all components are installed on a single machine.

#### MULTI-TIER ARCHITECTURE

Logical application architecture model whose aim is to:

- 1) Design an application as a stack of software layers. The function of each layer is clearly defined:
  - The presentation layer is the visible part of the application and is interactive with users.
  - The business layer reflects its respective application and programs.
  - The management and data access layer.
- 2) Allocate these layers according to a technical architecture on physical and/or virtual machines, usually three, but they can be more.

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## Architecture examples

### Single-tier architecture examples (physical server)

Platform / Target	Sizing recommendations
Windows Server 2012 R2 64-bit Windows Server 2016 64-bit <i>(from 11.0.2 GA only)</i>  RedHat Enterprise Linux or Oracle Enterprise Linux, 7.1 or later 7.x, 64-bit  <i>From 30 to 60 users</i>	Single processor Intel 6-Core Xeon @2.4GHz, 24GB RAM <ul style="list-style-type: none"> <li>OS: 2 GB</li> <li>Database: 6 GB</li> <li>60 X3 sessions: 6 GB</li> <li>60 Syracuse sessions: 2 to 4 GB</li> <li>MongoDB: 1 GB</li> <li>ElasticSearch: 1 GB</li> <li>Print Server (if Windows): 1 to 2 GB</li> </ul>
Windows Server 2012 R2 64-bit Windows Server 2016 64-bit <i>(from 11.0.2 GA only)</i>  RedHat Enterprise Linux or Oracle Enterprise Linux, 7.1 or later 7.x, 64-bit  <i>From 60 to 120 users</i>	Single processor Intel 8-Core Xeon @2.4GHz, 32GB RAM <ul style="list-style-type: none"> <li>OS: 2 GB</li> <li>Database: 8 GB</li> <li>120 X3 sessions: 12 GB</li> <li>120 Syracuse sessions: 4 to 8 GB</li> <li>MongoDB: 1 GB</li> <li>ElasticSearch: 1 to 2 GB</li> <li>Print Server (if Windows): 1 to 2 GB</li> </ul>
Windows Server 2012 R2 64-bit Windows Server 2016 64-bit <i>(from 11.0.2 GA only)</i>  RedHat Enterprise Linux or Oracle Enterprise Linux, 7.1 or later 7.x, 64-bit  <i>From 120 to 250 users</i>	Dual processor Intel 8-Core Xeon @2.4GHz, 64GB RAM <ul style="list-style-type: none"> <li>OS: 2 GB</li> <li>Database: 16 GB</li> <li>250 X3 sessions: 20 GB</li> <li>250 Syracuse sessions: 8 to 16 GB</li> <li>MongoDB: 2 GB</li> <li>ElasticSearch: 4 GB</li> <li>Print Server (if Windows): 2 GB</li> </ul>

These sizing examples do not take into account workloads generated by multiple batch tasks and/or web services exchanges.



## Multi-tier architecture (mixed) examples

Platform / Target	Sizing recommendations
Windows Server 2012 R2 64-bit	Database and Application / Main Process server (physical machine): Single processor Intel 6-Core @2.4 GHz, 32GB RAM (2GB for OS, 16 GB for production database instance, 10 GB for Sage software, 4 GB free)
Windows Server 2016 64-bit (from 11.0.2 GA only)	Additional Process server (physical or virtual machine): Single processor Intel 6-Core or 6 vCPUs @2.4GHz / 24+GB RAM
RedHat Enterprise Linux or Oracle Enterprise Linux, 7.1 or later 7.x, 64- bit	10 GBps network backbone between Database and Additional Process server highly recommended (low latency network)
<i>For 100 to 250 user sessions</i>	MongoDB, Elasticsearch server (physical or virtual): Single processor Intel 2-core or 2 vCPUs @2.4GHz / 4GB RAM
	Syracuse Web server (physical of virtual): Single processor Intel 6-Core or 6 vCPUs @2.4GHz / 12GB RAM
	Print Server (virtual) (Windows only): 2 vCPUs @2.4GHz / 4GB RAM
Windows Server 2012 R2 64-bit	Database and Application / Main Process server (physical machine): Single processor Intel 6 Core @2.4GHz / 64GB RAM (4 GB for OS, 32 GB for production database instance, 20 GB for Sage software, 8 GB free)
Windows Server 2016 64-bit (from 11.0.2 GA only)	2 x Additional Process servers (physical or virtual machines): Single processor Intel 6-Core or 6 vCPUs @2.4GHz / 24+GB RAM each
RedHat Enterprise Linux or Oracle Enterprise Linux, 7.1 or later 7.x, 64- bit	10 GBps network backbone between Database and Additional Process servers highly recommended (low latency network)
<i>For 250 to 500 user sessions</i>	MongoDB, Elasticsearch server (physical or virtual): Single processor Intel 4-core or 4 vCPUs @2.4GHz / 8GB RAM (or split into 2 smaller VMs)
	2 x Syracuse Web server (physical of virtual): Single processor Intel 6-Core or 6 vCPUs @2.4GHz / 12GB RAM each
	Print Server (virtual) (Windows only): 4 vCPUs @2.4GHz / 6GB RAM Or 2 x Print Servers (virtual) (Windows only): 2 vCPUs @2.4GHz / 4GB RAM each

These sizing examples do not take into account workloads generated by multiple batch tasks and/or web services exchanges.

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## Sizing rules for scalability

### Additional process servers

Platform / Target	Sizing recommendations (physical)	Sizing recommendations (virtual)
Windows 64-bit <i>for 150 user sessions</i>	Single 4-core Intel Xeon @2.4 GHz / 16 GB RAM	4 vCPUs @2.4 GHz / 16GB RAM
<i>for 300 user sessions</i>	Dual 4-core or single 8-core Intel Xeon @2.4 GHz / 32 GB RAM	8 vCPUs @2.4 GHz / 32GB RAM*
Linux 64-bit <i>for 150 user sessions</i>	Single 4-core Intel Xeon @2.4 GHz / 16GB RAM	4 vCPUs @2.4 GHz / 16GB RAM
<i>for 300 user sessions</i>	Dual 4-core or single 8-core Intel Xeon @2.4 GHz / 32GB RAM	8 vCPUs @2.4 GHz / 32GB RAM*
IBM-AIX 64-bit <i>for 300 user sessions</i>	IBM POWER 7/8 4 cores @3.6GHz / 32GB RAM	IBM POWER 7/8 - 8 LCPUs @3.6GHz - 32GB RAM
<i>for 600 user sessions</i>	IBM POWER 7/8 8 cores @3.6GHz / 64GB RAM	IBM POWER 7/8 - 8 LCPUs @3.6GHz - 64GB RAM

\* Rather than a virtual server with 8 vCPUs, consider implementing two VMs with 4 vCPUs each for better virtualization performance

## Front-end servers

Resources	Sizing recommendations (physical) not including OS needs (typically 2 GB)	Sizing recommendations (virtual) not including OS needs (typically 2 GB)
<b>Syracuse Web server(s)</b>	For every 60 concurrent web sessions: 1 core in Intel Xeon @2.4GHz 2GB RAM 2 node.js processes	For every 60 concurrent web sessions: 1 vCPU @2.4GHz 2 GB RAM 2 node.js processes
	For high number of users and/or web services, instead of building a “big” Syracuse Web presentation server with a high CPU core count, you rather should provision several smaller servers in a cluster, especially if virtualized.	
<b>MongoDB server(s)</b>	1 core in Intel Xeon @2.4GHz 1GB RAM Min. disk space: 10GB 10krpm <i>(more CPU, RAM, disk resource needed if MongoDB is used for storing attachments)</i>	1 vCPU @2.4GHz 1GB RAM Min. disk space: 10GB 10krpm <i>(more CPU, RAM, disk resource needed if MongoDB is used for storing attachments)</i>
<b>Elastic Search server(s)</b>	1 core in Intel Xeon @2.4GHz <i>(more if high indexing usage)</i> 1GB RAM minimum, 2GB or more recommended Minimum disk space: 10GB 10krpm (recommended: 10% to 15% of X3 folder size per indexed language)	1 vCPU @2.4GHz <i>(more if high indexing usage)</i> 1GB RAM minimum, 2GB or more recommended Minimum disk space: 10GB 10krpm (recommended: 10% to 15% of X3 folder size per indexed language)
<b>Print server(s)</b>	2 CPU cores in Intel i3, i5, i7, Xeon >= 2.0GHz / 2GB RAM	2 vCPU(s) >= 2.0GHz / 2GB RAM
	Depends on print document traffic, more resources or several print servers will be necessary on medium-to-high implementations. Provision at minimum 20GB free space on system disk for temp files.	
<b>Front-end server, Citrix XenApp or Microsoft Remote Desktop Server</b>		
<i>for 30 connections</i>	1 core in Intel Xeon @2.4GHz / 8GB RAM / 2 x 72GB 15krpm RAID-1 disk	1 x vCPU @2.4GHz / 8GB RAM / 60GB disk on fast storage
<i>for 60 connections</i>	2 cores in Intel Xeon @2.4GHz / 16GB RAM / 2 x 72GB 15krpm RAID-1 disk	2 x vCPUs @2.4 GHz / 16GB RAM / 80GB disk on fast storage
<i>for 100 connections</i>	4 cores in Intel Xeon @2.4GHz CPU / 22GB RAM / 2 x 72GB 15krpm RAID-1 disk	4 x vCPUs @2.4GHz / 24GB RAM / 120GB on fast storage
Provision 250MB per user on filesystem storing user profiles. To increase security: we recommend implementing a cluster of several machines configured in Load-Balancing mode.		

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