Oracle® Agile

Engineering Data Management

Agile e6.1.2.2 Hardware Sizing Guide

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CONTENTS

Preface

The Oracle documentation set includes Adobe® Acrobat™ PDF files. The Oracle Technology Network (OTN) Web site (http://www.oracle.com/technology/documentation/agile.html) contains the latest versions of the Oracle Agile EDM PDF files. You can view or download these manuals from the Web site, or you can ask your Agile administrator if there is an Oracle Documentation folder available on your network from which you can access the documentation (PDF) files.

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Note	Before calling Agile Support about a problem with an Oracle Agile EDM manual, please have the full part number ready, which is located on the title page.

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Readme

Any last-minute information about Oracle Agile EDM can be found in the Release Notes file on the Oracle Technology Network (OTN) Web site (http://www.oracle.com/technology/documentation/agile_eseries.html)

Agile Training Aids

Go to the Oracle University Web page (http://www.oracle.com/education/chooser/selectcountry_new.html) for more information on Agile Training offerings.

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Chapter 1

Introduction

This manual is intended to help you in sizing an Agile e61.2.2 installation. It gives information on different programs and services running in Agile e6.1.2.2, the optimization of the service performance, and security.

It describes the following topics:

- **Agile Architecture**: Describes the individual components of the process model and standard installation types for single or multiple sites.

Note	If you need more information on the Agile e6.1.2.2 architecture, refer to the Architecture Guide for Agile e6.1.2.2.

- **Sizing Agile e6.1.2.2**: Gives information on the recommended CPU, hard disk, etc. requirements for the different Agile e6.1.2.2 components.

Chapter 2

Agile e6 Architecture

Agile e6.1.2.2 Process Model

This chapter gives an overview of the Agile e6.1.2.2 architecture to familiarize you with the components which you will find in the Hardware Sizing chapter.

- **Level 1 — Database Server**

  Agile e6.1.2.2 uses an Oracle database as storage for the application data. The database does not only store the user data but also the repository containing the metadata.

  In a distributed environment the database can be fully replicated.

- **Level 2 — Additional Server Components**
  - **File Server:** The File Management System (FMS) itself is client-server architecture and checks-in/-out documents from/to the user's computer. Files are managed in the vault whereas the user's computer does not require direct access to any of the vaults.

    For replicating distributed files a rule-based file replication is available.
    - **FMS Server**: Stores the files onto local disks and releases files to the File Server client.
    - **Web File Service**: Provides an HTTP interface for the File Server. The Web Client (Internet browser) or a Java Client started via WebStart requests from the Web File Service a special file. The Web File Service checks this file out from the File Server and transfers it to the browser.
  - **View Server**: Contains the Oracle AutoVue Server and the VueLink service, which transfers files from the File Server to the Java Client. Is displays different types of files in the Java Client, e.g. 2D/3D CAD files or Microsoft Office documents.

Note	We recommend using the View Server as a separate server.

- **Level 3 — Application Server**

  The application server runs the Agile e6 server processes and thus provides the Agile e6.1.2.2 functions like document management, version management, release management, etc. As well as extended functions like BOM operations, variant management etc.

  The functionality is provided by compiled user-exits and database stored procedures for appropriate tasks.

  The application server is driven by the repository. See also 'Level 2 – Additional Server' for other services.
  - **Agile e6 Server**: Machine running the Agile e6 server processes. These processes perform the major business logic. One process serves only one user.
    - DataView Daemon: Starts Agile e6.1.2.2 processes for the Windows Client
    - JAVA Daemon: Starts Agile e6.1.2.2 processes for the Java Client
    - Database Client Software
  - **J2EE Server (Oracle Weblogic Server)**: The J2EE components of Agile e6.1.2.2 are

running on an Oracle Weblogic Server. For more information please refer to the topic – 'Application Server' in the chapter "Hardware Sizing" of this document and the Architecture Guide.

- **Level 4 — Clients**

  With Agile e6.1.2.2, multiple types of clients are available, serving the different needs of casual users and power users.

  - Java Client (recommended client): Java Client for Windows platforms
  - Windows Client: Native Windows Client (DataView Client)
  - Web Client: Uses an Internet Browser as Web Client front-end (Internet Explorer or Mozilla)
  - FMS Client: Communicates the Agile e6 processes and performs tasks managed by the Agile e6.1.2.2 process. Transfers files from local disk to the File Server and back. The FMS Client runs in the background.

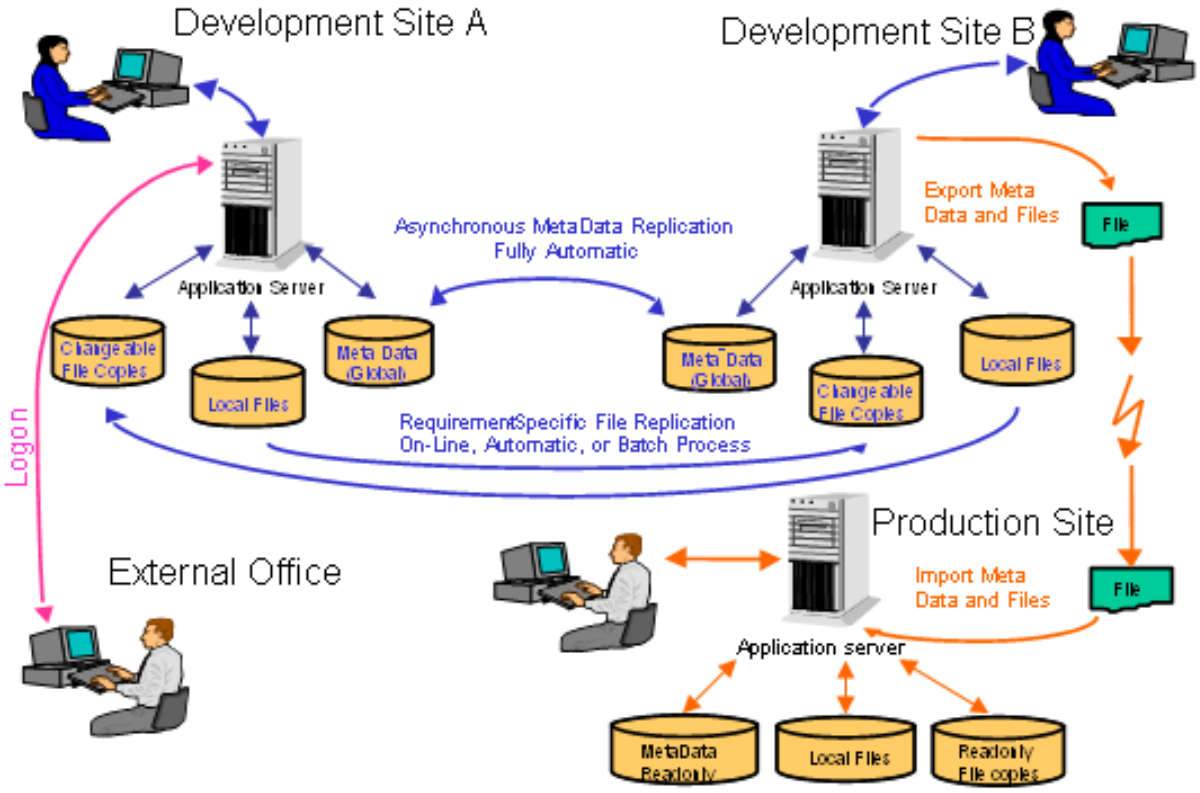
Installation Scenarios

Depending on how many sites are involved, different installation types are possible. Before sizing the hardware, you need to define your installation scenario. This specifies how many times a specific hardware is used and on how many different sites.

Single Site Installation

All components are installed on a single site. The different Agile e6 services can be distributed to one or more servers depending on the number of users working with the installation.

Multiple Sites Installation

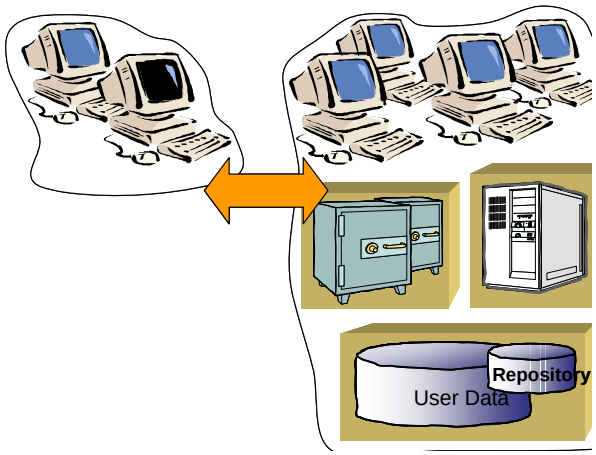


Depending on the profile of a site, different types of replication/distribution are possible:

1. Central installation with local clients

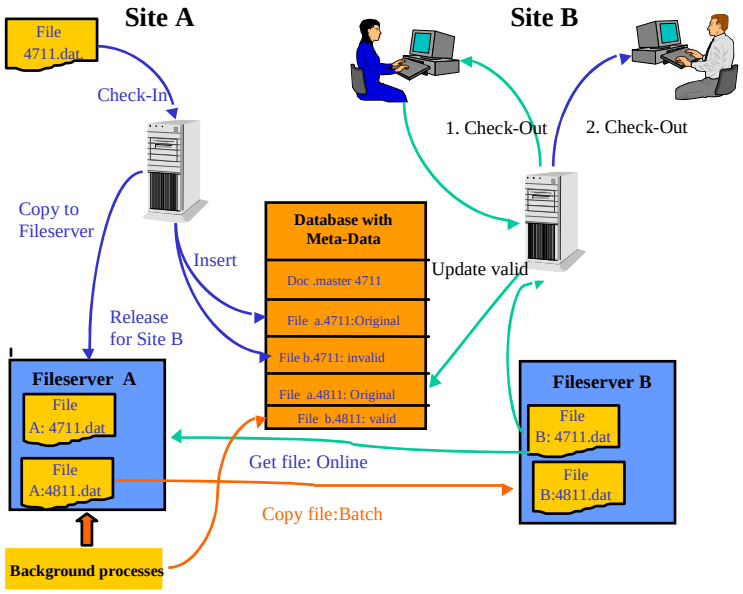
   The central installation with local clients is frequently implemented and allows a simple, centralized management with worldwide access.

   All services, besides the client, are installed on one central site and accessed via network.



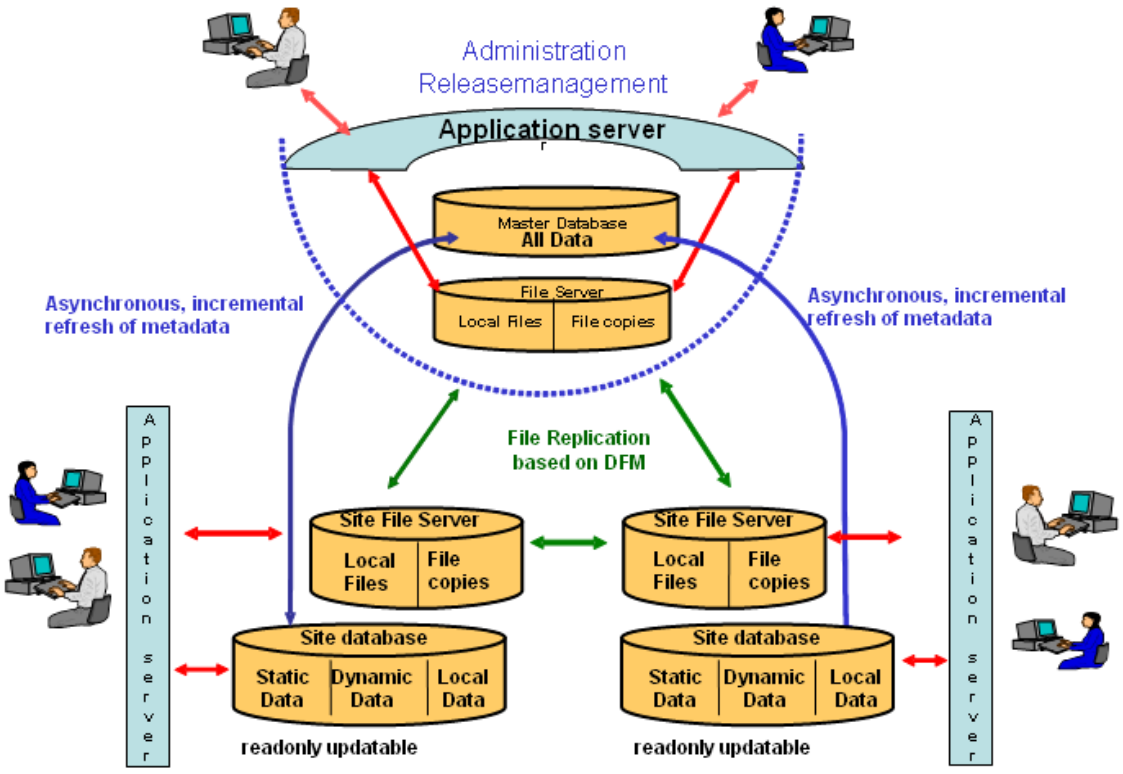
2. Central installation with local clients and distributed file management

   Distributed file management means that Clients and Vaults are installed locally on several sites and one central application server and central installation is available. Files are (partially) distributed/ replicated. This leads to an improved availability of managed files.



3. Fully replicated environments with distributed file management and replicated database

   With a fully replicated database, separate application servers are installed on each site. Each site has a complete installation including database, application servers, file server, and files can be replicated via DFM. The metadata is replicated based on features of the database system via asynchronous symmetric replication.



Note	This solution requires the Oracle Database Enterprise edition.

Chapter 3

Hardware Sizing

General Recommendations

When sizing the hardware for an Agile e6.1.2.2 installation, keep the following in mind:

- Use scalable hardware as you might want to add additional users and functionality in the future. The memory, disk space, and CPU should be larger than needed for the initial installation.
- Check the specific restrictions of the selected operating system. Especially the Windows server has a specific behavior.

Note	The Agile e6.1.2.2 server should not be a combination of domain controller, e-mail, print, and file server.
Note	A Windows machine should not run out of physical memory. Otherwise, sever server problems will occur. In case of no physical memory, the Oracle database will crash when the instance tries to allocate additional memory.

General Database Server Sizing

Small databases (dump size) are usually fast. The more data is in use, the slower the application performs and the more resources are needed on the database server.

In general, the database instance uses less CPU than the Agile e6.1.2.2 server process (30:70 or 40:60).

The database performance is defined by four parameters:

1. Number and performance of CPU.
2. Main memory used for the database.
3. Disk I/O.
4. Client – Server connection speed.

Network

We recommend a 1 GBit connection between the Database and the Application server.

Essential is the speed of the connection, not the throughput. 1 GBit LAN only defines the throughput. If the connection is heavily loaded, the elapsed time for each IP packet is high and the connection will be slow.

Note	To connect the Database Server with the Application Server do not use WAN.

If database and application are on the same machine, the connection is faster than on separate machines.

Sharing data between databases via replication, the network load will be at least 1 MB. During upgrade or initial synchronization, a considerable higher network load is to be expected (>= 1 to 2 MB). For database replication 25% more CPU power and more memory (>50 MB) is needed. Additional Oracle server processes (ca. 10 connects) perform the replication work.

Sizing the Oracle Database Server

For a description of the database templates see Administration Manual for Agile e6.1.2.2

Database Template	Number of concurrent Users	Table space in GB	Memory in GB
Demo	80	3	0.8
Small	100	18	2.5
Medium	300	41	6
Large	600	77	12
XLarge	1000+	138+	20+

The following table gives an overview on the required disc space depending on the selected template for the data files of the database.

Template / Table spaces	plm_demo size (GB)	plm_prod_ small size (GB)	plm_prod_ medium size (GB)	plm_prod_ large size (GB)	plm_prod_XLarge size (GB)
EDB	0.5	5	10	20	40
EDB_IDX	0.5	5	10	20	40
EDB_LOB	0.15	1	4	8	15
EDB_TMP	0.15	1	4	8	15
EDB_TMPIDX	0.15	1	4	8	15
SYSTEM	0.5	1	2	3	3
SYSAUX	0.3	1	2	3	3
TEMP	0.15	1	2	3	3
TOOLS	0.1	0.1	0.1	0.1	0.1
UNDOTBS1	0.15	1	2	3	3
USERS	0.1	0.1	0.1	0.1	0.1

CPU

Database Template	Number of CPUs (Dual and Quad Core)
Demo	1
Small	2
Medium	4
Large	4-8
XLarge	>8

Memory

For Oracle database the memory allocation is determined by the init-parameters, which can be altered in the server parameter file (spfile<SID>.ora) or the selected template.

To increase database performance, we recommend fitting the machines with more physical memory than necessary.

Server memory for Oracle database 11g:

- 10 MB per connected user.
- RAM - depending on the database size.

Note Disk I/O reduces when more memory is allocated for the database. Some activities are buffered in the database memory.

Database Template	Number of Users	Memory in GB
Demo	80	0.8
Small	100	2.5
Medium	300	6
Large	600	12
XLarge	1000+	20+

Note The maximum memory values have to be increased if the expected number of concurrent sessions exceeds the number defined for the template, or the dump size is higher.

Hard Disk

Write intensive parts of the database (e.g. undo, redo log, temp) and system swap or page file have to be on separate disks. We recommend using different disks for the database and the operating system to avoid any impact on the database. Each service (file service, swap, etc) which uses disk I/O can affect the database performance.

As I/O is most critical to the database, it is recommended to use four to six physically separated disks, or an equivalent performing controller base RAID shelf (RAID 0/1) exclusively for the database. Add a separate disk for the operating system. RAID 5 has to be used for archived redo

log files.

Data file	Contents	RAID Level
edb.dbf	Table data	1/0
edb_idx.dbf	Index data	1/0
edb_lob.dbf	LOB data	1/0
edb_tmpidx.dbf	Temporary index data	1/0
edb_tmp.dbf	Application temporary data	1/0
temp.dbf	Temporary database table space	1/0
undo.dbf	Undo database table space	1/0
system.dbf	SYSTEM table space	1/0
sysaux.dbf	SYSAUX table space	1/0
tools.dbf; users.dbf	Table space for small user's and tool's data	10
Archived redo log files	Archived redo logs needed for db recovery	5
control01.dbf, control02.dbf, control03.dbf	Database control files	1/0 (a separated disk for each copy)
Redo01-05.log	Database redo log files	1/0

The database server needs enough free disk space for:

- Database backups (database exports (hot backup) and file image backup (cold backup))
- Database logs
- Case of emergency: complete image backup (db files)
- Copies of the database dump for production, training, development, testing, upgrade, etc

The productive Oracle database runs in archive log mode. The backup strategy includes a backup of all database files (cold backup) and the archive logs produced during backup. In addition Oracle exports are performed daily (hot backup).

For the archive log, we recommend to provide disk space six times the size of the dump. The database will stop when the disk space for the log is used up.

Note Old archived logs have to be backed up once a week.

It is recommended to have the last database backup (both hot and cold) on the server machine, in order to reduce the recovery time.

If the database raises a media error (defect of file), recovery has to be performed using the cold backup that is kept on the server machine. If missing, restore copied files back to temporary disk location.

Calculate with the size of two cold database backups to have enough disk space for the recovery process. Do not use the free space for file storage. In case of emergency, you will not be able to recover your database in time.

	Factor	*	Single Size	=	Total
DB dump size			1		
Data files	3	*	1	=	3
Cold backup	2	*	3	=	6
Hot backup	2	*	1	=	2
Archive log files	6	*	1	=	6
Oracle 11g Database Software		*			5
Database Server logs		*			3
Operating system		*			1
Swap		*			2,5
Total					28,5

The database server requires at least 30 GB disk space in the beginning.

Database growth has to be monitored over time and actions to be taken if more space is needed, e.g. after 6 months.

Application Servers

The two mandatory application server types are:

- Agile e6 Server
- J2EE Server with installed Oracle WebLogic Server

Sizing the Agile e6.1.2.2 Application Servers

CPU

- **Windows**: 2 to 3 processors (Dual or Quadcore) should be able to support up to 100 active concurrent users.
- **UNIX**: 2 processors.

Note This can differ depending on how you use the application.

Note Additional CPUs are needed for using Enhanced Change Management.

Memory

80 MB physical memory for each concurrent user (Windows / UNIX).

For frequent use of complex functions such as BOM (structure size), copy or large amount of data

in one operation, the memory requirements are considerably higher.

The first connection, after starting the Agile e6 Server, will consume more physical memory on this server.

- **Windows**: We recommend the following server structure:
  - Separate database server for installation of up to 50 concurrent user
  - One application server for every 100 concurrent users.

    Depending on the installed operating system version, installed components, for example, Terminal Server software, the maximum number of concurrent users can be restricted to a lower value (approx. 70). We recommend you to verify the maximum the number of users by running stress test on your particular environment.
  - For additional users, an additional server has to be considered (1-n)
  - For more than one servers, an NLB cluster setup can be used or a load balancer software.

  For bigger installations (e.g. 400 users), UNIX could be the preferred server operating system. However, this decision is made by the system administration.
- **UNIX**: With UNIX, a large amount of users can be administered.

  Solaris and HP-UX use additional swap space, which can grow up to 150% of the physical memory for each concurrent user.

Hard Disk

Space required: Minimum 3 GB

Provide enough disk space for the Agile e6.1.2.2 application, the Oracle WebLogic software and several environments, including the loader and log files.

Temporary unused memory is paged out. Many of the Agile e6 processes remain inactive because the user works with different softwares (CAD, office), or memory allocated for bigger reports is not currently used.

The Agile e6.1.2.2 server needs swap space or page file for the inactive memory pages:

- 3 * RAM: RAM < 500 MB
- 2 * RAM: 500 < RAM < 2000
- 1 * RAM: RAM > 2000

Use the operating system manual to define the swap space. Some operating systems have maximum sizes for the swap space.

Note Compared to Windows, a UNIX system will have more swap space but less main memory.

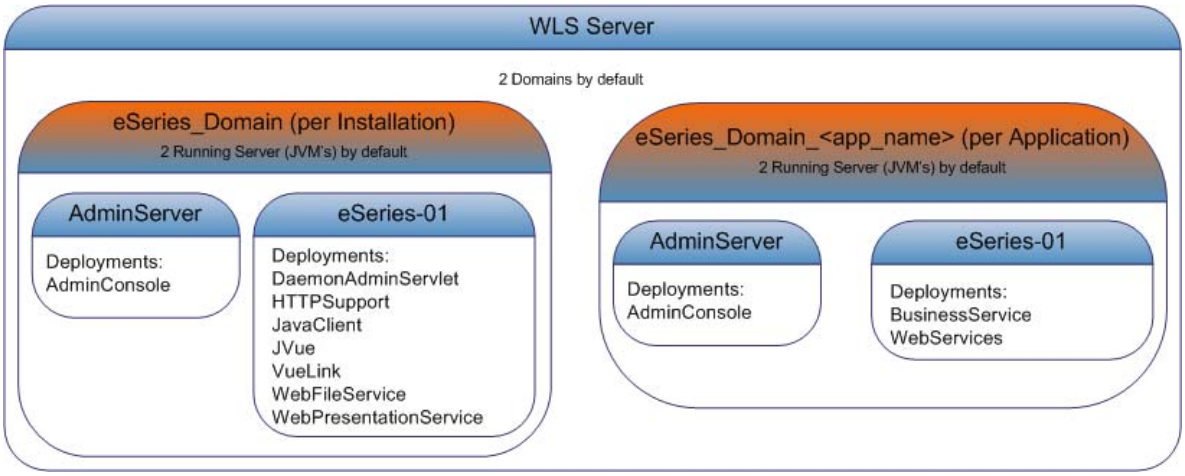
Network

The Agile e6.1.2.2 process holds one database connection and general one client connection. The database connection has 10 times the throughout and much more round trips. Thus a fast network connection especially to the database server is necessary (no WAN).

Sizing the Oracle WebLogic Server

It is recommended to run the Oracle WebLogic Server on the same machine where the Agile e6.1.2.2 server is running.

The following picture shows the WebLogic deployment architecture after an Agile e6.1.2.2 installation.



There are two domains:

1. eSeries_Domain – this domain is one per installation.
2. eSeries_Domain_<app_name> - this domain is per Application.

If there are two or more applications installed, for instance, prod, test, dev, etc, then there will be one eSeries_Domain and few application domains.

For example, eSeries_Domain_prod, eSeries_Domain_dev, etc.

For more information about the Agile e6.1.2.2 architecture, refer to the Agile e6.1.2.2 Architecture Guide.

For more information about Oracle Weblogic domains structure, refer to the Oracle WebLogic Server documentation in the Oracle Fusion Middleware Documentation Library at

http://download.oracle.com/docs/cd/E15523_01/index.htm

Go to Product Area -> WebLogic Server

- **32-bit JVM:** When you use 32-bit JVM (Weblogic installed on Linux, Windows), maximum heap size for JVM is ~2GB. That is, the maximum memory allocated for each domain is ~2GB, for both AdminServer and eSeries-01 server.

  Recommended maximum heap size is ~1.5GB.

  By default, an Agile e6.1.2.2 installation takes 1.5GB for eSeries_Domain and 1.5GB for eSeries_Domain_<app_name>. For every additional application installed, 1.5GB has to be allocated, additionally.

  For example, if there are production, test and development applications installed, the total memory required is 1.5GB for eSeries_Domain plus 3 x 1.5GB - for eSeries_Domain_prod,

eSeries_Domain_dev and eSeries_Domain_test. This totals to 6GB.

- **64-bit JVM:** For a 64-bit JVM (Weblogic on Solaris, AIX and HP-UX), maximum heap size for the JVM is practically unlimited and depends on the maximal memory available on the machine. So, for the applications with large number of concurrent user sessions, it is recommended to use a 64-bit JVM and the JVM's maximum heap size should be set to 3GB per domain.

  For example, if there are prod, test and dev applications installed, total memory needed is 3GB for eSeries_Domain plus 3 x 3GB for eSeries_Domain_prod, eSeries_Domain_dev and eSeries_Domain_test. This totals to 12GB.

  For applications with extra huge number of concurrent user sessions, at least 4GB has to be considered as a JVM's maximal heap size per domain.

Sizing the Clients

The following three clients can all be sized:

- Java Client
- Windows Client
- Web Client

For more information on the Agile e6.1.2.2 clients refer to the *Architecture Guide for Agile e6.1.2.2.*

CPU

The size of the CPU depends on your operating system.

We recommend the following values:

Operating System	Min CPU Speed (in MHz)
Windows XP	1000
Windows Vista	2000 (Dual Core CPU)

Memory

We recommend the use at least the following values:

Operating System	Min RAM Size (in GB)
Windows XP	1
Windows Vista	2

Hard Disk

An Agile e6.1.2.2 client installation requires approximately 180 MB disk space.

Network

Note	When sizing the network, consider the network load produced by the client and for file transfer when using the File Server.

Java or Windows Clients produce an average of about 2.5 to 4 Kbytes (10 to 32 KB) network load.

For the Web Client a 256 KB connection will usually not be under full load. A 128 KB connection acts slower, and a 64 KB connection is possible but the performance decrease is remarkable.

20 times more information is sent to the Web Client (browser) than received back.

Add Network load according to expected documents and drawings etc. shared via WAN. You can check existing WAN connections for already existing network loads.

File transfer uses the total capacity of a network connection. If a network line is under heavy load the elapsed time of the IP-packages is long. Make sure to enable a fast file transfer (< 10 sec) as the connection will slow down during file transfer. The network connection must have enough spare bandwidth.

Sizing Other Servers

FMS Servers

There are no special requirements for the Agile e6.1.2.2 File Server. The machine should not be swapped, and enough free memory should be available for file buffer. The throughput of the File Server is determined by the network connection. Usually, the possible disk I/O is higher than the throughput of the network interface. For the File Server identical operating system versions are used as the Agile e6.1.2.2 server. It is not necessary having the same operating system as the client. You can install on mixed operating systems.

- Clients on all Windows platforms
- Fileservers are Windows or UNIX, or both

CPU

No special requirements. CPU is needed for the TCP/IP stack and File I/O.

Memory

At least 512 MB of free memory for a dedicated server is required.

The process allocates 1 MB. Each connection uses main memory to buffer the transmission. So enough free memory should be available.

If WebFile Service is running as an application on WebLogic server, the server where the WebLogic application is running needs a fast connection to the File Server.

It is possible to install the WebFile Service in a Tomcat on the File Server if you use DFM and don’t have an Oracle Application Server at the DFM site. This requires an additional free memory of 512 MB on this server, resulting in a total of at least 1GB free memory.

Hard Disk

The File Server installation needs 1 MB of disk space. Estimate the necessary disk space for the stored documents.

- How much disk space is required for the next month and years?
- What is the concept to raise disk space and backup volume?
- Is it possible to add new disks to the system?

The File Server stores the files in vaults. An electronic vault is a directory and its contents. One directory is limited by the partition size. The maximum capacity of an electronic vault is the size of the partition. If the vault is running out of disk space you can create a new vault on a second partition or you have to shift the vault to a bigger partition. The directory must be moved to the bigger partition with preserved file permissions (Windows!!) and the vault definition must be changed in the Agile e6.1.2.2 System.

Agile e6.1.2.2 only supports local file systems. File systems, in particular NFS, commit the file write in a state where the file is still in the file cache and not completely written on the remote server. If the File Server machine crashes in this situation, the file is corrupt. If storage systems (e.g. SAN) are utilized, you have to exclude this issue. This is the same security reason why a database only uses local file systems.

A RAID5 shelf is recommended for security and capacity reasons.

Network

A fast connection to the PLM client reduces time to store and load files. The Network is the bottleneck of the File Server. The disk system is generally faster than the network and CPU load is not high on the server. If clients are in different network segments you can use more than one network card or use multiple File Server. But the vault definition only has one hostname (IP-address) and can only be reached over one network card.

You can combine the File Server with the Agile e6.1.2.2 Server, Oracle Application Service. The File Server needs primarily disk I/O, while the other services need CPU.

View Server

Please see the Oracle AutoVue Installation Manual. The FAQ section of that manual contains example configuration.

Note	Please consider disk space for the AutoVue cache.