integrity™ lifecycle manager

System Guidelines

11.1

PTC Inc., 140 Kendrick Street, Needham, MA 02494 USA

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System Guidelines Introduction

This document provides system guidelines to support Integrity Lifecycle Manager 11.1 with a safe margin of operating capacity to ensure acceptable performance and a satisfying user experience for the majority of deployment scenarios.

The process of engineering and sizing enterprise applications is complex. While the guidelines provided in this document are intended to be applicable to the majority of customer environments, one size does not fit all deployment scenarios. Each customer is unique, and in cases where deployment requirements exceed the parameters described within this document, it is recommended that you consult PTC Technical Support or Professional Services representative for further assistance with hardware and configuration choices.

Product Applications and Components

This document provides guidelines for Integrity Lifecycle Manager; which incorporates the following capabilities: workflows and documents, configuration management.

All guidelines provided in this document apply to product installation during initial deployment for the following components of an Integrity Lifecycle Manager deployment:

- PTC Integrity Lifecycle Manager server requirements
- Federated Server™ architecture (FSA)/proxy server requirements
- PTC Integrity Lifecycle Manager Agent Server requirements
- network requirements
- database recommendations
- PTC Integrity Lifecycle Manager client requirements

Factors Affecting System Recommendations

Hardware platform and customer usage profiles can have a significant effect on the performance and user experience of Integrity Lifecycle Manager. The following are some of the more significant factors that have been observed to impact performance of Integrity Lifecycle Manager, at both client and server levels:

- Type and speed of CPU, and number of CPUs.
- Integrity Lifecycle Manager is engineered on a client/server architecture that highly depends on the use of Java to enable transparent cross-platform operation. Java heap sizing, in both the server and client, is a critical consideration to achieve optimal system performance and user experience.
- With the configuration management capability, the following parameters have been noted to have an impact on system performance:
    - project size: number of projects, subprojects, members
    - numbers of users connecting to the Integrity Lifecycle Manager server
    - usage profiles of all users
- With the workflows and documents capability, the following parameters have been noted to have an impact on system performance:
    - number of users connecting to the Integrity Lifecycle Manager server
    - number of items interacted with in the results set and/or processed

    - complexity of data (such as relevance rules and relationships)
    - usage patterns (such as number of queries, reports, and charts)
- Database server hardware and the latency between the Integrity Lifecycle Manager server and the database can have a significant impact on Integrity Lifecycle Manager.
- Speed of the LAN/WAN connection between the client instance and the Integrity Lifecycle Manager server it is connected to. In cases where slow network connections are resulting in marginal user response time, the deployment of an FSA proxy server may provide a significant improvement in user response times.

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Integrity Lifecycle Manager server Recommendations

This chapter contains hardware and networking recommendations for the Integrity Lifecycle Manager server.

Recommendations for Co-Location

Due to the challenges in engineering a multi-application platform for deterministic behavior and performance, PTC recommends the following for greatest results:

- Install the Integrity Lifecycle Manager server on a dedicated server computer with no other applications running.
- Install the Integrity Lifecycle Manager server on a machine that is separate from the machine hosting the database that the Integrity Lifecycle Manager server applications depend on.
- Install the Integrity Lifecycle Manager server at the same physical location as the database server.

Integrity Lifecycle Manager server System and Hardware Recommendations

The recommendations for the Integrity Lifecycle Manager server are based on platform configurations used by PTC during internal large system performance testing. These tests have been designed around large numbers of users, representative data profiles, and representative usage profiles.

- For a Windows operating environment, refer to CPU and memory sizing recommendations in the table on the next page.
- For a UNIX operating environment, PTC recommends Solaris (refer to CPU and memory sizing recommendations in the table on the next page). PTC recommends Solaris for the following reasons:
  - Solaris is the dominant and most widely deployed UNIX O/S in the industry.
  - The Integrity Lifecycle Manager product is tested on Solaris more than on any other UNIX variant.
- For a Linux operating environment, refer to CPU and memory sizing recommendations in the table on the next page. PTC does not recommend a particular Linux variant.

Note

Unless otherwise noted, recommendations provided for each major operating system apply to all supported versions of that OS. For specific version numbers, go to: http://support.ptc.com/partners/hardware/current/support.htm

Integrity Lifecycle Manager server Sizing Recommendations

Platform	Processor	RAM/ Heap	Disk
Windows	Four core+ P4 XEON Class @ 3 GHz	16 GB/ 8 GB	See Disk Storage Sizing Recommendations on page 14
Solaris (on SPARC)	Four core+ UltraSPARC IV @ 1GHz+	16 GB/ 8 GB	See Disk Storage Sizing Recommendations on page 14
Linux	Four core+ P4 XEON Class @ 3 GHz	16 GB/ 8 GB	See Disk Storage Sizing Recommendations on page 14

Disk Storage Hardware Guidelines

The Integrity Lifecycle Manager server uses the disk system for the following purposes:

- storage of executables and configuration information
- revision bulk data cache (BDC) (configuration management only)
- attachments and embedded images (workflows and documents only)

Hardware guidelines are outlined as follows, and, in some cases, are unique to a particular purpose:

- Select disks with the fastest possible speeds (read/write access times). The majority of the Integrity Lifecycle Manager large-system performance testing has been performed on 10,000+ RPM disks, but it has been observed that the database server is quite often I/O bound (that is, waiting in disk I/ O operations). Disks of speed 15,000 RPM are readily available from all vendors.
- Back up the server repository on a regular basis to ensure that data can be recovered in the event of a catastrophic failure. The customer’s disaster recovery policies determine the frequency of these backups.
- Disk access performance is the most critical consideration for the BDC. Optimize the BDC for performance not reliability. There is no requirement to host the BDC on a reliable disk, as this content can be re-created during normal server usage (with a small impact on server performance).

- PTC recommends that the disk allocated for internal operating system operation (that is, for swapping, paging, and so on) be hosted on a disk spindle or disk array separate from the disk(s) used by the Integrity Lifecycle Manager server application. It is expected that a qualified system administrator will be familiar with this standard practice.
- While not recommended, if a commercial database is deployed on the same machine as the Integrity Lifecycle Manager server, the database data files should be located on a disk spindle(s) or disk array that is separate from the storage unit used by the Integrity Lifecycle Manager server application.
- PTC recommends that the Integrity Lifecycle Manager database data files be stored on a highly reliable storage configuration. Integrity Lifecycle Manager server applications manage data that is considered critical to the business of the enterprise. The advantages of enterprise storage include the following:
    - data integrity maintained during disk failure
    - uninterrupted access to disk array, even during disk failure or disk upgrades
    - high performance operation

Disk Storage Sizing Recommendations

Calculate the amount of disk space required to host the Integrity Lifecycle Manager server application as follows:

Required Disk Space = disk space required for the installation of executables + bulk data cache

Since the amount of disk storage required by the BDC is 100 percent determined by customer needs, the disk requirements should be tailored to each customer deployment using the recommendations in the following sections.

Application Executables and Configuration Files

Approximately a minimum of 3 GB is required for the Integrity Lifecycle Manager server installation.

Bulk Data Cache Recommendations

For configuration management, the BDC is a critical factor in the performance of revision retrieval from the server. It is especially critical in an FSA proxy server configuration where a properly engineered BDC can significantly reduce the number of files that need to be transferred between the proxy and main servers.

Since disk space is a relatively inexpensive commodity, PTC recommends that a generous amount of BDC be configured to achieve optimal performance. The following guideline is suggested:

BDC size = sum of Sandbox size + expected attachments size + 200% safety margin

where the total size of all Sandboxes accessed by all users connecting to this server and the size of all Integrity Lifecycle Manager attachments determines BDC size.

Example 1: If your entire user community works on 10 Sandboxes (combination of regular, variant and build Sandboxes) of size 50 MB each (including all FSA connected users), then the BDC on the main server should be sized to 1.5 GB (10 x 50 MB + 200%).

Example 2: If the users connecting through an FSA proxy server work on two projects of size 100 MB each, then the BDC on the FSA proxy server should be sized to 600 MB (2 x 100 MB + 200%).

Database Disk Requirements

Since each customer is unique, the amount of disk reserved for archives (configuration management) and workflow/document data must be customized to each customer's needs.

Database Deployment Recommendations

Integrity Lifecycle Manager supports and is tested on a range of commercial databases. For a complete list, go to http://support.ptc.com/partners/hardware/current/support.htm Integrity Lifecycle Manager depends heavily on a backend database to perform the required functions. The backend database can have significant impact on the performance of the application, particularly with larger Integrity Lifecycle Manager configurations. PTC does not recommend any particular database from the set of supported databases nor does it recommend any database sizing.

- PTC customers are expected to have qualified database administrators (DBA). Commercial databases are complex products requiring specialized database administrator knowledge to optimize database performance and data integrity. PTC is not responsible for database administration.
- The customer's DBA regularly tunes (analyzing, indexing, and so on) their database environment for optimal performance.
- If the customer does not currently have an existing database or a DB administrator, but they still prefer a commercial database, then PTC recommends MS-SQL. When properly tuned, Oracle may provide superior performance, but MS-SQL provides the best out of the box, general, un-tuned performance of the three choices.
- PTC strongly recommends that customers deploy the database on a dedicated machine that is separate from the Integrity Lifecycle Manager servermachine.

- PTC does not recommend database hardware configurations. It is expected that the customer's DBA or database vendor provide specific recommendations.
- Integrity Lifecycle Manager server applications manage data that is considered critical to the business of the enterprise. PTC strongly recommends that the database tables be stored on highly reliable storage configuration.
- If customers elect to co-locate the database and Integrity Lifecycle Manager server on the same machine, then they should pay particular attention to the following hardware considerations:
  - Disk

    As always, a faster disk is better, but just as importantly, PTC strongly recommends that the Integrity Lifecycle Manager server disk storage be located on a dedicated disk (or disk array) that is separate from the database tablespace.
  - Memory

    Allocate adequate memory on the machine to support operation of both Integrity Lifecycle Manager server and database-specific applications running simultaneously.

FSA Proxy Server Machine Sizing Recommendations

Several high level architectural factors are important to consider in recommending FSA machine sizing:

- Memory

  Given that the application is the same software as deployed for the main Integrity Lifecycle Manager server, PTC recommends that the same amount of memory be deployed to ensure optimal Java performance.
- CPU

  While the proxy server is involved with the connection management and client/server communication, it is relieved of all responsibility for dealing with backend (file system or database) operations. Therefore, the requirement for CPU processing should be less than that of the main server.
- User loading

  By design, an FSA proxy server is intended to service a subset of the total set of users hosted off a main server (that is, a development team working at a remote location). Therefore, it can be assumed that the overall load imposed on a single FSA server is less than that of a main server. As always, the

number of users located on the proxy server has a direct impact on performance.

- Bulk Data Cache

  Within an FSA environment, proper sizing of the BDC is critically important to a well performing FSA operation.

The following recommendations are based on a combination of these factors and results obtained through empirical testing on a configuration with 50 users hosted remotely off an FSA server:

Platform	Processor	RAM/Heap	Disk
Windows	Four core P4 @ 2GHz+	8 GB/ 4 GB	See Disk Storage Sizing on an FSA Proxy Server on page 17
Linux	Four core P4 @ 2GHz+	8 GB/ 4 GB	See Disk Storage Sizing on an FSA Proxy Server on page 17

If the customer has a requirement to deploy an FSA proxy on Solaris, PTC recommends that they deploy with the same memory as noted, but that they select a CPU with equivalent or better processing capability.

Disk Storage Sizing on an FSA Proxy Server

Calculate disk sizing on an FSA proxy server as follows:

Required Disk Space = Disk space required for installation of executables + Bulk Data Cache

FSA executables are the same as that of the main server (see Application Executables and Configuration Files on page 14). For recommendations on BDC sizing, see Bulk Data Cache Recommendations on page 14.

Consider two factors, latency and bandwidth, when engineering the client/server network connection for optimal Integrity Lifecycle Manager performance and user experience. From lab testing results obtained against a typical FSA configuration using a simulated WAN network connection, the following points are noteworthy:

- Latency is more critical than bandwidth in obtaining the best possible operation response times.
- PTC recommends that the WAN connection provide bandwidth of at least 256Kbps to provide reasonable response time to most configuration management operations.

Integrity Lifecycle Manager server Network Recommendations

Given that Integrity Lifecycle Manager is built on a client/server architecture (user interface as well as backend database access), the performance of the network has a direct impact on the performance of Integrity Lifecycle Manager. Several standard recommendations should be followed:

- at least a 100bT (100Mbps) LAN be deployed between client and server
- Integrity Lifecycle Manager client, each Integrity Lifecycle Manager server (main and proxy), and database server be equipped with 100bT NICs (minimally) to ensure optimal performance
- LAN network interconnections between servers should be optimized by:
    - configuring all servers relating to the Integrity Lifecycle Manager server operation on the same IP subnet
    - deploying high speed switching hubs

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FSA Proxy Network Recommendations

The FSA proxy architecture has been designed to optimize the performance of the product in cases where the client/server communication must be routed through a slower network connection (such as a Wide Area Network (WAN)).

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- PTC recommends that the WAN connection provide bandwidth of at least 256Kbps to provide reasonable response time to most configuration management operations.

Integrity Lifecycle Manager server Failover Mechanism

As a safeguard, PTC offers a failover mechanism for the Integrity Lifecycle Manager server. In the event that your main Integrity Lifecycle Manager server fails (the server's operating system goes down, the network to the database is lost, or the network that the server is communicating over is lost), a secondary Integrity Lifecycle Manager server takes over and resumes server operations without manual intervention and minimal impact on users.

To implement the failover mechanism, refer to the *Integrity Lifecycle Manager Server Failover Configuration*.

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Integrity Lifecycle Manager Client Memory Recommendations

The client operating system and other applications consume system memory: Windows Vista/ Windows 7 can use almost 512 MB of the system memory to implement the operating system. PTC recommends that client machines have at least 2 GB of physical RAM.

Additional client memory may be required when using the Document view in the Integrity Lifecycle Manager for Integrity Requirements solution. When determining the available client memory, consider the amount of data that is intended to be displayed in the Document view and how many Document views are to be displayed. Additionally, if multiple documents are viewed simultaneously, then the memory demand scales with the number of open documents.

If working with non-trivial requirements documents (containing several thousand items of content), PTC recommends setting the Integrity Lifecycle Manager client heap to at least 1 GB. The client machine memory should be sized accordingly.