

Oracle Primavera P6 Enterprise Project Portfolio Management Performance and Sizing Guide

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Oracle Primavera P6 Enterprise Project Portfolio Management v 8.0 is a platform independent solution for the Enterprise.

INTRODUCTION

Oracle Primavera P6 Enterprise Project Portfolio Management (EPPM) is a robust and easy-to-use integrated solution for globally prioritizing, planning, managing, and executing projects, programs, and portfolios.

This document outlines an estimate of hardware and software requirements for deploying Oracle Primavera P6 Enterprise Project Portfolio Management product. Three deployment scenarios are considered, i.e. small, medium, and large and recommendations for each type are provided. These recommendations should be considered only as guidance while planning product deployment

The following assumptions are made in this document:

- A highly available environment is desired
- Database specific best practices for high availability, backup, and recovery are being followed
- Load balancing specifics, software and hardware, is beyond the scope of this document.

Many improvements and feature enhancements have been implemented in Primavera P6 EPPM R8 product. The Job Service, Summarizer and Leveler modules are re-architected to be platform independent, robust, reliable and highly scalable.

ARCHITECTURE OVERVIEW

Oracle Primavera P6 Enterprise Project Portfolio Management is a Java 2 Platform, Enterprise Edition (J2EE platform) web application. The J2EE platform consists for a set of industry-standard services, APIs and protocols that provide the functionality for developing multi-tiered, web-based, enterprise applications. The division of tiers allows the application to scale according to customer's performance demands. Oracle Primavera P6 Enterprise Project Portfolio Management uses the J2EE specification to build a flexible and scalable cross-platform solution.

The division of tiers allows the application to scale according to customer's performance demands.

The main tiers of Oracle Primavera P6 Enterprise Project Portfolio Management are:

- **The presentation tier** – A web server layer rendering JSPs, JavaScript, Applets etc. to present a feature rich UI accessible through various supported browsers
- **The middle tier** – A J2EE application server forms the middle tier where all business logic of Oracle Primavera P6 Enterprise Project Portfolio Management is implemented.
- **The data tier** –The data tier consists of a standalone or clustered RDBMS environment utilizing Java Database Connectivity (JDBC) to integrate with the middle tier.

Oracle Primavera P6 Enterprise Project Portfolio Management application resides on an application server and the repository of the application data resides on the database server. The figure 1 illustrates the architecture of Oracle Primavera P6 suite of Products.

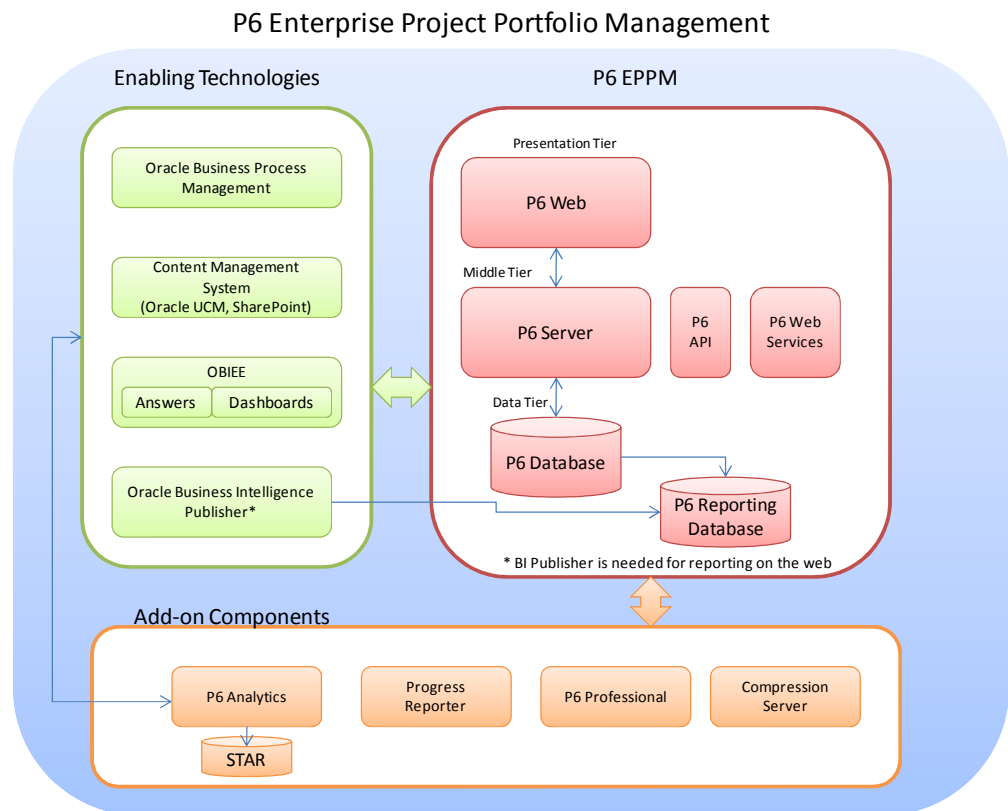


Figure 1: P6 EPPM Architecture

Typical Oracle Primavera P6 Enterprise Project Portfolio Management deployments comprise of the following components:

- A clustered web server load balanced using a load balancing router or software solution. End-users including administrators interact with Primavera P6 through these web servers.
- A clustered J2EE application server on which Oracle Primavera P6 Enterprise Project Portfolio Management is deployed.
- Oracle Primavera P6 Enterprise Project Portfolio Management uses a RDBMS as its data repository. Depending on the dataset size, the database server can be a standalone or clustered, as depicted in this sample architecture, the database is clustered. For optimized performance, the application servers and RDBMS are co-located, for example within the same subnet.

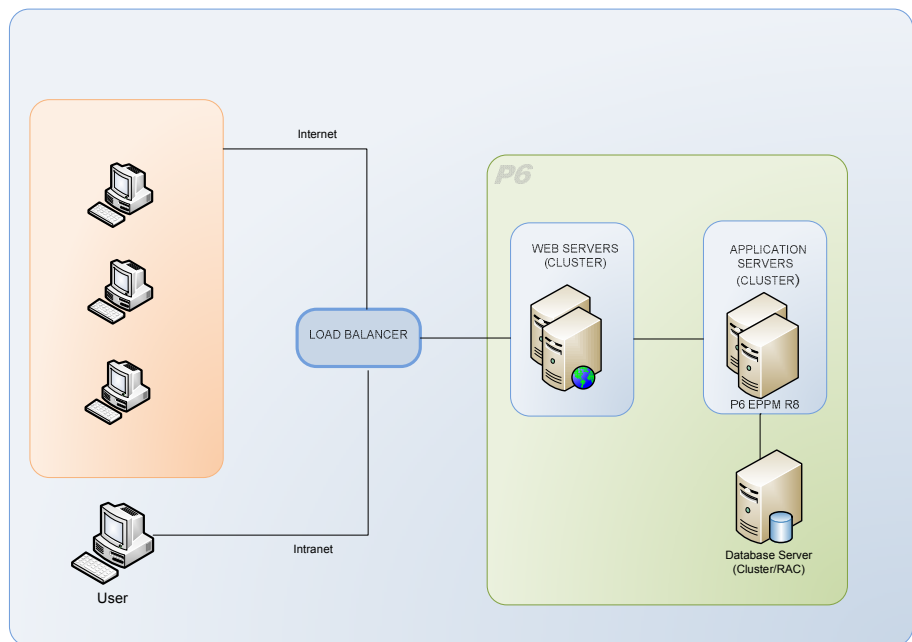


Figure 2: Sample P6 EPPM Deployment

PERFORMANCE AND SCALABILITY CONSIDERATIONS

While there are multiple ways to achieve desired performance and scalability levels in Oracle Primavera P6 Enterprise Project Portfolio Management, the performance considerations can be grouped in two categories, Vertical and Horizontal. There are several pros (and cons) of choosing one over the other; organizations can decide based on the desired level of performance, availability requirements, short-term vs. long-term outlook of system usage, seasonality and frequently used application areas.

Vertical Scaling (Scaling up)

Vertical scaling involves adding additional resources or upgrading resources on an existing system. Vertical scaling is usually a good approach if the application bottlenecks are processor and memory-related.

JVM Heap Size

The application objects such as Projects, Activities, and Assignments etc. are stored in the Java Virtual Machine (JVM) heap allocation. Most of these objects are short lived and are periodically cleaned up by the JVM's garbage collection mechanism. As the number of concurrent users increases, performance and scalability is affected by the available heap space in the JVM. Increasing the heap size is an easier way to achieve the desired performance and scalability.

Hardware Upgrade

Desired performance and scalability can also be achieved by upgrading CPU, adding extra cores, upgrading to faster I/O devices, and upgrading from a 32-bit to 64-bit hardware.

Operating System Upgrade

Another way to achieve desired level of performance is by upgrading to latest versions of the operating system, installing latest patch updates and by upgrading from 32-bit version to a 64-bit version etc.

While vertical scaling is easier to achieve, it does not address the availability requirements. If the desired level of availability is high, then vertical scaling alone will not be sufficient.

Horizontal Scaling (Scaling out)

As the demand for application grows, additional nodes can be added to an existing application server cluster to handle the increased system load. For high availability requirements, horizontal scaling is the better option.

Adding Application Server Nodes

As the usage of application grows within the organization adding additional server nodes are the best way to achieve desired performance and scalability. If the organization's business model exhibits seasonality or periodic variations, the system load will fluctuate accordingly. For example, the average load on the system quadruples during month end closing, or the plant is closed for a week every quarter for maintenance. Adding or removing application server nodes should be considered to manage seasonality. To mitigate risk of degraded performance and undesired downtime, it is crucial to understand the business cycles of the

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Database Scaling and Clustering

Database server scaling options are available and have been widely adopted and implemented. Database clustering allows multiple nodes in a clustered system to mount and open a single database that resides on shared disk storage. This configuration provides high availability in the database environment. One example of database clustering is Oracle Real Application Clusters (RAC).

DEPLOYMENT CONSIDERATIONS

Oracle Primavera P6 Enterprise Project Portfolio Management performance depends on the load faced and response characteristics of each tier discussed in the previous section. Performance affecting factors are identified and discussed in the following sections. These factors should be considered during deployment planning.

Oracle Primavera P6 Web Client

The number of concurrent users accessing the system directly affects the web client performance. Performance is also affected by the activities being performed within each user session i.e. Activity Gantt, Resource Planning, Scheduling, Leveling, Summarizing etc. Concurrent users and their system activities largely affect CPU and memory requirements of the application server.

Oracle Primavera P6 Server

The Oracle Primavera P6 Enterprise Project Portfolio Management server is a J2EE application that uses J2EE technologies for interaction with end-users, target systems, database repository etc. Following are some areas of server operation that need to be considered during Oracle Primavera P6 Enterprise Project Portfolio Management sizing.

Job Service

In Primavera P6 R8, the job service process is integrated within the application server for platform independence, better performance and scalability. Job Service is responsible for executing real-time and scheduled application jobs. The following application areas are processed as jobs:

- Summarizer

- Scheduler

- Leveler

For all deployment categories, we recommend setting up dedicated application server node for running job service.

The job service is capable of processing large number of projects, activities and resource assignments. Numbers of concurrent jobs largely affect CPU and memory requirements of the application server and load on the database servers.

- For medium to large deployments, we recommend setting up a dedicated application server node for job service. This application server should not be part of the cluster processing HTTP requests from the web client. Additionally we recommend turning off the job service on the application servers in the cluster, which are serving web client requests. Horizontally scaling out by adding more dedicated job service application server nodes can address increased performance requirements.
- For long running jobs, we recommend off-peak hours job scheduling. For example, scheduling a job to run, when the load on the system is low.
- For heavily data intensive jobs, such as summarizing an entire EPS, we recommend sequential rather than concurrent scheduling. For example, do not schedule two large EPS summarization jobs to run at the same time.

Summarizer

The newly designed Summarizer is highly scalable and robust. The following factors could impact the response time of Summarizer:

- Number of Activities/Assignments
- Length of project
- Depth of WBS Hierarchy
- Length of Activities/Assignments
- Number of Financial Periods

Activity Gantt

The Activity Gantt feature underwent scaling efforts to help large deployments. Small deployments also benefit from this enhancement because of optimization in code to help load data quicker. The last release had a limit that allowed the user to load 15k activities. This release has raised the limit to 100k activities. The following factors could impact the response of the Activity Gantt feature:

- Number of Activities/Assignments
- Number of activity Relationships
- Number of currently opened projects
- Length of project
- Depth of WBS Hierarchy
- Length of Activities/Assignments
- Amount of client side memory allocated to the JRE and applets

- Other load on the application server

Resource Management

The Resource Management feature now allows for a more interactive resource a manage approach. Resource management is now easily and intuitively accomplished. The following factors could impact the response time of the Resource Management:

- Number of Resources
- Number of Resources Assignments to Activities
- Number of currently opened projects
- Filter usage
- Length of project
- Depth of WBS Hierarchy
- Amount of client side memory allocated to the JRE and applets
- Other load on the application server

Risks

The Risk feature has gone through a complete redesign that will help provide for a high confidence level of success by evaluating factors such as cost and scheduling. The following factors could impact the response of the Risk feature:

- Number of Risks
- Number of Activity Assignments to Risk
- Number of currently opened projects
- Number of Risk Scoring Matrix assignments
- Number of Response Plan assignments
- Amount of client side memory allocated to the JRE and applets
- Other load on the application server

DEPLOYMENT CATEGORIES

Oracle Primavera P6 Enterprise Project Portfolio Management deployments can be classified into three categories i.e. **small, medium and large**. Some of the factors considered for defining these categories are outlined below. These factors influence the hardware and software specifications during Oracle Primavera P6 Enterprise Project Portfolio Management deployment.

		Deployment Categories		
		Small	Medium	Large
Number of Objects	Projects	200	1,000	50,000
	Active Users	50	100	200
	Activities	100,000	1,000,000	5,000,000
	Activities per project	5,000	10,000	20,000
	Resources	500	1,000	4,000
	Resource Assignments	100,000	1,000,000	5,000,000
	Resource Assignments per project	5,000	10,000	20,000
	Risks	100	500	2,500

Table 1 – Deployment Categories

DEPLOYMENT ARCHITECTURES

Small Deployment – Single Node

This deployment model is suitable for a business unit or a division within an organization. It also is useful for setting up a pilot with the intent of moving to a medium or large size deployment. This deployment can achieve the desired performance or scalability, but does not address the high availability requirement due to single point of failure.

Application Server Configuration

CPU	Intel Xeon 5000 series (Quad Core 3.46 GHz) or equivalent
Java Heap Size	2 GB
Operating System	Oracle Enterprise Linux (OEL) 64-bit or Windows7 server

	64-bit or equivalent
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Job Service Configuration

CPU	Intel Xeon 5000 series (Quad Core 3.46 GHz) or equivalent
Java Heap Size	4 GB
Operating System	Oracle Enterprise Linux (OEL) 64-bit or Windows7 server 64-bit or equivalent

Database Server Configuration

CPU	Intel Xeon 7000 series (Quad Core 2.66 GHz) or equivalent
RAM	2 GB
Operating System	OEL 64-bit or Windows7 server 64-bit or equivalent

Medium Deployment – Clustered

Assuming that high availability is desired for a medium deployment, the application server is clustered. If high availability is not a requirement, desired scalability can be achieved vertically by adding equivalent units of memory and CPU.

The clustered nodes can exist on the same physical machine as separate node deployments when a high-end machine is used for the application server. A load balancing router can be used to load balance between the nodes for optimal performance.

Application Server Configuration

CPU	Intel Xeon 5000 series (Quad Core 3.46 GHz) or equivalent
Java Heap Size	4 GB per node
Operating System	OEL 64-bit or Windows7 server 64-bit or equivalent

Job Service Configuration

CPU	Intel Xeon 5000 series (Quad Core 3.46 GHz) or equivalent
Java Heap Size	4 GB per node
Operating System	Oracle Enterprise Linux (OEL) 64-bit or Windows7 server 64-bit or equivalent

Database Server Configuration

CPU	Intel Xeon 7000 series (Quad Core 2.66 GHz) or equivalent
RAM	4 GB per node
Operating System	OEL 64-bit or Windows7 server 64-bit or equivalent

Large Deployment – Clustered

Assuming that high availability is desired for a large deployment, the application server is clustered.

For optimal system performance, it is highly recommended to deploy Oracle Primavera P6 Enterprise Portfolio Management application on a 64-bit architecture.

A large deployment involves a high system load due to large data sets, processing, concurrent users etc. To handle this load, it is recommended to add a dedicated clustered web server and a clustered database server, such as Oracle RAC Database. Due to the intense computations typically seen at large deployments, a large JVM heap is highly recommended. Horizontally scaling out by adding more nodes can address increased performance requirements. It is not necessary to have application servers on different machines, multiple nodes with Oracle Primavera P6 Enterprise Project Portfolio Management can be deployed on the same physical machine, assuming that the machine is a high-end one and has adequate physical memory and CPU.

Application Server Configuration

CPU	2 Intel Xeon 5000 series (Quad Core 3.46 GHz) or equivalent
Java Heap Size	8 GB per node
Operating System	OEL 64-bit or Windows7 server 64-bit or equivalent

Job Service Configuration

CPU	Intel Xeon 5000 series (Quad Core 3.46 GHz) or equivalent
Java Heap Size	8 GB per node
Operating System	Oracle Enterprise Linux (OEL) 64-bit or Windows7 server 64-bit or equivalent

Database Server Configuration

CPU	2 Intel Xeon 7000 series (Quad Core 2.66 GHz) or equivalent
RAM	8 GB per node
Operating System	OEL 64-bit or Windows7 server 64-bit or equivalent

OTHER FACTORS

This document covers the performance of the overall Architecture of the P6 EPPM configuration; however, the factors around the database setup play a very important role on performance. The following factors could impact the performance of the Database:

- Hardware architecture and OS
- NIC (number of NICs, speed and duplex settings)
- Number of database instances on a server (dedicated vs. shared)
- Disk storage system performance (I/O speed, Buffer, Mirroring)
- Tablespace layout and extent sizing
- Table data, index, and lob distributions on tablespaces
- Table and index fill factor definition
- Database block sizing
- Connection management (dedicated vs. MTS)
- RAM allocations (automatic, SGA, PGA, Shared Pool, Buffer Pool, etc.)
- CBO optimizer parameter configuration setting
- Database table and index statistics gathering mechanism and frequency
- Anti-virus software
- Additional database jobs

ENABLING TECHNOLOGIES

Oracle BPM

For creating and managing business processes and workflows, Oracle Primavera P6 EPPM utilizes Oracle Business Process Management (BPM) technology. For information on hardware and sizing requirements please refer to Oracle BPM documentation.

<http://www.oracle.com/us/technologies/bpm/index.html>

Oracle BI Publisher

For enterprise reporting, Oracle Primavera P6 EPPM utilizes Oracle Business Intelligence Publisher. For information on hardware and sizing requirements please refer to BI Publisher documentation.

<http://www.oracle.com/us/solutions/ent-performance-bi/bi-publisher-066551.html>

OBIEE

For enhanced analytical and advanced reporting capabilities, Oracle Primavera P6 EPPM utilizes Oracle Business Intelligence Enterprise Edition (OBIEE) product. For information on hardware and sizing requirements, please refer to OBIEE documentation.

<http://www.oracle.com/us/solutions/ent-performance-bi/enterprise-edition-066546.html>

Content Management System

For document management and collaboration, Oracle Primavera P6 EPPM can be configured to use Oracle Universal Content Management (UCM) OR Microsoft SharePoint. For information on hardware and sizing requirements for Microsoft SharePoint please contact Microsoft. For information on hardware and sizing requirements for Oracle, please refer to Oracle UCM documentation.

<http://www.oracle.com/technetwork/middleware/content-management/overview/index.html>

P6 Analytics and Reporting Database

For information on hardware and sizing requirements for P6 Analytics and Reporting databases, please refer to the white paper on P6 Analytics and Reporting Database planning and sizing document.

<http://www.oracle.com/us/p6-analytics-and-reporting-db-wp-080572.pdf>

CONCLUSION

Following a systematic approach to evaluating, planning and testing the architecture for your Primavera P6 Enterprise Project Portfolio Management deployment is the only way to assure a successful deployment. With careful examination of the performance and scalability objectives, system availability requirements, short-term vs. long-term outlook of system usage, seasonality and frequently used application areas, the appropriate hardware choices can be made early in the process.



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