Oracle
Primavera
Portfolio Management Hardware and Sizing Guide

Version 20
April 2024

Contents

Introduction

Oracle Primavera Portfolio Management (OPPM) consists of many server components that can be installed in various combinations to support various sizes of enterprises. This document provides a starting point for designing hardware architecture to support OPPM components. Oracle has made an effort to specify configurations that provide for best performance; however, your experience may vary depending on your data configuration and usage patterns.

Use this guide to gain an understanding of the potential hardware configurations. The guide does not offer specific recommendations or certifications for particular customer environments. You may have explicit needs to be evaluated by Primavera Consulting Services in order to provide accurate hardware configuration advice.

The OPPM Hardware Sizing Guide serves as instruction to help you gain a sense of the necessary hardware configuration requirements to run OPPM. Any specific hardware configuration queries should be directed to Primavera Consulting Services.

This guide:

- Provides a starting point for customers of differing sizes to plan and develop a hardware architecture plan.
- Provides a sample technique for judging the size of an implementation. This technique should be modified to suit relevant customer situations.
- Describes how to develop a hardware strategy for implementing the OPPM solution with the appropriate performance, scalability, and cost for the size of the implementation.

OPPM Deployment Configuration Options

OPPM is designed to work with a variety of hardware and software and to integrate with existing Enterprise systems. The following figure depicts scenarios for deploying OPPM where performance tests have been conducted with the data set (see ***Appendix A*** for details):

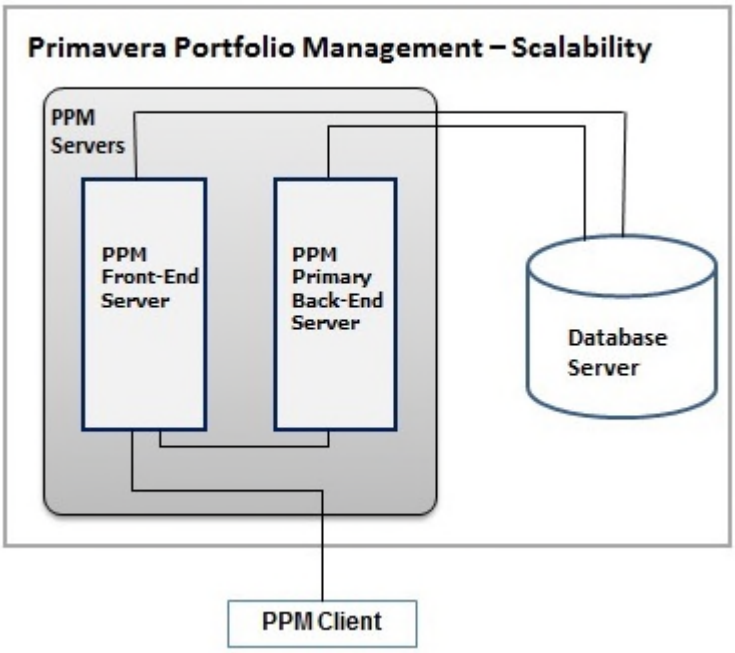
Front-End Server: IIS server that handles HTTP requests and the presentation layer.

Primary Back-End Server: This is the primary function engine. It is responsible for analysis, rank calculation, and processing functions.

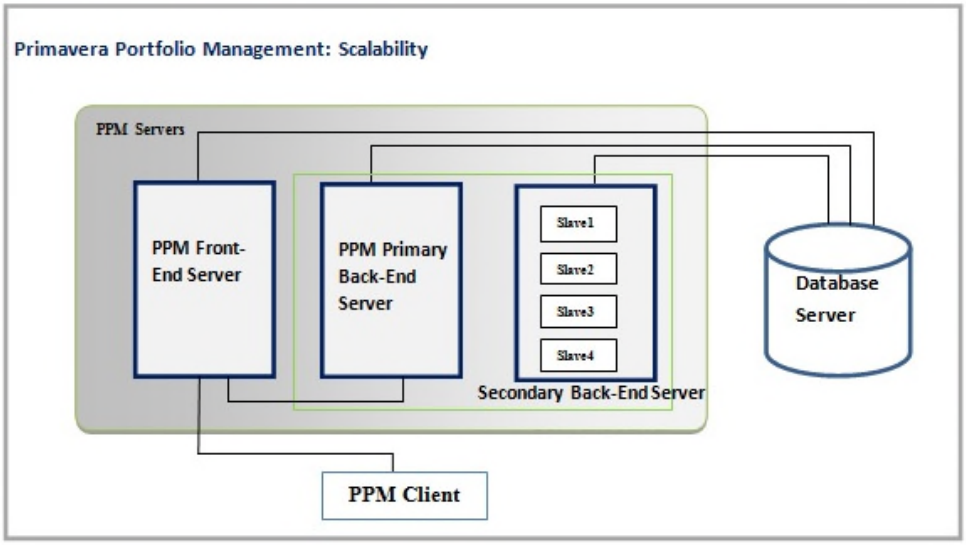
Secondary Back-End Server: This is a secondary function engine that helps process functions.

Database Server: Oracle Database server or Microsoft SQL server.

The initial or XSmall deployment configuration for OPPM is shown below:



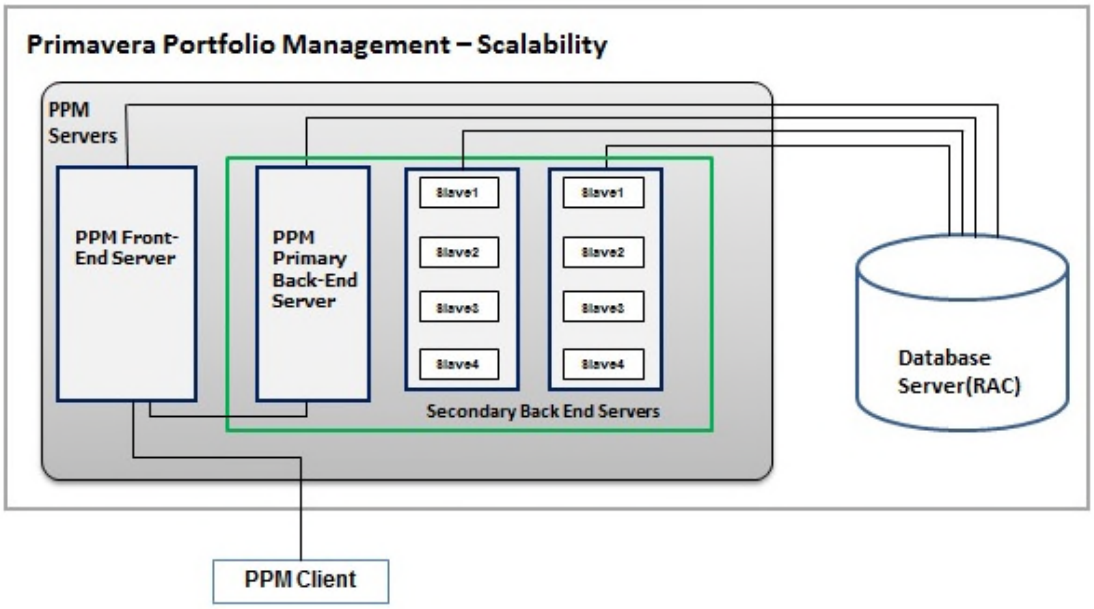
For Small deployments, include a secondary back-end server. This is suggested as a result of testing with the data set described in ***Appendix A***.



You can manage increasing complexity by adding additional servers (secondary back-end and front-end servers). For database servers, the number of nodes in RAC implementation must be increased, as shown in the figure below:

> **Note**: Each back-end application server adds additional capacity to process the Action Queue. Add as many back-end application servers as

necessary to process the Action Queue within the time required by business needs.



Performance Considerations

There are multiple ways to achieve the desired performance level in OPPM. Your organization can determine this based on the following factors:

- Desired level of performance
- Availability requirements
- Short-term or long-term outlook of system usage
- Number of concurrent users
- Usage of workflows and the complexity of those workflows
- Dependency of workflows decision routes on calculations done by function engine
- Frequency of refresh required for portfolios and OBP
- Number of summary portfolios and summary functions
- Number of actions triggered per hour
- Cells calculation per hour
- The complexity (normal/advance type) of functions

As the demand for the application grows, additional nodes (front-end, secondary back-end, and database RAC node) can be added. An increase in secondary slaves may impact database resources.

A detailed list of data set is available in ***Appendix A***.

Vertical Scaling (Scaling Up)

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

Hardware Upgrade

Desired performance and scalability can be achieved by upgrading the CPU, adding extra cores, adding physical memory, or upgrading to faster I/O devices. Oracle recommends 64-bit hardware.

Operating System Upgrade

The desired performance level can be attained by upgrading to latest version of the operating system and installing the latest patch updates. Oracle recommends using 64-bit software. For the full list of system requirements, applications, and application version levels refer to the *Tested Configurations* document in the OPPM documentation library.

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

Horizontal Scaling (Scaling Out)

As the demand for the applications grows, additional nodes (front-end and secondary back-end) can be added to an existing server cluster to handle the increased system load and processing of functions. For high availability requirements, horizontal scaling is a more favorable option. From our test results it is observed that adding multiple secondary subordinate servers along with adding database server (RAC nodes) has shown optimal performance.

> **Note**: One slave can be used for each CPU core. For example, a quad-core CPU can have up to four subordinates in the secondary server.

Database Scaling and Clustering

Database server scaling options are available and have been widely adopted and implemented. Database clustering enables 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. Oracle Real Application Clusters (RAC) is an example of database clustering. Similarly, MSSQL server uses Microsoft clustering for resource allocation. You should consult a SQL database expert to discuss how clustering can help with shared resources for increased performance.

Configuration Type

Oracle recommends that you compare your OPPM configuration to the parameters described in ***Appendix A***. OPPM performance may vary depending upon the type of operations, data fields/parameters etc.

For the purposes of these guidelines, implementation "size" is measured by the peak number of simultaneous OPPM users. The peak number of simultaneous users is a good indicator of how your hardware should be configured; however, there are many factors that may yield unpredictable results. These factors include: the size of the database, the types of operations a given set of users performs, and other factors determined by the characteristics of the solution implemented in OPPM. For a complete list of these factors, see ***Appendix A.***

OPPM is a highly customizable platform. Performance and hardware requirements heavily depend on the data configuration and the nature and number of calculations. OPPM hardware guidelines give you an idea of what different sizes of configurations look like, but actual needs vary depending upon the details of the implementation and customer requirements. Oracle recommends that you assess hardware needs for OPPM components after the design of the OPPM implementation is complete.

Deployment Considerations or Categories

This section provides estimates of server configurations for varying numbers of named users, licensed and concurrent users. A *named* user is a user who has an account with the system but may not currently be logged in. A *concurrent* user is a user currently logged into the system.

This document assumes:

- The maximum number of concurrent users at any given time is around 20% of the named users. The hardware sizing is based on the maximum concurrent users estimated for each deployment category. Named users counts can be used to estimate concurrent users in cases where concurrent user counts are not available.
- Users are continuously performing actions and use 60 seconds of think time (intervals between interactions)

Based on a typical production environment and respective loads, OPPM deployments can be categorized into three categories: Small, Medium, and Large. Tests were conducted for moderate and large datasets, and the maximum recommended number of concurrent users is listed in the table below. However, the recommended user counts will not be the same for all deployments; it depends entirely on the data set, environment, type of operations, and so on. Moreover, these recommendations are based on the testing conducted under a controlled environment where OPPM is the sole application running on the servers.

Attributes	XSmall	Small	Medium	Large
Number of Named Users	less than 100	100 - 250	251 - 750	751 - 1250
Maximum concurrent users (with an average of 60 seconds think time)	20	50	100	200

Note: In some cases, a single user can trigger millions of functions; therefore, it entirely depends upon the type of data set, type of operations, and so on. The following suggested / tested data set does not cover those type of scenarios. Processing of such huge amount of

actions may take more time.

Implementation

OPPM Implementation can be classified into four categories as listed below. This section outlines the minimum recommended server and storage requirements for each deployment category. Oracle recommends that you scale your hardware configuration by at least matching the values indicated in tables for the following configurations:

- **Notes**:
- The CPU and Memory recommendations are intended for the OPPM application instances only. Operating System and other services or processes demands must be sized separately.
- The CPU and Memory (RAM) recommendations are appropriate for the supported Platform and Operating System configurations mentioned in the *OPPM Tested Configurations* document.
- For Oracle database implementations, Oracle RAC Configuration is recommended for medium and large deployment categories. Oracle recommends that you follow the standard Oracle RAC specifications and guidelines etc. for implementation.

Front-End Server Configuration

Deployment Category	XSmall	Small	Medium	Large
Memory (RAM)	16 GB	18 GB	24 GB	24 GB
CPU Intel (R) Xeon (R) CPU E5-2699 v3 @ 2.30 GHz, 2295 MHz	4 Core	4 Core	6 Core	6 Core
Server / VM Disk Space	100 GB*	150 GB*	250 GB*	250* GB

* Disk space consumption depends on the amount of transactions happening and business data uploaded.

Primary Back-End Server Configuration

Deployment Category	XSmall	Small	Medium	Large
Memory (RAM)	16 GB	18 GB	24 GB	24 GB

CPU Intel (R) Xeon (R) CPU E5-2699 v3 @ 2.30 GHz, 2295 MHz	4 Core	4 Core	6 Core	6 Core
Server / VM Disk Space	100 GB*	150 GB*	250 GB*	250* GB

* Disk space consumption depends on the amount of transactions happening and business data uploaded.

Secondary Backend Server Configuration

Deployment Category	XSmall	Small	Medium	Large
Memory (RAM)		18 GB	24 GB	32 GB
CPU Intel (R) Xeon (R) CPU E5-2699 v3 @ 2.30 GHz, 2295 MHz	N/A	4 Core	6 Core	8 Core / 2 Nodes of each 4 Core
Server / VM Disk Space		150 GB	250 GB	250* GB each
Number of Slaves		4	6	8 / 2* 4 Core (each Node)

* Disk space consumption depends on the amount of transactions happening and business data uploaded.

Database Server Configuration

Deployment Category	XSmall	Small	Medium	Large
Memory (RAM)	16 GB	18 GB	24 GB	24 GB See Note below.
CPU Intel (R) Xeon (R) CPU E5-2699 v3 @ 2.30 GHz, 2295 MHz	4 Core	4 Core	6 Core	6 Core
OPPM Database Server - Oracle RAC - Number of Nodes (Oracle database only)	N/A	N/A	2 Nodes	4 Nodes
Server / VM Disk Space	200 GB*	250 GB*	500 GB* (each node)	500 GB* (each node)
SGA & PGA (Oracle database only)	70% of total RAM			

* Disk space consumption depends on the amount of transactions happening and business data uploaded.

Note: 24 GB is the minimum RAM required for a large OPPM install. However, 32 GB to 64 GB is routinely used by customers with cell history that exceeds our performance testing parameters described in ***Appendix A***.

Appendix A. Attributes Affecting Performance

Many factors impact OPPM performance. Depending on the complexity of the your implementation, the hardware resources may become strained and OPPM's performance may be compromised. The following set of attributes that are significant to OPPM performance have been identified. Use the counts provided below as a guide to ensure that any given configuration is within range for acceptable performance.

Attributes Used to Test Hardware Sizing

The following list of attributes and counts were used to test for OPPM's hardware sizing.

> **Note**: Any deviation from these may impact performance / hardware resource usage. In some cases, a single user can trigger millions of functions. The tested data set does not cover those type of scenarios. Processing of such huge amount of actions may take more time.

Attribute Name	Count
Total number of categories	5,000
Number of categories with horizontal functions	1551
Number of categories with vertical functions	4959
Number of categories that use the "today" function	11
Total number of sub-items, items and portfolios	31,941
Number of sub-items	21,571
Number of items	29,793
Data/row in cell history table	21,638,853
Data/row in cell history log table	1,354,215
Data/row in workflow instance audit log table	797,230

Additional Attributes

Some of the other attributes that can affect OPPM performance and sizing needs are:

- Number of portfolios
- Number of categories with functions that walk the dependency tree(s)
- Number of categories with functions that access sub-items
- Number of categories with over-time functions
- Number of Query-Based portfolios set to periodically refresh
- Number of non-calculating portfolios

- Number of calculating and static portfolios containing around 500 items
- Total number of dependency relations in system
- Highest number of dependencies on one item or portfolio
- Highest number of users in a group (directly or indirectly)
- Number of scorecards with more than 20 categories
- Number of tabs with more than 100 categories (directly or included in a table on the tab)
- Number of objects with individual security settings
- Number of general (e.g., not specific) alerts defined
- Number of categories set to “imported”

These parameters may not be the same for all deployments; it entirely depends on the data set, environment and type of operations etc. Thus, huge variations in the parameters, skewed usage of OPPM will impact capacity requirements mentioned in this sizing guide. Moreover, these recommendations are based on the testing conducted under controlled environment where only OPPM application will be running on the servers.

In This Section

Best Practices for Better Performance

The following are some of the best practices recommended for improved performance:

- Do not create portfolios with thousands of items. Break these portfolios down into sub-portfolios that get rolled up into a portfolio of portfolios.
- On average servers, limit very large portfolios (up to 1,000 items) to one or two.
- Try to maintain an upper limit of 500 items in a single portfolio.
- These limitations hold true for static and Query-Based Portfolios (QBPs). Therefore, carefully examine the query definition of each QBP to ensure that these don't grow too large.
- Use non-calculating portfolios to organize thousands of items in one portfolio without incurring a negative impact to performance.
- The same limitations hold true for the number of dependencies on a single item or portfolio, but the performance impact is limited to functions walking the dependency tree(s).
- Scorecards with a large number of columns (typically >20 categories) and forms with multiple categories (>100 per tab) can also affect performance. Revisit your configuration choices and reduce complexity where practical.
- Run the Database Clean up Utilities on a regular basis (from the application console) to remove both duplicate and older cells from the database.
- Administrators can also reduce the size of the workflow instance audit log table by using a schedule job to cleanup workflow instances”.
- Finally, minimize user-driven actions and updates when there is a heavy load on the system. For example by processing large amounts of data during off-peak hours.

Factors Affecting Application Performance

The following factors can impact application server performance:

- Number of configured and available database connections
- Number of users that will be concurrently uploading data
- Other applications running on the application server (CPU utilization before OPPM Servers installed/started)

The following factors can impact database performance:

- Number of database instances on a server (dedicated versus shared)
- Disk storage system performance (I/O speed, buffer, mirroring)
- Table space layout and extent sizing
- Table data, index and LOB distributions on table spaces
- Table and index fill factor definition
- Database block sizing
- RAM allocations (automatic, SGA, PGA, shared pool, buffer pool)
- Database table and index statistics gathering mechanism and frequency
- Additional database jobs

Configuration, Hardware, and Environment Factors

The following factors can also impact the application performance:

- Hardware architecture and operating system
- Amount of memory and Swap/Virtual Memory configurations
- Anti-virus software
- Amount of I/O being performed by other applications running on the servers
- Network Interfaces (number of NICs, speed and duplex settings)
- Network throughput, no. of hops and latency conditions etc.,
- Network Bandwidth consumed by other applications
- Amount of memory available on client for browser

Other Actions Affecting Performance

Other actions that can also impact OPPM application performance include the following:

- User actions

  User actions play a key role in the scalability of the application. When sizing a configuration, you need to understand the operations users plan on doing. You must consider user roles when determining your scaling options.

- Server hardware

  You need to evaluate your hardware to see if it will work with the application. If the server is old, it will probably not handle as many users as a newer server. In some cases, the server may also be virtualized or segmented. In both cases, this means there are fewer resources for the application. This must be considered when planning for the number of users a configuration can handle.

- Storage types

  OPPM tests are executed with local disks. You can use server-side disk storage or a SAN configuration for your servers; however, a SAN configuration can be more complex to setup with your system. You need to ensure that the connections to the SAN are working.

- Network

  You must ensure your network infrastructure is up-to-date and running efficiently. The application and the database servers must be in the same location.

- Network locations of end-users

  Performance can also be affected by the network location of the end user relative to the application server. Any user that has many network hops to the application server will likely experience poor performance. More hops and high latency are key factors that you need to consider when planning an installation. An environment that contains many hops and high latency will have the most effect on key areas.

Copyright

Oracle Primavera Portfolio Management Hardware and Sizing Guide