

Technical white paper

Project and Portfolio Management Center Sizing Recommendations



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Introduction

This article provides recommendations on PPM Center hardware sizing, in order to help you achieve desirable performance when using PPM Center.

The recommendations, derived from the PPM Sizing Tool which is design and verified to be working by PPM, are intended for reference only. The reference configuration data supplied in this article is based on the lab performance testing. Please note that the testing environment may be different from your testing or production environment.

Failure to test the transaction rate that is expected at the height of daily system usage in the testing environment, for example, every Friday afternoon is the peak time for Time Management module, may result in a recommendation that is not sufficient enough to support our requirements. In this case, contact HP Support for additional advices.

Note: PPM makes every reasonable effort to ensure that the tool is up-to-date, complete, and accurate. However, the occurrence of errors or omissions cannot be completely ruled out. This tool allows for update in case of product changes and uncovered scenarios. The tool does not take into consideration customized functionalities implemented in the system.

This article includes the following information:

- ["Overview of PPM Center system" on the next page](#)
- ["Hardware sizing recommendations" on page 9](#)
- ["Sample usage" on page 15](#)

Overview of PPM Center system

This section provides general information about PPM Center system. With this background knowledge, you can have a better understanding of the hardware sizing recommendations.

For more detailed information about PPM Center system, see the *Installation and Administration Guide* for PPM Center.

If you are familiar with PPM Center system, you can safely skip this section.

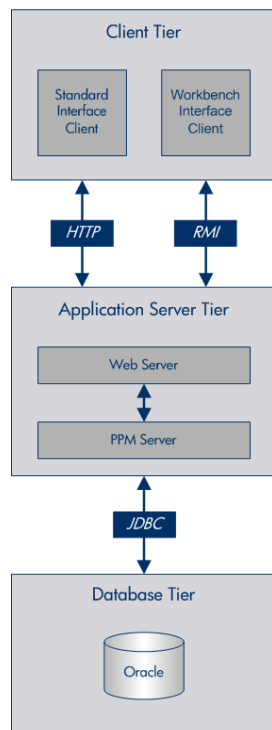
Overview of PPM Center architecture

PPM Center is based on a three-tier architecture that consists of:

- Client tier
- Application server tier
- Database tier

The architecture is shown in the following figure.

Figure 1: PPM Center architecture



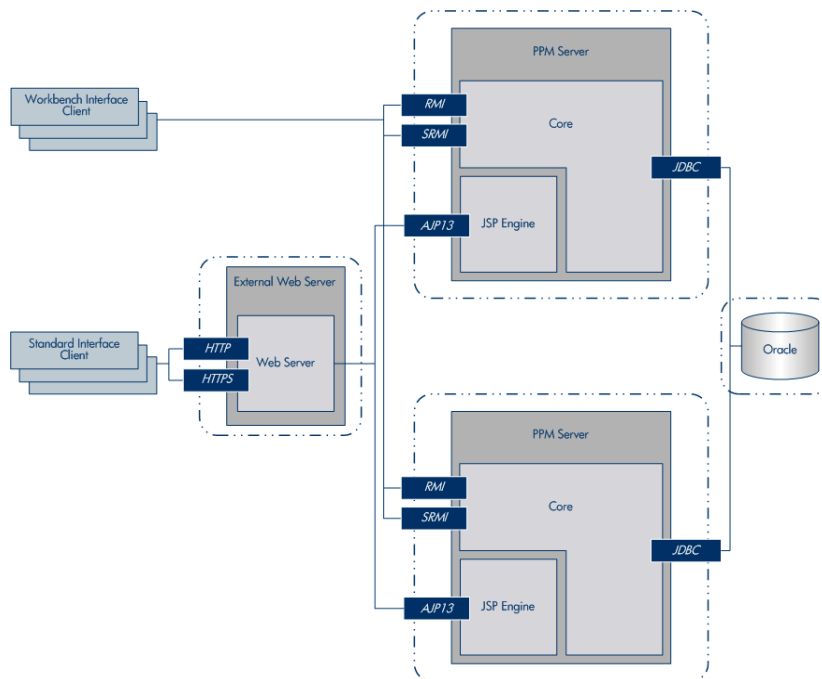
Server cluster system and single-server configuration

The three-tier architecture of PPM Center supports a variety of system configurations. You can deploy PPM Servers in a single-server configuration or a server cluster configuration.

Server cluster configuration enables you to run PPM Center on several parallel servers. Server cluster configurations improve performance systems that handle high transaction volumes or a large number of concurrent users. In addition to handling higher user loads and providing greater scalability, the server cluster configuration supports load balancing and server failover features.

The following is an example of server cluster configuration.

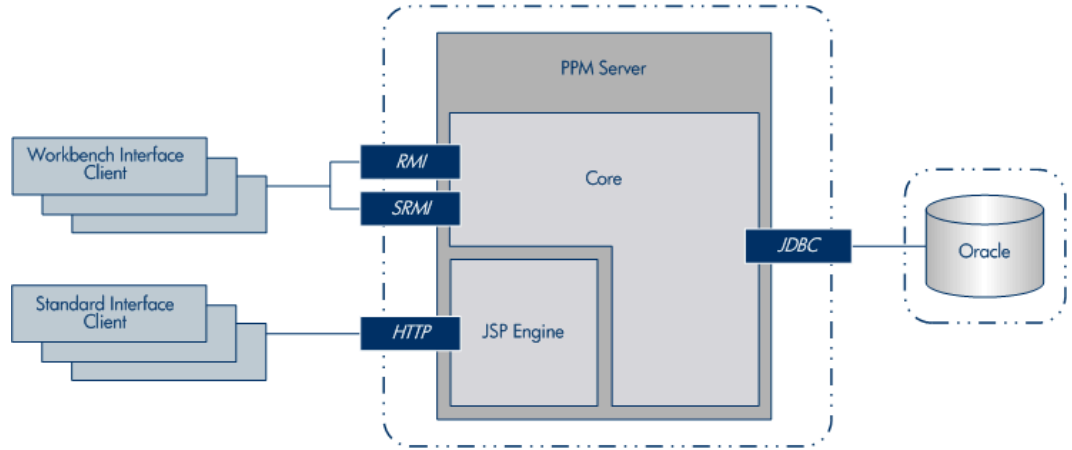
Figure 2: Server cluster configuration



PPM Center test and development instances are typically single-server configurations that consist of one PPM Server and one Oracle database. The single PPM Server handles the entire user load and functions as the Web server. It also houses the file system for the program code, reports, execution logs, and attachments files. The Oracle database stores all other data.

The following is an example of single-server configuration.

Figure 3: Single-server configuration



Defining sizes of PPM instances

This section defines the size of PPM Center instance deployed by your organization. The size is decided based on the following factors:

- Total number of PPM Center licensed users (Total)
- Number of licensed users and estimated concurrent users in each of the following PPM Center modules:
 - Demand Management (DM)
 - Time Management (TM)
 - Resource Management (RM)
 - Project Management (PjM)
 - Dashboard

Note: The number of estimated concurrent user is calculated by the PPM Sizing Tool in the lab testing environment. If the mapping between the number of licensed users and the number of concurrent users does not apply to your organization, contact HP Support for advices.

If your organization uses only one module, the size of this module is actually the size of PPM instance deployed by your organization.

If your organization uses more than one module, you have to compare the sizes determined by the number of licensed users or estimated concurrent users in each module and the size determined by the total of PPM licensed users. Take the highest size level as the size of PPM instance deployed by your organization. See ["Sample usage" on page 15](#) for examples.

Total Number of PPM Licensed Users

Size	Number
Entry	0 ~ 6,000
Small	6,000 ~ 12,000
Medium	> 12,000
Large	

Demand Management

Size	Number of Licensed User	Number of Estimated Concurrent User
Entry	0 ~ 3,000	0 ~ 150
Small	> 3,000	> 150
Medium		
Large		

Project Management

Size	Number of Licensed User	Number of Estimated Concurrent User
Entry	0 ~ 3,000	0 ~ 150
Small	3,000 ~ 6,500	150 ~ 325
Medium	> 6,500	> 325
Large		

Time Management

Size	Number of Licensed User	Number of Estimated Concurrent User
Entry	0 ~ 3,000	0 ~ 2,700
Small	3,000 ~ 6,000	2,700 ~ 5,400
Medium	6,000 ~ 6,500	5,400 ~ 5,850
Large	> 6,500	> 5,850

Resource Management

Size	Licensed User	Estimated Concurrent User
Entry	0 ~ 2,000	0 ~ 1,800
Small		
Medium	2,000 ~ 4,000	1,800 ~ 3,600
Large	> 4,000	> 3,600

Dashboard

Size	Licensed User	Estimated Concurrent User
Entry	0 ~ 2,500	0 ~ 750
Small	> 2,500	> 750
Medium		
Large		

Hardware sizing recommendations

The following hardware configurations are recommended for the entry-level, small, medium, and large PPM instances. Choose the hardware configuration in accordance with your PPM instance.

The recommendations cover the web, application, and database tiers. And in each tier, the resources RAM, CPU, and disk space are considered.

Hardware sizing recommendation - Entry Level

Item	Speculation	Note
Web Tier		
Number of CPUs	4	2.27-3.0 GHz per CPU core
RAM	8 GB	Dedicated for PPM use
Disk Space	80 GB	
Application Tier		
Number of PPM Servers	1	If the application server is hosted on a virtual machine, the resources (CPU, RAM, and disk space) should be increased by 30%.
Number of CPUs per server	6	2.27-3.0 GHz per CPU core
RAM per server	8 GB	Dedicated for PPM use
Disk space per server	80 GB	
PPM Node Configuration in the Application Tier		
Number of user-traffic nodes	1	
Number of background service nodes	1	
Database Tier		
Number of CPUs	16	2.27-3.0 GHz per CPU core
RAM	32 GB	Dedicated for PPM use
Disk space	480 GB	

Hardware sizing recommendation - Small

Item	Speculation	Note
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Web Tier		
Number of CPUs	4	2.27-3.0 GHz per CPU core
RAM	8 GB	Dedicated for PPM use.
Disk Space	80 GB	
Application Tier		
Number of PPM Servers	2	
Number of CPUs per server	5	2.27-3.0 GHz per CPU core
RAM per server	6 GB	Dedicated for PPM use
Disk space per server	80 GB	
PPM Node Configuration in the Application Tier		
Number of user-traffic nodes	2	
Number of background service nodes	1	
Database Tier		
Number of CPUs	16	2.27-3.0 GHz per CPU core
RAM	32 GB	Dedicated for PPM use
Disk space	480 GB	

Hardware sizing recommendation - Medium

Item	Speculation	Note
Web Tier		
Number of CPUs	4	2.27-3.0 GHz per CPU core
RAM	8 GB	Dedicated for PPM use.
Disk Space	80 GB	
Application Tier		
Number of PPM Servers	2	If the application server is hosted on a virtual machine, the resources (CPU, RAM, and disk space) should be increased by 30%.
Number of CPUs per server	7	2.27-3.0 GHz per CPU core
RAM per server	12 GB	Dedicated for PPM use
Disk space per server	100 GB	

PPM Node Configuration in the Application Tier		
Number of user-traffic nodes	4	
Number of background service nodes	2	
Database Tier		
Number of CPUs	32	2.27-3.0 GHz per CPU core
RAM	64 GB	Dedicated for PPM use
Disk space	960 GB	

Hardware sizing recommendation - Large

Item	Speculation	Note
Web Tier		
Number of CPUs	4	2.27-3.0 GHz per CPU core
RAM	8 GB	Dedicated for PPM use.
Disk Space	80 GB	
Application Tier		
Number of PPM Servers	4	If the application server is hosted on a virtual machine, the resources (CPU, RAM, and disk space) should be increased by 30%.
Number of CPUs per server	6	2.27-3.0 GHz per CPU core
RAM per server	16 GB	Dedicated for PPM use
Disk space per server	100 GB	
PPM Node Configuration in the Application Tier		
Number of user-traffic nodes	9	
Number of background service nodes	3	
Database Tier		
Number of CPUs	32	2.27-3.0 GHz per CPU core
RAM	96 GB	Dedicated for PPM use
Disk space	960 GB	

Important notes on hardware sizing recommendations

In addition to the above hardware sizing recommendations, HP suggests that you pay attention to the following items:

- Operating System

HP suggests you use the following:

- Microsoft Windows Server, 2008 R2 (64-bit), or
- Red Hat Enterprise Linux 6 (64 bit)

Note: If you use Windows server, it is recommended to add 1-2 GB more memory (RAM) on the machine dedicated for PPM use.

- PPM Center

HP suggests you use the following:

- PPM Center 9.2x, or
- PPM Center 9.3x

- PPM Center heap size

HP suggests that heap size for each node should be 2048 MB at least. A background service node requires greater heap size than a user node. You can adjust heap size of the nodes on a server under the limit of the server memory.

If you lower the total number of PPM nodes, you should increase the heap size, maxThreads, and database connections.

- JDK Software

HP strongly recommends 64-bit JDK software of the following versions:

- 1.7.0 Update 45 or later
- 1.8.0 Update 25

- Database

The database server should be a separate 64-bit physical machine.

Database and application servers should be located in the same data center.

If you have heavy workload in database server, consider using Oracle RAC which improves performance by providing clustering and high availability in Oracle database environments.

Note: Oracle RAC One Node is a single instance database which provides protection from unplanned failures or downtime. If you use PPM with Oracle 11g Release 2, it might be an option to avoid downtime.

- Cluster Node

If you have heavy background services workload, it is better to add one more PPM background service node.

It is recommended to separate user nodes and background service nodes in different servers. All PPM nodes should be located in the same data center.

- Virtual Machine

Hosting the PPM Oracle database schema on a virtual machine (VM) is strongly discouraged in a production environment for performance reasons. PPM has conducted performance benchmarks which show that for some common user scenarios (such as opening a PPM request), the performance of the system, when the database schema is hosted on a VM, can be severely degraded up to 50% compared with hosting the database on a dedicated physical machine.

Note, however, that regardless of performance issues, HP does support running the PPM database schema on a VM as long as the configuration is officially supported by Oracle. As a result, such an architecture can be used for low-load environments where lower total cost of ownership (TCO) is more important than performance and user experience, which is typically the case for test or development environments.

These performance concerns with VM hosting do not apply to PPM application server: R&D has no concern towards hosting PPM application servers on virtual machines, even in production environment, as long as the reduced performance of each PPM node resulting from VM hosting is compensated proportionally by increasing the number of PPM nodes in the cluster.

- Hardware load balancer

A hardware load balancer is recommended in the server cluster configuration, for it improves load distribution, transaction capacity, and system performance.

- HP servers for reference

Here are some HP servers for your reference:

- Web Server: HP ProLiant BL460c Gen8 Server Blade-Single 8Core E5-2600, 32G Mem, 2*146GB HDD
- App Server: HP ProLiant BL460c Gen8 Server Blade-Single/Dual 8Core E5-2600, 32G Mem, 3*500GB HDD
- DB Server: HP ProLiant DL560 Gen8 Server-Quad 8Core E5-4600, 96G Mem, 16*146G HDD

- Document management system sizing

The document management system (DMS) affects PPM performance. Take DMS sizing into considerations when adjusting hardware sizing.

- If you apply PPM File System solution , attached documents are uploaded to the PPM Server file system. In this case, additional disk space is needed for document management in the application server.
- If you apply PPM Database DMS solution, attached documents in PPM are uploaded to the PPM database. In this case, additional disk space is needed for document management in the database server.
- If you apply PPM External Database DMS solution, attached documents in PPM are uploaded to the specified Oracle database on your network. In this case, additional disk space is needed for document management in the specified Oracle database.

For more information about DMS solutions, see the *Document Management Guide and Reference*.

Sample usage

Case 1

The number of PPM Center users in Organization A is as follows.

Module	Number of Licensed Users	Number of Estimated Concurrent Users
DM	2,500	125
TM	4,000	3,600
Total	7,000	N/A

According the Recommendation Levels table, we can get the following result.

Module	Recommendation Level
DM	Entry
TM	Small
Total	Small

To achieve desirable performance, your organization should at least apply hardware sizing for small PPM instances. See "[Hardware sizing recommendation - Small](#)" on page 9 for detailed hardware sizing recommendations.

Case 2

The number of PPM Center users in Organization B is as follows.

Module	Number of Licensed Users	Number of Estimated Concurrent Users
TM	7,000	6,300
PjM	7,000	350
Total	14,000	N/A

According the Recommendation Levels table, we can get the following result.

Module	Recommendation Level
TM	Large
PjM	Medium or Large
Total	Medium or Large

To achieve desirable performance, your organization should at least apply hardware sizing for large PPM instances. See "[Hardware sizing recommendation - Large](#)" on page 11 for detailed hardware sizing recommendations.

Case 3

The number of PPM Center users in Organization C is as follows.

Module	Number of Licensed Users	Number of Estimated Concurrent Users
RM	6,100	5,490
TM	3,000	2,700
Total	9,100	N/A

According the Recommendation Levels table, we can get the following result.

Module	Recommendation Level
RM	Large
TM	Small
Total	Small

To achieve desirable performance, your organization should at least apply hardware sizing for large PPM instances. See "[Hardware sizing recommendation - Large](#)" on page 11 for detailed hardware sizing recommendations.

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