Project and Portfolio Management Center

Software Version: All versions

Sizing Recommendations

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Contents

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 designed 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 the requirements. In this case, contact 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:

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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
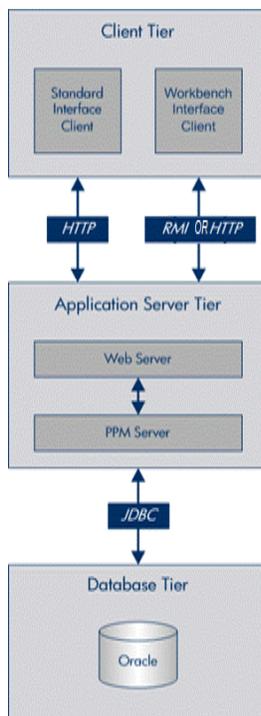
Server cluster system and single-server configuration

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
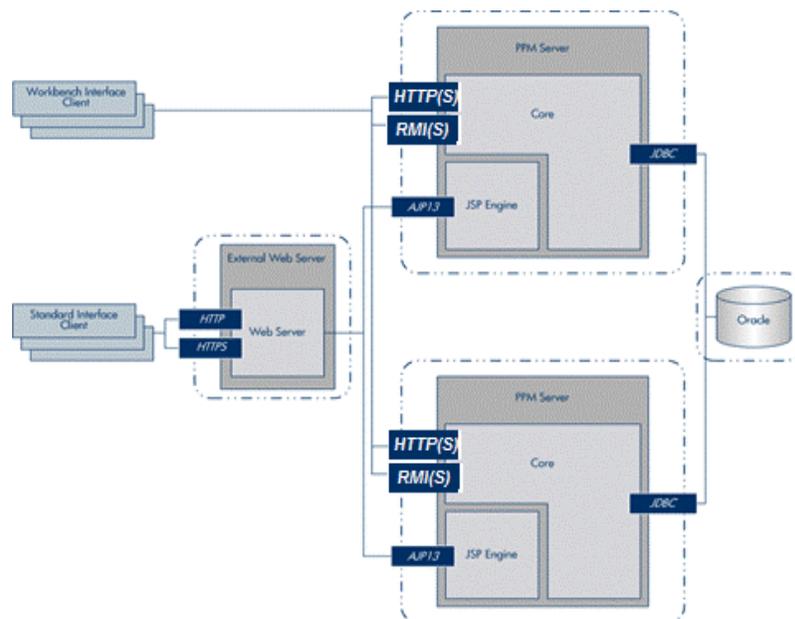
PPM Center test and development instances are typically single-server configurations that consist of one PPM Server and one Oracle database. The single PPM Server handles the entire user load and functions as the Web server. It also

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
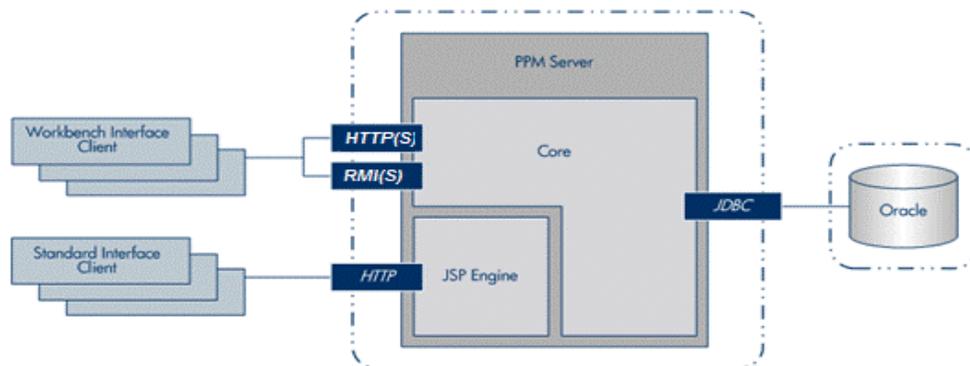
Defining sizes of PPM instances

This section defines the size of PPM Center instance deployed by your organization. The size is decided based on the number of concurrent users in PPM center at peak time, it is usually a percentage of PPM licensed users.

If your organization uses multiple modules, you have to calculate the overall concurrent users in each module at peak time. Concurrent users in different modules have different weights according to their workload.

- DM user is the baseline and has the standard weight 1.
- PjM and PgM users have the weight 1.5.
- The other modules have the weight 1.

So, for instance, if there are 50 users working on DM, 50 users working on PjM and 50 users working on PgM, the estimated concurrent user would be:

50*1+50*1.5+50*1.5=200

Definition of PPM instance size

Size	Number of Estimated Concurrent User
Entry	0-200
Small	200-400
Medium	400-1600
Large	> 1600

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.

Note: Web tier refers to the server on which external web server, e.g. Apache/IIS is deployed. Application Tier refers to the server(s) on which PPM nodes are deployed. Database tier refers to the server(s) on which Oracle is deployed. It could be an RAC DB, so it is not necessarily just one single server. It could be multiple clusters that are provisioned with required resources.

Why the recommendations?

Database tier sizing is made by the Oracle Database Appliance OLTP Database Template Size, as shown below.

For details, see https://docs.oracle.com/cd/E22693_01/doc.12/e55580/sizing.htm.

Template	CPU Cores	SGA (GB)	PGA (GB)	Flash (GB)	Processes	Redo log file size (GB)	Logbuffer (MB)
odb-01s (All Hardware Versions)	1	2	1	6	200	1	16
odb-01 (All Hardware Versions)	1	4	2	12	200	1	16
odb-02 (All Hardware Versions)	2	8	4	24	400	1	16
odb-04 (All Hardware Versions)	4	16	8	48	800	1	32
odb-06 (All Hardware Versions)	6	24	12	72	1200	2	64
odb-12 (All Hardware Versions)	12	48	24	144	2400	4	64
odb-16 (X5-2, X4-2, X3-2 Only)	16	64	32	192	3200	4	64
odb-24 (X5-2, X4-2 Only)	24	96	48	192	4800	4	64
odb-32 (X5-2 Only)	32	128	64	192	6400	4	64
odb-36 (X5-2 Only)	36	128	64	192	7200	4	64

For each node, we assume it supports 200 concurrent users at peak time, and they requires approximately 200*1.5=300 DB connections. Each connection has at most 2 sessions on average. We have 600 sessions, and according to the formula: Sessions=Processes*1.5 + 22. We need approximately 400 processes.

We refer to the table above to decide the sizing recommendations for different levels of instances.

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	
EC2 (for PPM on AWS)	T3.xlarge or C5.xlarge	

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%. Customers should be aware that VM -based server could sometimes encounter performance fluctuation when the host physical server has a fluctuating workload.
Number of CPUs per server	6	2.27-3.0 GHz per CPU core dedicated for PPM use
RAM per server	10 GB	Entry level server deploys user-traffic node and background service node on the same server, so RAM needed on this sever: 4GB(for User-traffic)+3GB(for BG service)+3GB(for OS)=10GB
Disk space per server	80 GB	
EC2 (for PPM on AWS)	C4.2.xlarge or C5.2xlarge	
PPM Node Configuration in the Application Tier		
Number of user-traffic nodes	1	
Number of background service nodes	1	
Database Tier		
Number of CPUs	4	2.27-3.0 GHz per CPU core dedicated for PPM use

RAM	16 GB	Dedicated for PPM use
Disk space	480 GB	
RDS (for PPM on AWS)	DB.T3.xlarge	

Hardware sizing recommendation - Small

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	
EC2 (for PPM on AWS)	T3.xlarge or C5.xlarge	
Application Tier		
Number of PPM Servers	2	
Number of CPUs per server	6	2.27-3.0 GHz per CPU core dedicated for PPM use
RAM per server	10 GB	Dedicated for PPM use, the server on which 2 nodes (user-traffic) are deployed needs 10GB RAM, while the server on which just one node (background service) is deployed needs 6GB RAM.
Disk space per server	80 GB	
EC2 (for PPM on AWS)	C4.2xlarge or C5.2xlarge	
PPM Node Configuration in the Application Tier		
Number of user-traffic nodes	2	
Number of background service nodes	1	
Database Tier		

Number of CPUs	6	2.27-3.0 GHz per CPU core dedicated for PPM use
RAM	32 GB	Dedicated for PPM use
Disk space	480 GB	
RDS (for PPM on AWS)	Db.t3.2xlarge	

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	
EC2 (for PPM on AWS)	C4.2xlarge or C5.2xlarge	
Application Tier		
Number of PPM Servers	3	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	9	2.27-3.0 GHz per CPU core dedicated for PPM use
RAM per server	20 GB	Dedicated for PPM use
Disk space per server	100 GB	
EC2 (for PPM on AWS)	t3.2xlarge	
PPM Node Configuration in the Application Tier		
Number of user-traffic nodes	8	

Number of background service nodes	2	Customers may need more service nodes if they have heavy user traffic.
Database Tier		
Number of CPUs	16	2.27-3.0 GHz per CPU core
RAM	128 GB	Dedicated for PPM use
Disk space	960 GB	
RDS (for PPM on AWS)	r5.4xlarge	

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	
EC2 (for PPM on AWS)	T3.xlarge or c5.xlarge	
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	9	2.27-3.0 GHz per CPU core

RAM per server	20 GB	The server on which 4 nodes are deployed needs 20 GB RAM, while the server on which 3 nodes are deployed needs 16 GB RAM.
Disk space per server	100 GB	
EC2 (for PPM on AWS)	t3.2xlarge	
PPM Node Configuration in the Application Tier		
Number of user-traffic nodes	12	Could be increased according to the number of concurrent users at peek time
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	
RDS (for PPM on AWS)	r5.8xlarge	

Important notes on hardware sizing recommendations

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

- Operating System

  We suggest 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

  We suggest you use the following:

  - PPM Center 9.42.000x, or

  - PPM Center 9.5x

- PPM Center heap size

  We suggest that heap size for each node should be 4096 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

  We strongly recommend 64-bit JDK software of the following versions:

  - 1.8.0 Update 101 or later

- 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 failtures 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, we do not 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.

> **Note:** If you insist on hosting database in VM, make sure you allocate dedicated CPU resources as specified in the above sizing recommendations for PPM.

- 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 docuement management in the specified Oracle database.

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