



Oracle Primavera Contract Management, Business Intelligence Publisher Edition-Sizing  
Guide  
An Oracle White Paper  
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## INTRODUCTION

Oracle Primavera Contract Management, Business Intelligence Publisher Edition is a browser-based product that enables project users to interactively review, update, and comment on documents on which they need to take action. With the help of a Web browser, Contract Management grants real-time access to a Contract Management project database across an intranet or the Internet.

### **Contract Management Database Server**

The database server stores your project data. Web clients access project data through the Contract Management Web Server. You can run Contract Management with an Oracle database.

### **Requirements of the Contract Management Web and Application Servers**

- Internet access
- A firewall configured to allow only Http/Https requests to the port and TCP/IP address of the Web Server.
- Oracle BI Publisher 11g (11.1.1.5.0) is needed to ensure the proper functioning of the letters module

The Contract Management Web Server validates Contract Management Web users, enforces Contract Management's business rules, and communicates with the Contract Management database server.

## ARCHITECTURE OVERVIEW

Oracle Primavera Contract Management, Business Intelligence Publisher Edition 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, and enterprise applications. The division of tiers allows the application to scale according to customer's performance demands. Oracle Primavera Contract Management uses the J2EE specification to build a flexible and scalable cross-platform solution.

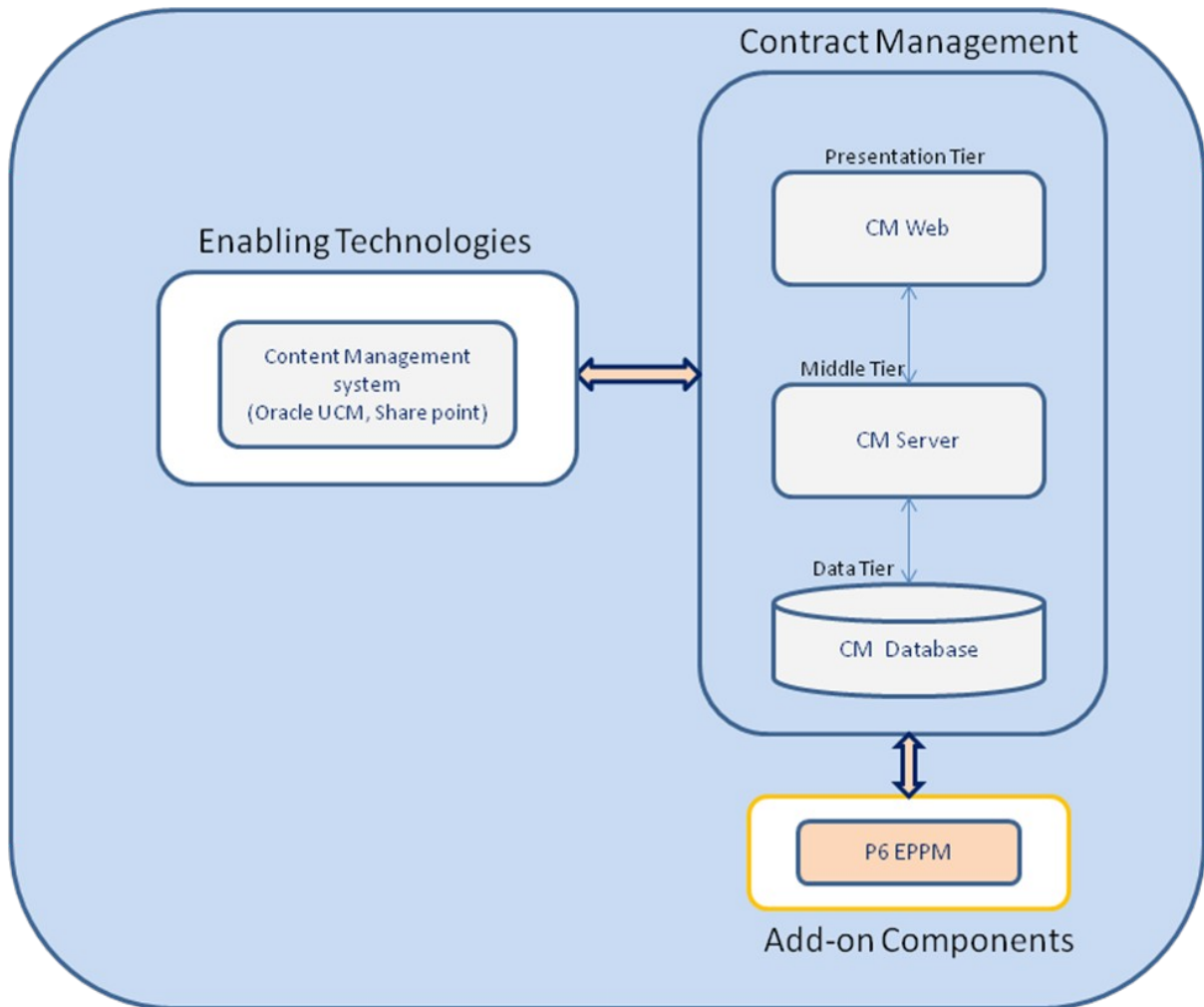
The division of tiers allows the application to scale according to customer's Performance demands.

The main tiers of Oracle Primavera Contract Management, Business Intelligence Publisher Edition 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 Contract 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 Contract Management, Business Intelligence Publisher Edition 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 Contract Management, Business Intelligence Publisher Edition.



**Figure 1:** Oracle primavera contract management business intelligence publisher edition architecture

Typical Oracle Primavera Contract Management, Business Intelligence Publisher Edition deployments comprise of the following components:

- A clustered J2EE application server on which Oracle Primavera Contract Management, Business Intelligence Publisher Edition is deployed.
- Oracle Primavera Contract Management, Business Intelligence Publisher Edition 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.

## **DEPLOYMENT CONSIDERATIONS**

Oracle Primavera Contract Management, Business Intelligence Publisher Edition 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.

### **Performance testing deployment categories**

The Oracle Primavera Contract Management, Business Intelligence Publisher Edition deployments for the performance testing are categorized as below:

1. Weblogic\_10.3.4 & SQL server 2003 on Windows environment.
2. Weblogic\_10.3.4 & Oracle11gR2 (10.2.0.2) on Oracle Enterprise Linux environment.
3. Weblogic\_10.3.4 on Windows with Oracle11gR2 (10.2.0.2) on Oracle Enterprise Linux environment.

Some of the factors considered for defining these categories are outlined below. These factors influence the hardware and software specifications during Oracle Contract Management deployment.

For optimal system Performance, it is highly recommended to deploy Oracle Primavera Contract Management Business Intelligence Publisher Edition on a 64-bit

## **DEPLOYMENT ARCHITECTURES**



## Architecture.

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.

### Windows environment:

#### Application Server Configuration

|                  |  |
|------------------|--|
| CPU              | Intel[R] core[TM] 2 Duo CPU E8400 3.00 GHz or equivalent |
| Java Heap        | Size 2 GB per node                                       |
| Drive Space      | 300 GB   |
| Operating System | Windows server 2008 R2 Standard (64-Bit)                 |
| RAM              | 4 GB   |

#### Database Server Configuration

|                  |  |
|------------------|--|
| CPU              | Intel[R] core[TM] 2 Duo CPU E8400 3.00 GHz or equivalent |
| Drive Space      | 300 GB   |
| Operating System | Windows server 2003 (64-Bit)                             |
| RAM              | 4 GB   |

### Oracle Enterprise Linux environment:

#### Application Server Configuration

|                  |  |
|------------------|--|
| CPU              | Intel[R] core[TM] 2 Duo CPU E8400 3.00 GHz or equivalent |
| Java Heap        | Size 2 GB per node                                       |
| Drive Space      | 300 GB   |
| Operating System | Oracle Enterprise Linux 6.0 (64-Bit)                     |
| RAM              | 4 GB   |

#### Database Server Configuration





|                  |  |
|------------------|--|
| CPU              | Intel[R] core[TM] 4 Duo CPU E8400 3.00 GHz or equivalent |
| Drive Space      | 300 GB   |
| Operating System | Oracle Enterprise Linux 6.0 (64-Bit)                     |
| RAM              | 16 GB  |

### **Weblogic\_10.3.4 on Windows and Database on Oracle Enterprise Linux:**

#### **Application Server Configuration**

|                  |  |
|------------------|--|
| CPU              | Intel[R] core[TM] 2 Duo CPU E8400 3.00 GHz or equivalent |
| Java Heap        | Size 2 GB per node                                       |
| Drive Space      | 300 GB   |
| Operating System | Windows server 2003 R2 Standard (32-Bit)                 |
| RAM              | 4 GB   |

#### **Database Server Configuration**

|                  |  |
|------------------|--|
| CPU              | Intel[R] core[TM] 4 Duo CPU E8400 3.00 GHz or equivalent |
| Drive Space      | 300 GB   |
| Operating System | Oracle Enterprise Linux 6.0 (64-Bit)                     |
| RAM              | 16 GB  |

## **FACTORS THAT AFFECT CONTRACT MANAGEMENT PERFORMANCE**

### **Database Performance**

- Hardware architecture and OS (UNIX vs. Windows, 32-bit vs. 64-bit, RAC vs. standalone)

- Hardware specs (number of CPUs and speed, RAM)
- 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)
- Table space layout and extent sizing
- Table data, index, and lob distributions on table spaces
- Table and index fill factor definition
- Database block sizing
- Connection management (dedicated vs. MTS)
- RAM allocations (automatic, SGA, PGA, Shared Pool, Buffer Pool, etc.)
- Database table and index statistics gathering mechanism and frequency
- Anti-virus software
- Additional database jobs

## **Configuration/Hardware/Environment Factors:**

- Amount of memory available on client for browser
- Maximum Java heap memory setting on client machine's JVM (-Xmx JVM setting for applets)
- Amount of heap memory available to application server's JVM (-Xmx and other JVM heap related settings).
- Number of worker threads configured in the application server
- Number of configured and available database connections.
- Number of concurrent active users logged on to an application server
- Network throughput: Time it takes to download a 5K file between application server and browser
- Network latency between browser and application server
- Number of users that will be concurrently loading data.
- Number of other applications running on the application server's CPU (CPU utilization before Contract Management is installed)
- Amount of I/O being performed by other applications running on application server's CPU (sharing the same NIC)
- Number of CPUs in an application server cluster

- Application Data Factors:
- Number of individual projects or project nodes that each non-users has access to
- Average number of activities being displayed.
- Number of calculated User Defined Fields being displayed in Activities or Projects scorecards

## SCALING OPTIONS

### Network Location

Ideal performance occurs when the application server and the database server reside on the same subnet of the network (ideally no network hops any data packet goes from the application server to the switch and then on to the database server.) This is because of two main factors:

1. Any hops between subnets add to the overall latency of the configuration, and
2. A simplified network configuration allows for fewer things to go wrong. If they are on the same subnet it makes diagnosing and solving problems easier.

### Scaling the servers

There are typically two options for scaling any application server: horizontal scaling or vertical scaling.

## HORIZONTAL SCALING (SCALING OUT)

Horizontal scaling or scaling out means adding more servers to a particular configuration. Multiple commercial grade servers (not bigger hardware) are clustered to divide and share the concurrent workloads. In this scenario, the size and speed of a single system doesn't limit total capacity. It has a more complex architecture and requires increased management overhead and technical skills for a federated server farm.

When we speak of clustering the application server, we refer to the addition of any type of software or hardware load balancer (Weblogic supports software load balancing). Any time a performance issue arises because of hardware resource (CPU) limitations associated with load, another server can be added to the cluster, which reduces the overall load per CPU.

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 organization and plan for the desired level of performance, availability and scalability.

## **VERTICAL SCALING (SCALING UP)**

To scale vertically means to have each user use more CPUs, more powerful processors, more memory, and faster disk drives. Vertical scaling is usually a good approach if the application bottlenecks are processor and memory-related even under low user load, such as report generation intensive sites. This is usually not the preferred way because it involves migrating users, software and lab space to a new server. Scaling up, however, yields quick performance gains. But a system's vertical scaling capability soon reaches a point where further scaling up becomes prohibitively expensive and/or technically impossible.

## **JVM Heap Size**

The application objects such as Alerts, User access 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.

## **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 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.

## **SCALING THE DATABASE SERVER**

Database server scaling options are abundant and have been widely adopted and implemented. They typically fall into one of two lines: scaling up (fewer, larger servers) or scaling out (more, smaller servers). In general, a single, big SMP server costs significantly more than many smaller servers combined with the same processing power.

However, the savings on the hardware cost should be evaluated against the complexity and additional technical management overhead of the federated server farm.

## **Disk storage system**

Investment in high performance storage systems will improve database-related activities. The IO speed is the leading measuring metric. Although the application remains the same, usage, expectations, financial, and technical scenarios are different. There are other factors to consider as well. Database scalability solutions

are readily available, but the selection of the scaling architecture should be on a case-by-case basis.

## **OTHER SIZING CONSIDERATIONS**

### **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. How many users are going to use the application for updating activities? If you have 200 users in the system all working and loading projects into the page, then you can expect the performance of the application will not be as good as when you have 200 users who only login and look at static dashboards. So when determining your scaling options, the various roles of the user population become very important.

### **Server hardware**

If you have existing hardware, you need to look closely to see if it is appropriate. If the server is very 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. So you need to consider this when planning for the number of users a configuration can handle.

### **Storage types**

Some customers use server-side disk storage. All of Primavera's tests are executed with local disks. However, you might use a SAN configuration for your servers. This brings a little more complexity to the system. You need to make sure that the connections to the SAN are in a good state.

### **Network**

One of the biggest performance problems you might encounter revolves around your network infrastructure. Very often customers believe their network infrastructure is up to date and infer that performance problems are caused by other factors. However, in many of these cases the problems are actually caused by poor



network structure. Sometimes it is because of a saturated network and sometimes it turns out that the server or the clients are in an old building and the network there was never updated. Whatever the reason, you need to be sure that the network is in a good state. Ideally you should ensure that the application server and the database servers are in the same location.

### **End user Geography**

A major concern for performance is 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.

## **CONTRACT MANAGEMENT RESULTS WITHIN A CONTROLLED ENVIRONMENT**

Weblogic was able to handle the load of 100 virtual users using 27% - 30% CPU and Memory on the application server and 7% -10% CPU and Memory on the database server respectively.

## CONCLUSION

When determining sizing requirements for an installation, there are many factors to consider. It is clear that a simple metric of “number of concurrent users” is only one of many factors that should be used to determine minimum hardware requirements. In many cases, a smaller pilot configuration with your existing hardware can reveal much about network issues that might affect a full Oracle Primavera Contract Management, Business Intelligence Publisher Edition installation. You can use the reference configuration as a starting point for hardware recommendations and settings for the user loads that were tested. However it is only a starting point. Your data set and usage patterns will always be factors that make your installation unique. It is therefore important not to assume guarantees based on the specs provided, and leave the opportunity to scale out later if necessary. If you have metric values which are substantially larger than the reference configuration, you should anticipate the requirements for potential upgrades. However, the “how much more” question can never truly be answered completely– it is always just a best guess based on extrapolation. Designing configurations that can be scaled out easily is the key to allowing for growth.



## Frequently Asked Questions

### **How much hardware does Oracle Primavera Contract Management, Business Intelligence Publisher Edition installation requires?**

Tables that describe the recommended hardware for each deployment size are described above.

### **How much disk space does Oracle Primavera Contract Management, Business Intelligence Publisher Edition requires?**

The Contract Management application requires little space around 200MB. However you do need enough space to run the Application Server software such as Weblogic. You will also need enough space to keep historic log files. Also, you be sure you have the appropriate amount of disk space on you database server. Recommendations can be found in the above tables.

### **Can Oracle Primavera Contract Management, Business Intelligence Publisher Edition run in a cluster?**

Yes, Oracle Primavera Contract Management, Business Intelligence Publisher Edition can run in a cluster only on Weblogic.

### **Do the Oracle Primavera Contract Management, Business Intelligence Publisher Edition Services affect performance?**

Yes. Oracle Primavera Contract Management, Business Intelligence Publisher Edition Services do affect performance for the Contract Management Web application. The difference in performance depends on some of the following factors:

- Hardware size
- Data size
- Contract Management feature usage
- Data change rate

### **Will i need more space when upgrading to Oracle Primavera Contract Management, Business Intelligence Publisher Edition ?**

No

## **How can I make Oracle Primavera Contract Management, Business Intelligence Publisher Edition Service run faster?**

You can make the Oracle Primavera Contract Management, Business Intelligence Publisher Edition Service faster by:

- Making sure the Contract Management Service are installed on a dedicated server
- Contract Management Services can also be separated to multiple servers. If performance is a concern, a good idea would be to install all global services on one server and the Project Publication service on its own dedicated server.
- Verify the database has the optimum settings for efficiency
  - Enough memory
  - Fast disks
  - No other database instance running

## **Should the database be installed in a shared database environment?**

No. Oracle Primavera recommends a dedicated Database Server for the Contract Management.

## **What is the best way to monitor performance for Oracle Primavera Contract Management, Business Intelligence Publisher Edition?**

You can use Oracle Enterprise Manager to monitor many aspects of the database (Oracle Database only) as well as OS and Weblogic exposed metrics.

**How much disk space will the database schema require for table spaces?** Minimum is 200 MB and it can be increased based on the size of deployments.



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Oracle Corporation  
World Headquarters  
500 Oracle Parkway  
Redwood Shores, CA 94065  
U.S.A.

Worldwide Inquiries:  
Phone: +1.650.506.7000  
Fax: +1.650.506.7200  
oracle.com

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