Deploying PeopleSoft Enterprise applications on HP BladeSystem

Executive summary

With a new focus on optimizing business productivity, competitiveness and agility, Oracle raises the standard of what you can expect from an ERP solution with its next-generation PeopleSoft Enterprise 9.0 application suites. Today's PeopleSoft applications provide increased attention to governance and key performance indicators to support insight-driven decision making. Added to that is the ability to use Oracle Fusion Middleware to extend PeopleSoft Enterprise applications, leading to greater value across your organization.

This white paper provides an overview of the HP BladeSystem infrastructure and discusses the benefits of deploying PeopleSoft on the HP BladeSystem environment. By building upon a highly integrated and flexible architecture, businesses enjoy increased agility in deploying systems and provisioning for peak capacity requirements. Along with centralized management, cable reduction, thermal logic, and lower hardware acquisition costs, the HP BladeSystem environment provides a catalyst for increasing service levels while reducing total cost of ownership.

Target audience

This paper is intended for PeopleSoft system architects, application and systems administrators, as well as business decision makers.

HP BladeSystem and an Adaptive Enterprise

Today's business environments demand an adaptable IT infrastructure that is capable of adjusting to the changing needs and requirements of the business. This Adaptive Infrastructure is powered by three interrelated, core capabilities: the ability to establish and maintain continuous and secure operations; the ability to plan, monitor, and control devices in response to changing demands; and the ability to dynamically provision, assign, and share resources whenever needed.

The HP BladeSystem exemplifies how HP technology can enable an Adaptive Infrastructure through a modular design that simplifies deployment and maintenance, increases high-availability and high-performance features, and integrates management and security features. HP server blades are commonly viewed as compact and efficient servers that primarily save space and power. However, the full benefits of a blade deployment go beyond the considerations of an individual server. The full story lies in the integration and consolidation of the business infrastructure to provide a complete system of server, storage, power, and network resources managed through a single management framework – HP BladeSystem – that is adaptable and synchronized with the IT demands of an organization.

HP BladeSystem modular architecture

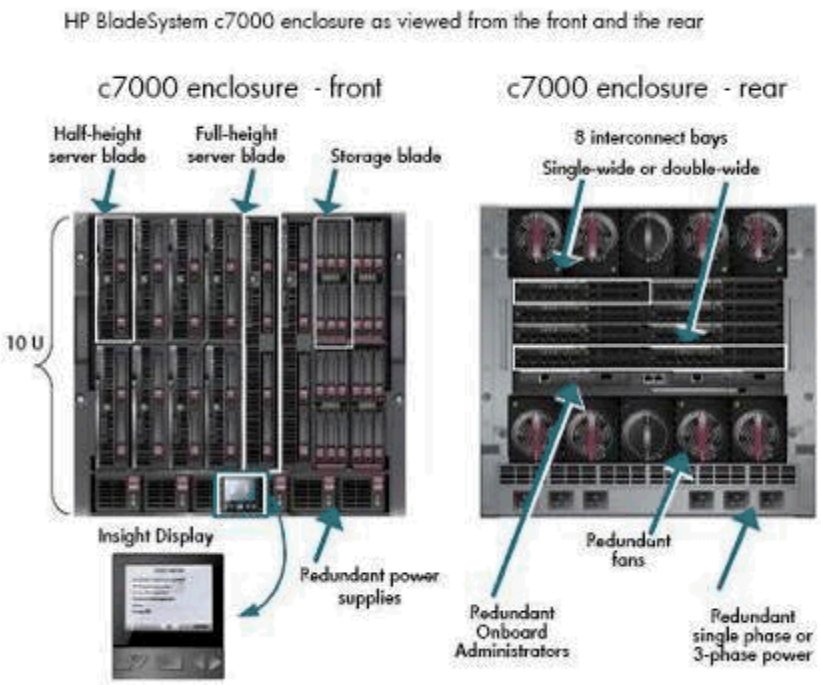
The HP BladeSystem infrastructure is composed of a number of modular components designed to give an organization maximum flexibility when deploying PeopleSoft Enterprise applications. These components include the server enclosure, server blades, network and storage interconnects, and power enclosures. This document is not intended to provide a detailed description of each of the modular components but will provide a baseline as components pertain to the recommendations for deploying PeopleSoft on the HP BladeSystem.

The HP BladeSystem c7000 and c3000 enclosures provide the building block for the environment, which includes full-height and half-height blade servers, storage blades, tape storage blades, network interconnects, management modules, HP Virtual Connect modules, power supplies, and cooling fans. The functionality of each of these components is explained within this section.

HP c7000 BladeSystem enclosure

The c7000 BladeSystem enclosure, which is an adaptive infrastructure in a box, is optimized for large data center or enterprise environments. The c7000 BladeSystem enclosure supports eight full height server blades or 16 half-height server and/or storage blades as well as varying combinations of both full- and half-height blades.

Figure 1. HP BladeSystem c7000 enclosure



HP c3000 BladeSystem enclosure

The c3000 enclosure design is versatile, hassle-free and ideal for the remote office or small and medium business (SMB) deployment with a lower entry price point. The c3000 enclosure supports both 110V and 220V power sources, four full-height blades and eight half-height server and/or storage blades as well as varying combinations of both full- and half-height blades.

Figure 2. HP BladeSystem c3000 enclosure

Onboard Administrator

These enclosures include an Onboard Administrator (OA) management module which provides real time management of the entire BladeSystem. This module monitors enclosure power and cooling, regulates fan speed, and feeds enclosure status information to the enclosure's Insight Display. One OA management module is included with each enclosure by default. A second management module can be added to the c7000 enclosure for redundancy. Up to three enclosures can be connected together through their OA management modules providing a single view for all three enclosures. The Onboard Administrator provides a single view of the BladeSystem infrastructure allowing IT Administrators the ability to manage their PeopleSoft hardware environment from a single view.

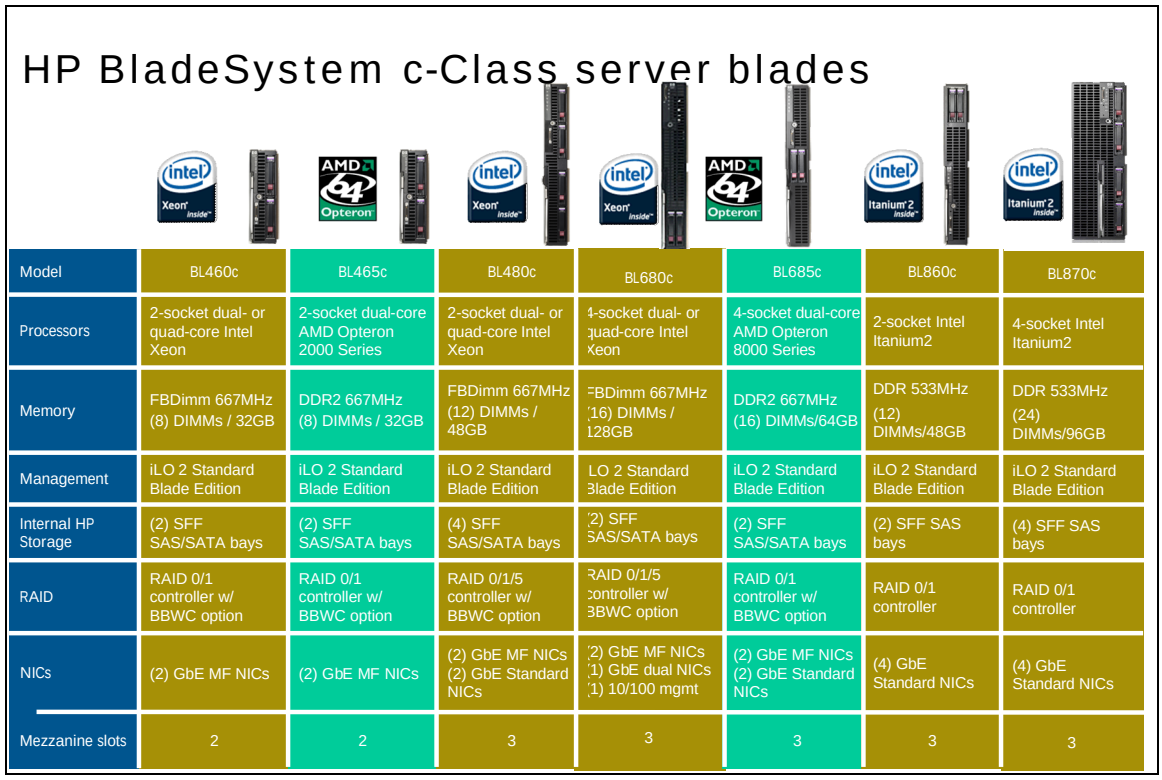
c-Class BladeSystem blade servers

Blade servers provide the system components for your PeopleSoft environment. Several choices are available including both HP ProLiant and HP Integrity server blades. HP ProLiant blades are built upon Intel Xeon and AMD Opteron class processors, whereas HP Integrity server blades are built upon Intel Itanium class processors and provide a wider range of available operating environments, including OpenVMS, Linux, Windows, and HP-UX.

In a PeopleSoft environment, many customers choose to deploy their applications either in an HP Integrity system running HP-UX, or on HP ProLiant systems running Windows. Still, more businesses are beginning to consider Linux as a commercial-class operating system and we are beginning to see some interest from PeopleSoft customers.

Another option we see considered many times is to deploy PeopleSoft database services on HP Integrity servers while scaling out at the web and application tiers with HP ProLiant machines. This type of heterogeneous solution can provide a robust back-end for database and batch processing while increasing availability and reducing costs by load balancing web and application services among many server environments. Within the HP BladeSystem enclosure, businesses can take advantage of both technologies and deploy the right mix of servers for their needs.

Figure 3. HP BladeSystem c-class server blades



Model	BL460c	BL465c	BL480c	BL680c	BL685c	BL860c	BL870c
Processors	2-socket dual- or quad-core Intel Xeon	2-socket dual-core AMD Opteron 2000 Series	2-socket dual- or quad-core Intel Xeon	4-socket dual- or quad-core Intel Xeon	4-socket dual-core AMD Opteron 8000 Series	2-socket Intel Itanium2	4-socket Intel Itanium2
Memory	FBDimm 667MHz (8) DIMMs / 32GB	DDR2 667MHz (8) DIMMs / 32GB	FBDimm 667MHz (12) DIMMs / 48GB	FBDimm 667MHz (16) DIMMs / 128GB	DDR2 667MHz (16) DIMMs/64GB	DDR 533MHz (12) DIMMs/48GB	DDR 533MHz (24) DIMMs/96GB
Management	iLO 2 Standard Blade Edition	iLO 2 Standard Blade Edition	iLO 2 Standard Blade Edition	iLO 2 Standard Blade Edition	iLO 2 Standard Blade Edition	iLO 2 Standard Blade Edition	iLO 2 Standard Blade Edition
Internal HP Storage	(2) SFF SAS/SATA bays	(2) SFF SAS/SATA bays	(4) SFF SAS/SATA bays	(2) SFF SAS/SATA bays	(2) SFF SAS/SATA bays	(2) SFF SAS bays	(4) SFF SAS bays
RAID	RAID 0/1 controller w/ BBWC option	RAID 0/1 controller w/ BBWC option	RAID 0/1/5 controller w/ BBWC option	RAID 0/1/5 controller w/ BBWC option	RAID 0/1 controller w/ BBWC option	RAID 0/1 controller	RAID 0/1 controller
NICs	(2) GbE MF NICs	(2) GbE MF NICs	(2) GbE MF NICs (2) GbE Standard NICs	(2) GbE MF NICs (1) GbE dual NICs (1) 10/100 mgmt	(2) GbE MF NICs (2) GbE Standard NICs	(4) GbE Standard NICs	(4) GbE Standard NICs
Mezzanine slots	2	2	3	3	3	3	3

The HP ProLiant BL460c and BL465c server blades are half-height blades with two sockets housing dual or quad-core Intel Xeon processors, or dual-core AMD Opteron processors respectively. These servers are ideally suited to PeopleSoft web and application services. Up to sixteen of these server blades can fit into one c7000 enclosure, or eight of these servers in a c3000 enclosure.

The HP ProLiant BL480c is a full-height server blade with two sockets supporting dual or quad-core Intel Xeon processors, but provides additional memory capacity, as well as more internal disk space and more capacity for interface cards. For this reason, the BL480c may be considered for PeopleSoft database services in situations where batch transactions and growth are expected to be small.

For environments where batch activity and growth are of a concern, many businesses will turn to the HP ProLiant BL680c or BL685c blade server. These servers support dual or quad-core Intel Xeon processors, or dual-core AMD Opteron processors respectively, but provide four sockets for CPU scalability, as well as availability for more memory. Although these servers only support two internal drives, they do offer additional interface cards which can be used to connect storage through a SAN.

The HP Integrity BL860c and BL870c blade servers provide a robust system infrastructure for business critical workloads with availability, scalability, and virtualization in mind. These servers are built upon the Intel Itanium processor family, which are noted in PeopleSoft deployments around the globe for delivering always-available, scalable solutions with excellent price-performance for mixed workloads.

The BL860c server is a full-height blade with two sockets supporting single and dual-core Intel Itanium processors. It scales to 48GB of memory and can support up to two internal drives. For this reason, the BL860c is generally suited for web and application services in a PeopleSoft deployment, or in smaller implementations, may be used as a database server as well.

The BL870c server is a double-wide, full-height blade with four sockets supporting single and dual-core Intel Itanium processors. With up to 96GB of memory and four internal drives, this server can

provide great scalability for database and batch services, or can be used to consolidate and scale web and application services for larger PeopleSoft environments.

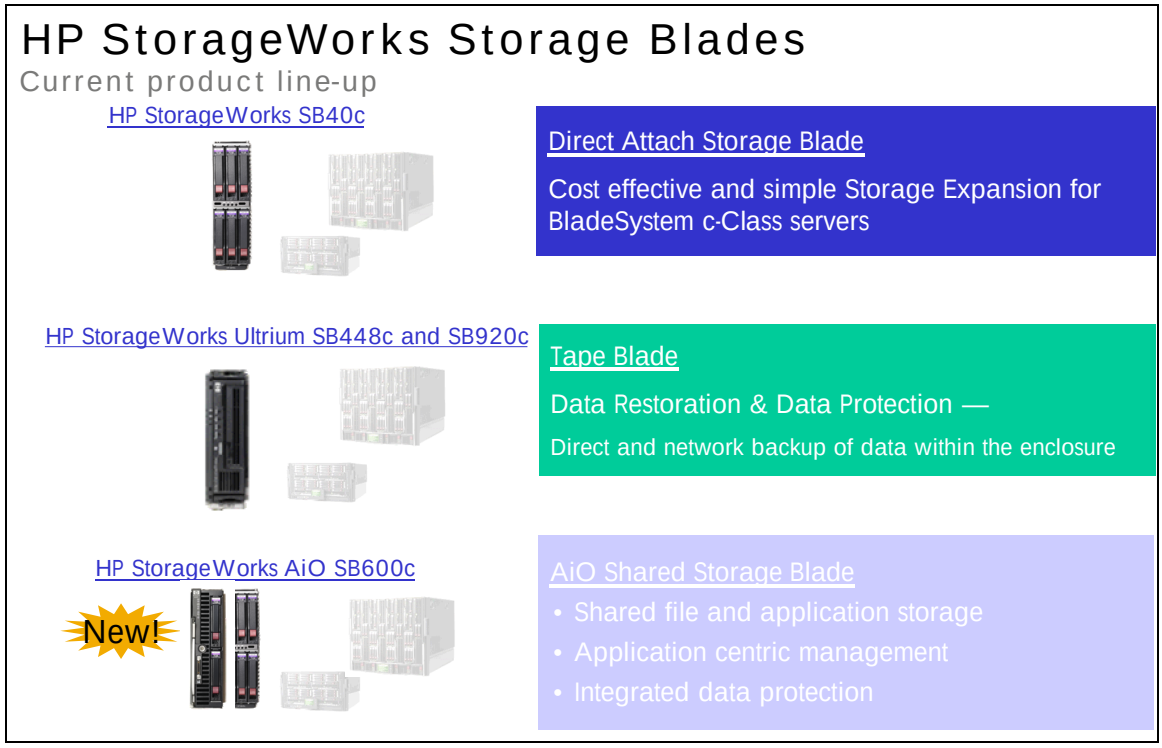
With HP Integrity Virtual Machines, businesses can take advantage of a shared environment providing software isolation for several operating environments. In addition, HP provides secure resource partitions so that businesses may pool system resources for many applications, while still providing an appropriate level of security for each business process. This kind of shared application server utility can provide stupendous cost savings while increasing agility, accelerating project adoption, and increasing service levels at the same time.

Indeed, customers, as well as HP internally has realized such advantages with HP Integrity server and PeopleSoft applications, and the HP BladeSystem environment with HP Integrity blade servers is particularly poised to deliver these benefits.

c-Class BladeSystem Storage blade

In addition to server blades, IT administrators have the option of consolidating HP storage solutions within the c-class BladeSystem enclosure.

Figure 4. HP BladeSystem c-class storage blades



PeopleSoft applications requiring disk storage capacity beyond the internal storage of a blade server can use several HP StorageWorks blade solutions. The SB40c is a half-height c-Class direct-attach storage blade featuring support for up to six hot-plug, Small Form Factor (SFF) Serial Attached SCSI (SAS) or Serial ATA (SATA) hard disk drives. The StorageWorks SB40c storage blade sits in the bay[1] next to the blade server attached to it.

[1] Both the server blade and storage blade must be in the same BladeSystem zone. (There are four zones in a c7000 enclosure and two zones in a c3000 enclosure.)

Using the onboard Smart Array P400 RAID controller, the SB40c provides industry-leading performance, availability, and storage density, to meet customers' demanding and growing storage needs.

In addition, HP offers the StorageWorks AiO SB600c All-in-One storage blade. The SB600c and an i-SCSI based NAS device providing additional storage capacity to those environments with lower IO performance requirements, with ease of management. The All-in-One Storage Manager (ASM) interface reduces the time, expense, and expertise required to keep up with rapidly growing applications. ASM handles all underlying storage tasks and presenting network storage in application-centric terms, giving administrators new found levels of control. Administrators can quickly and easily setup or expand data areas, migrate data from capacity constrained servers, implement disk and tape backup policies, and more.

For off-line storage needs, the HP StorageWorks Ultrium SB448c or SB920c tape blade is ideal for HP BladeSystem c-Class customers who need a data protection solution. This tape blade provides direct attached data protection for the adjacent server and provides network backup protection for all data within the enclosure. The SB448c tape blade provides data speeds of 173GB/hour with up to 400GB of capacity, while the SB920c delivers up to 800GB of capacity with speeds of 432GB/hour.

c-Class blades mezzanine options

HP BladeSystem mezzanine boards provide additional network and Fibre Channel storage connectivity into existing HP blade servers. They fit into blade server expansion slots and provide functionality specific to the type of board used. Currently, there are various mezzanine board options for Ethernet and InfiniBand network connectivity as well as for SAN storage connectivity. Several options include:

- The HP NC373m PCI Express Dual Port Multifunction Gigabit Server Adapter
- The NC326m PCI Express dual-port Gigabit Server Adapter
- The NC325m quad-port Gigabit server adapter
- The NC512m dual-port 10 Gigabit Ethernet network server adapter
- The Emulex LPe1105-HP dual-port Fibre Channel HBA with 4 Gbps connectivity
- The QLogic QMH2462 dual-port 4Gb Fibre Channel HBA adapter
- The HP single-port 4X DDR InfiniBand PCI-Express Mezzanine adapter

Additional specifications on these and other options can be found on the HP BladeSystem c-class components website.

c-Class interconnect options

HP BladeSystem interconnects are network devices that plug into the rear of the BladeSystem enclosure and provide connectivity to all the blade server NICs and Fibre Channel Storage ports. HP BladeSystem supports industry network and storage standards, such as Ethernet, Fibre Channel and InfiniBand. HP provides several choices for interconnects, allowing customers to choose the best technology for their infrastructure. Some options include:

- The Cisco Catalyst Blade Switch 3020
- The HP GbE2c Ethernet Blade Switch
- The HP GbE2c Layer 2/3 Ethernet Blade Switch
- The HP 1:10Gb Ethernet BL-c Switch
- The HP 10Gb Ethernet BL-c Switch

- The HP 1Gb Ethernet Pass-Thru Module
- The Brocade 4Gb SAN Switch
- The Cisco MDS 9124e Fabric Switch
- HP 4Gb Fibre Channel Pass-Thru Module
- The HP 4X DDR InfiniBand Switch Module

Additional specifications on these and other options can be found on the HP BladeSystem c-class components website.

HP Virtual Connect

Virtual Connect is an industry standard-based implementation of server-edge I/O virtualization. It puts an abstraction layer between servers and the external networks so that the LAN and SAN see a pool of servers rather than individual servers.

Once LAN and SAN connections have been made to the server pool, the server administrator can utilize the Virtual Connect Manager user interface to create an I/O connection profile for each server. Instead of using default Media Access Control (MAC) addresses for Network Interface Controllers (NICs) and default World Wide Names (WWNs) for HBAs, Virtual Connect Manager creates bay-specific I/O profiles, assigns unique MAC addresses and WWNs to these profiles, and administers them locally.

The ability to support Virtual Connect is built in to each HP BladeSystem c-Class component, including the Onboard Administrator (OA), FC HBAs, NICs, and the HP Integrated Lights-Out (iLO) communication channels. Virtual Connect works with the standard Ethernet NICs and FC HBAs available for HP BladeSystem c-Class server blades; no specialized mezzanine cards are required.

Optional Virtual Connect modules are required to activate full server-edge I/O virtualization. New Virtual Connect Ethernet and FC modules simplify the connection of server NICs and HBAs to the data center environment and extend the capabilities of these standard server devices by supporting the secure administration of their Ethernet MAC addresses and FC WWNs. No virtual devices are created; the MAC addresses and WWNs are real and are the only identifiers seen by the system, the OS, and the networks.

Secure management is achieved by accessing the physical NICs and HBAs via the enclosure's OA and the iLO interfaces on the individual server blades.

Virtual Connect has the unique ability to manage the MAC addresses and WWNs presented by the hardware without re-cabling and without requiring the assistance of multiple administrators. Although the hardware ships with default MAC addresses and WWNs, Virtual Connect resets these identifiers prior to boot so that Preboot eXecution Environment (PXE)/SAN boot and the OSs only see the identifiers managed by Virtual Connect.

One of the advantages of Virtual Connect in a PeopleSoft environment is that it can increase the server-side network and SAN connectivity speeds for server blades within an enclosure. At the same time, server interconnects are handled within the enclosure, reducing cabling. In addition, management of the server network and SAN is administered from a console, as opposed to physically re-cabling and re-assigning MAC addresses.

The ease of management provided by Virtual Connect truly becomes evident when deploying new blades into the environment, and especially while re-provisioning blades to meet peak needs for one application or another. Take, for example, a business running PeopleSoft Financials, CRM, and HR Benefits. Typically, these business processes have a steady workload associated with them, with some peak capacity requirements. In the past, many businesses would treat each environment separately,

purchasing servers to meet the peak capacity for each environment. With the HP BladeSystem, we can re-provision idle capacity to meet business needs without over purchasing.

During Financials end-of-month closings, it is typical for PeopleSoft FMS users to need additional capacity, so several blade servers may be tasked for Financials. PeopleSoft HR Benefits requirements may be relatively low, except during open enrollment once a year. PeopleSoft CRM applications may see cyclical spikes, based on customer activity, say for example, during and after the holiday buying season for many retailers.

With HP Virtual Connect, blade servers within a pool may be provisioned to one task during a peak capacity need, and then re-provisioned for another task as capacity requirements shift. Using Virtual Connect in conjunction with a boot-from-SAN image of the required application environment can quickly and easily re-deploy capacity as it is needed, literally in minutes.

Some of the Virtual Connect interconnect components include:

- The HP 1/10Gb Virtual Connect Ethernet Module
- The HP 4Gb Virtual Connect Fibre Channel Module

Additional specifications on these and other options can be found on the HP BladeSystem c-class components website.

Why HP blades for PeopleSoft?

As more and more PeopleSoft components become interrelated, mission-criticality of any business system will be predicated by the availability of all applications. Every day, companies are faced with the decisions of balancing the requirements for their PeopleSoft deployment with the total cost of ownership, including hardware acquisition cost as well as more of the "soft" costs such as power and cooling, management and supporting the environment. The HP BladeSystem provides an Adaptive Infrastructure that can help businesses achieve the following benefits:

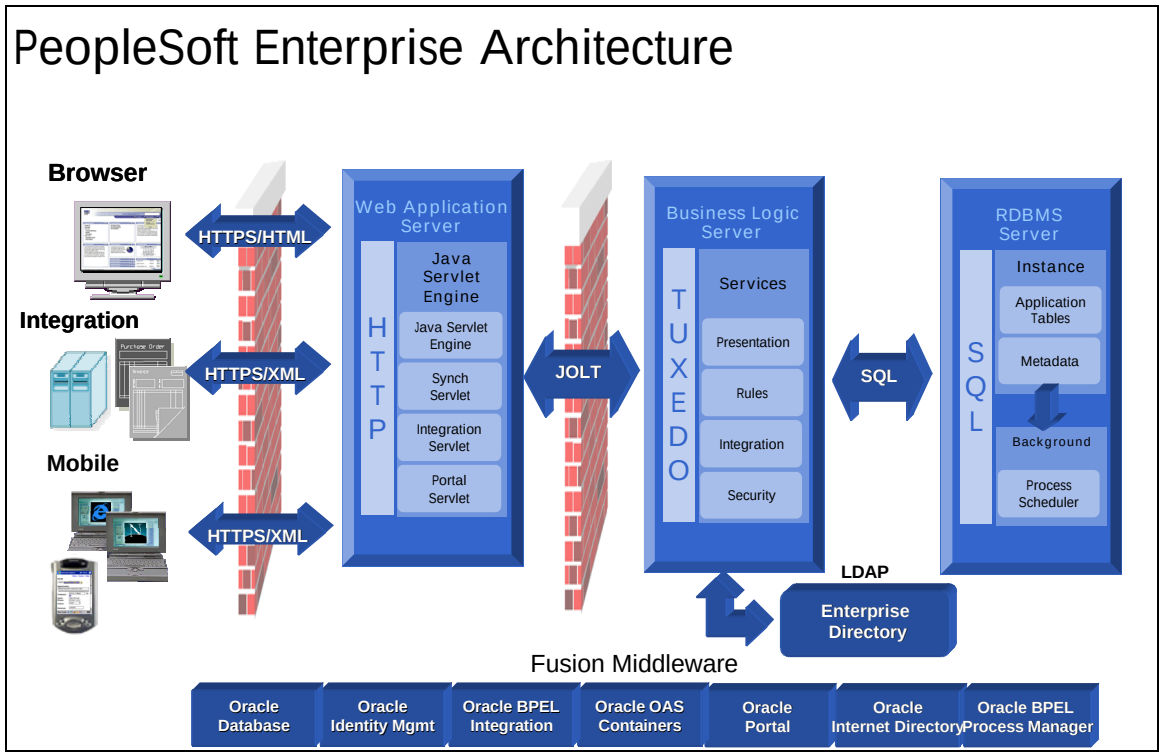
- Architecture flexibility
- Increased agility
- Centralized management and deployment
- Data center consolidation and cable reduction
- Lower hardware acquisition costs

PeopleSoft Application configuration

The PeopleSoft Internet Architecture is a server-centric, component architecture that enables secure end user access to PeopleSoft applications. Any Internet-enabled device, such as a Web browser running on a PC or a mobile phone—which uses standard Internet technologies such as HTML, XML, and HTTP—can access and execute PeopleSoft Internet Applications.

By leveraging ubiquitous Internet technologies such as Extensible Markup Language (XML) and HyperText Transfer Protocol (HTTP), the PeopleSoft Internet Architecture delivers a set of server based technologies that supports true Internet-based systems integration. These integration technologies, along with Oracle SOA strategies, streamline integration of PeopleSoft applications with other PeopleSoft applications, custom internal systems, eMerchants, and customer trading partner systems.

Figure 5. PeopleSoft Internet Architecture



PeopleSoft Internet Architecture

Web tier

Clients in the PeopleSoft Internet Architecture connect to the application environment through a browser interface over the Internet. For high-availability, HP recommends that requests come in via a content switch such as those offered by companies like Cisco, Foundry, and the like. It is recommended that multiple content switches be cascaded together to eliminate a single point of failure. In this manner, users will connect through a virtual IP address (VIP), and the content switch will direct traffic to many web instances installed on several servers. For additional security, choose a content switch that also provides secure socket layer (SSL) encryption/decryption acceleration.

For scalability of the web server tier, administrators often set up several web instances on different ports, and then point the VIP to the different web instances across several machines. This is also a good strategy when setting up multiple application environments to use a pool of servers. One can set up each web instance for HR, Financials, Portal, CRM, etc. on each of the web servers, and then use one VIP on the content switch for each of these environments which points to the appropriate web instance on each machine.

When setting up users through a content switch, it is necessary to turn persistence on. In PeopleSoft, the web server has two main functions; one is to deliver the presentation of the applications through an HTTP server, the other uses a Java Servlet engine in order to provide authentication and authorization to the applications based on a role that is assigned to each user. Since authentication is held at the web tier, once a particular user session is started on a specific instance, the path from the content switch to the web server instance should be maintained throughout the session, or else the user will have to log back in to complete a transaction.

The web tier in PeopleSoft tends to be more memory intensive than CPU intensive. For this reason, we generally recommend smaller blade servers with more memory at this tier. Web servers should have at least two network interface cards (NIC's), but generally don't need much scalability for additional cards. An HBA may make good sense in order to use a boot from SAN strategy for additional provisioning options for the blades, which will be discussed in a later section of the paper, but on the whole, a couple of mezzanine slots for additional cards should suffice.

For Windows and Linux environments, the BL460c or BL465c are generally good options. With dual-core processors, these can provide the processor power required, along with enough memory to handle 1000 to 1500 concurrent users, depending upon configuration and usage patterns. Paying particular attention to the number of threads and Java heap size for your configuration can avoid typical performance and scalability issues. One should also take care that if SSL encryption/decryption is provided by these servers, you should expect far fewer users per server, thus the consideration for an SSL accelerator in the content switch.

For IT staffs that have expertise in UNIX, the HP Integrity BL860c blade running HP-UX may be a better solution. First, if you choose to run SSL on the web server, tests have shown that the explicit parallelism with the Itanium chip family provides far better performance for encryption/decryption. Also, the web server software used with HP-UX is 64-bit, which provides better access to memory, and we have run tests showing acceptable performance for up to 3000 concurrent users on these servers.

Application tier

Once a user makes a request through the web server, a connection is made to the application server, which uses BEA Tuxedo as a middleware platform. If the user traffic is entirely within the corporate firewall, communication between the web server and Tuxedo on the application tier is handled directly. If users are coming in through a firewall, for security reasons PeopleSoft introduces an encrypted middleware product from BEA called Jolt which then communicates with Tuxedo on the application layer.

The web server configuration file contains an entry that specifies the application server domains that it should address. The entry will look similar to this:

```
psserver=apphost1:port, apphost2:port
```

By setting up the application host instances in this configuration file, administrators can set up a round-robin load balancing strategy. Since authentication takes place at the web tier, it does not matter which application host in the string the web server addresses, it can go to one host for one transaction, and another host for the next transaction. This provides an ideal high-availability strategy, in that, if a particular application host is lost, either due to the software package being down, or due to planned or unplanned server downtime, the user will not discern any difference in availability.

Other variations of this configuration exist. For example, if you have two servers acting as application hosts in the environment, and you know that one server has approximately twice the capacity of the other (for example, if you are adding a new server to an existing environment), you can modify the script to send twice as many user requests to the second server in the queue:

```
psserver=apphost1:port, apphost2:port, apphost2:port
```

Also, let's say you want to have all application traffic point to one server during normal operations, but you want to have failover to another host. This is sometimes the case when you have one application server and one database server and you want them to failover to one another. In this case, you can set up the script to point to the primary host unless it is not available, in which case it diverts traffic to the second host. This is accomplished by putting the second host in brackets:

```
psserver=apphost1:port, [apphost2:port].
```

Since PeopleSoft version 8 was released several years ago, the application tier has held all of the processing, roles, and cache for the applications. Since there is no code on the client, the PeopleSoft application tier tends to be heavy when it comes to on-line transaction processing (OLTP). Since the application tier scales very well across many servers, it is advantageous to have the application tier as a key system component to manage growth over time.

Due to the amount of activity that is processed on the application tier, it is not unusual to find the majority of PeopleSoft system resources be required at this tier. As a general rule of thumb, one might expect the ratio of resources required from the web, application, and database tiers in a PeopleSoft environment to be around 1:4:1.

PeopleSoft application servers tend to be CPU intensive and can consume a fair amount of memory as well. They do not tend to be IO intensive, and so, an ideal server blade for this environment would be one with capacity for processor and memory growth, but one that does not necessarily need many mezzanine slots for card expansion. For Linux and Windows 32-bit environments, the BL460c or BL465c would be a good choice. One can add several blades to the environment to meet growth requirements.

Starting with PeopleTools 8.49, Oracle also supports Windows 2003 with 64-bit extensions (x64) at the application tier. Businesses deploying on Windows may take advantage of larger shared memory spaces in this environment. For smaller implementations the BL460c and BL465c still make sense, but for larger implementations, it would be advisable to reduce the number of physical servers in the environment by implementing the BL680c or BL685c server. These servers offer twice the number of processor sockets and can provide much more memory for the application tier.

The HP Integrity BL860c and BL870c server blades offer a more robust environment on which to run your PeopleSoft applications. Running HP-UX, these servers provide unprecedented security and availability in a cost-savvy blade format. With a true 64-bit PeopleSoft code build, businesses take advantage of performance gains and scalability. For the application tier, the BL860c provides a great scale-out solution, by adding servers to the application tier as your business grows. For larger implementations, the BL870 offers consolidation, or growth for larger workloads that need the capacity found in this server.

Communication across the network from the web tier tends to be relatively low, with communications being managed by the BEA middleware components. Network traffic from the application server to the database server, however, can be intensive. In order to facilitate supportability of many database products, PeopleSoft uses an abstraction layer called PeopleCode on the database server which translates requests into appropriate SQL calls, depending on the database structure. This creates a one-to-many relationship for requests from the application server to network communications between the application and database servers. It is important, therefore, to setup your server environment on an isolated network segment in order to avoid contention with the user network. Doing this within Virtual Connect can simplify management of this network segment and increase performance.

Batch tier and Reporting

The database tier for PeopleSoft contains all of the application data, PeopleCode, and manages the SQL calls from the applications, batch processing and reporting. PeopleSoft Process Schedulers are used to schedule batch jobs against the database. In the majority of implementations, the batch Process Scheduler co-exists on the same physical machine as the database server. This reduces network traffic between the batch scheduler and the database, where the actual work takes place.

There are cases in which system architects will choose to put the Process Scheduler on a machine other than the database server. Usually, in this case, they will co-locate the Process Scheduler on the application servers, or may attribute a separate server for the Process Scheduler. There are a few reasons people do this.

First, if the certified deployment that is chosen only supports the database on a particular operating system, it will be necessary to put the Process Scheduler on a different machine. This would be the case if someone chose to deploy Linux x64 edition. Since it is currently only supported as a database server, the Process Scheduler must run on a different machine (presumably Linux 32-bit edition). Similarly, Windows 64-bit and Linux 64-bit on Itanium-based servers are only supported at the database tier, and the Process Scheduler would have to run on an approved Operating System version.

Some architects design the Process Scheduler on a different machine than the database server to avoid paying per-processor database license costs on more processors than are necessary. This may or may not be beneficial. For example, Oracle charges 0.5 database licenses for each core in an Intel or AMD environment, rounded-up to the next whole license. Take for example, if you were to choose a BL870c with two dual-core Itanium processors as your database/batch server. You would pay for two Oracle database licenses (2 dual-core processors = 4 cores * .05 licenses per core = 2 licenses). In a PeopleSoft implementation, the Process Scheduler uses about 20-25% of the processing power on the database server, so if you were to move that to a separate machine, you would only require 3 cores for database processing. Albeit, you would still have to buy 4 cores, as they are dual-core processors, but let's assume you wanted to isolate 3 cores in an Integrity Virtual Machine, so as only to have to pay license fees for 3 cores. The license fee for Oracle database would be the same (3 cores * .05 licenses per core = 1.5 licenses rounded-up = 2 licenses).

Certainly, one may make the case that for larger implementations, it may make more sense to move the Process Scheduler to a separate machine. If this is done wisely and in full consideration of the additional management costs, as opposed to just the cost of acquiring Oracle licenses, it may make sense. Still, more implementations just leave the Process Scheduler on the database server, and leave it at that.

The other reason for separating a Process Scheduler onto a separate machine is for reports. Some reporting tools only run on Windows, such as Crystal, nVision, PeopleSoft Cube Manager, and Adobe Acrobat. For those implementations running on UNIX or Linux, it will be necessary to have a separate reporting applications server to run these applications, and a Process Scheduler must be running on Windows in order for the applications to request data from the database. Indeed, even in pure Windows environments, it usually makes sense to run these reporting applications and their associated Process Scheduler on a separate machine so as not to tax online users.

Database tier

For the discussion of the database tier, we will assume that the batch Process Scheduler coexists on the same machine, and that a separate machine will be used for the Windows reporting applications.

When designing for high-availability at the database tier, there are a couple of options that are usually employed. The first option is to use clustering software to manage failover of the database services to another server during planned or unplanned downtime. For Windows, this is Microsoft Cluster Server (MSCS). For HP-UX or Linux environments, we recommend HP Serviceguard software.

In this case, database administrators can gracefully shut down the database, and then shutdown the database server. A network heartbeat, which monitors the availability of servers in a cluster, will detect that the primary database server is no longer available, and will restart the database services on the alternate node within minutes. In the case of an unplanned failure, however, the database will

be shut down abruptly and must recover from re-do log files before it is brought back on line. Although the database service comes back up on the alternate server very quickly, it may take several minutes to rebuild from the re-do logs, depending on how long it has been since the database applied logs.

For those who wish to avoid downtime in the event of an unplanned failure, Oracle Real Application Clusters (RAC) provides an excellent solution. In a RAC implementation, two or more nodes are set up in a RAC cluster. The database is kept synchronized on all nodes through a layer called cache fusion, and so, if one node is lost in a cluster, all other nodes continue to serve the database to the PeopleSoft application layer. For HP-UX systems, it is recommended to run Serviceguard extensions for RAC to provide better management of resources. The HP website provides more information on these benefits.

Generally for the database server, we will see requirements for CPU, memory and IO performance. Depending on the amount of batch activity versus online activity that will take place, and the size of the implementation, different servers may be considered at this tier. For small implementations the BL460c or BL465c may be considered, and can use the StorageWorks SB40c storage blade as a direct attach SCSI device to store data. The BL860c provides for a more robust environment for small implementation running on HP-UX, or 64-bit Linux or Windows.

For medium to larger implementations, the BL680c or BL685c would make a good choice for running a Linux or Windows database server. The 64-bit extension (x64) version of these Operating Systems are certified with PeopleSoft, and although these are 64-bit emulation packages, they do provide larger shared memory spaces and better database performance than a 32-bit environment as your database starts to grow.

For larger implementations, the BL870c blade server may be your best choice. With options to run HP-UX, Windows 64-bit, or Linux 64-bit with PeopleSoft, this server provides the true strength of 64-bit processing for the database, and the ability to address all of your physical memory. The Integrity server line is also noted for providing excellent performance for mixed workloads, including database search and writes, batch performance, SQR reporting, and data warehousing.

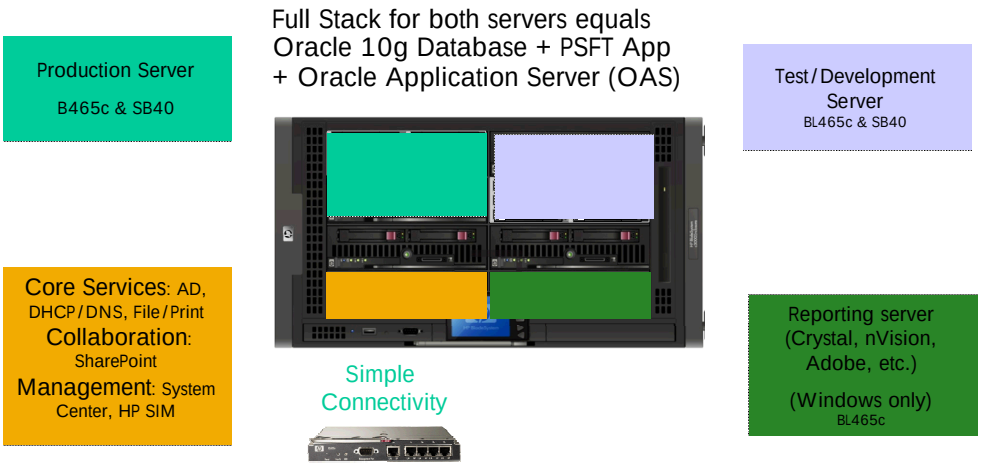
Building your PeopleSoft Enterprise

One of the biggest benefits to deploying PeopleSoft on HP BladeSystem environments is the ability to grow and quickly respond to business needs over time. Consider a small implementation that is destined to grow over time, or perhaps an initial deployment which will grow as more functionality is added. Blades give you the option to purchase what you need today, and then quickly add to the environment over time.

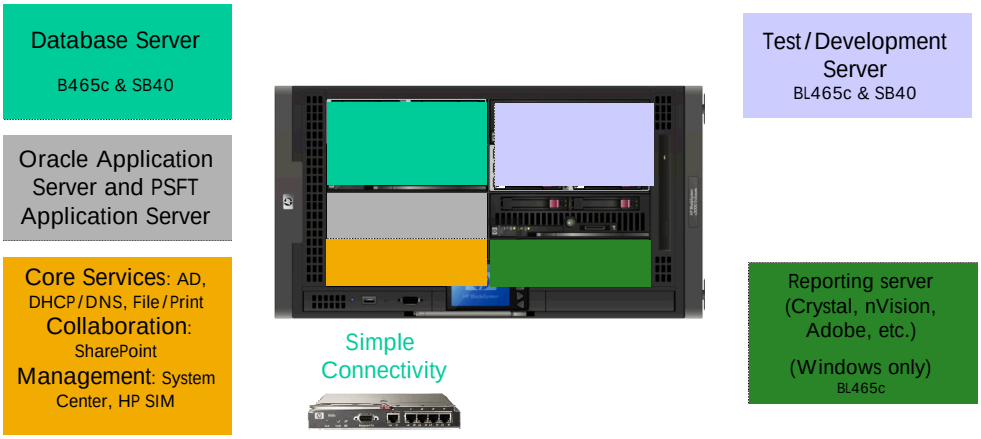
In scenario one, let's say you are staring a new components distribution company and you are planning to use PeopleSoft Order Management to take and fulfill orders. If you are starting off with a few corporate accounts, you may not need much processing power to handle your work load. In Figure 6a, we see that you can consolidate your Production environment onto one blade server which will serve web, application, batch, and database functionality. Development and Test can be consolidated into another blade and each of these environments can use an SB40c storage blade for attached storage.

Figure 6. Managing growth

a.)



b.)



c.)

Over time, the size of your database may grow, and more activity around reporting and decision support is becoming relevant to your business. You can then choose to implement another blade and separate web and application services off to that new environment. This will provide additional capacity to your database server. See Figure 6b.

As you expand, perhaps you will need to hire additional staff to keep up with order growth. With additional users on the system, you may find the need to further grow the environment, and you can do so by adding another server to the environment and separating web services from the application services, as show in Figure 6c.

This shows a simple growth path within a small HP BladeSystem C3000 enclosure. Certainly, it is evident that over time, you may consider moving into the larger C7000 enclosure, and redeploy your smaller server used for the database into the application tier, while providing a larger machine for database services. Certainly, as you are adding staff, you may also consider implementing PeopleSoft Human Capital Management (HCM) system to manage your Human Resources and Benefits. From the HP BladeSystem enclosure, you can create a pool of services that can be shares among different applications and accelerate new project adoption.

Provisioning Blades for PeopleSoft Enterprise

Adding resources into your HP BladeSystem can also be greatly improved. If you consider the time that it takes to deploy a new server in a datacenter, the management tools from HP can greatly reduce time. When setting up a new server, usually we see administrators install the Operating System, set up the network and storage paths, create luns, and then start their installation of the PeopleSoft environment. This process takes quite a bit of time, and impedes speedy reaction to changing business requirements.

In the HP BladeSystem environment with Virtual Connect, you can reduce this time considerably. HP's Virtual Connect technology helps to simplify provisioning and re-provisioning of servers by providing an abstraction layer that separates the world wide storage ID's, Ethernet ID's and boot parameters from the physical device. With this virtualization, any server blade can be given a pre-defined definition or profile independent of the hardware.

Assume our environment is supporting PeopleSoft Benefits and Open Enrollment is causing a sudden peak in demand that is resulting in delayed response times. We can create a pre-scripted response using a boot from SAN process with an HP StorageWorks EVA and using HP Rapid Deployment Pack for Linux and Windows implementations, or HP Ignite-UX for Unix implementations.

First we assign a pre-defined "spare" application node profile to an available server. Then we utilize Rapid Deployment Pack or Ignite-UX scripting interface to execute a serious deployment scripts to create a new boot LUN for the additional server node. A tar file with your PeopleSoft image is deployed on the new boot LUN and is unpackaged and a script is run in order to facilitate modification of certain parameters. Once the new PeopleSoft application image is create, it can join the production environment.

Take this one step further. If you are expecting cyclical peaks for benefits enrollment, perhaps it make sense to have a pre-provisioned boot-from-SAN LUN already available to add capacity to your PeopleSoft HCM environment when necessary. In this scenario, you can quickly repurpose some blade in the environment as an additional PeopleSoft HCM application server. This may be a test server that you temporarily take off line in order to meet the requirements of your production peak. Alternatively, if you have some other applications, say a Financials environment, that has idle capacity during this time, you can reassign one of the Financials application servers to meeting the HCM peak, and then turn that server back over to Financials, once the crisis is over.

Sample blades configurations

The HP BladeSystem environment can be used to greatly enhance your PeopleSoft deployment strategy regardless of whether you have a small implementation with simple requirements, or a larger mission-critical application deployment. In the following discussions we will present some sample configurations for PeopleSoft applications on HP BladeSystem. For purposes of demonstration, we will show environments running HP Integrity blade servers with HP-UX Operating Environments. A similar architecture may be used with HP ProLiant blade servers for Windows and Linux environments, although you should work with your local HP System Design team in order to determine the right size for your deployment.

Figure 7. Basic configuration

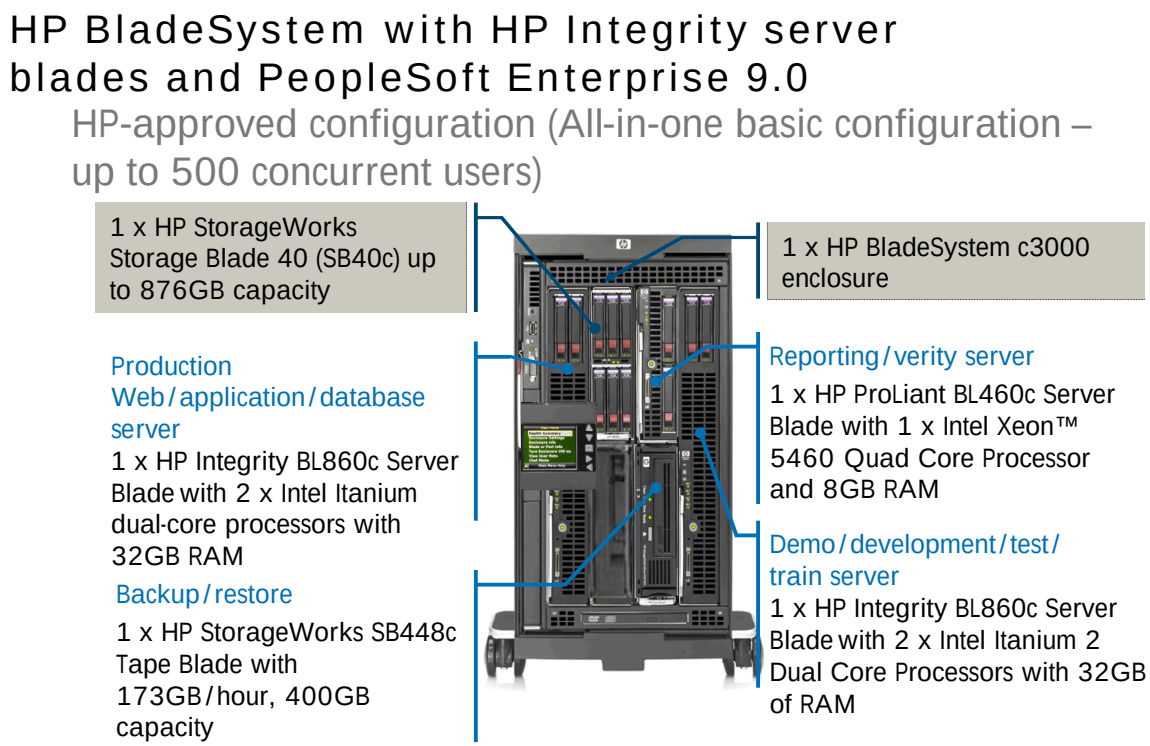
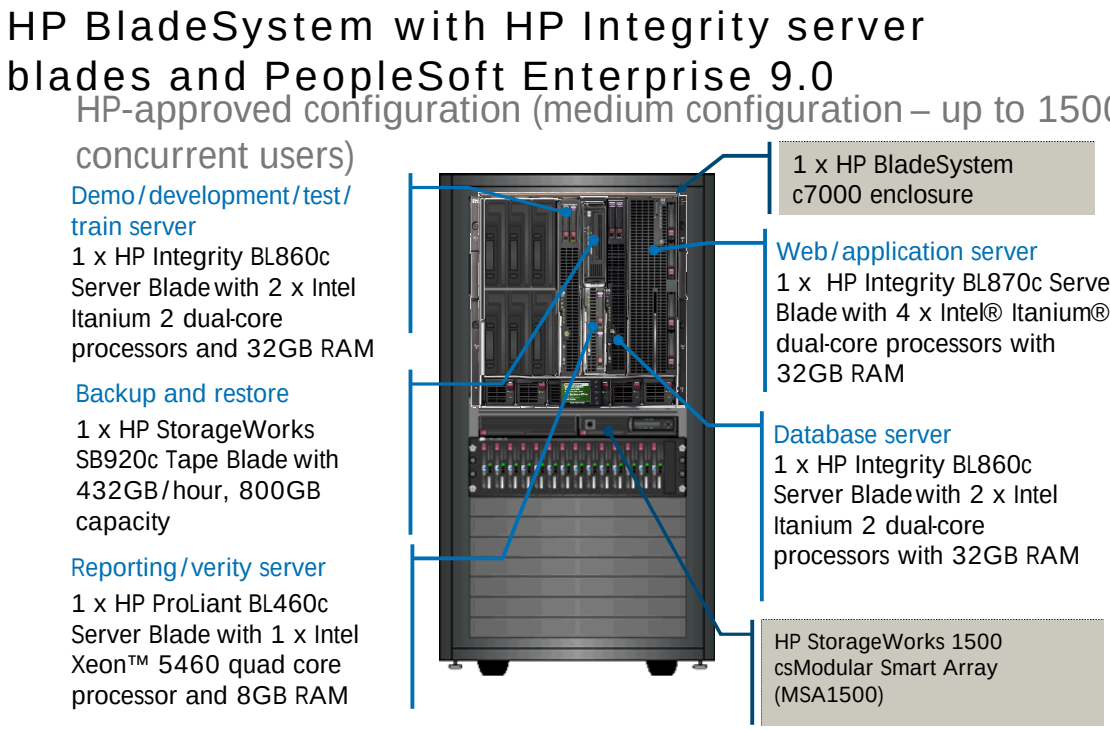


Figure 7 depicts a basic PeopleSoft implementation within a single HP BladeSystem enclosure. For a small environment where servers may be deployed in a closet rather than a dedicated data center, the C3000 enclosure can be set up in a tower-enhanced form factor with standard voltage plugs for your region. With HP Thermal Logic, we can minimize cooling concerns and provide a robust all-in-one solution in an enclosure. In the scenario, we deploy one HP Integrity BL860c server blade in a logical configuration running web, application, batch and database services. A second server blade provides development and test instances. The HP StorageWorks SB40c storage blade is used to store the primary database, whereas larger internal disks may be used to store data on development and

test machines. An HP StorageWorks SB448c tape blade can be used to create backups of the environment, and a separate HP ProLiant BL460c blade server running Windows can be deployed for reporting applications, and Verity search engine components.

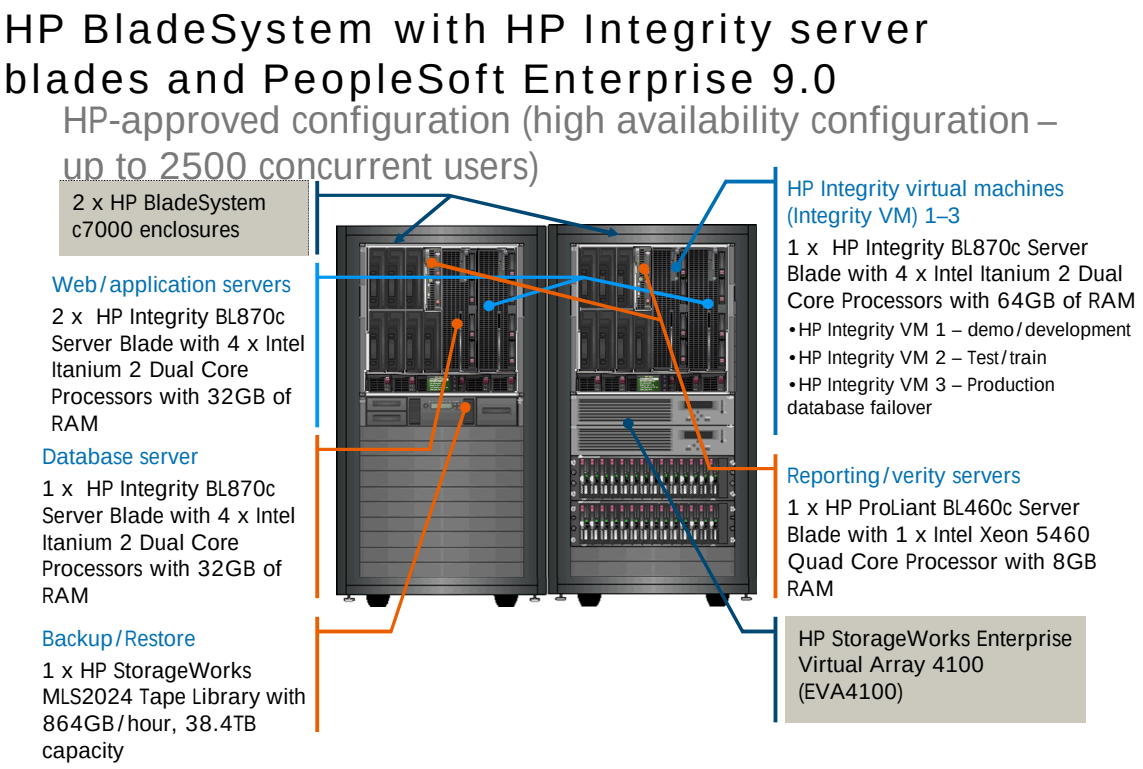
Figure 8. Growth configuration



In Figure 8, we begin to see options to manage growth of the PeopleSoft environment. In this scenario, we are showing a deployment that is expecting a lot of Online activity, but perhaps not much batch activity. The web and application services are deployed on an HP Integrity BL870c server blade, while database services run on one HP Integrity BL860c server blade. A second BL860c server blade provides development and test instances.

Due to greater storage requirements, the HP StorageWorks 1500 Modular Storage Array (MSA1500) is shown. This not only provides more capacity and additional performance, but can also be shared as a SAN device among the production and development and test instances. In addition, the HP StorageWorks BL920c tape blade can be used to back up greater amounts of data in less time.

Figure 9. Full-featured configuration



For larger configurations that require high-availability and a more full-featured solution, the HP BladeSystem can accommodate these requirements. By deploying web and application services across multiple environments, we not only increase our capacity and response time, but we are also able to manage system failures and provide a continuity of business services.

In Figure 9, the production database is deployed one HP Integrity BL870c server blade while a second BL870c server blade provides development and test instances. By using HP Integrity Virtual Machines, we can separate out an additional server environment within the Development/Test machine to be used in the event of a database system failure. In addition, using HP Workload Manager (WLM), we can automate the attribution of system resources based on need and priority, so that in the event of a production system failure, WLM will adjust resources to ensure proper production service levels.

To meet expanding storage needs, the HP StorageWorks Virtual Array 4100 (EVA4100) provides a robust, scalable SAN environment to meet the needs of production and test and development environments. The StorageWorks MLS2024 Tape Library can manage backup for large databases and facilitate quick restore rates.

Again, the HP BladeSystem is fully integrated and can include many product lines including both HP Integrity and HP ProLiant blade servers in the same enclosure. In this scenario, we show redundant HP ProLiant blade servers being used to provide services for Windows reporting applications and Verity search engines.

Summary

The HP BladeSystem enables an Adaptive Infrastructure through modular architecture flexibility, coupled with centralized management and control, present an ideal environment for PeopleSoft Enterprise deployments. The HP BladeSystem provides the scalability and performance required for commercial applications while benefiting from a high degree of centralized management and deployment to reduce ongoing operational costs. The benefits of the HP BladeSystem extend to other business applications and provide the unique opportunity for an organization to standardize on a single infrastructure for PeopleSoft, Oracle and other applications in their environment.

Several configuration options were reviewed through this paper, however each PeopleSoft implementation is unique. HP has developed extensive experience with PeopleSoft application with over 20 years of joint partnership activity. As you plan your deployment of PeopleSoft Enterprise applications, research available options, and then work with your regional HP Alliance team, and Solution Design team to help you develop the right strategy to build an environment that will grow with you into the future.

For more information

For detailed configuration assistance, please contact an HP sales resource or an authorized HP reseller.

Get more information about the HP and Oracle Alliance at http://www.hp.com/go/oracle

Additional information regarding HP and Oracle applications including PeopleSoft Enterprise can be found at http://www.hporacleapps.com

See the following websites for additional HP BladeSystem information:

HP BladeSystem, www.hp.com/go/bladesystem

HP Virtual Connect for c-Class BladeSystem User Guide, http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00865618/c00865618.pdf?jumpid=reg_R1002_USEN

To help us improve our documents, please provide feedback at www.hp.com/solutions/feedback.

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