PeopleSoft Enterprise Portal Million User Benchmark

DELIVERING OVER 1,100 HITS PER SECOND ON A HEWLETT PACKARD 9000 SUPERDOME SERVER

PEOPLESOFT BENCHMARK
MAY 2001

PeopleSoft Enterprise Portal Million User Benchmark–Delivering Over 1,100 Hits Per Second on a Hewlett Packard 9000 Superdome Server

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Introduction

As a global leader in eBusiness applications, PeopleSoft is committed to delivering high performance solutions that meet our customers' expectations. Business software must deliver rich functionality with robust performance. This performance must be maintained at volumes that are representative of customer environments.

PeopleSoft benchmarks demonstrate PeopleSoft's software performance characteristics for a range of processing volumes in a specific configuration. Customers and prospects can use this information to determine the software, hardware, and network configurations necessary to support their processing volumes.

The primary objective of our benchmarking effort is to provide as many data points as possible to support this important decision.

This white paper gives an overview of the first benchmark of the PeopleSoft Enterprise Portal of the PeopleSoft Internet Architecture. This PIA portal technology is the foundation of the various portal solutions of PeopleSoft 8 (Employee, Customer, Supplier, Campus, Government, etc.). Additional benchmarks are planned for these portal solutions throughout 2001.

Note: This benchmark was conducted by PeopleSoft, Hewlett-Packard, and IBM engineers. These engineers are experts in their respective fields. PeopleSoft engineers have specific expertise in tuning PeopleSoft applications, HP engineers provided expertise in Superdome, HP-UX, and Java Virtual Machine (JVM) tuning technology, and IBM engineers provided expert tuning for the DB2 environment. Furthermore, this performance test was conducted in a benchmark environment that provides ideal settings to maximize overall throughput. Actual results may vary on a customer by customer basis, based on their PeopleSoft tuning expertise and hardware and software selections.

Benchmark Environment

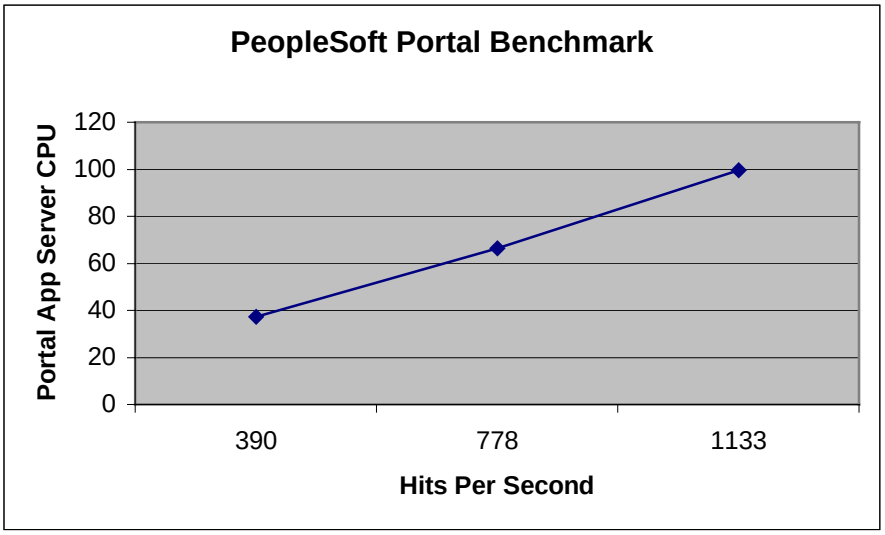
Benchmark Profile

In May 2001, Hewlett-Packard and PeopleSoft conducted a benchmark to measure the performance of the PeopleSoft Internet Architecture portal technology on a HP 9000 Superdome server with the following configuration:

- PeopleTools 8.13
- HP-UX 11i (HP-UX 11.11)
- IBM DB2 Universal Database version 7.1
- BEA WebLogic Server 5.1
- Sun iPlanet Directory Server 4.13

The benchmark measured transaction throughput in terms of page hits per second (a.k.a. page views per second) and client response times. A standard data composition model was used for 1,000,033 user profiles. The testing was conducted in a controlled environment with no other applications running. The goal of this benchmark was to test the scalability and throughput of the PeopleSoft Internet Architecture portal technology.

The following diagram shows the portal application server CPU utilization as hits per second (HPS) were increased. At 1,133 HPS, the portal application server CPU utilization was 99.63%.

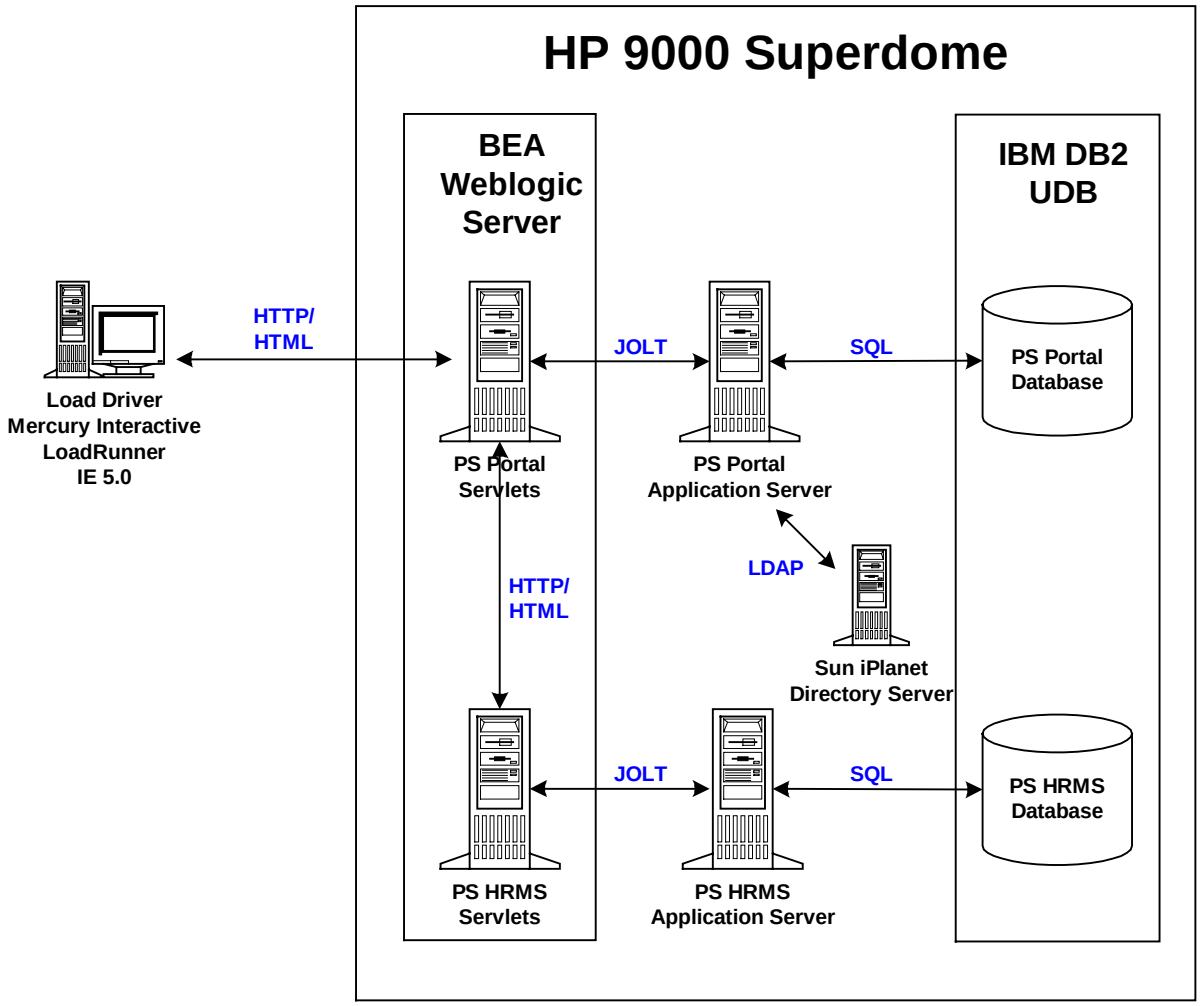


Methodology

Mercury Interactive LoadRunner 6.5 was used as the load driver, simulating concurrent users submitting transactions from Microsoft Internet Explorer 5.0.

The following diagram shows the PeopleSoft Internet Architecture benchmark configuration. All of the PIA server components (web server, applications server, directory server, and database server) were on a single HP 9000 Superdome server machine, configured with specific hardware partitions dedicated to each tier.

Two PIA server installations (web, application, and database) were housed on the HP 9000 Superdome server: one for the PeopleSoft Enterprise Portal and another for PeopleSoft HRMS.



Portal Benchmark Configuration

Timing measurements were taken approximately twenty minutes into the run with server processing executing at a consistent rate. Three different benchmark runs were measured:

1. 390 HPS throughput supported by a single WebLogic web server instance (with 4 dedicated CPU's).

2. 778 HPS throughput supported by two WebLogic web server instances (each instance with 4 dedicated CPU's for a total of 8 CPU's at the web server tier).

3. 1,133 HPS throughput supported by three WebLogic web server instances (each instance with 4 dedicated CPU's for a total of 12 CPU's at the web server tier).

Benchmark Script Summary

The following is a summary of the portal benchmark script and the end user actions that were executed for this benchmark. The simulated end users performed the following steps:

1. Views the PeopleSoft portal signon page.

2. Signs onto the system, authenticating against the iPlanet directory server via LDAP, and the end user's personalized home page is displayed.

3. Views 40 static news articles that are securely accessed through the navigation menu from the home page.

4. Views his personal address information. Single signon is performed between the Peoplesoft Portal application server and the PeopleSoft HRMS application server to automatically authenticate the end user against the HRMS system without requiring the end user to re-enter a user ID / password.

5. Signs off the system.

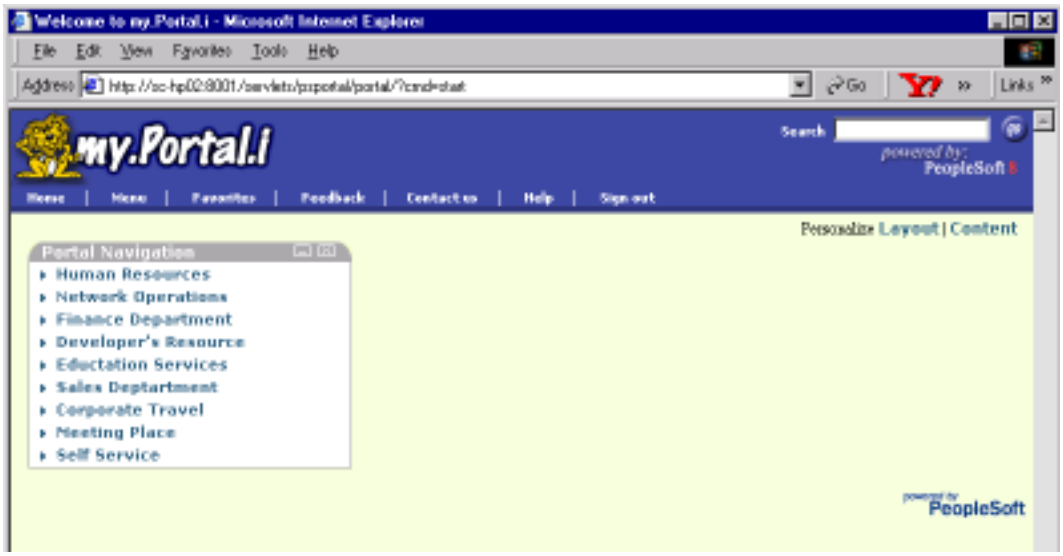
Note that the benchmark script involved accessing mostly static HTML pages (step 3 above). One HRMS self-service transaction is accessed in the script. PeopleSoft has found this to be consistent with typical portal usage where the end user usually accesses much more static content than database-driven, transactional content.

The following are several screen shots of the actual portal application that was used in the benchmark.

The following is the PeopleSoft 8 signon page presented to the end user:

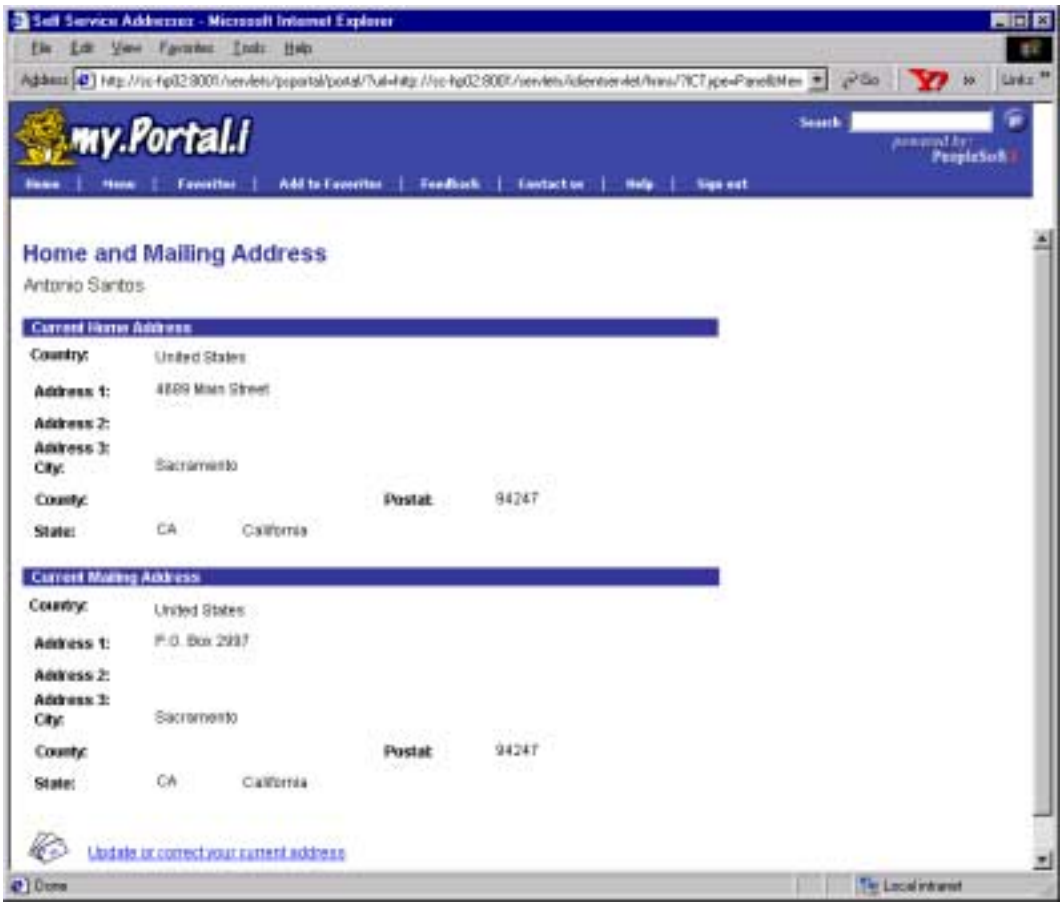
PeopleSoft Enterprise Portal Signon Page

The end user enters a user ID and password. The user is then authenticated against the iPlanet directory server. Once authenticated, the user's personal home page is displayed:



Portal Home Page

The end user then navigates through the portal site, viewing 40 separate static news links from the portal navigation menu shown above. The end user then clicks on the “Self Service” link, is automatically authenticated against the PeopleSoft HRMS application server using the single signon processing of the PeopleSoft Internet Architecture, and his home and mailing address information is displayed within the portal:



PeopleSoft HRMS Employee Self Service Page within the Portal

The end user then clicks on the portal “Sign Out” link and signs off the system.

Data Composition Description

The database was based on our standard data composition model for 1,000,033 portal end users. 1,000,000 users were defined in the iPlanet directory server and 1,000,439 employees were defined in the PeopleSoft HRMS system.

The row totals for the tables used in the Employee Address transaction were as follows:

Table	Rows
PERSONAL_DATA	1,000,439
PS_ADDRESSES	2,000,685
PS_ADDRESS_TYPE	2,000,528
PS_JOB	5,000,274
PS_PERS_DATA_EFFDT	2,000,504
PSOPRALIAS	1,000,235
PSOPRCLS	1,000,288
PSOPRDEFN	1,000,235
PSROLEUSER	1,000,087
ROLEXLATOPR	1,000,034

Benchmark Results

Server Performance

The benchmark was conducted on a single HP 9000 Superdome server with 64 HP PA-RISC 8600 550MHz processors. One of the attributes of the Superdome server is the ability to create hardware partitions made up of cells of 4 processors each. These hardware partitions can then be dynamically manipulated to make most efficient use of available system resources. The final partition configuration that was used to support each PIA tier is summarized below:

PIA Tier	Number of discrete partitions	Total CPU	Total Memory (GB)
Portal Web Server, HRMS Web Server	3	12	24

Portal Application Server	1	24	48
HRMS Application Server	1	24	48
Portal Database Server, HRMS Database Server, IPlanet Directory Server	1	4	8
Total	6	64	128

As stated previously, three separate benchmark runs were executed:

1. **390 HPS** throughput supported by **one** WebLogic web server instance (with 4 dedicated CPU's).

2. **778 HPS** throughput supported by **two** WebLogic web server instances (each instance with 4 dedicated CPU's for a total of **8** CPU's at the web server tier).

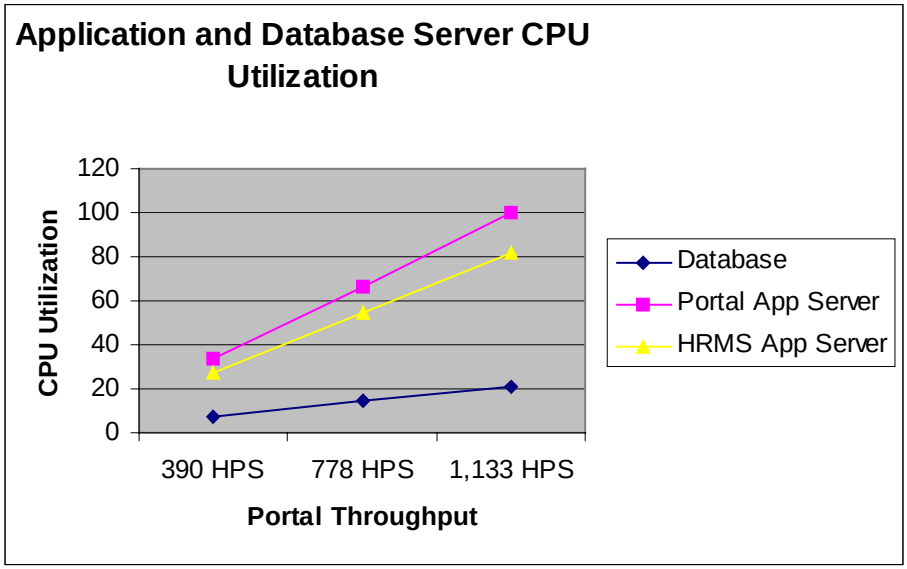
3. **1,133 HPS** throughput supported by **three** WebLogic web server instances (each instance with 4 dedicated CPU's for a total of **12** CPU's at the web server tier).

The following summarizes the CPU and Memory utilization across each tier for these three runs:

PIA Tier	390 HPS	778 HPS	1,133 HPS
Portal Database Server, HRMS Database Server, iPlanet Directory Server	CPU: 7.08 Mem: 34.15	CPU: 14.22 Mem: 34.14	CPU: 20.48 Mem: 34.09
Portal Application Server	CPU: 33.35 Mem: 24.88	CPU: 66.43 Mem: 25.19	CPU: 99.63 Mem: 25.53
HRMS Application Server	CPU: 27.2 Mem: 25.13	CPU: 54.36 Mem: 25.52	CPU: 81.78 Mem: 25.92
Portal / HRMS WebLogic Server 1	CPU: 44.21 Mem: 18.62	CPU: 45.11 Mem: 20.86	CPU: 45.57 Mem: 20.61
Portal / HRMS WebLogic Server 2	NA	CPU: 43.15 Mem: 20.88	CPU: 46.42 Mem: 21.86
Portal / HRMS WebLogic Server 3	NA	NA	CPU: 41.38 Mem: 22

PIA Server Utilization of CPU and Memory resources (Percent) as HPS is Increased

The following graph summarizes the CPU utilization across the Database/Directory Server, Portal Application Server, and HRMS Application Server as HPS is increased:



At maximum throughput, there were 100 concurrent end users. Note that the number of concurrent end users was not the goal of this benchmark. Maximizing hits per second portal throughput was the focus. Simulated end user transaction entry was done at a *much* faster pace (e.g. over 10 page views per second at the highest rate) than what is typically used for a PeopleSoft benchmark.

In a real-world environment, end users will spend additional time assimilating information and gradually navigating through the portal environment. Based on known actual usage patterns, PeopleSoft expects that very similar server CPU utilization results would have occurred if thousands of concurrent users were used for the benchmark, given that the HPS loads were the same.

Client Response Times

The following summarizes the average user response times for each run for the Signon/View Home Page step and View Address step (steps 2 and 4 listed in the "Benchmark Script Summary" section).

Benchmark Step	User Response Time @ 390 HPS	User Response Time @ 778 HPS	User Response Time @ 1,133 HPS
Signon/View Home Page	3.16	3.18	3.24
View Address	2.14	2.16	2.4

End User Response Time (in seconds) as HPS is Increased

PIA Server Benchmark Environment

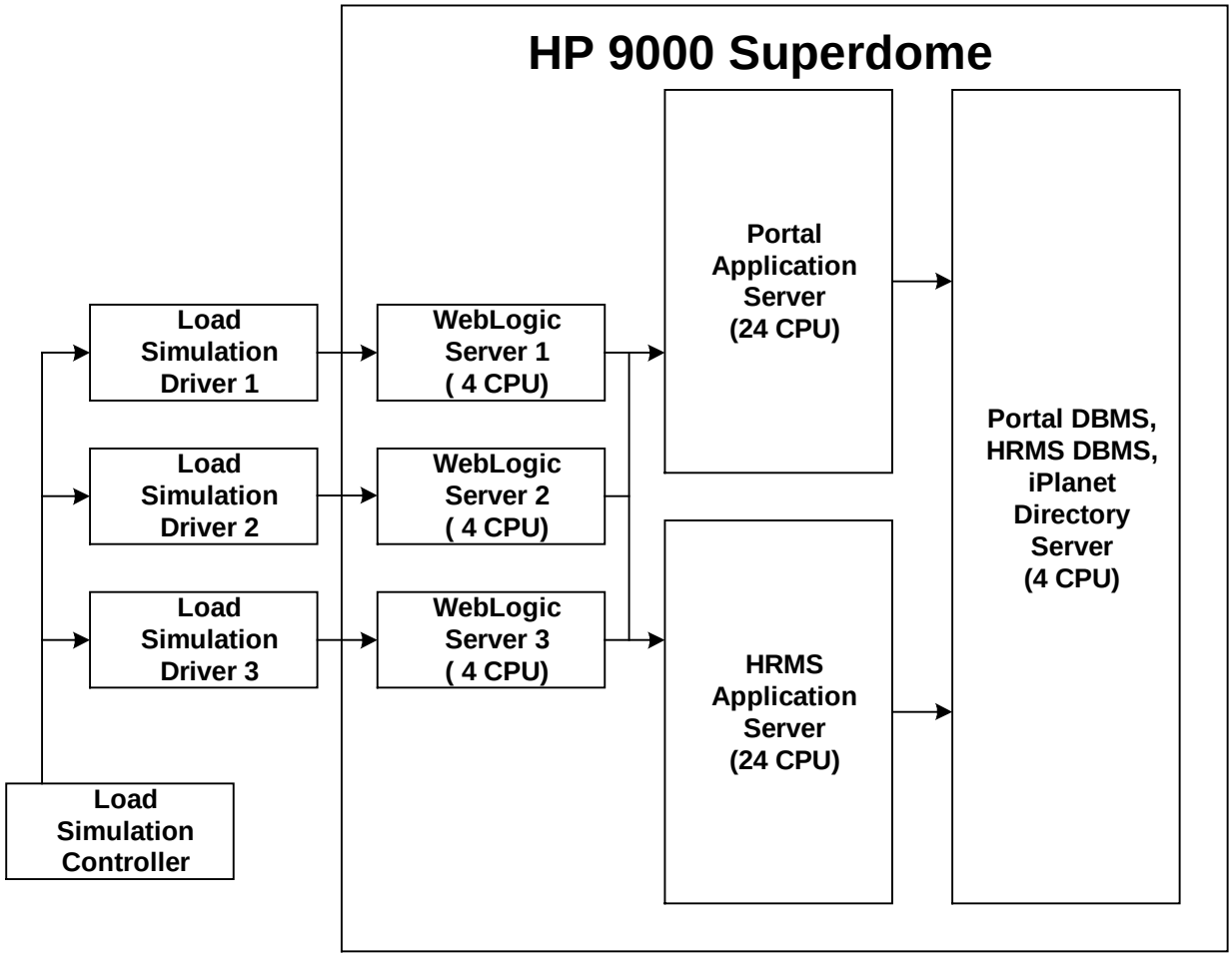
With the maximum throughput of 1,133 HPS, the following topology was used for this benchmark:

- Two database servers. One for the portal and another for the HRMS system.

- One iPlanet Directory server. This iPlanet server shared the same CPU resources as the two database servers.
- For the portal, one application server with 24 PSAPPSRV processes.
- For the HRMS system, one application server with 24 PSAPPSRV processes.
- Three WebLogic servers. Each WebLogic server instance ran one Java virtual machine. The portal and HRMS PIA Java servlets shared these three WebLogic servers.

And the following drove the benchmark:

- Three load simulation drivers.
- One load simulation controller.



Benchmark Topology

Note that the three WebLogic servers each communicated with both the Portal and HRMS application servers.

Summary of Findings

The goal of this benchmark was to show that over 500 HPS throughput could be supported through the PeopleSoft Internet Architecture portal technology on the HP Superdome server. We greatly exceeded this goal. Even with such high throughput, client response times remained very fast and consistent with average response times of less than three seconds.

The following are other important findings from this benchmark:

- ❖ The web and application servers should be as fast as possible since they are limited by CPU processing power.
- ♦ Database server CPU utilization was very low even at peak loads. This is due directly to the caching design of the PIA portal architecture. The database server is typically what limits total possible scalability. Theoretically, from the above findings, additional web and application server CPU could have been added to reach throughput of 6,000 HPS.
- ♦ Web server and application server processing both approached 100% linear scaling.
- ♦ End user response times remained near constant as HPS was increased from 390 HPS to 1,133 HPS and web servers were added (one to three).

What is the significance of 1,133 HPS? 1,133 HPS translates into:

- ♦ 68 thousand hits per minute
- ♦ 4 million hits per hour
- ♦ 98 million hits per 24 hour day

My Yahoo! receives close to 100 million hits in a full 24 hour day and has well over 100 million registered users (only one million registered users were used in this benchmark).

Benchmark Environment

Hardware Configuration

Portal and HRMS Web Server

Processors	12 x HP PA-RISC 8600 550MHz
Cache	1.5 MB Level I
Memory	24 GB

Portal Application Server

Processors	24 x HP PA-RISC 8600 550MHz

Cache	1.5 MB Level I
Memory	48 GB

HRMS Application Server

Processors	24 x HP PA-RISC 8600 550MHz
Cache	1.5 MB Level I
Memory	48 GB

Portal Database Server, HRMS Database Server, and iPlanet Directory Server

Processors	4 x HP PA-RISC 8600 550MHz
Cache	1.5 MB Level I
Memory	8 GB

Load Simulation Drivers

One Hewlett-Packard LH4R NetServers running Microsoft Windows NT 4.0 were used, each with the following attributes:

Processors	4 x 450MHz Intel Pentium II Xeon
Cache	2 MB Level II
Memory	1 GB

Two Hewlett-Packard LH4R NetServers running Microsoft Windows NT 4.0 were used, each with the following attributes:

Processors	4 x 400MHz Intel Pentium II Xeon
Cache	1 MB Level II
Memory	1 GB

Controller

One Hewlett-Packard LXr 8000 NetServer running Microsoft Windows NT 4.0 was used.

Processors	3 x 400MHz Intel Pentium II Xeon
Memory	4 GB

The load simulator and controller machines were connected by a 100 Megabit network to each other and to the HP 9000 Superdome. The Superdome partitions were connected by a dedicated gigabit network.

Software Versions

Database Server

IBM DB2 Universal Database 7.1 Fixpak 2a

HP-UX 11i (HP-UX 11.11)

Application Servers

PeopleTools 8.13

BEA Tuxedo 6.5 with patch level 126

BEA Jolt 1.2 with patch level 4

HP-UX 11i (HP-UX 11.11)

Web Server

WebLogic Server 5.1 SP9

PeopleTools 8.13

BEA Jolt 1.2 with patch level 4

HP-UX 11i (HP-UX 11.11)

Directory Server

iPlanet Directory Server 4.13

HP-UX 11i (HP-UX 11.11)

Load Simulator Driver

Windows NT Server 4.0 Service Pack 6a

Mercury Interactive LoadRunner 6.5 service pack 1b

Controller

Windows NT Server 4.0 Service Pack 6a

Mercury Interactive LoadRunner 6.5 service pack 1b

Microsoft Internet Explorer 5.0