



Improved Price/Performance for Oracle's JD Edwards EnterpriseOne on System i

*Demonstrating the business value of POWER6 processor technology and
i5/OS Application Server Licensing*

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Table of contents

Change history	1
Abstract	2
Introduction	2
POWER6 performance tests	2
Test objectives	2
Test configurations.....	3
Test methodology	4
Results	5
Summary	8
Resources	9
About the author	9
Appendix 1: Hardware and software configuration	10
System i configurations.....	10
Loadrunner configuration.....	11
Appendix 2: System and application tuning	12
i5/OS tuning	12
WebSphere tuning	12
EnterpriseOne tuning.....	12
Appendix 3: Benchmark Workload	13
Trademarks and special notices	15



Change history

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Abstract

This paper describes tests which demonstrate improved price/performance for Oracle's JD Edwards EnterpriseOne on the IBM System i™ platform based on recent product announcements.

Introduction

Customers are constantly looking for ways to improve the price/performance of their IT systems. IBM recently made two System i announcements that are very relevant to JD Edwards EnterpriseOne customers.

First, IBM announced the availability of i5/OS® Application Server processor licensing which allows JD Edwards EnterpriseOne customers to run the JD Edwards EnterpriseOne Java™ Application Server (WebSphere®) in a System i partition at a significantly reduced price. Running the JD Edwards EnterpriseOne Java Application Server in this configuration was found to have comparable sub-second response times to the traditional "All on i" configuration. Both of these options were tested and are reviewed in this paper.

Second, IBM announced the availability of 4.7 GHz POWER6™ processors on selected System i models. POWER6 technology allows customers to run more users on their System i hardware. The tests in this paper demonstrate the ability to run 33% more users (1600 vs. 1200) on comparably configured POWER6 and POWER5™ processor configurations with 17% improved response time.

Both of these announcements demonstrate IBM's continued commitment to improving the price/performance of our customer's environments running JD Edwards EnterpriseOne software on System i hardware.

POWER6 performance tests

Test objectives

In August 2006, Oracle published a whitepaper written in collaboration with IBM titled "Benchmark Kit Validation Test for IBM System i5 with JD Edwards EnterpriseOne 8.11 SP1" which described the results of performance tests of JD Edwards EnterpriseOne 8.11 SP1 with Tools 8.96_A1 on an IBM System i5™ Model 570 with four 2.2Ghz advanced POWER5 processors. These tests demonstrated stability, scaling, and performance of JD Edwards EnterpriseOne on IBM System i5.

IBM has made two product announcements since then which provide a significant improvement to price/performance for JD Edwards EnterpriseOne on the System i platform:

- In April 2007, IBM announced support for i5/OS Application Server processor entitlement which offers improved pricing on selected models for i5/OS processors assigned to logical partitions for applications which do not use DB2® for i5/OS within the partition. The WebSphere Java

Application Server component of JD Edwards EnterpriseOne is a very good candidate for this new licensing.

- In July 2007, IBM announced System i model 570 support for 4.7 GHz POWER6 processors which deliver outstanding price/performance. JD Edwards EnterpriseOne should show a significant performance improvement on this new processor technology.

The performance tests described in this paper had two objectives:

- Demonstrate that the performance of JD Edwards EnterpriseOne on System i continues to scale with improvements in processor technology to deliver improved capacity and response times
- Demonstrate that JD Edwards EnterpriseOne on System i can take advantage of the i5/OS Application Server licensing to improve the cost of acquisition while still delivering very good performance.

Test configurations

Two configurations were used for these tests. The first configuration is called “All on i” in which all three major components of the JD Edwards EnterpriseOne environment are run in the same i5/OS partition. The following figure shows an “All on i”. These tests were run with four POWER6 processors allocated to this partition with 32GB of main storage. The web clients were connected to the system by a dedicated 1Gbps network.

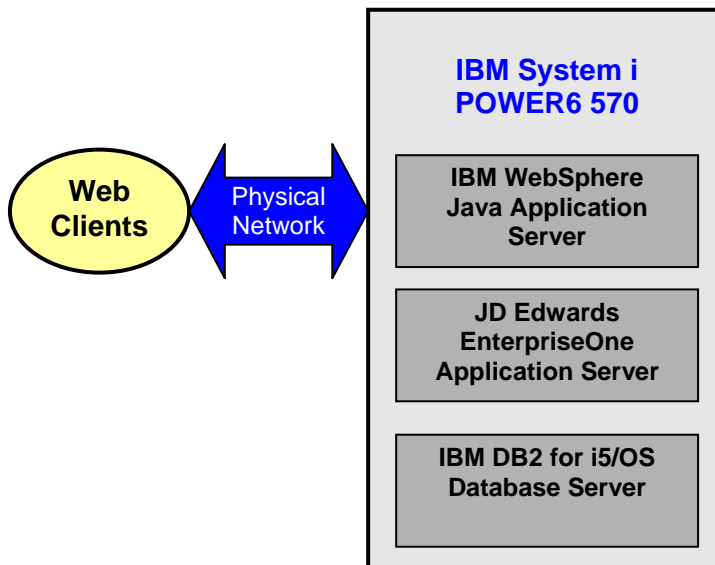


Figure 1 - "All on i" benchmark configuration

The following figure shows the second configuration which is called “Virtual 3 Tier”. In this configuration, the WebSphere Java Application Server (JAS) is still run under i5/OS but in a different partition while the JD Edwards EnterpriseOne Application Server and the IBM DB2 for i5/OS Database Server continue to run in the same partition. These tests were run with two partitions, each with two POWER6 processors and 16GB of main storage. This configuration was selected based on performance characteristics of the

JD Edwards EnterpriseOne components and to facilitate processor licensing on whole rather than partial processors. The web clients were still connected to the system by a dedicated 1Gbps network but communications between the two i5/OS partitions was implemented with a Virtual Network which takes advantage of the i5/OS capabilities to provide a virtualized network that is both fast and secure.

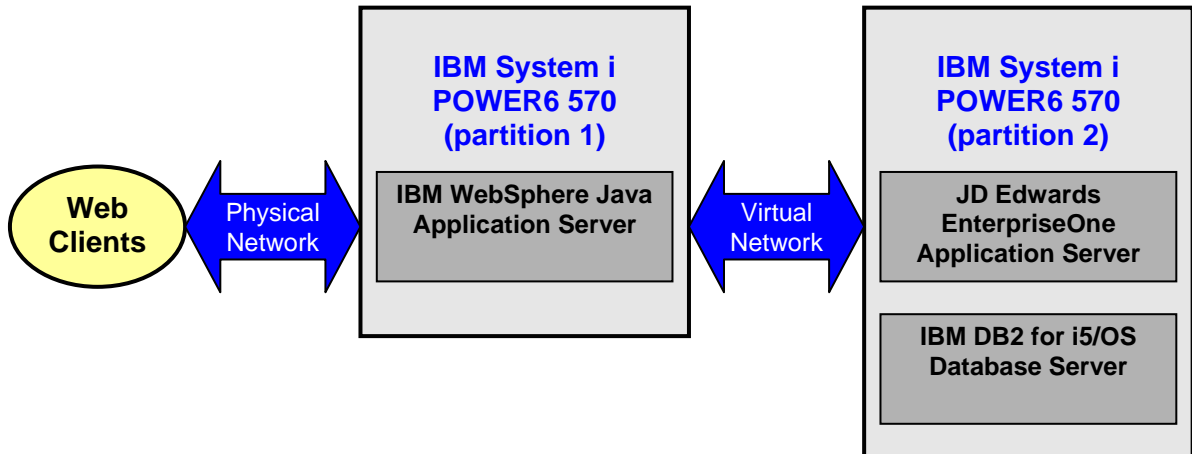


Figure 2 – Virtual 3 tier benchmark configuration

This configuration is a very good fit for the new i5/OS processor entitlement option for System i models 550, 570, and 595 which offers a reduced i5/OS entitlement charge for processors assigned to logical partitions hosting applications that don't access DB2 data in the same partition. These partitions can run products such as Lotus® Domino® and Sametime®, which do not require DB2 UDB to execute. This option is also ideal for Web application serving workloads such as Java language business applications running under WebSphere Application Server or even PHP or Apache-based applications running on i5/OS. This processor entitlement option is applicable when these applications access DB2 data only in other i5/OS partitions or servers. The Java WebSphere Application Server fits into this category because it is a Java application running under WebSphere which accesses data in the IBM DB2 for i5/OS Database Server which can be run in a different partition.

Test methodology

Oracle uses Mercury Interactive to generate LoadRunner scripts which simulate web-based clients. These scripts can be configured to run large numbers of concurrent users with each user submitting business processes at a predefined rate. These scripts are provided by Oracle to support sizing efforts across a commonly used range of applications based on usage models representing a mid-size manufacturing company performing a variety of financial, distribution, and manufacturing tasks. The scripts include think time to simulate a user's typical interaction for a business process such as entering a new multi-line sales order. For further information on the business functions represented please refer to Appendix 3: Benchmark Workload.



These scripts are designed to run for approximately one hour. These measurements ran for approximately 80 minutes because of the increased time needed to “ramp up” as the simulated users start entering transactions at a rate of three users every two seconds. Response time information is collected over the measurement interval from the time all the users are signed on until all users have signed off. Response times are measured from the time the user clicks the <OK> button until the HTML response page is returned for the final step of a business transaction. Performance information for the server is reported for a 30 minute interval when all the users are active. The testing was conducted in a controlled environment with no other applications running.

Results

The following table summarizes the results of the POWER6 test measurements using the “All on i” configuration described above. These measurements were run on a four-processor configuration using the recently announced POWER6 System i processors.

The table also contains the results of comparable tests run in 2006 on a four-way POWER5 processor configuration. Details of this test are contained in the whitepaper, “Benchmark Kit Validation Test for IBM System i5 with JD Edwards EnterpriseOne 8.11 SP1”. A link to this paper is provided in the Resources section of this paper. The “Change” column provides a comparison of the results between the two tests.

	POWER5 ¹	POWER6 ²	Change
Number of users	1,200	1,600	33% more users
CPW processor rating	16,000	20,100	26% more capacity
Average processor utilization	65%	65%	--
Weighted average “OK” button Response time (seconds)	0.153	0.127	17% faster
Financials user response time	0.117	0.081	31% faster
Distribution user response time	0.103	0.075	27% faster
Manufacturing user response time	0.297	0.290	2% faster

Table 1 - Comparison of System i POWER5 and System i POWER6 tests with JD Edwards EnterpriseOne

¹ EnterpriseOne 8.11 SP1 and Tools 8.96_A1

² EnterpriseOne 8.12 and Tools 8.96_C1



The following observations can be made from these tests in comparing POWER5 with POWER6 performance:

- The number of benchmark users supported at comparable processor utilizations increased 33% from 1,200 to 1,600. The CPW capacity of the System i increased 26% from 16,000 to 20,100 indicating POWER6 delivers greater throughput per CPW over POWER5.
- Average response time improved from 0.153 seconds to 0.127 seconds, an improvement of 17%.

The following table summarizes the results of the Virtual 3 Tier configuration. As described previously, these measurements use two partitions, each running with two dedicated POWER6 processors.

	Virtual 3 Tier	All on i
Number of users	1,600	1,600
CPW processor rating	10,800 (E1 & DB2) 10,800 (Web tier)	20,100
Average processor utilization	67% (E1 & DB2) 56% (Web tier)	65%
Weighted average "OK" button Response time (seconds)	0.169	0.127
Financials user response time	0.100	0.081
Distribution user response time	0.097	0.075
Manufacturing user response time	0.402	0.290

Table 2 - Virtual 3 Tier and "All on i" test results running JD Edwards EnterpriseOne.

The following observations can be made from these tests in comparing Virtual 3 tier and "All on i" configurations when running JD Edwards EnterpriseOne.

- The Virtual 3 tier Configuration is comparable to the "All on i" configuration in terms of processor capacity and utilization. These 1,600 user configurations both used the same number of processors and the same amount of memory.
- Average response time for the Virtual 3 Tier configuration was 0.169 seconds versus 0.127 seconds for the "All on i" configuration. Although this is a slower response time, this configuration still provides very good performance.
- IBM has historically recommended "All on i" for optimal performance and these results still support that statement, but the difference is not very large. The choice between "All on i" and



Virtual 3 Tier should not be made based strictly on the basis of performance. Other considerations such as ease of system management should drive that choice.



Summary

The performance measurements documented in this paper again demonstrate the scalability and performance of JD Edwards EnterpriseOne on System i which showed improved performance with the new POWER6 processor technology. These measurements also show that the Virtual 3 Tier configuration provides very good performance and should be considered in conjunction with Application Server licensing as an alternative to the "All on i" configuration.



Resources

The following resources contain additional information which supplements the content of this paper.

- IBM System i Announcements
<http://www.ibm.com/systems/i/announce2007july/>
- Benchmark Kit Validation Test for IBM System i5 with JD Edwards EnterpriseOne 8.11 SP1
<http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP100822>
- IBM System i Performance and Tuning Tips for Oracle's JD Edwards EnterpriseOne 8.12 and WebSphere 6.0
<http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP100985>
- IBM eServer iSeries [System i] Information Center
<http://publib.boulder.ibm.com/series/>
- WebSphere Application Server for OS/400 Version 6 Information Center
<http://publib.boulder.ibm.com/infocenter/wsdoc400/v6r0>
- System i Performance Capabilities Reference i5/OS Version 5 Release 4
<http://publib.boulder.ibm.com/infocenter/series/v5r4/topic/rzahx/sc410607.pdf>

About the author

Jim Denton has been with IBM Rochester since 1981 and has held a variety of positions in operating system development and performance analysis on the S/38, the AS400, and the System i. Recent experience includes five years as an SQL developer and a three year assignment to the IBM Benchmark and Briefing Center in Montpellier France. Since 2005, Jim has been a member of the ERP development team with the mission of working closely with EnterpriseOne and World developers, producing performance benchmarks, and providing performance and tuning guidance for EnterpriseOne customers on System i.

Questions or comments on this paper can be sent to ibmoracl@us.ibm.com.



Appendix 1: Hardware and software configuration

The following summarizes the hardware and software configurations used for these tests.

System i configurations

The following table summarizes the System i configurations used for the performance tests. All configurations were implemented as partitions using dedicated processors on an IBM System i5 Model 9406-MMA Feature 7061) system with 16 processors.

	"All on i" Configuration (all servers)	Virtual 3 Tier Application and Database Server	Virtual 3 Tier WebSphere Java Application Server
System hardware			
Number of processors	4	2	2
Processor type	POWER6 (4.7 Ghz)	POWER6 (4.7 Ghz)	POWER6 (4.7 Ghz)
Memory	32 GB	16 GB	16 GB
Disk	90 x 35GB disk arms (RAID5)	90 x 35GB disk arms (RAID5)	15 x 35GB disk arms (RAID5)
Oracle J D Edwards software			
EnterpriseOne Application	8.12	8.12	8.12
EnterpriseOne Tools	8.96_C1	8.96_C1	8.96_C1
IBM software			
i5/OS	V5R4	V5R4	V5R4
WebSphere	6.0.2.17	-	6.0.2.19
IBM group PTF's			
DB2 for i5/OS	SF99504 (Level 11)	SF99504 (Level 11)	SF99504 (Level 11)
WebSphere App Server V6.0	SF99312 (Level 14)	-	SF99312 (Level 16)
Java	SF99291 (Level 6)	SF99291 (Level 6)	SF99291 (Level 7)
IBM HTTP Server for i5/OS	SF99114 (Level 7)	SF99114 (Level 7)	SF99114 (Level 9)

Table 3. Comparison of System i POWER5 and System i POWER6 tests with JDEdwards

Loadrunner configuration

A total of four systems were used to run Loadrunner. One was used as the Loadrunner controller and the other three were used as Loadrunner agents with each running an approximately equal share of the simulated users as determined the controller. All four systems had the same configuration in terms of hardware and software:

- Hardware
 - IBM xSeries® 330
 - Two 1.4 Gigahertz Intel® Pentium III Processors
 - 1.75 Gigabytes of memory
- Software
 - Microsoft® Windows® 2000 Server SP4
 - Mercury Interactive LoadRunner 7.8.0.0



Appendix 2: System and application tuning

The following describes how i5/OS, WebSphere, and JD Edwards EnterpriseOne were tuned based on the published tuning guidelines published and listed above in the Resources section.

i5/OS tuning

- Main storage pools were configured to minimize faulting in the machine pool.
- Activity levels were set to sufficiently large values to preclude job transitions to ineligible.
- In the “All on i” configuration, Websphere was run in a separate main storage pool to minimize faulting.

WebSphere tuning

- Initial heap size for the Application Server JVM was set to 2400 Megabytes based on the guideline of specifying 1.5 megabytes per user.
- A single JVM was used to support all 1600 users.

EnterpriseOne tuning

- All 1600 users used the same i5/OS user profile
- Measurements were run with the following kernel settings
 - 32 Call Object Kernels with multithreading enabled
 - ThreadPoolSize was set to 20
 - ThreadPoolSizeIncrement was set to 1
 - 16 Security Kernels
 - 10 Network Kernels



Appendix 3: Benchmark Workload

The following seventeen JD Edwards EnterpriseOne business processes are represented in the Loadrunner scripts provided by Oracle.

Financials

H0411E – Standard Voucher Entry: User enters two voucher payments against five G/L accounts each. User then performs a name search for a supplier and enters a third voucher, again applied to five G/L accounts. This business process is performed 10 times in one hour per user.

H0411I – Supplier Ledger Inquiry: User performs two searches on a supplier ID and then opens the document for review. This business process is performed 10 times in one hour per user.

H03B102E – Standard Receipts Entry: User receives payments and applies to the appropriate invoices. This business process is performed 10 times in one hour per user.

H0911E – Journal Entry: User enters two 10-line journal entries. This business process is performed 16 times in one hour per user.

H09210I – Trial Balance/Ledger Comparison: User navigates to Trial Balance/Ledger Comparison page and enters search date range and performs the search and compare on two different accounts. This business process is performed five times in one hour per user.

Distribution

H4114E – Inventory Adjustments: The user performs a 10 line inventory adjustment. This business process is performed 20 times in one hour per user.

H41202I – Summary Availability: The user performs a lookup of an inventory item, and then checks for its availability. This business process is performed 10 times in one hour per user.

H4310E – Purchase Order Entry: The user enters four 10 line purchase orders. This business process is performed five times in one hour per user.

H43214I – Open Receipt Inquiry: The user performs a lookup of a specific order number. This business process is performed 10 times in one hour per user.

H4205U – Confirm Shipments: The user confirms an order has shipped. This business process is performed 10 times in one hour per user.

H4210I – Customer Service Inquiry: The user performs a lookup of a customer order. This business process is performed 10 times in one hour per user.

H4210E – Sales Order Entry: The user enters four 10 line sales orders. This business process is performed five times in one hour per user.



Manufacturing

H3002E – Work Order Entry: The user enters a new work order. This business process is performed 20 times in one hour per user.

H30200I – Single Level Bill of Material Inquiry: The user performs a lookup for an inventory item with subsidiary components. This business process is performed 20 times in one hour per user.

H31113U – Work Order Material Issues: The user looks up a work order and revises the quantity issued for a particular item. This business process is performed 20 times in one hour per user.

H31114U – Work Order Partial Completions: The user looks up a work order and updates one of the line items' status to completed. This business function is performed 10 times in one hour per user.

H4021I – Supply/Demand Inquiry: The user performs a lookup on a specific item number to check its supply and demand. This business function is performed 10 times in one hour per user.

For further information on the benchmark definition, please refer to the whitepaper "Benchmark Kit Validation Test for IBM System i5 with JD Edwards EnterpriseOne 8.11 SP1". The link to this paper can be found above in Resources.



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