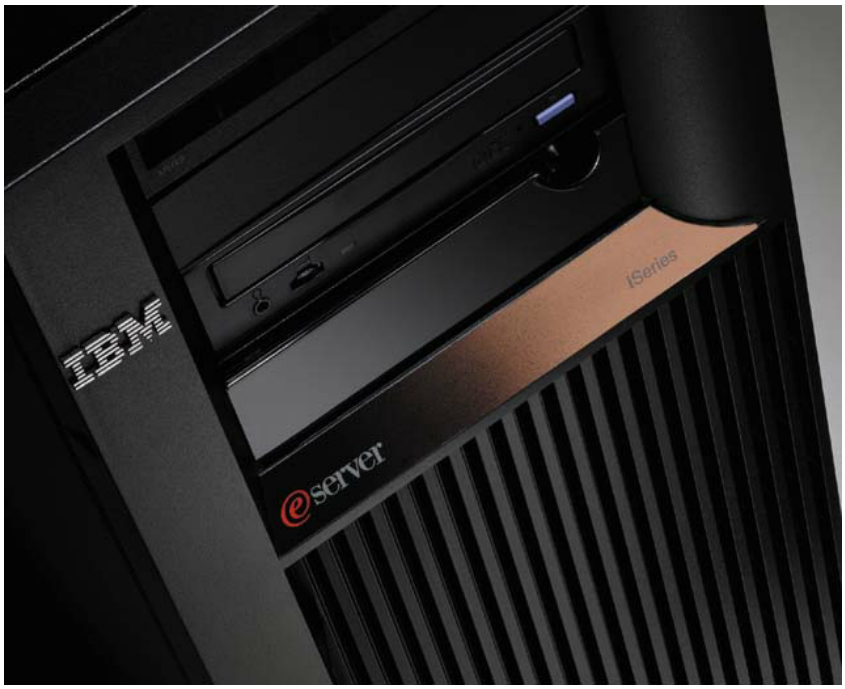

OneWorld Batch Performance Testing

Technology Demographic Table	
Product	J.D. Edwards OneWorld™
Version	B73.3.1, B73.3.2, B73.3.3 (Xe)
Platform/OS	IBM @server iSeries™
Industry	All
Application	All
Database	IBM DB2® Universal Database™
Keywords	IBM AS/400®, iSeries, UBE
Date	4/8/02

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Table of Contents

EXECUTIVE SUMMARY 3

BACKGROUND 3

TEST ENVIRONMENT 4

TEST RESULTS 6

CONCLUSIONS 8

ADDITIONAL INFORMATION 9

Executive Summary

Customers often inquire about the impact of batch workloads on an overall J.D. Edwards OneWorld™ system. Historical testing has focused on the interactive-user aspects of the OneWorld environment with little attention paid to batch.

This paper summarized the findings of in-depth testing conducted by the IBM J.D. Edwards International Competency Center using the IBM @server for J.D. Edwards. Tests were performed to validate the viability of one-way and two-way servers for the OneWorld environment.

The results of these tests confirmed that while running reasonable batch workloads, the one-way and two-way servers can handle 100 and 240 concurrent users respectively in a "Virtual Three-tier" configuration. These same systems can handle 40 and 100 users respectively in an "All-in-One" configuration. Interactive user response time was found to be acceptable (generally less than two seconds) regardless of the batch workload placed on the system.

Customers with high batch processing needs or those requiring high batch processing speed during peak interactive time periods will want to consider the two-way server even when a one-way server is deemed adequate.

Batch jobs were shown to complete faster in aggregate when run concurrently vs. serially. In other words, two equal Universal Batch Engines (UBE) run concurrently will finish in less time than the same UBE run serially twice.

No two customer environments are alike. It is important to understand the overall batch processing needs of each customer and determine the hardware best suited to meet these needs.

Background

The varied workloads within J.D. Edwards OneWorld require different types of processing and use system resources differently. OneWorld interactive user workload should not be confused with traditional "green screen" interactive workload. OneWorld does not use 5250 Interactive CPW. All OneWorld jobs, including those jobs that service user requests, run as batch or batch-immediate processes.

Generally, OneWorld user workload consists of many short queries of the database, characterized by quick bursts of processor activity and client-server communication. UBEs, or batch workload, usually run longer queries and require more processor time. An example of UBE processing is a long report, which consolidates information across branches and retrieves and processes large volumes of data. UBE work will consume any available processor resources unless it is preempted by higher priority work.

Each job on the IBM @server iSeries™ server has a run priority, ranging from zero to 99, with zero being the highest priority and reserved for system tasks. By default in a OneWorld environment, interactive sessions process at a priority of 20 and UBE jobs run at a priority of 50. Interactive workload therefore takes priority over batch workload

and the processor will devote more attention to the interactive user. Because of this, even though a UBE will use as much of the processor as possible, interactive work will always enjoy adequate response time. It is also because of this priority difference that UBE performance degrades as workload is increased.

In previous versions of IBM OS/400® and OneWorld, long-running background processes tended to "take over" a processor and user performance suffered. This lead to the adoption of the "N-1" rule. If four UBE processes needed to run concurrently, five processors were recommended, leaving one processor available to handle user requests.

The current tests showed that user response time does not degrade below acceptable levels even when multiple UBEs are run per processor invalidating the "N-1" rule. As the total workload grows, higher priority jobs receive the resources necessary and the lower priority jobs receive less resources.

Test Environment

Test Configuration

Two IBM @server for J.D.Edwards models were tested, a one-way, 270-2252 and a two-way, 270-2434. The one-way system was configured with 2.5GB of memory; the two-way system had 4.5 GB. Eight and twelve disk arm configurations were tested for each system. Varying the number of disk drives was done to evaluate the disk subsystem performance of OneWorld Xe on these severs. This test used 10K rpm disk units with 17.5 GB capacity attached to a single 2748 IOA configured for device parity protection. In both systems, the integrated IBM @server xSeries™ server was used for OneWorld deployment.

The following software versions were used:

- OneWorld Xe SP14.1_WEBP
- OS/400 V5R1
- IBM WebSphere® Application Server Standard Edition version 3.5.4

The OneWorld HTML client was used with two different configurations. The first configuration tested was "Virtual Three-tier." The "Virtual Three-tier" configuration places the OneWorld database, the OneWorld application, and batch/UBE workload on one server (enterprise server), and the JAS/WebSphere application on a second server. The second configuration tested was "All-in-One" which adds the OneWorld JAS server workload to the enterprise server, creating a complete OneWorld environment running on a single server.

Test Process

The tests consisted of batch and interactive components run simultaneously to represent a typical customer environment.

The HTML interactive client workload was generated using Rational test scripts provided by J.D. Edwards. These scripts run a variety of OneWorld applications designed to simulate tasks performed by typical OneWorld users. The applications used are listed in Table 1.

The batch workload was generated by submitting groups of UBE's arranged to execute the length of the test. Tests were run varying the number of concurrent UBEs from zero to two on the one-way server and from zero to four on the two-way server.

J.D.Edwards and IBM selected UBEs to represent a typical client environment. The UBEs selected and the base run times are shown in Table 2. UBEs were selected to obtain a good balance of short running, report style UBEs, and long running UBEs that perform updates**.**

TABLE 1 Scripts

Manufacturing	Distribution	Finance
Work Order Entry	Inventory Adjustments	Voucher Entry
Bill of Materials Inquiry	Summary Inventory Availability	Supplier Inquiry
Work Order Materials Issues	Purchase Order Entry	Journal Inquiry
Work Order Partial Completion	Purchase Order Receipts Match	Trial balance
Supply/Demand Inquiry	Sales Order Entry	Address Book Name Search
	Customer Service Inquiry	Cash Receipts
	Address Book Name Search	
	Ship Confirm	

TABLE 2 UBEs

Name and Description	UBE ID	Estimated Records	Base run time
Finance			
Trial Balance	R09410	407 account balances (F0902)	6min
Open AP Report	R04423B	210,000 accounts payable detail (F0411)	15min
GL Post - Voucher	R09801	24,000-27,000 entires (F0911)	13min
Distribution			
Print Pick Slips	R42520	10,000 sales order detail (F4211)	8min
Sales Order Update	R42800	5,000 sales order detail (F4211)	11min
Manufacturing			
Work Order Processing, Attaches Routing / Parts	R31410	473 work orders (F4801)	12.5min
Variance Report	R31802	1400 work orders (F4801)	3min

Note: Record counts are approximations. Multiple versions of the UBEs were run and some had higher or lower number of records selected.

Measurements

Average interactive user response time and UBE completion time were reported for each test. UBE run times were collected for those UBEs that completed during the interactive user test.

Various system measurements were recorded, including CPU utilization, memory faulting and disk subsystem performance.

Test Results

Table three shows the CPU utilization and response time for the one-way server running zero, one, and two UBEs in both "Virtual Three-tier" and "All-in-One" configurations. In all cases, end user response time was less than two seconds.

Table three also shows UBE elongation as additional UBEs are run concurrently. UBE elongation was comparable in both "Virtual Three-tier" and "All-in-One" configurations. Two concurrent UBEs were needed to cause maximum CPU utilization on the one-way server.

Table four shows the CPU utilization and response time for the two-way server running zero, one, two, three and four UBEs in both "Virtual Three-tier" and "All-in-One" configurations. In all but the four-UBE test, end user response time was less than two seconds.

Table four also shows UBE elongation as additional UBEs are run concurrently. UBE elongation was comparable in both "Virtual Three-tier" and "All-in-One" configurations. Four UBEs were required to cause maximum CPU utilization on the two-way server.

Table five shows results from a series of tests running only UBEs. During these tests, no interactive workload was placed on the system in order to analyze the performance of running more than one UBE concurrently on a single processor. This environment is similar to an overnight batch run when there are few users on the system.

Tests were completed running one, two and three UBEs concurrently. Results indicate that two UBEs running concurrently will complete in 23% less time than the same UBEs running serially. Further, three UBEs running concurrently will complete in the same time it would take to run two UBEs serially.

TABLE 3 270-2252 One-Way Server

	% CPU Utilization	Avg Response Time (sec)	% UBE elongation
Virtual Three-tier			
100 users - 0 UBEs	35%	1.25	N/A
100 users - 1 UBE	90%	1.50	60%
100 users - 2 UBEs	98%	1.70	160-200%
All-in-One			
40 users - 0 UBEs	34%	1.15	NA
40 users - 1 UBE	90%	1.51	60%
40 users - 2 UBEs	99%	1.67	160-200%

Table 4 270-2434 Two-Way Server

	% CPU Utilization	Avg Response Time (sec)	% UBE elongation
Virtual Three-tier			
100 users - 0 UBEs	13%	0.95	N/A
100 users - 1 UBE	51%	1.00	0-20%
100 users - 2 UBEs	68%	1.10	40-90%
100 users - 3 UBEs	92%	1.20	55-85%
100 users - 4 UBEs	98%	1.44	80-145%
240 users - 0 UBEs	34%	1.36	N/A
240 users - 1 UBE	65%	1.26	2-50%
240 users - 2 UBEs	85%	1.38	48-130%
240 users - 3 UBEs	95%	2.46	73-150%
240 users - 4 UBEs	99%	2.48	96-230%
"All-in-One"			
40 users - 0 UBEs	13%	0.77	N/A
40 users - 1 UBE	50%	0.82	0-24%
40 users - 2 UBEs	71%	0.93	35-80%
40 users - 3 UBEs	91%	1.03	50-91%
40 users - 4 UBEs	93%	1.06	100-130%
100 users - 0 UBEs	32%	0.84	N/A
100 users - 1 UBE	66%	1.00	0-45%
100 users - 2 UBEs	84%	1.11	40-120%
100 users - 3 UBEs	95%	1.25	65-160%
100 users - 4 UBEs	98%	1.35	100-200%

Table 5 UBEs Only

UBE	Name	One UBE At A Time (mm:ss)	Two UBEs Concurrently (mm:ss)	Three UBEs Concurrently (mm:ss)
R09410	Trial Balance	5:51	9:36	14:42
R42800	Sales Order Update	11:43	19:42	24:59
R42520	Print Pick Slips	6:46	13:14	19:09
R31410	Work Order Processing	12:06	13:37	17:41
	Total Time For All To Complete	37:24	33:10	32:23

Conclusions

Both one-way and two-way servers running moderate UBE activity provide good OneWorld performance. The one-way server can accommodate up to 100 concurrent users and two concurrent UBEs while the two-way server can accommodate up to 240 concurrent users and four concurrent UBEs.

UBE elongation is observed as the number of UBEs increases; however, end-user response time is not significantly effected. End-user response time remains under two and one-half seconds even at the highest UBE levels.

Running two concurrent UBEs on a one-way server is 23% more efficient to running the same UBEs serially. Running up to four UBEs on a two-way server is more efficient to running fewer UBEs serially. However, running UBEs concurrently causes elongation of any specific UBE. When a specific UBE needs to complete quickly, the number of concurrent UBEs should be reduced to one on the one-way server and to two on a two-way server.

Additional Information

Additional information can be found at the following web sites;
IBM/J.D. Edwards Alliance - **ibm.com**/erp/jdedwards/

IBM AS/400 Home Page - www.iSeries.ibm.com/

IBM J.D. Edwards support web site,
ibm.com/servers/eserver/iseries/service/erp/jdesupport.htm
This site contains many important documents on current recommendations, including an informational APAR for each release of OS/400 supported. This informational APAR lists the current recommendations for PTF and service pack levels to install and run OneWorld. From the website, links to several important documents and other web sites can also be found.

J.D. Edwards - www.jdedwards.com

Additional information can also be found in the following documentation: IBM redbook J.D. Edwards OneWorld Implementation for IBM AS/400® (SG24-5195)

Please direct questions, comments or suggestions regarding this document to Robert Jump or Bob Reynolds at the IBM/J.D. Edwards International Competency Center at: rjjump@us.ibm.com or xdrreyn@us.ibm.com

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