Performance benefits of IBM Power Systems and IBM FlashSystem for JD Edwards EnterpriseOne

IBM Power 780 server with AIX and IBM FlashSystem 820 flash storage improves batch performance in a client proof of concept test

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Change history

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Abstract

This paper describes a performance health check and proof of concept test done with a large medical manufacturing company running JD Edwards EnterpriseOne. The results show that an IBM Power® 780 server running AIX® with IBM FlashSystem™ 820 flash storage provides an expected 28% reduction in a key batch window for this client. This validates previous test results that show significant performance improvements can be achieved with POWER7+™-processor based servers.

Introduction

IBM Power Systems™ servers running Oracle's JD Edwards EnterpriseOne applications provide the reliability and efficiency needed to run almost every aspect of a business. Many organizations rely on this proven combination of hardware and software for running their mission-critical business processes within operational windows and service level agreements. As companies change and grow, business processes increase in complexity and scope while operational windows and service level agreements become more restrictive. Clients need to have their applications and infrastructure handle these requirements and they rely on their infrastructure providers to partner with them to meet these needs.

A major medical manufacturer in the United States contacted IBM for assistance with a business challenge. As night batch processing was increasing in complexity and time, the business continued to expand worldwide operations which limited the window available for nightly batch processing. The client asked IBM to engage in a proof of concept (PoC) test to investigate ways to significantly improve the performance of their nightly batch runs in order to address this key aspect of their business.

The PoC test results demonstrate how IBM systems and flash storage can help this client meet their business challenges by:

- successfully implementing an integrated IBM stack of IBM Power Systems and IBM FlashSystem flash storage
- reducing JD Edwards EnterpriseOne infrastructure capacity requirements and increased system utilization through virtualization
- significantly decreasing the time needed for nightly batch processing

The PoC test emulated the client workload by running the same JD Edwards EnterpriseOne batch applications the client was experiencing performance issues with, and by using actual client data in those runs. This ensured that results could be repeated in the production environment, and allowed the client to see the real business value of running this workload on IBM Power Systems servers with flash storage.

Current environment and challenges

The client was running JD Edwards EnterpriseOne 9.0.2 applications with 8.98.3.3 tools. With a worldwide operation running up to 950 users and a heavy batch workload on the system, they utilize applications from the financials, distribution, and manufacturing suites. Many of these applications have been modified to fit their business processes. Additionally, the client runs a lengthy and complex nightly batch process with a significant portion being the MRP (Manufacturing Resource Planning) processing to plan the manufacture of their medical equipment.

Current hardware and software environment

The JD Edwards EnterpriseOne production environment was currently running on an IBM Power 795 server with POWER7® processors. The Power 795 server had 32 cores activated and licensed with AIX 6.1 and 1 TB of memory. The system was configured with the following logical partitions:

LPAR	Cores*	Memory GB	Notes
Database	12	400	Oracle Database 11.1 (8 TB)
Applications	3	64	EnterpriseOne 9.0.2 with Tools 8.98.3.3 (900 users)
User Batch	2	32	EnterpriseOne 9.02 with Tools 8.98.3.3
Scheduled Batch	8	32	EnterpriseOne 9.02 with Tools 8.98.3.3
Web Servers (4)	1	24	Oracle Application Server 10.2 with Java™ 1.5 (32-bit)
Euro Apps	1	4	EnterpriseOne 9.0.2 with Tools 8.98.3.3 (50 users)
Euro User Batch	1	16	EnterpriseOne 9.0.2 with Tools 8.98.3.3
Euro Sched Batch	1	8	EnterpriseOne 9.0.2 with Tools 8.98.3.3
Scheduler	1	32	Cisco

Table 1: Current environment LPAR configuration:

* Note: Other than the logical partition running the database, core counts are approximate as the system is configured to run uncapped and dynamically move processing resource between the partitions as needed.

The Power 795 server ran with dual Virtual I/O Servers (VIOS) to virtualize all system resources and was attached to a SAN Volume Controller (SVC) to virtualize the storage for the environment. The SVC has 32 GB of memory, contains one set of four 146 GB Solid State Drives, and controls the storage on the client's DS8300 storage system. The JD Edwards production environment contains 8 TB of data after a recent conversion to Unicode.

Client challenges

The key challenge facing this client was the need to improve the processing time required for their nightly batch processes. The full set of batch jobs was taking 8-12 hours to complete and many times would still be running when interactive users would begin signing on to the system. The client's key batch processes requiring a dedicated system were running up to five hours.

End-user performance was being impacted when batch processing runs extended into the daytime hours. With the interactive processing increasingly growing in the worldwide arena, the window for batch processing was shrinking. Additionally, the JD Edwards EnterpriseOne and infrastructure teams were receiving complaints from end users about the performance of key applications such as sales order entry running the Configurator.

Finally, the client leadership team was looking at an older DS8300 storage system and wanted to make the right decision about database storage for the future of their JD Edwards EnterpriseOne data.

Selecting the proof of concept environment

Given the current set of challenges, the client approached IBM about partnering with them to conduct a health check of their current JD Edwards application environment and a proof of concept test of potential new hardware to address their business issues.

The IBM team assembled to work on this PoC test with the client included:

- a JD Edwards application technical sales specialist
- an Oracle Database specialist
- an IBM Power Systems and AIX expert
- and a storage specialist with deep knowledge of IBM FlashSystem flash storage and the Oracle Database

The IBM team and the client IT group worked jointly on both the health check of their current environment and the follow-on PoC testing.

Selecting the hardware

For the hardware, the IBM team recommended bringing in a Power 780 server with the latest POWER7+ processor technology, and an IBM System Storage® DS8870. Based on the positive experience the client had using solid state drives in their SVC, the team decided to also bring in IBM FlashSystems 820 flash storage.

IBM Power 780

The Power 780 provides a unique combination of performance for the most demanding application workloads and availability characteristics that keep your business running. In addition, PowerVM virtualization helps to maximize your efficiency to keep your costs in line and Capacity on Demand technology for non-disruptive growth options to maintain business resiliency. With all this coming together in one integrated energy-saving package, the Power 780 makes a great business solution.

Figure 1. IBM Power 780 server

IBM FlashSystems 820

The IBM FlashSystem 820 is designed to speed up the performance of multiple enterprise-class applications, including OLTP and OLAP databases, virtual desktop infrastructures, technical computing applications and cloud-scale infrastructures. These IBM systems deliver extreme performance per gigabyte, so organizations can quickly uncover business insights using traditional data analytics as well as new, big-data technologies.

Figure 2. IBM FlashSystem 820 flash storage

The Power 780 server used for the PoC testing was configured with four enclosures; each enclosure had two 8-core 4.42 GHz sockets and 512 GB of memory for a total of 64 cores and 2 TB of memory. To run the JD Edwards EnterpriseOne workload, only a portion of the system was needed. The Power 780 server was configured with the following logical partitions to run the JD Edwards EnterpriseOne production workload:

LPAR	Cores	Memory GB	Notes
Database	12	400	Oracle Database 11.2.0.3.4 (8 TB)
Applications	3	32	EnterpriseOne 9.0.2 with Tools 8.98.4.11
User Batch	3	32	EnterpriseOne 9.0.2 with Tools 8.98.4.11
Scheduled Batch	3	64	EnterpriseOne 9.0.2 with Tools 8.98.4.11
Web Servers (4)	1	12	Oracle Application Server 10.2
Scheduler	1	32	Cisco
VIOS (2)	0.4	16	PowerVM 2.2.2 SP1

Table 2: PoC test environment LPAR configuration

The VIO Servers virtualized the I/O for the system through eight 8 Gb Fibre Channel adapters attached to the external storage and four 10 Gb Ethernet adapters for communications.

The IBM FlashSystem 820 has 20 TB of useable EMLC flash storage, capable of 450,000 I/O operations per second (IOPs). LUNs were created in multiples of four and used the default of 512-byte sectors. The size of each LUN was kept below 2 TB and was accessible through all ports. From the host side all data and redo logs were aligned on 4 KB boundaries, a recommended best practice.

Selecting the workload

The client identified the workload and measurement criteria based on what was most critical to their business. In addition, they wanted a repeatable workload so that multiple tests could be run with a consistent amount of work applied to the system.

The client selected their nightly batch cycle and running single user tests of the Sales Order Entry application using the Configurator function as the test workload. The batch runs could be checked from their scheduler based on runtime and consisted of 712 distinct jobs comprised of:

- 154 critical batch jobs including the MRP process
- 134 non-critical JD Edwards EnterpriseOne batch jobs
- 424 jobs to pull data from JD Edwards EnterpriseOne tables to populate their data warehouse

The measurement of the interactive application was more subjective and was measured based on perceived performance from an end-user. The team ensured that the latest operating system, compiler, and database enhancements could be leveraged by making some infrastructure changes as well.

Upgrading the application and middleware

The JD Edwards EnterpriseOne applications were not upgraded from 9.0.2, however, the tools release was moved to the latest level, 8.98.4.11 in order to support the latest level of the Oracle Database. No application code changes were introduced for these tests.

The Oracle Database was upgraded to 11.2.0.3.4 which brought it to the latest level and contained some key performance related fixes. The Oracle Application Server was not updated, since the interactive applications were not going to be a major focus for this exercise.

Upgrading AIX and the system software

The team chose to bring the operating system up to the latest level, AIX 6.1 TL 7 SP 6. This level of the operating system contained patches for the latest level of the Oracle Database. The JD Edwards EnterpriseOne 9.02 business functions were compiled to AIX 6.1 as well.

The Power Systems software was updated to VIOS 2.2.2. Active Energy Manager was installed in order to allow the POWER7+ processors to be over-clocked and run faster than 4.42 GHz.

Tuning the proof of concept environment

Tuning of the environment occurred in two phases. The first phase occurred before the PoC hardware arrived and was designed to gather information for conducting the PoC. The second phase was the set of tests run with the new hardware and upgraded environment.

Conducting the health check

The client and IBM teams jointly ran tests on the current production environment and utilized JD Edwards EnterpriseOne, AIX, and Oracle Database tools to identify a number of potential changes that could be introduced into the environment immediately and also used in the upcoming PoC tests.

Proof of concept method and tuning

The client team selected the batch run for a night that was particularly heavy as the test workload. The database was saved before the batch cycle began and measurements were taken of the runtimes for each of the batch jobs and the run as a whole.

Because the system has other activity going on during nightly batch, the workload was run again on a dedicated partition to remove variability and produce a baseline for repeatable runs. The same measurements were then collected for the batch jobs. As expected the batch cycle was considerably reduced when running on a dedicated system. The differences between the production run and the baseline were noted and used to calculate the expected batch time reductions in the production environment.

The Power 780 server and FlashSystem 820 were installed and configured as described previously. A number of runs were made and analyzed to find areas that could benefit from tuning, then a final run was completed with this system configuration.

Results of the proof of concept test

The chart below summarizes the results of the proof of concept test runs.

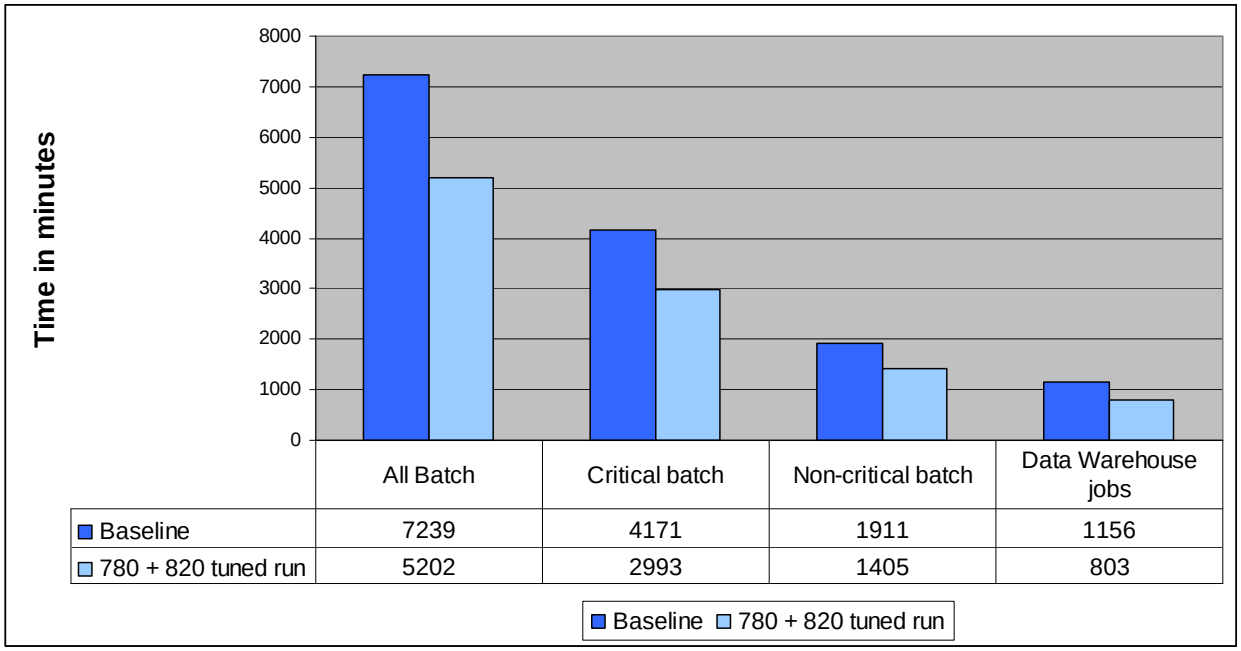

Figure 3: Proof of concept batch test run results

The critical batch column represents the JD Edwards EnterpriseOne MRP batch jobs and the area of most interest to the client. The final set of changes, shown as the “780 + 820 tuned run” above, focused on ensuring that the Oracle Database was most effectively utilizing the FlashSystem 820 and resulted in a 28% reduction in runtime for the critical batch jobs.

Additionally, the client had an experienced end-user run the JD Edwards EnterpriseOne Sales Order Entry application using the Configurator and the perception was that the application was running faster with this final configuration.

After examining these results achieved by running their workload with their data, the client was confident that they could achieve a 28% run time reduction in their nightly batch processes.

Summary

The tests documented here, based on actual data from a medical manufacturer, demonstrated that both IBM Power Systems servers with POWER7+ processor technology and FlashSystem 820 flash storage when used together can provide substantial improvements for JD Edwards EnterpriseOne batch job performance. These results validate other published test results based on Oracle workloads with IBM Power Systems servers and storage products. They also indicate that the ongoing development investments in IBM Power Systems servers and FlashSystem flash storage continue to provide significant performance improvements to clients using Oracle's JD Edwards EnterpriseOne applications.

Contact Information

Please submit any questions you may have about the content of this paper to: ibmoracle@us.ibm.com.

Resources

These Web sites provide useful references to supplement the information contained in this document:

- For more information about IBM Power Systems servers visit:
  http://www.ibm.com/systems/power
- For more information about IBM FlashSystem flash storage, visit:
  http://www.ibm.com/systems/storage/flash
- For more information about the IBM AIX operating systems, visit:
  http://www.ibm.com/systems/power/software/aix
- For more information about the IBM and Oracle alliance, visit these two sites:
  http://www.ibm.com/oracle
  http://ibmandoracle.com
- For more information about JD Edwards EnterpriseOne applications, visit:
  http://www.oracle.com/us/products/applications/jd-edwards-enterpriseone/overview/index.html

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