

IBM System x3755 Performance and Power Consumption Study

Test report prepared under contract from IBM.

Executive Summary

IBM Corporation commissioned VeriTest, the testing service of Lionbridge Technologies, Inc., to perform competitive testing on their IBM System x3755, a four socket AMD server, against a comparative product from Hewlett Packard (“HP”).

For this study, VeriTest evaluated which system provided the best performance and power utilization between the IBM System x3755 configured with three and four Quad-Core AMD Opteron 8384 2.7 GHz processors and the HP DL580 G5 configured with four Six-Core Intel Xeon 7460 2.67 GHz processors. Details of the system configurations are given in Appendix A of this report.

Testing was conducted using the SPECjbb2005 benchmark tool. This benchmark exercises the implementations of the JVM (Java Virtual Machine), JIT (Just-In-Time) compiler, garbage collection, threads and some aspects of the operating system. It also measures the performance of CPUs, caches, memory hierarchy and the scalability of shared memory processors (SMPs). SPECjbb2005 simulates a wholesaling operation receiving orders, managing deliveries, and generating reports of various sorts. The database is replaced by in-memory Java Collection objects and transaction logging is implemented using XML. The purpose of this test was to compare how the IBM x3755 in both three and four processor configurations performed when compared to a four processor HP ProLiant DL580 G5. The JVM used during test execution was the 64-bit Sun Microsystems Java Version 6 Update 12, which was the latest publicly available release as of testing.

Two specific IBM System x3755 configurations were tested against the HP ProLiant DL580 G5. First a direct four processor to four processor configuration was tested. Note, under this configuration this represented 16 cores in the IBM system and 24 cores in the HP system. The results below illustrate that the IBM solution was able to outperform the HP solution by 24% while at the same time drawing 4.5% less power when running the SPECjbb 2005 benchmark.

Second, the IBM System x3755 was configured using three processors and IBM’s CPU PasThru card and compared against the four processor HP DL580 G5. Note, under this configuration this represented 12 cores in the IBM system and 24 cores in the HP system. Testing revealed the IBM System x3755 was able to perform the SPECjbb2005 benchmark comparable with the four processor HP ProLiant DL580 G5 solution, while at the same time utilizing 19.7% less power to produce these equivalent results.

Key Findings

- ❑ The IBM System x3755 with four quad-core processors performed 24% higher and utilized 4.5% less power than the HP DL580 G5 with four six-core processors.
- ❑ The IBM System x3755 with a three quad-core processor configuration performed equal to the HP DL580 G5 with four six-core processors while utilizing 19.7% less power.

Testing Methodology

The test environment consisted of an IBM System x3755 and an HP DL580 G5 server. Both servers ran Windows Server 2008 SP1 x64 Enterprise Edition. The IBM System x3755 specifications included four quad-core AMD Opteron 8384 2.7GHz processors, 32GB DDR2 PC5300 RAM (16 x 2GB DIMMs), and dual 15K RPM 73GB SAS hard drives configured in a RAID1. For the three processor configuration, one of the CPU/RAM modules was removed from the x3755 system and replaced with the CPU PassThru card. This reduced the number of CPU cores to 12 and the amount of RAM to 24 GB. The HP DL580 G5 specification included four six-core Intel Xeon 7460 2.67GHz processors, 32GB DDR2 PC5300 RAM (16 x 2GB DIMMs), and dual 72 GB 15K RPM SAS hard drives configured in a RAID1+0. Additional description and details can be found in Appendix A.

SPECjbb2005 was installed on both servers. SPECjbb2005 is a benchmark for evaluating the performance of servers running typical Java business applications. The same test methodology and configurations of SPECjbb2005 were executed on both servers, and scores from SPECjbb2005 were used to compare performance between the IBM and HP solutions.

In addition, power utilization was captured using a Dranetz/BMI Power Meter. The WATTS used was measured during the execution of the SPECjbb2005 benchmark.

The testing process consisted of executing the same SPECjbb2005 configuration on the IBM System x3755 and the HP DL580 G5 with different CPU configurations as documented in the table below. Table 1 below shows the various system configurations compared in this study.

Test Configurations		
System Configuration	Number of Processors (Total Cores)	Amount of RAM (GB)
IBM System x3755 w/pass thru card in 4 th slot	3 (12)	24
IBM System x3755 w/o pass thru card	4 (16)	32
HP ProLiant DL580 G5	4 (24)	32

Table 1: System Configurations

Test Results

All tests were executed running SPECjbb2005 in the different test scenarios described. SPECjbb 2005 provides a metric called Business Operations Per Second (BOPS) to reflect the performance measured during benchmark execution. The charts below show the advantage the IBM System x3755 had in both SPECjbb performance and power utilization.

Testing revealed that the IBM System x3755 when configured with three CPU processors (12 cores) and a pass-thru module in the fourth slot produced 99.72% of the SPECjbb BOPS as those produced by the four processor (24 core) HP ProLiant DL580 G5. Also, the IBM system contained only 24 GB RAM, whereas the HP system contained 32 GB RAM during this test scenario.

Additionally, not only did the IBM deliver nearly identical BOPS with half as many CPU cores and 33% less RAM, it also required 19.7% less power to achieve these results. Figure 1 below further illustrates these results. The results are normalized for comparison. The HP system results are set at a value of 100% and the IBM system results are presented relative to that value. Appendix B provides the raw SPECjbb BOPS produced under this configuration comparison.

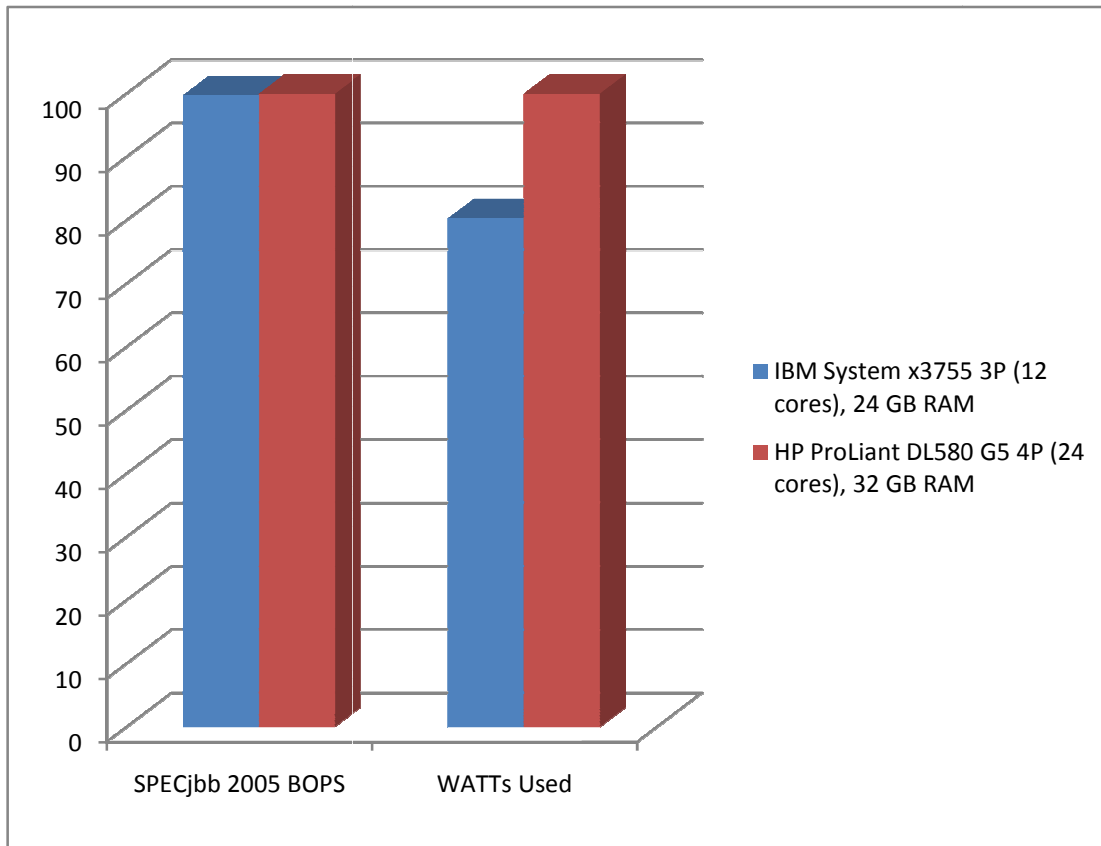


Figure 1: Performance and Power Comparison: IBM System x3755 3P vs. HP ProLiant DL580 G5

When comparing the IBM System x3755 in a four processor (16 cores) configuration to the HP ProLiant DL580 G5 four processor (24 cores) configuration, testing revealed the IBM system produced 24% higher SPECjbb 2005 BOPS and required 4.5% less power. This scenario reveals that the IBM solution, when configured similarly to the HP solution, can produce significantly higher BOPS and still require less power to achieve these results.

Under this configuration, the IBM system contained 33% fewer CPU cores and was still able to produce higher SPECjbb 2005 BOPS, and by utilizing fewer CPU cores the power consumed to produce these results was lower than the HP solution.

Figure 2 below further illustrates these results. The HP system results are set at a value of 100% and the IBM system results are presented relative to that value. Appendix B provides the raw SPECjbb BOPS produced under this configuration comparison.

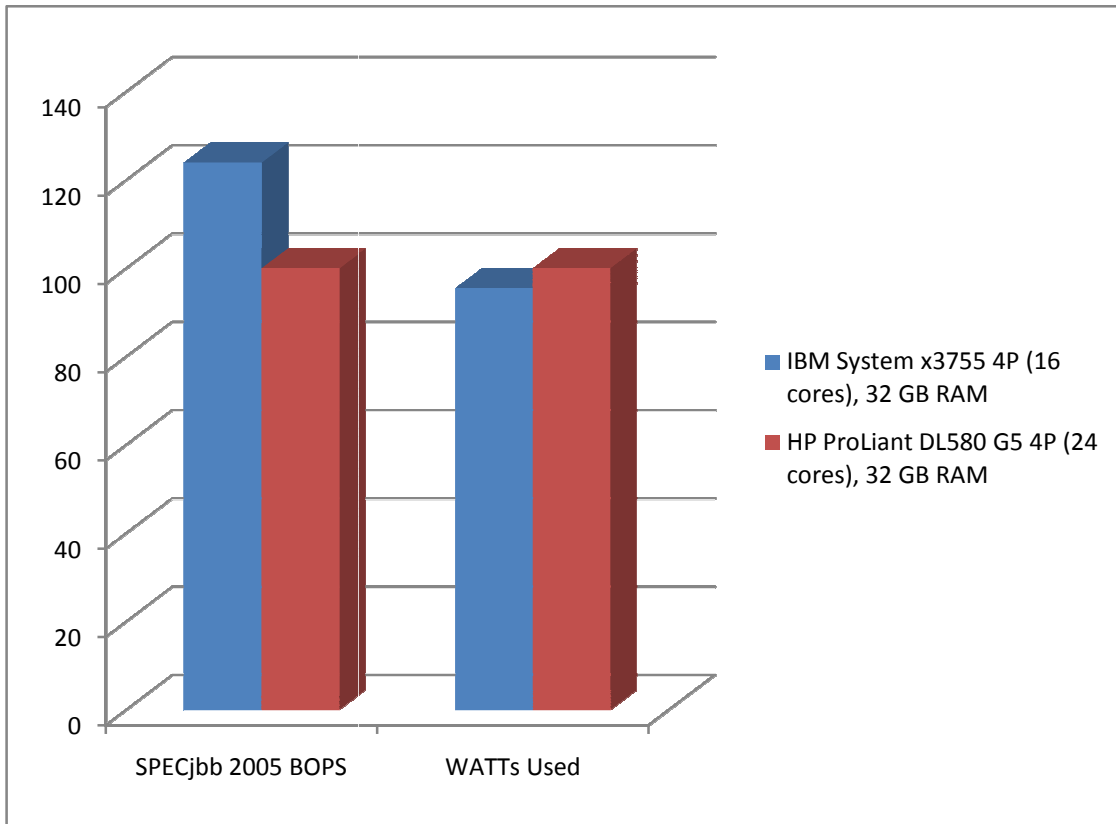


Figure 2: Performance and Power Comparison: IBM System x3755 4P vs. HP ProLiant DL580 G5

Conclusion

This study shows the advantages of the IBM System x3755 platform over the HP ProLiant DL580 G5 platform. The tests conducted by VeriTest highlighted the advantages of both performance and power utilization using the AMD based IBM System x3755 system.

When configured with three processors and the CPU PassThru card with 24 GB of RAM, the IBM solution was able to produce statistically identical SPECjbb BOPS results while utilizing 19.7% less power than the HP ProLiant DL580 G5.

When configured in a four processor configuration with 32 GB of RAM, the IBM solution was able to produce 24% higher SPECjbb BOPS and required 4.5% less power than the HP ProLiant DL580 G5.

Appendix A: Hardware and Software Configuration Details

- Servers Under Test

Model	IBM System x3755
CPU	Quad-Core AMD Opteron 8384 2.7 GHz
RAM	32 GB (16x2GB) DDR2 667 MHz
HDD	2 x 72GB 15K RPM 2.5in SAS (RAID1)
Operating System Version	Microsoft Windows Server 2008 Enterprise x64 SP1

Model	HP ProLiant DL580 G5
CPU	Six-Core Intel Xeon 7460 2.67 GHz
RAM	32 GB (16x2GB) DDR2 667 MHz
HDD	2 x 72GB 15K RPM 2.5in SAS (RAID1)
Operating System Version	Microsoft Windows Server 2008 Enterprise x64 SP1

- Benchmark Software
 - SPECjbb 2005 v1.07
- Java Virtual Machine Software
 - Sun Microsystems Version 6 Update 12 x64

Appendix B: SPECjbb Raw BOPS Results			Te
System Configuration	SPECjbb BOPS Run1	SPECjbb BOPS Run2	SPECjbb BOPS Average
IBM System x3755 w/pass thru card in 4 th slot	112952	112876	112914
IBM System x3755 w/o pass thru card	140215	140619	140417
HP ProLiant DL580 G5	115543	110914	113229

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