

NVIDIA Business Platform vs. Intel Stable Image Platform Program

Test report prepared under contract from NVIDIA Corporation in collaboration with Advanced Micro Devices

Executive Summary

NVIDIA Corporation and Advanced Micro Devices commissioned VeriTest, a division of Lionbridge Technologies, Inc., to evaluate the performance and stability of the NVIDIA Business Platform™ PCs from two different vendors against Intel® Stable Image Platform Program PCs from five different vendors and two Intel® based Dell Optiplex PCs. Exact specifications of all the machines can be found in Appendix A.

Performance testing of all PC platforms under test was conducted to evaluate the performance with a selection of industry standard benchmarks from VeriTest, PC World, SiSoftware and Futuremark. Specifics on which benchmark tools were used appear in the testing methodology of this report.

In addition to the benchmark testing, stability testing of all PC platforms was performed using Passmark's BurnInTest Professional V5 utility. Its task was to evaluate how the machines functioned under high stress and load for an extended period of time. Please see the testing methodology of this report for further details.

About the NVIDIA Business Platform

The NVIDIA Business Platform offers unmatched quality and superior technology to meet demanding business needs. The NVIDIA Business Platform is fully synchronized with AMD's Commercial Stable Image Platform Program, which provides stable AMD processors over a 15 month stability period. NVIDIA focused on the following principles when designing the NVIDIA Business Platform:

- ◇ **Quality:** NVIDIA conducts a rigorous testing program to ensure the highest level of quality for NVIDIA Business Platform PCs. Motherboard manufacturers and system builders must pass an exhaustive certification process where both NVIDIA and the partner certify hardware and software components. NVIDIA conducts extensive testing of the NVIDIA Business Platform, subjecting systems to tens of thousands machine-hours of stress tests and thousands of hours of attended platform testing. NVIDIA Business Platform PCs also complete comprehensive compatibility testing with popular third-party

Key Findings

- **NVIDIA PCs deliver excellent stability** – Both the NVIDIA and Intel-based chipset systems passed a 15 day burn-in process in which both types of systems were subjected to high stress. The only exception would be the Intel chipset based machine manufactured by MPC which failed this test after 24 hours. Based on the results of our testing, the NVIDIA Business Platform PCs are as stable if not more stable as the equivalent Intel and Dell PCs.
- **Strong “Real-World” Benchmark Performance by NVIDIA** Generally the NVIDIA chipset based machines produced higher benchmark scores on the benchmarks which were based on “real world” applications testing.
- **Inconsistent Intel Performance** – The two Intel based chipset machines manufactured by MPC and Elonex never successfully ran at least one of the benchmarks after over 50 retries. The MPC PC also repeatedly failed the stability test at least once per day for the duration of the test.

productivity applications like Microsoft Office, Adobe Creative Suite, Intuit QuickBooks and many more.

- ◇ **Stability:** Once an NVIDIA Business Platform PC is qualified within an organization's IT environment, IT managers have the confidence that identical hardware and software configurations will be available for at least one year. IT managers can more predictably transition their organization from one generation of technology to the next.
- ◇ **Longevity:** As part of the NVIDIA Stable Image Program, NVIDIA and its channel partners will release stable platforms on a yearly cadence. Each generation of NVIDIA Business Platform PCs will be available for purchase for at least 12 months with support continuing another two years after the end of the purchase cycle. By aligning PC purchases with the NVIDIA Business Platform calendar, IT managers maximize the time to acquire and deploy stable image platforms.
- ◇ **Security:** The NVIDIA Business Platform features the NVIDIA ActiveArmor™ Firewall, the industry's first hardware-optimized firewall that protects PCs from malicious spyware and hacker attacks. The NVIDIA Business Platform motherboard also includes an integrated security chip that supports the Trusted Platform Module 1.2 from the Trusted Computing Group, allowing secure storage of digital keys, certifications, and passwords.
- ◇ **Manageability:** As part of the NVIDIA Business Platform, NVIDIA certifies remote management software packages from leading software companies like Altiris and Microsoft. NVIDIA certified solutions enable IT professionals to track hardware and software assets, protect sensitive resources, keep software up-to-date, and do it all from a central console.
- ◇ **Performance:** AMD processors provide cool and quiet operation and feature award winning AMD64 technology. AMD's stable processors offer greater productivity, and better security with AMD64 features such as HyperTransport™ technology, and Enhanced Virus Protection to enhance productivity and security.

About the AMD Commercial Stable Image Platform Program

The AMD Commercial Stable Image Platform enables the development of stable image PC solutions. The program features a selection of stable AMD64 processors and stable components, helping to diminish IT complexity resulting from frequent IT product refresh. The AMD CSIP program also provides testing of platform components and limits changes to components over a 15 month stability period. The benefits offered by CSIP include simplified PC management, reduced TCO, and enhanced end-user productivity. More information on AMD CSIP is available at www.amd.com/CSIP. Both of the AMD-based solutions tested include components from the AMD CSIP program.

Testing Methodology

The following section describes the procedures that were used to conduct all performance benchmarks and stability testing referenced in this paper.

Performance Testing

VeriTest ran leading industry standard benchmark tests to evaluate the performance of the PC platforms under test. Performance testing also helps to uncover anomalies that may not have typically been discovered by typical system testing. It is VeriTest's goal to provide independent, third-party evaluations of the performance of the desktops. VeriTest ran the following five (5) benchmarks on nine (9) platforms to evaluate and compare performance. All benchmarks were run twice for repeatability and validation of the consistency of the results. Unless otherwise stated, all benchmarks were loaded with default values. All Windows and NVIDIA firewall software products were disabled. In addition, the NVIDIA network management utility had to be de-installed in order for Sysmark 2004 to run properly. The following benchmark versions were run:

1. PC World Test Center's WorldBench 5. WorldBench is a dynamic tool for measuring a computer's real-world system performance. More information may be found at: http://www.pcworld.com/resource/article/0_aid.116892.00.asp

2. Futuremark's PCMark05 Advanced Edition. PCMark05 consists of a series of tests that represent common tasks in home or office programs. More information may be found at: <http://www.futuremark.com/products/pcmark05>)
3. Futuremark's SYSmark 2004 Second Edition. SYSmark 2004 SE is an application based benchmark that reflects usage patterns of business users in the areas of Internet content creation and office productivity. More information may be found at: <http://www.futuremark.com/products/sysmark2004>)
4. SiSoftware Sandra 2005 Engineer. Sandra 2005 is an information & diagnostic utility. You can get information about the CPU, chipset, video adapter, ports, printers, sound card, memory, network, Windows internals, AGP, PCI, PCIe, ODBC Connections, USB2, 1394/Firewire, etc. More information may be found at: [http://www.sisoftware.net/index.html?dir=news&location=2005sr2_release&lang=en&a=\)](http://www.sisoftware.net/index.html?dir=news&location=2005sr2_release&lang=en&a=))
5. VeriTest iBench 5.0. iBench evaluates performance using different Internet technologies, ranging from simple HTML pages with text and diagrams to complex pages with XML and JavaScript; the rendering of PDF documents and the Java Virtual Machine (VM) are also tested. It completes these tests in either a Flash enabled or in a non-Flash environment to test the effects of processing Internet content with or without Macromedia's Flash video animation plug-in. More information may be found at: <http://www.veritest.com/lionbridge/en-US/services/outsourced-testing/>

System Descriptions

For this study, VeriTest used a total of nine systems from various manufacturers. Two of the systems were utilizing NVIDIA chipsets and AMD processors, the other seven systems utilized Intel chipsets and Intel processors. Of those seven Intel-based systems, five were from the United States and two were from Europe. Table 1 provides a brief description of the system name and builder, and the location of the builder.

System	System Builder Location
Aspect Computer Corporation	North America
McKinnon Micro Tager	North America
Dell Optiplex SX280	North America
Dell Optiplex GX520	North America
Compusys	European Union
MPC	North America
Elonex Prosentia 4000	European Union
Seneca Data Nexlink	North America
Systemax	North America

Table 1: System Information

Stability Testing

VeriTest also conducted a stress test using Passmark's BurnInTest Professional V5 utility in an attempt to drive the systems with a heavy-enough load to induce system instability. PassMark BurnInTest™ is a software tool that allows all the major sub-systems of a computer to be simultaneously stress tested for endurance, reliability and stability. BurnInTest tests the CPU via mathematical operations and SIMD calculations, hard drives, RAM, CD-ROMs, CD burners, DVDs, sound cards, 2D graphics, 3D graphic, network connection, printers, and video playback.

BurnInTest Pro was setup on each machine using default, "out-of-the-box" settings with the exceptions listed at the end of Appendix A.

Reliability testing allows you to uncover anomalies that may only become apparent over an extended period of time or under high usage. This test was conducted for each platform over a 15 day span. Results were collected and measured at the conclusion of the testing cycle. An analysis of the data is shown in the Stability Results section of this report.

Passmark's BurnInTest Professional V5 can be found at: <http://www.passmark.com/products/bit.htm>

Benchmark Results

All numbers reported in the test report are an average of two test runs per benchmark. Figure 1 details the results observed after running the WorldBench benchmark. Figure 2 details the results of the Sysmark testing. Figure 3 shows the results of the PCMark benchmarks. Figure 4 illustrates the results of the iBench runs. Figure 5 shows the results of the SiSoftware benchmark.

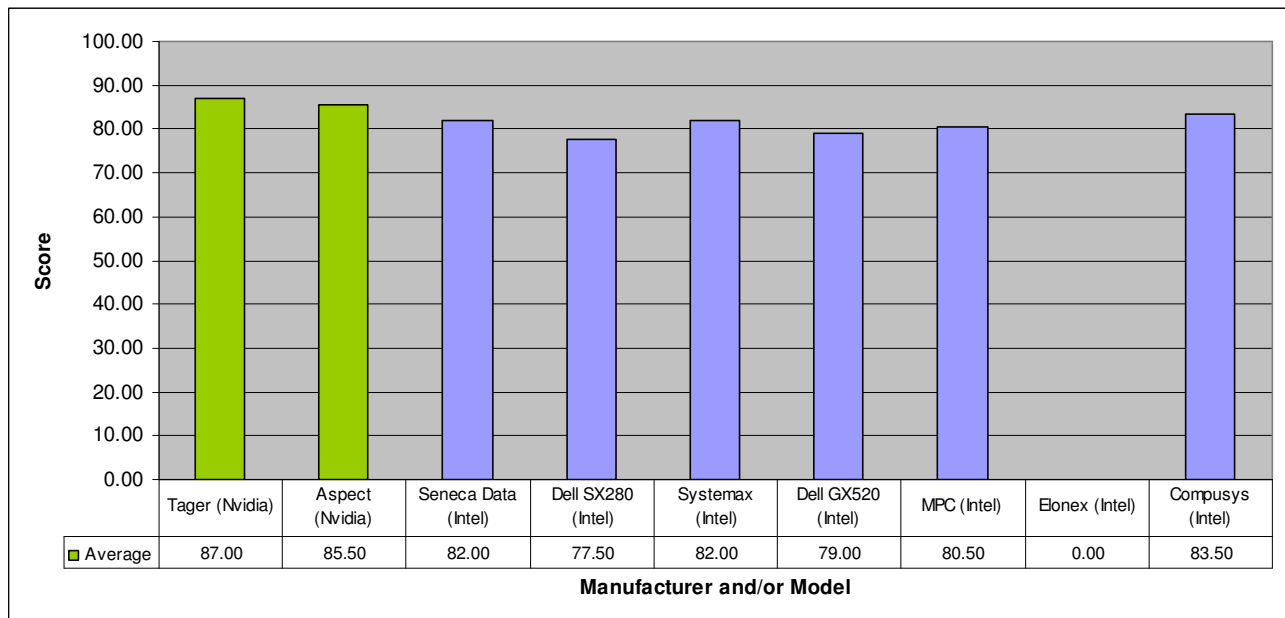


Figure 1: PC World WorldBench 2005 Results (higher is better)

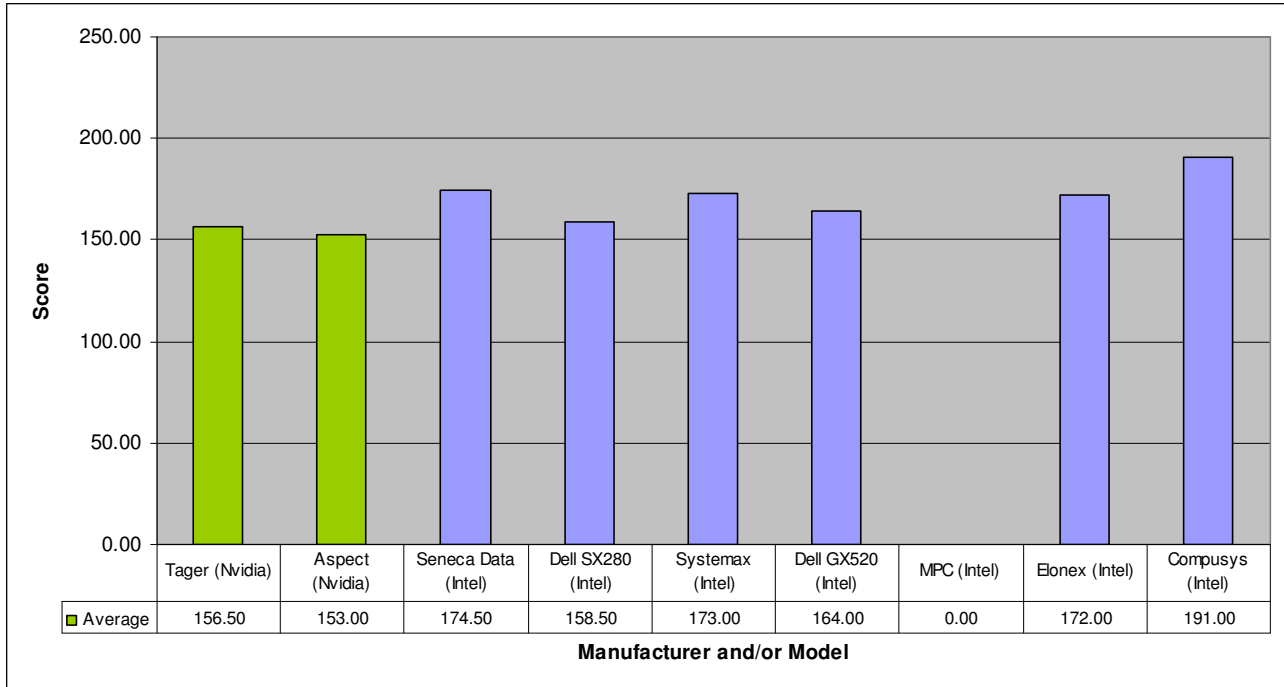


Figure 2: Futuremark SYSmark 2004 Results (higher is better)

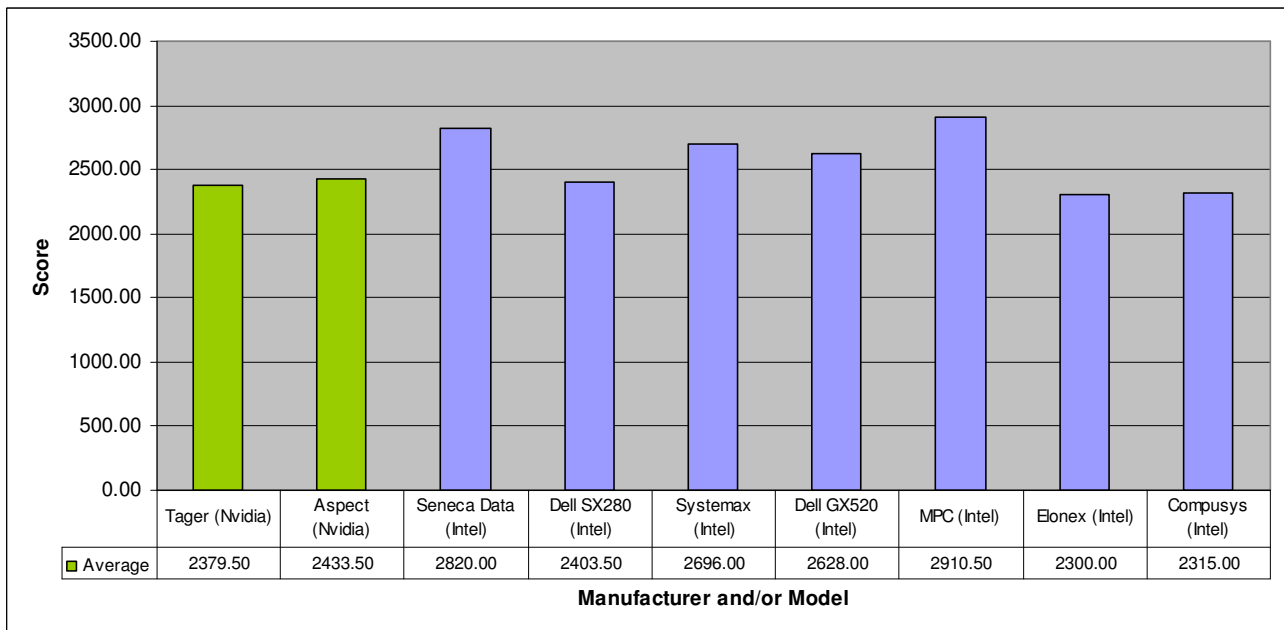


Figure 3: Futuremark PCMark05 Advanced Results (higher is better)

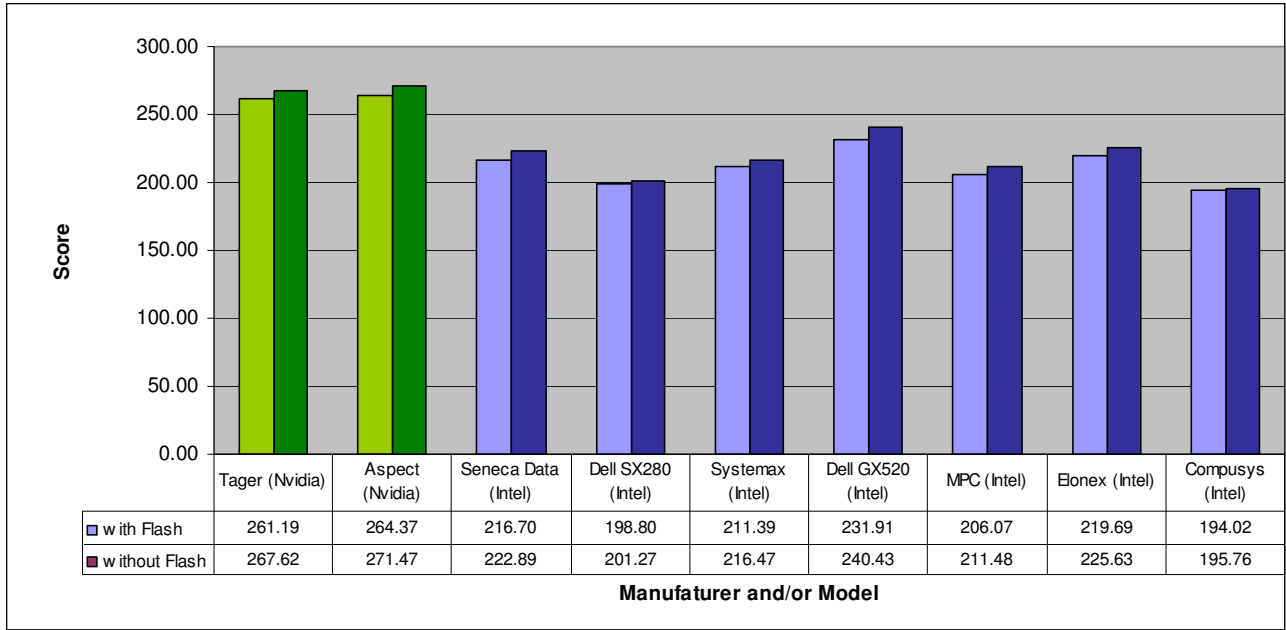


Figure 4: VeriTest iBench Results (higher is better)

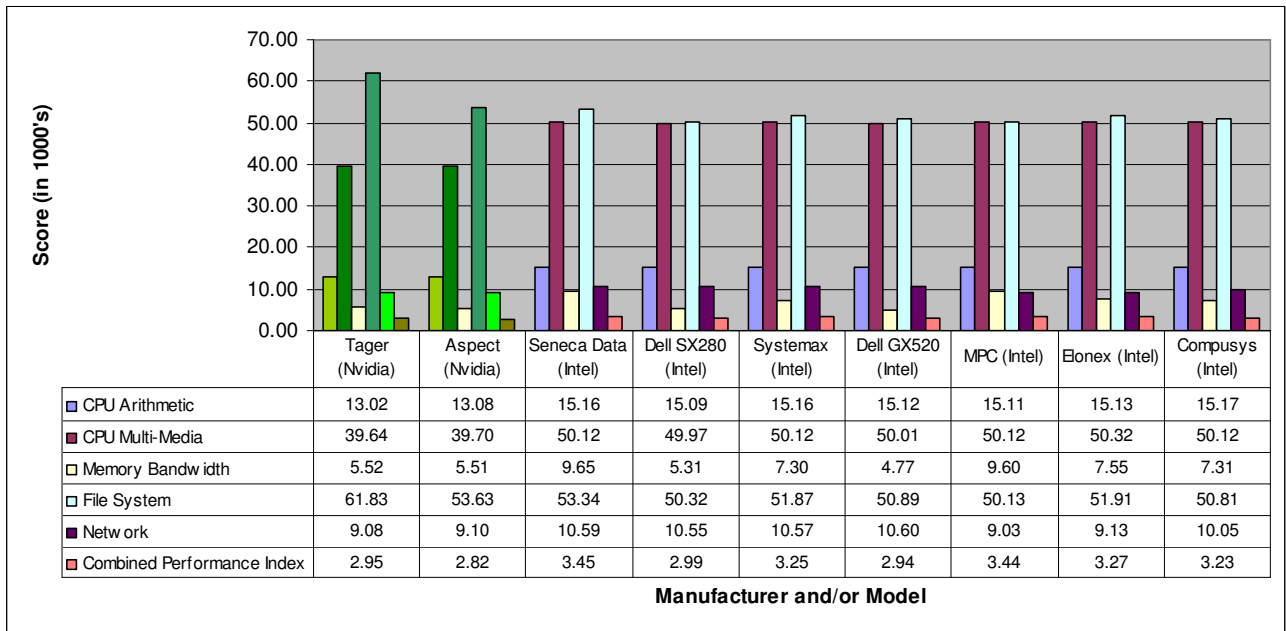


Figure 5: SiSoftware Sandra 2005 Engineer Results (higher is better)

Benchmark Conclusions

WorldBench 5:

With a score of 87, the Tager NVIDIA based system took the top honors. The Elonex system failed to complete this benchmark, subsequent reloads of the operating system and reboots of the Elonex system during the testing did not resolve this issue; therefore, the scores for the Elonex system were not valid and thus not reported.

PCMark05:

A score of 191 put the Compusys Intel based system in the winners circle. The MPC system failed to complete this benchmark, subsequent operating system reloads and reboots of the MPC system during the testing did not resolve this issue; therefore, the scores for the MPC system were not valid and thus not reported.

SYSmark 2004:

Although the MPC machine repeatedly failed the SYSmark testing, it eventually produced a winning score of 2910.5 on the SYSmark benchmark.

iBench 5.0:

The NVIDIA based Aspect system bested all others with a Flash enabled score of 264.37 and Flash disabled score of 271.47. The Tager and Aspect systems built with the NVIDIA chipset ran 12% and 13% faster than the highest scoring Intel chipset based machine on the iBench flash enabled runs respectively. On the Flash disabled portion of the iBench benchmark, the Tager and Aspect systems scored 10% and 11% percent higher respectively.

Sandra 2005:

Overall with a Combined Performance Index of 3445, the Seneca Data Intel based chipset system performed best.

Stability Results

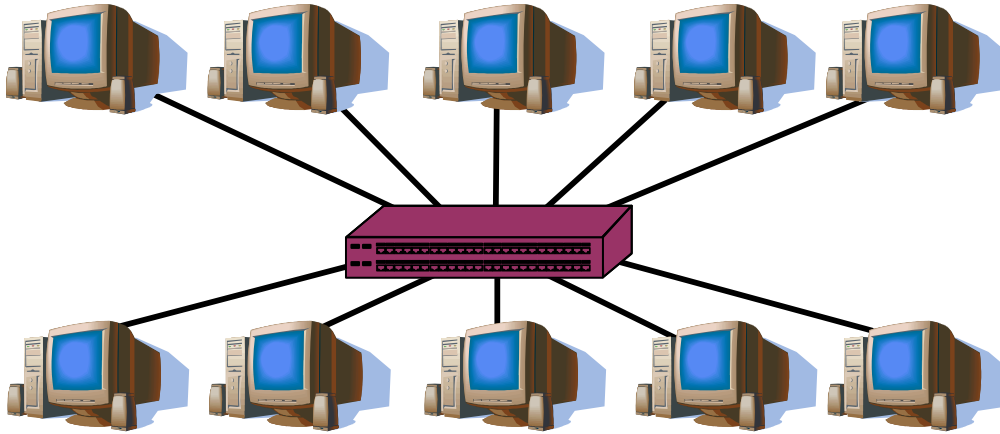
With the exception of the Intel based chipset machine manufactured by MPC, all of the systems under test completed the 15 day stress test without failure or error. The MPC machine failed the reliability testing in the first 24 hours of the test. It repeatedly failed it at least once per day for the duration of the test with a memory exception error. Subsequent reboots of the MPC system during the testing did not resolve this issue; therefore, the scores for the MPC system were not valid and thus not reported.

Stability Conclusions

The results of the stability testing using Passmark's BurninTest Pro showed that most of the systems were able to run for 15-days straight while exercising all of their primary components continuously and at the same time utilizing 100 percent of their CPUs. The exception was the Intel-based MPC system, which failed before reaching the 24-hour mark. The significant observation here is that both the AMD and most of the Intel-based systems are capable of running under extreme loads for extended periods of time without failure.

Appendix A

Test Bed Topology:



Test Bed Description:

The nine test machines and iBench server machine were connected to a Summit 48 network switch running at 100Mbps full-duplex and default MTU size of 1500 bytes. All systems utilized their onboard Gigabit Ethernet interfaces.

System Specifications:

Systems Under Test:

System	Processor	Chipset	Memory	Graphics	Hard Drive	Network	Bios	System Price
Aspect	AMD 3200+	NVIDIA nForce 430	512MB PC3200 DDR SDRAM	NVIDIA GeForce 6150	Western Digital WD800JD-22LSA0	NVIDIA nForce Network Controller	Phoenix 6.00PG 11/30/2005	\$550 USD
Tager	AMD 3200+	NVIDIA nForce 430	512MB PC3200 DDR SDRAM	NVIDIA GeForce 6150	Seagate ST3808110AS	NVIDIA nForce Network Controller	Phoenix 6.00PG 11/30/2005	\$789 CAD
Dell Optiplex SX280	Intel Pentium 4 530J	Intel 915G	512MB PC3200 DDR2 SDRAM	Intel GMA900	Maxtor 6L080M0	Broadcom NetXtreme 57xx Gigabit Controller	A04 02/09/05	\$898 USD
Dell Optiplex GX520	Intel Pentium 4 630	Intel 945G	512MB PC3200 DDR2 SDRAM	Intel GMA950	Maxtor 6L080M0	Broadcom NetXtreme 57xx Gigabit Controller	A05 10/13/05	\$878 USD
Compusys	Intel Pentium 4 630	Intel 945G	512MB PC4200 DDR2 SDRAM	Intel GMA950	Western Digital WD800JD-00LSA0	Intel Pro/1000 PL	NT94510J.86A.3309.2006.0109.1312	\$1,193 USD
MPC	Intel Pentium 4 630	Intel 945G	512MB PC4200 DDR2 SDRAM	Intel GMA950	Hitachi HDS728040P LA320	Intel Pro/1000 PM	NT94510J.86A.3309.2006.0109.1312	\$1,129 USD
Elonex	Intel Pentium 4 630	Intel 945G	512MB PC4200 DDR2 SDRAM	Intel GMA950	Seagate ST380013AS	Intel Pro/1000 PL	Phoenix 6.00PG 11/28/2005	\$1,270 USD
Seneca Data	Intel Pentium 4 630	Intel 945G	512MB PC4200 DDR2 SDRAM	Intel GMA950	Western Digital WD800JD-08LSA0	Intel Pro/1000 PM	NT94510J.86A.3191.2005.1112.1343	\$1,078 USD
Systemax	Intel Pentium 4 630	Intel 945G	512MB PC4200 DDR2 SDRAM	Intel GMA950	Western Digital WD800JD-23JN	Intel Pro/1000 MT	NT94510J.86A.3191.2005.1112.1343	\$645 USD

iBench Server:

System	Processor	Chipset	Memory	Video	Hard Drive	Network	Bios
Dell Precision 530	Dual Intel Xeon 2.2Ghz	Intel 860	1GB PC800	NVIDIA Quadro4 900XGL	Maxtor 6L080J4	Intel Pro/100+	Phoenix PCI PNP 2/25/02

PassMark BurnInTest Professional Settings:

Test Preferences:

Disk-

- Selected "Test this drive".

Network-

- Selected "Standard Network Test".



Parallel Port-

- Selected "Port detection only".

Serial Ports-

- Selected "Port detection only".

Select Tests Configuration and Their Duty Cycles:

- Autostop after 21,600 minutes (15 days).
- Selected "CPUMath" and set to 100% load.
- Selected "CPU SIMD" and set to 100% load.
- Selected "RAM" and set to 100% load.
- Selected "Video" and set to 100% load.
- Selected "2D Graphics" and set to 100% load.
- Selected "3D Graphics" and set to 100% load.
- Selected "Disks" and set to 100% load.
- Selected "Sound" and set to 100% load.
- Selected "Network" and set to 100% load.

Note: All other tests were unselected.

NVIDIA Corporation is the worldwide leader in programmable graphics processor technologies. The Company creates innovative, industry-changing products for computing, consumer electronics, and mobile devices. NVIDIA is headquartered in Santa Clara, CA and has offices throughout Asia, Europe, and the Americas. For more information, visit www.nvidia.com.

VeriTest (www.veritest.com), the testing division of Lionbridge Technologies, Inc., provides outsourced testing solutions that maximize revenue and reduce costs for our clients. For companies who use high-tech products as well as those who produce them, smoothly functioning technology is essential to business success. VeriTest helps our clients identify and correct technology problems in their products and in their line of business applications by providing the widest range of testing services available.

VeriTest created the suite of industry-standard benchmark software that includes WebBench, NetBench, Winstone, and WinBench. We've distributed over 20 million copies of these tools, which are in use at every one of the 2001 Fortune 100 companies. Our Internet BenchMark service provides the definitive ratings for Internet Service Providers in the US, Canada, and the UK.

Under our former names of ZD Labs and eTesting Labs, and as part of VeriTest since July of 2002, we have delivered rigorous, objective, independent testing and analysis for over a decade. With the most knowledgeable staff in the business, testing facilities around the world, and almost 1,600 dedicated network PCs, VeriTest offers our clients the expertise and equipment necessary to meet all their testing needs.

For more information email us at info@veritest.com or call us at 919-380-2800.

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