Principled Technologies®

TEST REPORT
DECEMBER 2009

A performance comparison of current and previous-generation Dell Precision desktop workstation systems

Executive summary

Dell Inc. (Dell) commissioned Principled Technologies (PT) to run a set of tests to compare the performance of two current and one previous-generation Intel® processor-based Dell™ Precision™ desktop workstation systems.

We tested the current systems—a Dell Precision T3500 with an Intel Xeon® Processor W3520 and a Dell Precision T1500 with an Intel Core™ i5 Processor 750—with 32-bit versions of three operating systems: Microsoft® Windows® 7 Ultimate (Windows 7), Microsoft Windows Vista® Ultimate SP2 (Windows Vista), and Windows® XP Professional SP3 (Windows XP).

We tested the previous-generation system, a 4-year-old Dell Precision 390 desktop workstation with an Intel Pentium® D Processor 950, with only 32-bit Windows XP. Appendix A provides detailed system configuration information.

KEY FINDINGS

The current Dell Precision systems with Windows 7 performed better than the 4-year-old Dell Precision 390 on the following tests:

- SYSmark Preview 2007: Dell Precision T3500 had a 153% advantage; Dell Precision T1500 had a 164% advantage. (See Figure 1.)
- SPECint_rate_2006: Dell Precision T3500 had a 317% advantage; Dell Precision T1500 had a 314% advantage. (See Figure 2.)
- SPECfp_rate_2006: Dell Precision T3500 had a 266% advantage; Dell Precision T1500 had a 286% advantage. (See Figure 3.)
- Application responsiveness: Dell Precision T3500 was almost 44% faster; Dell Precision T1500 was 44% faster. (See Figure 4.)
- CINEBENCH R10: Dell Precision T3500 was 78% faster on the single-core test and 230% faster on the dual-core test; Dell Precision T1500 was 88% faster on the single-core test and almost 224% faster on the dual-core test. (See Figure 5.)
- SPECviewperf 10: Dell Precision T3500 was 661% to 2,063% faster across all tests; Dell Precision was T1500 109% to 1,211% faster across all tests. (See Figure 6.)

Our tests fall into two categories: performance and application responsiveness. We used MAXON CINEBENCH R10, SPEC CPU2006, SPECviewperf 10, and SYSmark 2007 Preview v1.06 to test overall system performance. We used custom hand-timed tests to measure application responsiveness. In most instances, we found that the current Dell Precision desktop workstations running Windows 7 outperformed the previous-generation Dell Precision 390 desktop workstation running Windows XP.

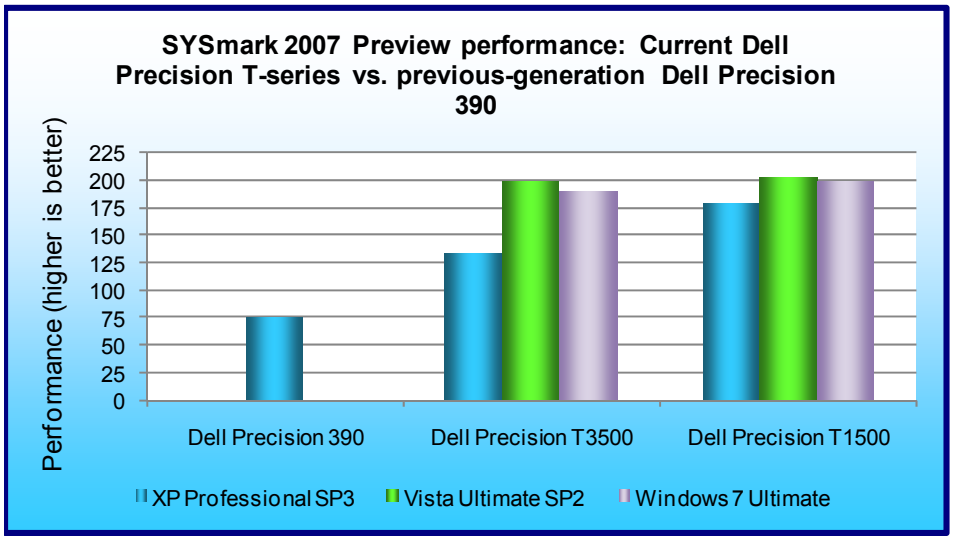

Figure 1: SYSmark 2007 Preview performance results for our test systems. Higher numbers are better.

Figure 1 shows the SYSmark 2007 Preview performance for the current Dell Precision T3500 and Dell Precision T1500 desktop workstations and the previous-generation Dell Precision 390 desktop workstation. The Dell Precision T3500 running Windows 7 achieved a score of 190, outperforming the previous-generation Dell Precision 390's score of 75 by 153 percent, while the Dell Precision T1500 running Windows 7 achieved a score of 198, outperforming the previous generation Dell Precision 390's score of 75 by 164 percent.

The SPEC CPU2006 benchmark consists of two benchmark suites, each of which focuses on a different aspect of compute-intensive performance. CINT2006 measures and compares compute-intensive integer performance, while CFP2006 measures and compares compute-intensive floating-point performance.

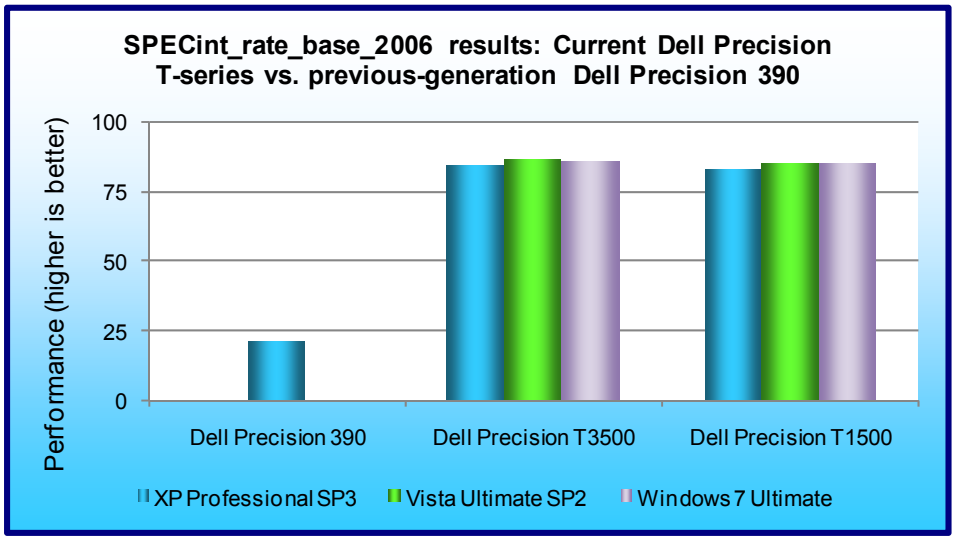

Figure 2: SPECint_rate_base_2006 results for our test systems. Higher numbers are better.

Figure 2 shows the SPECint_rate_base_2006 performance results of each system. The current Dell Precision T3500 running Windows 7 achieved a score of 85.9. This is a 317 percent performance increase over the previous-generation Dell Precision 390, which achieved a score of 20.6. The current Dell Precision T1500 running Windows 7 achieved a score of 85.3, a 314 percent performance increase over the previous-generation Dell Precision 390.

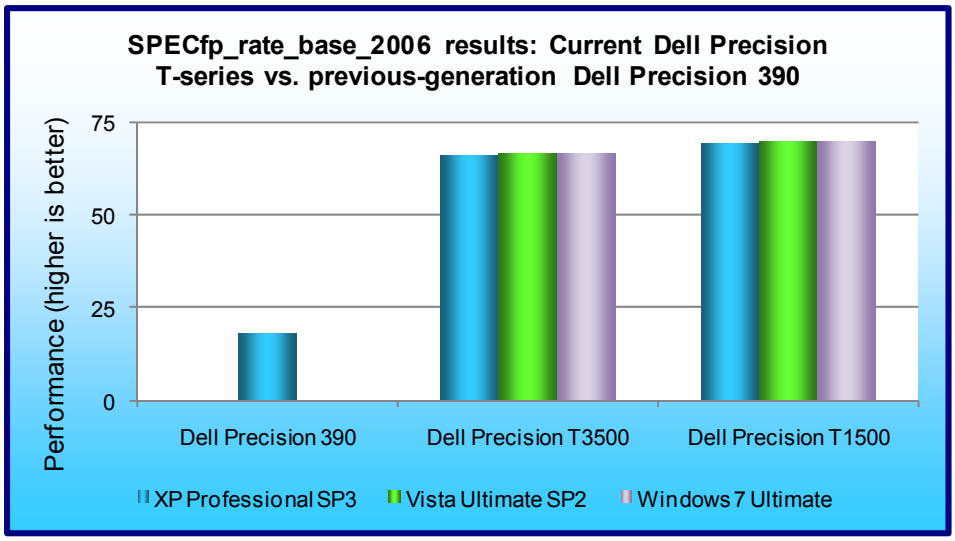

Figure 3: SPECfp_rate_base_2006 results for our test systems. Higher numbers are better.

Figure 3 shows the SPECfp_rate_base_2006 performance results of each system. The current Dell Precision T3500 running Windows 7 achieved a score of 66.3. This is a 266 percent performance increase over the previous-generation Dell Precision 390, which achieved a score of 18.1. The current Dell Precision T1500 running Windows 7 achieved a score of 69.9, a 286 percent performance increase over the previous-generation Dell Precision 390.

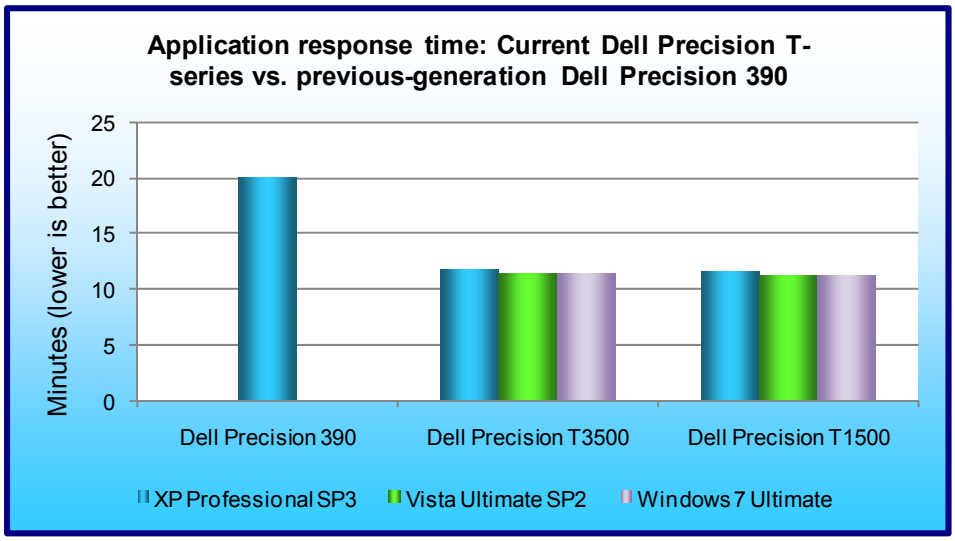

Figure 4 shows the application response time for each system. Both the current Dell Precision T3500 and the current Dell Precision T1500 running Windows 7 responded almost 44 percent faster on our application tests than the previous-generation Dell Precision 390, or almost 9 minutes faster.

Figure 4: Application responsiveness results for our test systems – the sum of the averages for all application responsiveness tests. Lower numbers are better.

MAXON CINEBENCH consists of two main components. The first test sequence targets the computer's main processor. CINEBENCH plays a scene that makes use of various CPU-intensive features. During the first run, the benchmark uses only one CPU or CPU core to determine a reference value. On computers that have multiple CPUs or cores, CINEBENCH runs a second test using all available CPU power. The benchmark produces a single-CPU score for all computers, and a dual-CPU score for those computers with multiple cores.

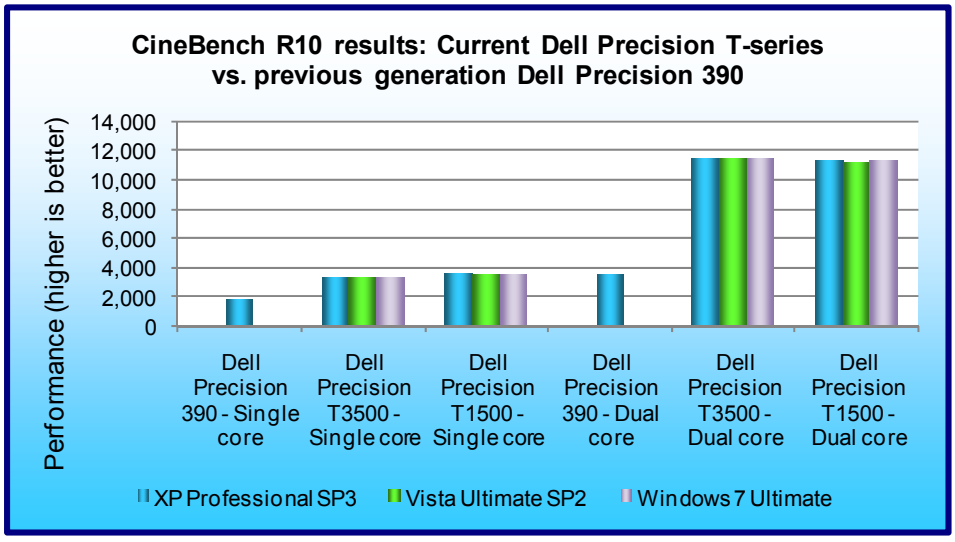

Figure 5 shows the MAXON CINEBENCH R10 single- and dual-core results for each system. The current Dell Precision T3500 and Dell Precision T1500 running Microsoft Windows 7 outperformed the previous-generation Dell Precision 390 in both tests. The Dell Precision T3500 beat the Dell Precision 390 by 78 percent on the single-core test (with respective scores of 3,328 and 1,865), and improved this win to almost 230 percent on the dual-core test (with respective scores of 11,473 and 3,473). The Dell Precision T3500 beat the Dell Precision 390 by 88 percent on the single-core test (with respective scores of 3,510 and 1,865), and improved this win to almost 224 percent on the dual-core test (with respective scores of 11,248 and 3,473).

Figure 5: MAXON CINEBENCH R10 results for our test systems. Higher numbers are better.

SPECviewperf 10 compares the performance of systems running in higher-quality graphics modes, and measures how effectively graphics subsystems scale when running multithreaded graphics content using popular CAD/CAM, visualization and digital content creation applications.

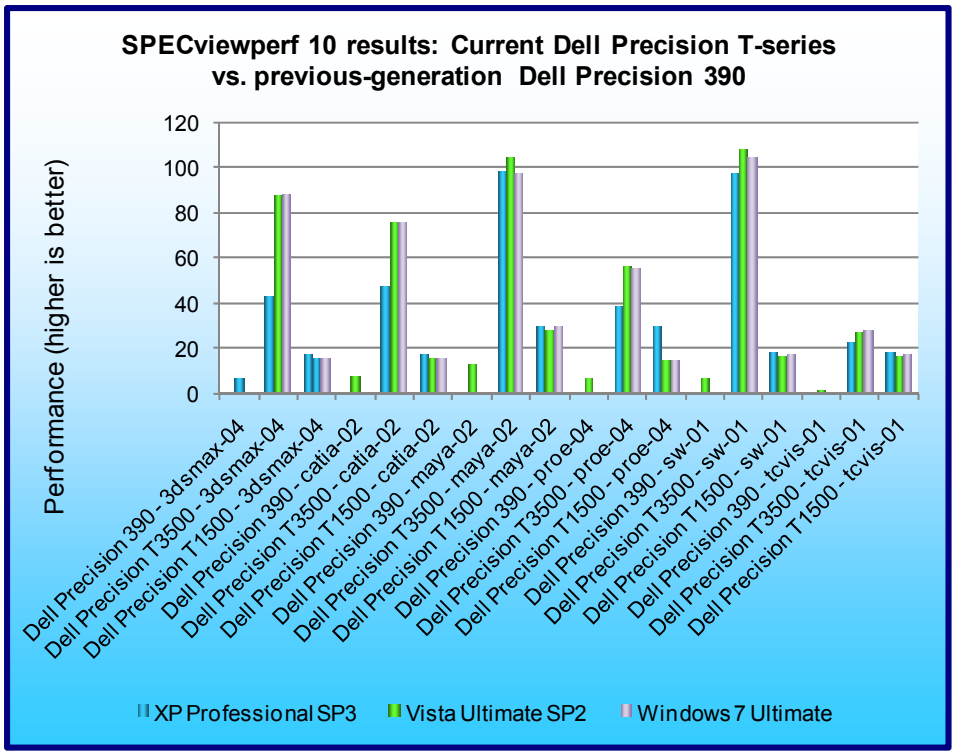

Figure 6 shows the SPECviewperf 10 results of each system. The Dell Precision T3500 running Microsoft Windows 7 outperformed the previous-generation Dell Precision 390 in all tests, with wins ranging from 661 to 2,063 percent. The Dell Precision T1500 running Microsoft Windows 7 outperformed the previous-generation Dell Precision 390 in all tests, with wins ranging from 109 to 1,211 percent. See Appendix B for detailed test results.

Figure 6: SPECviewperf 10 results for our test systems. Higher numbers are better.

Figure 7 shows a more detailed breakdown of application and system responsiveness results for the current Dell Precision T3500 desktop workstation running Windows 7 and the previous-generation Dell Precision 390 desktop workstation running Windows XP. The current Dell Precision T3500 running Windows 7 completed the below tasks over 500 seconds (almost 9 minutes) faster than did the previous-generation Dell Precision 390. For 100 users, this translates to over 15 hours of time saved by moving to the current Dell Precision T3500 running Windows 7.

Application responsiveness and system responsiveness tasks	Previous-generation Dell Precision 390 running Windows XP	Current Dell Precision T3500 running Windows 7	Time saved by upgrading to current Dell Precision T3500
Opening local Word document	6.29	2.48	3.81
Opening local Excel spreadsheet	2.84	1.43	1.41
Opening local PowerPoint deck	1.53	0.76	0.77
Opening Word document over network connection	6.39	2.46	3.93
Opening Excel spreadsheet over network connection	2.84	1.59	1.25
Opening PowerPoint deck over network connection	1.47	0.83	0.64
Installing a 1GB PNY USB stick	8.90	2.21	6.69
Installing a 1GB Kingston USB stick	10.28	2.22	8.06
Re-inserting a 1GB PNY USB stick	2.15	1.37	0.78
Re-inserting a 1GB Kingston USB stick	1.81	1.28	0.53

Application responsiveness and system responsiveness tasks	Previous-generation Dell Precision 390 running Windows XP	Current Dell Precision T3500 running Windows 7	Time saved by upgrading to current Dell Precision T3500
Copying files to another location on the hard drive	14.52	4.31	10.21
Copying files from the hard drive to a USB stick	287.33	307.55	-20.22
Copying files from a USB stick to the hard drive	35.14	30.47	4.67
Ripping a CD – Disc #1	382.10	153.72	228.38
Ripping a CD – Disc #2	438.66	166.27	272.39
Total	1,202.25	678.95	523.30

Figure 7: Application and system responsiveness, in seconds, for the Dell Precision 390 and Dell Precision T3500. Lower numbers are better.

Figure 8 shows a more detailed breakdown of application and system responsiveness results for the current Dell Precision T1500 desktop workstation running Windows 7 and the previous-generation Dell Precision 390 desktop workstation running Windows XP. The current Dell Precision T1500 running Windows 7 completed the below tasks over 500 seconds (almost 9 minutes) faster than did the previous-generation Dell Precision 390. For 100 users, this translates to over 15 hours of time saved by moving to the current Dell Precision T1500 running Windows 7.

Application responsiveness and system responsiveness tasks	Previous-generation Dell Precision 390 running Windows XP	Current Dell Precision T1500 running Windows 7	Time saved by upgrading to current Dell Precision T1500
Opening local Word document	6.29	2.43	3.86
Opening local Excel spreadsheet	2.84	1.59	1.25
Opening local PowerPoint deck	1.53	0.90	0.63
Opening Word document over network connection	6.39	2.53	3.86
Opening Excel spreadsheet over network connection	2.84	1.65	1.19
Opening PowerPoint deck over network connection	1.47	0.96	0.51
Installing a 1GB PNY USB stick	8.90	1.94	6.96
Installing a 1GB Kingston USB stick	10.28	1.90	8.38
Re-inserting a 1GB PNY USB stick	2.15	1.39	0.76
Re-inserting a 1GB Kingston USB stick	1.81	0.94	0.87
Copying files to another location on the hard drive	14.52	3.71	10.81
Copying files from the hard drive to a USB stick	287.33	302.31	-14.98
Copying files from a USB stick to the hard drive	35.14	32.94	2.20
Ripping a CD – Disc #1	382.10	149.34	232.76
Ripping a CD – Disc #2	438.66	162.84	275.82
Total	1,202.25	667.37	534.88

Figure 8: Application and system responsiveness, in seconds, for the Dell Precision 390 and Dell Precision T1500. Lower numbers are better.

Workload

SYSmark 2007 Preview v1.06

SYSmark 2007 Preview is a performance metric BAPCo created to measure system performance.

SYSmark 2007 Preview determines its overall rating from the mean result from four workload scenarios: e-learning, office productivity, video creation, and 3D modeling. SYSmark 2007 Preview records the time the system takes to complete each individual operation in each scenario.

SYSmark 2007 Preview consists of the following applications and corresponding tasks: Adobe® After Effects® 7 (e-learning), Adobe Illustrator® CS2 (video creation), Adobe Photoshop® CS2 (video creation), AutoDesk® 3ds Max® 8 (3D modeling), Macromedia® Flash 8 (e-learning), Microsoft® Excel® 2003 (office productivity), Microsoft Outlook® 2003 (office productivity), Microsoft PowerPoint® 2003 (office productivity), Microsoft Word® 2003 (office productivity), Microsoft Project 2003 (office productivity), Microsoft Windows Media® Encoder 9 series (video creation), Sony® Vegas 7 (video creation), SketchUp 5 (3D modeling), and WinZip® 10.0 (office productivity).

To learn more, visit http://www.bapco.com/support/sysmark2007preview/Help/Help.html.

SPEC CPU2006

The SPEC CPU2006 workload includes two benchmark suites: CINT2006 and CFP2006. (Note: SPEC and SPECint are trademarks of the Standard Performance Evaluation Corporation.) The CINT2006 benchmark focuses on measuring and comparing compute-intensive integer performance, while CFP2006 measures and compares compute-intensive floating-point performance. We ran both benchmarks.

Figure 9 lists the 12 applications that compose the CINT2006 benchmark. SPEC wrote nine of the applications in C and three (471.omnetpp, 473.astar, 483.xalancbmk) in C++. A CINT2006 run performs each of the 12 applications three times and reports the median for each. It also calculates the geometric mean of those 12 results to produce an overall score.

Name	Application area
400.perlbench	Programming language
401.bzip2	Compression
403.gcc	C compiler
429.mcf	Combinatorial optimization
445.gobmk	Artificial intelligence: Go
456.hmmer	Search gene sequence
458.sjeng	Artificial intelligence: chess
462.libquantum	Physics/quantum computing
464.h264ref	Video compression
471.omnetpp	Discrete event simulation
473.astar	Path-finding algorithms
483.xalancbmk	XML processing

Figure 9: The applications that make up the CINT2006 benchmark.

Figure 10 lists the 17 applications that compose the CFP2006 benchmark. SPEC wrote six of the applications in FORTRAN, three using C, four using both FORTRAN and C, and four in C++.

A CFP2006 run performs each of the 17 application (tasks) three times and reports the median for each. It also calculates the geometric mean of those 17 results to produce an overall score.

Name	Application area
410.bwaves	Fluid Dynamics
416.gamess	Quantum Chemistry
433.mic	Physics/Quantum Chromodynamics
434.zeusmp	Physics/CFD
435.gromacs	Biochemistry/Molecular Dynamics
436.cactusADM	Physics/General Relativity
437.leslie3d	Fluid Dynamics
444.namd	Biology/Molecular Dynamics
447.dealII	Finite Element Analysis
450.soplex	Linear Programming, Optimization
453.povray	Image Ray-tracing
454.calculix	Structural Mechanics
459.GemsFDTD	Computational Electromagnetics
465.tonto	Quantum Chemistry
470.lBM	Fluid Dynamics
481.wrf	Weather
482.sphinx3	Speech recognition

Figure 10: The applications that make up the CFP2006 benchmark.

Test methodology

In this section, we provide the methodology for three sets of tests: SYSmark 2007 Preview v.1.06, system responsiveness, and application responsiveness. For the application responsiveness and system responsiveness tests, we ran each test three times, taking the median of the three runs.

Measuring performance with BAPCo SYSmark 2007 Preview v1.06

Setting up the test

1. Reset the system to the base test image.
2. Disable the User Account Control.
    a. Click Start→Control Panel.
    b. At the User Accounts and Family Safety settings screen, click Add or remove user account.
    c. At the User Account Control screen, click Continue.
    d. Click Go to the main User Accounts page.
    e. At the Make changes to your user account screen, click Turn User Account Control on or off.
    f. At the User Account Control screen, click Continue.
    g. Uncheck Use User Account Control to help protect your computer, and click OK.
    h. At the You must restart your computer to apply these changes screen, click Restart Now.
3. Purchase and install SYSmark 2007 Preview v1.05 from https://www.bapcostore.com/store/product.php?productid=16165&cat=251&page=1.
4. At the Welcome to InstallShield Wizard screen, click Next.
5. At the License Agreement screen, select I accept the terms in the License Agreement, and click Next.
6. At the Choose Destination Location screen, click Next.
7. At the Ready to Install the Program screen, click Install.
8. When the installation is complete, click Finish.

Running the test

1. Launch SYSmark 2007 Preview by double-clicking the desktop icon.
2. Click Run.

3. Select Official Run, choose 3 Iterations, check the box beside run conditioning run, and enter a name for that run.
4. When the benchmark completes and the main SYSmark 2007 Preview menu appears, click Save FDR to create a report.

Record the results for each iteration.

Measuring performance with MAXON CINEBENCH R10

Setting up the test

1. Reset the system to the base test image.
2. Download CINEBENCHR10.zip from http://www.MAXON.net/en/downloads/downloads/CINEBENCH.html.
3. Right-click the CINEBENCH ZIP file, and choose Extract All.
4. Click Extract.

Running the test

1. Launch CINEBENCH R10 by double-clicking the CINEBENCH R10.exe file in the CINEBENCH R10 folder.
2. Enter the MHz frequency of the processor in the MHz (real freq.) field.
3. Enter a name in the Tester field.
4. Click the Start all tests button.
5. When the picture finishes rendering in multi-processor mode, save the results.
    a. Click the `to Clipboard` button.
    b. Launch Notepad and paste the results into an empty Notepad document.
    c. Save the results in the format system_run_N.txt.
6. Close CINEBENCH R10.
7. Reboot the system.
8. Repeat steps 1 through 7 two times, and report the median.

Measuring performance with SPEC CPU2006

SPEC CPU2006 configuration

For the Intel processor -based desktop workstations, we used the latest version of the Intel C/C++ and Fortran compiler. We followed SPEC's standard instructions for building the CINT2006 and CFP2006 executables. After studying the best results for this benchmark on the SPEC Web site, we chose the following software tools:

- Intel C/C++ Compiler 11.1.046
- Intel Fortran Compiler 11.1.046
- MicroQuill SmartHeap v8.0

The benchmark requires configuration files. PT used a custom configuration file based on similar tests online. From the SPEC Web site, we chose the most recent (as of the testing for this report) SPEC CPU2006 results that used the above compiler. We used these configuration files, along with modifications to reflect the appropriate system information about the system under test, in our testing. The configuration files we used appear in Appendix B.

To begin the benchmark, we performed the following steps:

- Open a command prompt.
- Change to the c:\cpu2006 directory.
- Type `shrc.bat` at the command prompt.
- Type `runspec -c <config file name> -T base -v 7 --define fast_opt=<fast_option> -r <#> <benchmark suite>` where
    - <config file name> = name of the configuration file

- <fast_option> = "SSE3" for Intel Pentium D processor based systems, and "SSE4.2" for the latest Intel Xeon processors.
- <#> = number of copies to run (we used two or four copies depending on the number of processor cores)
- <benchmark suite> = "fp" when running SPECfp and "int" when running SPECint.

When the run completes, the benchmark puts the results in the directory c:\cpu2006\result. The result file names are of the form CFP2006.<number>.<suffix> and CINT2006.<number>.suffix. The suffixes are html, asc, raw, and pdf. The number is three digits and associates a result file with its log, e.g., CFP2006.002.asc and log.002.

Appendices F and G provide the SPECint_rate_base2006 and SPECfp_rate_base2006 output results for the two test systems.

Measuring performance with SPECviewperf 10

Setting up the test

1. Reset the system to the base test image.
2. Download SPECViewperf10.exe from http://www.spec.org/gwpg/downloadindex.html.
3. Double-click on the SPECViewperf10 executable file to install the benchmark.
4. Click OK at the Language Selection dialog box.
5. Click Next at the Setup dialog box.
6. Click Next to accept the default installation directory.
7. Click Next to install.
8. Update the config.txt file located in the C:\Program Files\SPECopc\SPECViewperf\viewperf\viewperf10.0 directory with the hardware configuration details of the test system.

Running the test

1. Reboot the system.
2. Launch SPECviewperf® 10: Start→Programs\All Programs→SPECopc→ SPECViewperf10.0 Multithread\Viewperf 2 Threads.
3. Close the results viewer at the conclusion of the run, and save a copy of the ViewperfMTsummary.html file.
4. Repeat steps 1 through 3 two times, and report the median.

Application responsiveness tests

Setting up the test workload

We used a specific test workload for four of five test cases. (See Appendix C.) Before running the test on a system image, we copied the workload to both the system itself and to a target system. While the workload is the same for four test cases, we gave the workload folder a unique name for each test case. We describe the initial setup of the test workload below. When applicable, we include steps for renaming the test workload in the setup for the specific test case.

Setting up the test workload on the test system

1. Reset the system to the base image.
2. Copy the Corpus workload folder to the Documents folder (Windows 7, Windows Vista) or the My Documents folder (Windows XP). Note: For simplicity, we will refer to this folder only as the Documents folder throughout this report.

Setting up the test workload on the target system

1. Copy the Corpus folder to the target system.
2. Rename the Corpus folder to `openfiles2`.

Opening Microsoft Office files (local HDD)

This test requires a stopwatch. We used the following test documents:

- TwoCities.docx 496 KB (507,904 bytes)
- Supply Requisition Form2.xlsx 820 KB (839,680 bytes)

- Welcome!.pptx 352 KB (360,448 bytes)

Setting up the test

1. Rename the Corpus folder to `openfiles1`.
2. Reboot the system.
3. Allow the system to idle for 3 minutes before running the test.

Running the test

1. Open the openfiles1 folder.
2. Click once on the TwoCities.docx file to highlight the file.
3. Simultaneously press Enter to open the test document and start the timer.
4. Stop the timer when the document appears.
5. Close Word.
6. Wait 30 seconds.
7. Click the Supply Requisition Form2.xlsx file once to highlight the file.
8. Simultaneously press Enter to open the test spreadsheet and start the timer.
9. Stop the timer when the workbook appears.
10. Close Excel.
11. Wait 30 seconds.
12. Click the Welcome!.pptx file once to highlight the file.
13. Simultaneously press Enter to open the test slide deck and start the timer.
14. Stop the timer when the first slide appears.
15. Close PowerPoint.
16. Repeat steps 2 through 15 two times, and report the median.
17. Close the openfiles1 folder.

Opening Microsoft Office files (over a network using a wired connection)

This test requires a target system on the network and a stopwatch. We used the following test documents:

- TwoCities.docx 496 KB (507,904 bytes)
- Supply Requisition Form2.xlsx 820 KB (839,680 bytes)
- Welcome!.pptx 352 KB (360,448 bytes)

Note: We installed Windows 7 Ultimate (32-bit) on the target system.

Setting up the test

1. Disable the wireless network connection on the test system.
2. Verify the wired network connection works properly.
    a. Open the openfiles2 folder on the test system.
    b. Close the folder.
3. Reboot the system.
4. Allow the system to idle for 3 minutes before running the test.

Running the test

1. Browse to the target system on the network using the test system's wired network connection, and open the openfiles2 folder.
2. Click the TwoCities.docx file once to highlight the file.
3. Simultaneously press Enter to open the test document and start the timer.
4. Stop the timer when the document appears.
5. Close Word.
6. Wait 30 seconds.
7. Click the Supply Requisition Form2.xlsx file once to highlight the file.
8. Simultaneously press Enter to open the test spreadsheet and start the timer.
9. Stop the timer when the workbook appears.
10. Close Excel.
11. Wait 30 seconds.

12. Click the Welcome!.pptx file once to highlight the file.
13. Simultaneously press Enter to open the test slide deck and start the timer.
14. Stop the timer when the first slide appears.
15. Close PowerPoint.
16. Repeat steps 2 through 15 two times, and report the median.
17. Close the openfiles2 folder.

Installing/re-inserting a USB drive

This test requires a stopwatch, a 1GB PNY USB stick, and a 1GB Kingston Traveler USB stick.

Setting up the test

1. Copy the test.mp3 file from the Corpus folder to the PNY USB stick.
2. Copy the test.mp3 file from the Corpus folder to the Kingston USB stick.
3. Copy the 32-bit decay.exe device driver removal tool to the hard drive (e.g., C:\decay.exe).
4. Run the decay.exe tool.
    a. Open an administrative command prompt.
        i. In Windows 7 and Windows Vista, click the Start button, type `cmd` in Start Search, and press Ctrl+Shift+Enter.
        ii. In Windows XP, click the Start button, click Run, type `cmd` and press Enter.
    b. Type `cd C:\` and press Enter.
    c. Type `decay.exe -l` and press Enter to view drivers installed by the two USB sticks.
    d. Type `decay.exe` and press Enter to run the tool and remove these device drivers.
    e. Type `decay.exe -l` and press Enter to confirm that the tool removed the USB device drivers.
5. Reboot the system.
6. Allow the system to idle for 3 minutes before running the test.

Running the test

1. Simultaneously insert the PNY USB stick into USB port #1 and start the timer.
2. Stop the timer when the AutoPlay menu for the USB stick appears on the desktop.
3. After the USB device driver software installs successfully, remove the USB stick using the Safely Remove Hardware tool.
4. Wait 30 seconds.
5. Simultaneously insert the PNY USB stick into USB port #2 and start the timer.
6. Stop the timer when the AutoPlay menu for the USB stick appears on the desktop.
7. Remove the USB stick using the Safely Remove Hardware tool.
8. Wait 30 seconds.
9. Simultaneously insert the Kingston USB stick into USB port #1 and start the timer.
10. Stop the timer when the AutoPlay menu for the USB stick appears on the desktop.
11. After the USB device driver software installs successfully, remove the USB stick using the Safely Remove Hardware tool.
12. Wait 30 seconds.
13. Simultaneously insert the Kingston USB stick into USB port #2 and start the timer.
14. Stop the timer when the AutoPlay menu for the USB stick appears on the desktop.
15. Remove the USB stick using the Safely Remove Hardware tool.
16. Run the decay.exe tool.
    a. Open an administrative command prompt.
        i. In Windows 7 and Windows Vista, click the Start button, type `cmd` in Start Search, and press Ctrl+Shift+Enter.
        ii. In Windows XP, click the Start button, click Run, type `cmd` and press Enter.
    b. Type `cd C:\` and press Enter.
    c. Type `decay.exe -l` and press Enter to view drivers installed by the two USB sticks.
    d. Type `decay.exe` and press Enter to run the tool and remove these device drivers.
    e. Type `decay.exe -l` and press Enter to confirm that the tool removed the USB device drivers.
17. Repeat steps 1 through 16 two times, and report the median.

Copying files

This test requires a stopwatch, a 1GB Kingston Traveler USB stick, and the following workload:

- Corpus: 426 MB (446,697,472 bytes)

Setting up the test

1. Rename the openfiles1 folder to `copyfileslocal1`.
2. Right-click the copyfileslocal1 folder, and select Copy.
3. Right-click the Document folder, and select Paste.
4. Rename the new folder to `copyfilesusb1`.
5. Create two new output folders in the in Documents folder (e.g., `testouta1` and `testoutb1`).
6. Insert the USB stick, and create one output folder on the USB drive (e.g., E:\`testusbout1`).
7. Remove the USB stick using the Safely Remove Hardware tool.
8. Reboot the system.
9. Allow the system to idle for 3 minutes before running the test.

Running the test

1. Open the copyfileslocal1 workload folder in the Documents folder.
2. Press Ctrl+A to select all files, right-click the files, and select Copy.
3. Open the testouta1 folder.
4. Right-click the testouta1 folder.
5. Simultaneously select Paste and start the timer.
6. Stop the timer when the copy operation is complete, as indicated by the disappearance of the copy status bar.
7. Delete the testouta1 folder from the Documents folder, and empty the Recycle Bin.
8. Insert the USB stick into a USB port.
9. Open the copyfilesusb1 workload folder in the Documents folder.
10. Press Ctrl+A to select all files, right-click the files, and select Copy.
11. Open the testusbout1 folder on the USB stick.
12. Right-click the testusbout1 folder.
13. Simultaneously select Paste and start the timer.
14. Stop the timer when the copy operation is complete, as indicated by the disappearance of the copy status bar.
15. Rename the testusbout1 folder to `testusbin1` and remove the USB stick using the Safely Remove Hardware tool.
16. Re-insert the USB stick into the same USB port.
17. Open the testusbin1 folder.
18. Press Ctrl+A to select all files, right-click the files, and select Copy.
19. Open the testoutb1 folder in the Documents folder.
20. Right-click the testoutb1 folder.
21. Simultaneously select Paste and start the timer.
22. Stop the timer when the copy operation is complete, as indicated by the disappearance of the copy status bar.
23. Repeat steps 1 through 22 two more times, using the following steps to set up the test for each subsequent run.
    a. Delete the testusbin1 folder from the USB stick.
    b. Create a new output folder with a different unique name on the USB drive (e.g., E:\`testusbout2`).
    c. Remove the USB stick using the Safely Remove Hardware tool.
    d. Delete the testoutb1 folder from the Documents folder, and empty the Recycle Bin.
    e. Create two new output folders with unique names in the Documents folder (e.g., `testouta2` and `testoutb2`).
    f. Rename both the copyfileslocal1 and copyfilesusb2 workloads to unique names (e.g., `copyfileslocal2` and `copyfilesusb2`).

Appendix A – Detailed system configuration information

Figure 11 presents the configuration details for the current desktop workstation systems.

Current system	Dell Precision T3500	Dell Precision T1500
General		
Processor and OS kernel: (physical, core, logical) / (UP, MP)	1P,4C,4L / MP	1P,4C,4L / MP
System power management policy Windows XP	Dell Desktop Power Methodology	Dell Desktop Power Methodology
System power management policy Windows Vista	Dell Desktop Power Methodology	Dell Desktop Power Methodology
System power management policy Windows 7	Dell Desktop Power Methodology	Dell Desktop Power Methodology
Processor power-saving option	EIST	EIST
CPU		
Vendor	Intel	Intel
Name	Xeon	Core i5
Model number	W3520	750
Stepping	D0	B1
Socket type and number of pins	LGA1366	LGA1156
Core frequency (GHz)	2.67	2.67
Front-side bus frequency	2400 QPI Link	2400 QPI Link
L1 cache	32 KB + 32 KB (per core)	32 KB + 32 KB (per core)
L2 cache	1 MB (256 KB per core)	1 MB (256 KB per core)
L3 cache (MB)	8	8
Platform		
Vendor	Dell	Dell
Motherboard model number	0XPDFK	0P67HD
Motherboard chipset	Intel X58	Intel P55
Motherboard revision number	13	11
System/motherboard serial number	FCSPVK1	2GTXVH1
BIOS name and version	Dell A02 (05/22/2009)	Dell 1.0.1 (09/18/2009)
BIOS settings	Default	Default
Memory module(s)		
Vendor and model number	Samsung M391B5673DZ1-CF8	Elpida EBJ21UE8BBF0-DJ-F
Type	PC3-8500	PC3-10700
Speed (MHz)	1,066	1,333
Speed running in the system (MHz)	1,066	1,333
Timing/Latency (tCL-tRCD-tRP-tRASmin)	7-7-7-20	9-9-9-24
Size (MB)	4,096	4,096
Number of memory module(s)	2 x 2,048 MB	2 x 2,048 MB
Channel (single/dual)	Dual	Dual
Hard disk		
Vendor and model number	Seagate ST3250318AS	Western Digital WD1600AAJS-75M0A0
Size (GB)	250	160
Buffer size (MB)	8	8
RPM	7,200	7,200
Type	SATA 3.0 Gb/s	SATA 3.0 Gb/s
Controller	Intel 82801JR (ICH10R)	Intel PCH

Current system	Dell Precision T3500	Dell Precision T1500
Driver Windows XP	Intel 8.8.0.1009 (02/11/2009)	Intel 8.9.2.1002 (08/07/2009)
Driver Windows XP 64 bit	Intel 8.9.0.1023 (06/04/2009)	Intel 8.9.0.1023 (06/04/2009)
Driver Windows Vista	Intel 6.2.0.1019 (09/28/2007)	Intel 8.9.2.1002 (08/07/2009)
Driver Windows Vista 64 bit	Intel 8.9.0.1023 (06/04/2009)	Intel 8.9.2.1002 (08/07/2009)
Driver Windows 7	Intel 8.9.2.1002 (08/07/2009)	Intel 8.9.2.1002 (08/07/2009)
Driver Windows 7 64 bit	Intel 8.9.0.1023 (06/04/2009)	Intel 8.9.2.1002 (08/07/2009)
Operating system		
Windows XP		
Name	Windows XP Professional	Windows XP Professional
Build number	2600	2600
Service pack	3	3
File system	NTFS	NTFS
Kernel	ACPI Multiprocessor PC	ACPI Multiprocessor PC
Language	English	English
Microsoft DirectX version	9.0c	9.0c
Windows Vista		
Name	Microsoft Windows Vista Ultimate	Microsoft Windows Vista Ultimate
Build number	6002	6002
Service pack	2	2
File system	NTFS	NTFS
Kernel	ACPI x86-based PC	ACPI x86-based PC
Language	English	English
Microsoft DirectX version	10	10
Windows 7		
Name	Microsoft Windows 7 Ultimate	Microsoft Windows 7 Ultimate
Build number	7600	7600
Service pack	NA	NA
File system	NTFS	NTFS
Kernel	ACPI x86-based PC	ACPI x86-based PC
Language	English	English
Microsoft DirectX version	11	11
Graphics		
Vendor and model number	2 x NVIDIA Quadro FX 1800	NVIDIA Quadro NVS 295
Type	Discrete	Discrete
Chipset	Quadro FX 1800	Quadro NVS 295
BIOS version	62.94.6E.00.19	62.98.56.00.11
Total available graphics memory (MB)	1,917	1,531
Dedicated video memory (MB)	768	256
System video memory (MB)	0	0
Shared system memory (MB)	1,149	1,275
Resolution	1,280 x 1,024 x 32 bit	1,280 x 1,024 x 32 bit
Driver Windows XP	NVIDIA 6.14.11.8267 (05/12/2009)	NVIDIA 6.14.11.8246 (03/17/2009)
Driver Windows XP 64 bit	NVIDIA 6.14.11.7864 (12/17/2008)	NVIDIA 6.14.11.9100 (09/12/2009)
Driver Windows Vista	NVIDIA 7.15.11.8267 (05/12/2009)	NVIDIA 6.14.11.8246 (03/17/2009)
Driver Windows Vista 64 bit	NVIDIA 6.14.11.7864 (12/17/2008)	NVIDIA 7.15.11.8267 (05/12/2009)
Driver Windows 7	NVIDIA 8.15.11.9038 (07/14/2009)	NVIDIA 8.15.11.9038 (07/14/2009)
Driver Windows 7 64 bit	NVIDIA 8.15.11.9038 (07/14/2009)	NVIDIA 8.15.11.9038 (07/14/2009)
Sound card/subsystem		
Vendor and model number	SoundMAX Integrated Digital High Definition Audio	Realtek High Definition Audio

Current system	Dell Precision T3500	Dell Precision T1500
Driver Windows XP	Analog Devices 5.10.1.5852 (08/22/2008)	Realtek 5.10.0.5904 (07/28/2009)
Driver Windows XP 64 bit	Analog Devices 5.10.2.5852 (08/22/2008)	Realtek 5.10.0.5969 (10/28/2009)
Driver Windows Vista	Analog Devices 6.10.1.5853 (02/13/2009)	Realtek 5.10.0.5904 (07/28/2009)
Driver Windows Vista 64 bit	Analog Devices 6.10.1.5853 (02/13/2009)	Realtek 6.0.1.5859 (05/23/2009)
Driver Windows 7	Analog Devices 6.10.1.7250 (04/23/2009)	Realtek 5.10.0.5904 (07/28/2009)
Driver Windows 7 64 bit	Microsoft 6.1.7600.16385 (07/13/2009)	Realtek 6.0.1.5859 (05/23/2009)
Ethernet		
Vendor and model number	Broadcom NetXtreme 57xx Gigabit	Broadcom NetLink Gigabit
Driver Windows XP	Broadcom 11.7.2.0 (10/22/2008)	Broadcom 12.2.2.1 (08/04/2009)
Driver Windows XP 64 bit	Broadcom 11.7.2.0 (10/22/2008)	Broadcom 12.2.0.3 (05/29/2009)
Driver Windows Vista	Broadcom 11.7.2.0 (10/22/2008)	Broadcom 12.2.2.2 (08/06/2009)
Driver Windows Vista 64 bit	Broadcom 11.7.2.0 (10/22/2008)	Broadcom 12.2.1.0 (06/07/2009)
Driver Windows 7	Broadcom 12.2.0.3 (05/28/2009)	Broadcom 12.2.2.2 (08/06/2009)
Driver Windows 7 64 bit	Microsoft 10.100.4.0 (04/26/2009)	Broadcom 12.2.1.0 (06/07/2009)
Optical drive(s)		
Vendor and model number	TSSTcorp TS-H653G	LG GH50N
Type	DVD-RW	DVD-RW
Interface	SATA	SATA
Dual/Single layer	Dual	Dual
USB ports		
Number	8	10
Type	USB 2.0	USB 2.0
Other	NA	Media card reader
IEEE 1394 ports		
Number	NA	NA
Monitor		
LCD type	Dell E2210H	Dell E2210H
Screen size (inches)	21.5	21.5
Refresh rate (Hz)	60	60

Figure 11: Detailed system configuration for the current Dell Precision desktop workstations.

Figure 12 presents the the configuration details for the previous-generation desktop workstation system.

Previous-generation system	Dell Precision 390
General	
Processor and OS kernel: (physical, core, logical) / (UP, MP)	1P,2C,2L / MP
System power management policy Windows XP	Dell Desktop Power Methodology
Processor power-saving option	EIST
CPU	
Vendor	Intel
Name	Pentium D
Model number	950
Stepping	B1
Socket type and number of pins	LGA 775
Core frequency (GHz)	3.40
Front-side bus frequency (MHz)	800
L1 cache	16 KB + 12 KB (per core)
L2 cache	4 MB (2 MB per core)
Platform	
Vendor	Dell
Motherboard model number	0MY510
Motherboard chipset	Intel i975X
Motherboard revision number	A0
System/motherboard serial number	PS030835
BIOS name and version	Dell 2.6.0 (05/22/08)
BIOS settings	Default
Memory module(s)	
Vendor and model number	Infineon 72T64000HU3SA
Type	PC2-5300
Speed (MHz)	667
Speed running in the system (MHz)	667
Timing/Latency (tCL-tRCD-tRP-tRASmin)	5-5-5-15
Size (MB)	512
Number of memory module(s)	1
Channel (single/dual)	Single
Hard disk	
Vendor and model number	Samsung HD080HJ/P
Size (GB)	80
Buffer size (MB)	8
RPM	7,200
Type	SATA 3.0 Gb/s
Controller	Intel 82801GB (ICH7/R)
Driver Windows XP	Intel 7.6.1.1002 (07/26/2007)
Operation system Windows XP	
Name	Windows XP Professional
Build number	2600
Service pack	3
File system	NTFS
Kernel	ACPI Multiprocessor PC
Language	English

Previous-generation system	Dell Precision 390
Microsoft DirectX version	9.0c
Graphics	
Vendor and model number	NVIDIA Quadro NVS 285
Type	Discrete
Chipset	Quadro NVS 285
BIOS version	5.44.2.21.9
Total available graphics memory (MB)	64
Resolution	1280 x 1024 x 32 bit
Driver Windows XP	NVIDIA 6.14.11.8267 (05/12/2009)
Sound card/subsystem	
Vendor and model number	SigmaTel High Definition Audio CODEC
Driver Windows XP	SigmaTel 5.10.0.4991 (03/20/2006)
Ethernet	
Vendor and model number	Broadcom NetXtreme 57xx Gigabit
Driver Windows XP	Broadcom 10.39.0.0 (06/05/2007)
Optical drive(s)	
Vendor and model number	Lite-On LTN486S
Type	CD-ROM
Interface	IDE
Dual/Single layer	Single
USB ports	
Number	7
Type	USB 2.0
Other	NA
IEEE 1394 ports	
Number	NA
Monitor	
LCD type	ViewSonic Optiquest Q7
Screen size (inches)	17
Refresh rate (Hz)	60

Figure 12: Detailed system configuration for the previous-generation Dell Precision 390 desktop workstation.

Appendix B – Detailed results

Figures 13 through 15 present the detailed test results for the systems.

Current system	Dell Precision T3500		
Operating system	**Windows XP Professional SP3**	**Windows Vista Ultimate SP2**	**Windows 7 Ultimate**
Application responsiveness			
Test case 1a: Opening files using common office applications (local HDD)			
Word document appears - median	00:02.24	00:02.61	00:02.48
Excel workbook appears - median	00:01.37	00:01.79	00:01.43
PowerPoint slide appears - median	00:00.75	00:00.83	00:00.76
Test case 1b: Opening files using common office applications (wired)			
Word document appears - median	00:02.35	00:02.60	00:02.46
Excel workbook appears - median	00:01.39	00:01.65	00:01.59
PowerPoint slide appears - median	00:00.76	00:00.84	00:00.83
Test case 2: Installing/re-inserting a USB drive			
Installing PNY USB stick - median	00:09.56	00:02.68	00:02.21
Installing Kingston USB stick - median	00:09.88	00:02.25	00:02.22
Re-inserting PNY USB stick - median	00:01.56	00:01.75	00:01.37
Re-inserting Kingston USB stick - median	00:01.63	00:01.36	00:01.28
Test case 3: Copying files locally			
Copying files to another location on the C: drive - median	00:13.08	00:05.71	00:04.31
Copying files from the hard drive to a USB stick - median	05:03.81	05:07.37	05:07.55
Copying files from a USB stick to the hard drive - median	00:29.27	00:31.94	00:30.47
Test case 4: Ripping a CD			
Disc #1 ripped - median	02:35.11	02:34.08	02:33.72
Disc #2 ripped - median	02:47.95	02:39.31	02:46.27
Industry-standard benchmarks			
BAPCo SYSmark 2007 Preview v1.06			
SYSmark 2007 Preview v1.06 Rating	134	199	190
MAXON CINEBENCH R10			
CB Single	3,350	3,319	3,328
CB Dual	11,498	11,488	11,473
Open GL	6,180	4,380	5,980
Multiprocessor speedup	3.43	3.44	3.44
SPEC CPU2006			
SPECint_rate_base_2006	84.20	86.60	85.90
SPECfp_rate_base_2006	65.90	66.30	66.30
SPECviewperf 10			
3dsmax-04	42.52	87.41	88.05
Catia-02	47.58	75.48	75.53
Maya-02	98.26	104.34	97.04
Proe-02	38.55	55.89	55.10
Sw-01	97.33	107.65	103.88
Tcvis-01	22.52	26.84	27.25

Figure 13: Detailed test results for the current Dell Precision T3500 desktop workstation system.

Current system	Dell Precision T1500		
Operating system	**Windows XP Professional SP3**	**Windows Vista Ultimate SP2**	**Windows 7 Ultimate**
Application responsiveness			
Test case 1a: Opening files using common office applications (local HDD)			
Word document appears - median	00:02.28	00:02.46	00:02.43
Excel workbook appears - median	00:01.51	00:01.56	00:01.59
PowerPoint slide appears - median	00:00.90	00:00.87	00:00.90
Test case 1b: Opening files using common office applications (wired)			
Word document appears - median	00:02.45	00:02.62	00:02.53
Excel workbook appears - median	00:01.82	00:01.77	00:01.65
PowerPoint slide appears - median	00:01.10	00:01.10	00:00.96
Test case 2: Installing/re-inserting a USB drive			
Installing PNY USB stick - median	00:09.18	00:02.31	00:01.94
Installing Kingston USB stick - median	00:09.12	00:01.83	00:01.90
Re-inserting PNY USB stick - median	00:01.49	00:01.48	00:01.39
Re-inserting Kingston USB stick - median	00:01.08	00:00.95	00:00.94
Test case 3: Copying files locally			
Copying files to another location on the C: drive - median	00:09.84	00:04.32	00:03.71
Copying files from the hard drive to a USB stick - median	05:00.60	05:01.02	05:02.31
Copying files from a USB stick to the hard drive - median	00:38.85	00:33.47	00:32.94
Test case 4: Ripping a CD			
Disc #1 ripped - median	02:30.13	02:29.08	02:29.34
Disc #2 ripped - median	02:43.37	02:39.49	02:42.84
Industry-standard benchmarks			
BAPCo SYSmark 2007 Preview v1.06			
SYSmark 2007 Preview v1.06 Rating	178	203	198
MAXON CINEBENCH R10			
CB Single	3,542	3,451	3,510
CB Dual	11,270	11,219	11,248
Open GL	3,026	2,997	2,994
Multiprocessor speedup	33.19	33.25	3.21
SPEC CPU2006			
SPECint_rate_base_2006	83.10	85.10	85.30
SPECfp_rate_base_2006	69.50	69.90	69.90
SPECviewperf 10			
3dsmax-04	17.04	14.95	15.27
Catia-02	16.66	15.25	15.59
Maya-02	29.40	27.34	29.17
Proe-02	17.27	14.16	13.86
Sw-01	17.44	16.21	16.52
Tcvis-01	2.31	2.08	2.33

Figure 14: Detailed test results for the current Dell Precision T1500 desktop workstation system.

Previous-generation system	Dell Precision 390
Operating system	**Windows XP Professional SP3**
Application responsiveness	
Test case 1a: Opening files using common office applications (local HDD)	
Word document appears - median	00:06.29
Excel workbook appears - median	00:02.84
PowerPoint slide appears - median	00:01.53
Test case 1b: Opening files using common office applications (wired)	
Word document appears - median	00:06.39
Excel workbook appears - median	00:02.84
PowerPoint slide appears - median	00:01.47
Test case 2: Installing/re-inserting a USB drive	
Installing PNY USB stick - median	00:08.90
Installing Kingston USB stick - median	00:10.28
Re-inserting PNY USB stick - median	00:02.15
Re-inserting Kingston USB stick - median	00:01.81
Test case 3: Copying files locally	
Copying files to another location on the C: drive - median	00:14.52
Copying files from the hard drive to a USB stick - median	04:47.33
Copying files from a USB stick to the hard drive - median	00:35.14
Test case 4: Ripping a CD	
Disc #1 ripped - median	06:22.10
Disc #2 ripped - median	07:18.66
Industry-standard benchmarks	
BAPCo SYSmark 2007 Preview v1.06	
SYSmark 2007 Preview v1.06 Rating	75
SPEC CPU2006	
SPECint_rate_base_2006	20.60
SPECfp_rate_base_2006	18.10
MAXON CINEBENCH R10	
CB Single	1,865
CB Dual	3,473
Open GL	1,544
Multiprocessor speedup	1.86
SPECviewperf 10	
3dsmax-04	6.43
Catia-02	7.25
Maya-02	12.75
Proe-02	6.64
Sw-01	6.40
Tcvis-01	1.26

Figure 15: Detailed test results for the previous-generation Dell Precision 390 desktop workstation system.

Appendix C – Corpus contents

The 426MB (446,697,762 bytes) test workload included the following files:

11/6/2005	7:14 PM	1,161,163	19th Century Asylum.JPG
9/3/2007	6:10 PM	14,239	2008 calendar10 (2).xlsx
9/3/2007	6:10 PM	14,239	2008 calendar10.xlsx
9/3/2007	11:35 PM	617,349	3boat-Jerome10 (2).docx
9/12/2007	12:57 AM	675,901	3boat-Jerome10 (2).pdf
9/12/2007	12:57 AM	1,071,399	3boat-Jerome10 (2).xps
9/3/2007	11:35 PM	617,349	3boat-Jerome10.docx
9/12/2007	12:57 AM	675,901	3boat-Jerome10.pdf
9/12/2007	12:57 AM	1,071,399	3boat-Jerome10.xps
9/9/2007	1:32 AM	11,947	Adjustable Meeting Agenda template1 (2).xlsx
9/9/2007	1:32 AM	11,947	Adjustable Meeting Agenda template1.xlsx
9/9/2007	2:01 AM	197,621	Adventure Works (2).pptx
9/9/2007	2:01 AM	197,621	Adventure Works.pptx
9/9/2007	1:18 AM	11,953	Agenda1 (2).xlsx
9/9/2007	1:18 AM	11,953	Agenda1.xlsx
9/3/2007	6:14 PM	11,968	Agenda10 (2).xlsx
9/3/2007	6:14 PM	11,968	Agenda10.xlsx
9/3/2007	5:58 PM	774,350	alice-carroll10 (2).docx
9/12/2007	12:56 AM	518,539	alice-carroll10 (2).pdf
9/12/2007	12:56 AM	629,597	alice-carroll10 (2).xps
9/3/2007	5:58 PM	774,350	alice-carroll10.docx
9/12/2007	12:56 AM	518,539	alice-carroll10.pdf
9/12/2007	12:56 AM	629,597	alice-carroll10.xps
7/28/2003	7:56 AM	70,144	Analysis (2).xls
7/28/2003	7:56 AM	70,144	Analysis.xls
9/16/2005	8:39 PM	1,074,183	Ancient christian stone marking Patrick's well.JPG
8/26/2005	5:12 PM	1,041,140	Art Gallery.JPG
9/10/2007	1:16 AM	26,694	Automation (2).rar
9/10/2007	1:16 AM	26,694	Automation.rar
12/19/2003	11:42 PM	16,896	bank24 (2).xls
12/19/2003	11:42 PM	16,896	bank24.xls
12/19/2003	11:42 PM	16,384	bank24temp (2).xls
12/19/2003	11:42 PM	16,384	bank24temp.xls
9/9/2007	1:13 AM	19,547	Bidder comparison worksheet and process1 (2).xlsx
9/9/2007	1:13 AM	19,547	Bidder comparison worksheet and process1.xlsx
9/3/2007	6:15 PM	24,480	Breakeven analysis10 (2).xlsx
9/3/2007	6:15 PM	24,480	Breakeven analysis10.xlsx
9/9/2005	4:22 PM	1,236,485	Bust of Collins.JPG
12/19/2003	11:42 PM	27,136	capbudget (2).xls
12/19/2003	11:42 PM	27,136	capbudget.xls
12/19/2003	11:42 PM	26,624	capbudgettemp (2).xls
12/19/2003	11:42 PM	26,624	capbudgettemp.xls
9/16/2005	8:38 PM	1,135,462	Christ Church 1038 AD.JPG
9/9/2007	12:16 AM	118,051	ChristmasCarol (2).docx

9/12/2007	12:56 AM	287,538	ChristmasCarol (2).pdf
9/12/2007	12:55 AM	507,684	ChristmasCarol (2).xps
9/9/2007	12:16 AM	118,051	ChristmasCarol.docx
9/12/2007	12:56 AM	287,538	ChristmasCarol.pdf
9/12/2007	12:55 AM	507,684	ChristmasCarol.xps
9/9/2005	4:21 PM	1,160,640	Church Altar-All Mosaic! (2).JPG
9/9/2005	4:21 PM	1,160,640	Church Altar-All Mosaic!.JPG
12/19/2003	11:42 PM	24,064	ciscoexpo (2).xls
12/19/2003	11:42 PM	24,064	ciscoexpo.xls
12/19/2003	11:43 PM	15,872	ciscoexpotemp (2).xls
12/19/2003	11:43 PM	15,872	ciscoexpotemp.xls
9/9/2005	4:21 PM	1,049,553	Clonakilty (2).JPG
9/9/2005	4:21 PM	1,049,553	Clonakilty.JPG
9/9/2007	2:03 AM	107,778	Communicating Bad News (2).pptx
9/9/2007	2:03 AM	107,778	Communicating Bad News.pptx
9/9/2007	2:23 AM	142,036	Company Handbook (2).pptx
9/9/2007	2:23 AM	142,036	Company Handbook.pptx
9/9/2007	2:24 AM	137,524	Company Meeting Title (2).pptx
9/9/2007	2:24 AM	137,524	Company Meeting Title.pptx
9/9/2007	2:09 AM	126,324	Company Meeting3 (2).pptx
9/9/2007	2:09 AM	126,324	Company Meeting3.pptx
9/9/2007	1:58 AM	252,618	Company Name (2).pptx
9/9/2007	1:58 AM	252,618	Company Name.pptx
9/9/2007	2:05 AM	340,381	Company Name2 (2).pptx
9/9/2007	2:05 AM	340,381	Company Name2.pptx
9/9/2007	2:18 AM	165,587	Company Name4 (2).pptx
9/9/2007	2:17 AM	165,587	Company Name4.pptx
9/9/2007	9:46 PM	1,467,429	conference (2).pptx
9/9/2007	9:46 PM	1,467,429	conference.pptx
9/11/2007	12:31 AM	1,468,617	conferenceA (2).pptx
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9/9/2007	12:51 PM	803,809	Microsoft© Office9.pptx
9/9/2007	4:07 PM	702,034	Microsoft© Office9.rar

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12/19/2003	11:42 PM	13,824	PVtemp.xls

9/9/2007	2:13 AM	75,931	Quarterly Results and.pptx
12/19/2003	11:42 PM	41,984	randdemo.xls
12/19/2003	11:43 PM	27,136	randdemotemp.xls
9/9/2007	2:18 AM	76,882	Recommending a Strategy.pptx
12/19/2003	11:42 PM	17,920	ReorderPoint_Backorder.xls
12/19/2003	11:42 PM	17,920	ReorderPoint_Lostsales.xls
9/9/2007	2:23 AM	122,701	Reporting Progress or Status.pptx
9/9/2007	2:06 AM	161,158	Return on Investment.pptx
10/1/2005	8:19 PM	1,288,715	Ring of Kerry.JPG
11/5/2005	6:39 PM	1,070,887	River Lee rising.JPG
11/6/2005	7:13 PM	1,109,309	River Rising.JPG
9/9/2007	2:27 PM	632,401	RoughingIt.docx
9/11/2007	12:03 AM	45,764	s1-s10.rar
12/19/2003	11:42 PM	13,824	s10_1.xls
12/19/2003	11:42 PM	13,824	s10_10.xls
12/19/2003	11:42 PM	13,824	s10_2.xls
12/19/2003	11:42 PM	15,872	s10_3.xls
12/19/2003	11:42 PM	13,824	s10_4.xls
12/19/2003	11:42 PM	13,824	s10_5.xls
12/19/2003	11:42 PM	14,336	s10_6.xls
12/19/2003	11:42 PM	97,280	S10_7.xls
12/19/2003	11:42 PM	97,280	s10_8.xls
12/19/2003	11:42 PM	13,824	s10_9.xls
9/11/2007	12:04 AM	10,898	s24.rar
12/19/2003	11:42 PM	13,824	s24_1.xls
12/19/2003	11:42 PM	13,824	s24_2.xls
12/19/2003	11:42 PM	13,824	s24_3.xls
12/19/2003	11:42 PM	13,824	s24_4.xls
12/19/2003	11:42 PM	13,824	s24_5.xls
12/19/2003	11:42 PM	13,824	s24_6.xls
12/19/2003	11:42 PM	13,824	s24_7.xls
9/11/2007	12:04 AM	11,542	s25.zip
12/19/2003	11:42 PM	14,848	s25_1.xls
12/19/2003	11:42 PM	15,360	s25_2.xls
12/19/2003	11:42 PM	14,848	s25_3.xls
12/19/2003	11:42 PM	14,848	s25_4.xls
12/19/2003	11:42 PM	15,360	s25_5.xls
9/11/2007	12:05 AM	12,276	s26.zip
12/19/2003	11:42 PM	16,384	s26_1.xls
12/19/2003	11:42 PM	16,896	s26_2.xls
12/19/2003	11:42 PM	19,968	s26_3.xls
12/19/2003	11:42 PM	15,360	s26_4.xls
12/19/2003	11:42 PM	16,896	s27_1.xls
12/19/2003	11:42 PM	17,920	s27_2.xls
12/19/2003	11:42 PM	16,896	s27_3.xls
12/19/2003	11:42 PM	15,360	s27_4.xls
12/19/2003	11:42 PM	29,696	s28_1.xls
12/19/2003	11:42 PM	17,408	s28_2.xls
12/19/2003	11:42 PM	23,552	s29_1.xls
12/19/2003	11:42 PM	23,552	s29_2.xls

12/19/2003	11:42 PM	16,384	s29_3.xls
12/19/2003	11:42 PM	26,112	s29_4.xls
12/19/2003	11:42 PM	15,872	s29_5.xls
12/19/2003	11:42 PM	264,192	S30_1.xls
12/19/2003	11:42 PM	259,584	s30_2.xls
12/19/2003	11:42 PM	56,832	s30_3.xls
12/19/2003	11:42 PM	13,824	s30_4.xls
12/19/2003	11:42 PM	13,824	s30_5.xls
12/19/2003	11:42 PM	22,016	S42problems1thru4.xls
12/19/2003	11:42 PM	21,504	S42problems1thru5.xls
9/11/2007	12:06 AM	149,171	s58.zip
12/19/2003	11:42 PM	404,480	s58_1.xls
12/19/2003	11:42 PM	207,360	s58_2.xls
12/19/2003	11:42 PM	17,408	s66_1.xls
12/19/2003	11:42 PM	16,896	s66_2.xls
12/19/2003	11:42 PM	13,824	s66_3.xls
9/3/2007	6:20 PM	30,418	Sales effectiveness.xlsx
9/9/2007	1:52 AM	15,474	Sales order1.xlsx
9/9/2007	2:20 AM	164,904	Sales proposal.pptx
9/9/2007	2:17 AM	54,168	Sales Training.pptx
9/9/2007	9:58 PM	54,185	Sales Training2.pptx
9/9/2007	10:02 PM	48,145	Sales Training3.pptx
1/24/2008	10:26 AM	109	Search
1/24/2008	12:21 PM	0	SearchCorpus.txt
9/9/2007	2:12 AM	68,502	Selling a Product or Service.pptx
12/19/2003	11:42 PM	18,944	ServiceLevelReorder.xls
9/9/2007	1:46 AM	12,139	Software Inventory1.xlsx
9/9/2007	9:55 PM	68,590	Staff Training.pptx
7/28/2003	7:56 AM	150,016	Staff.xls
7/28/2003	7:56 AM	142,336	Staff2.xls
9/3/2007	5:31 PM	139,054	Status charts10.pptx
11/6/2005	7:15 PM	1,744,412	Stone path.JPG
9/11/2007	12:15 AM	1,741,369	Stone path.zip
11/6/2005	7:15 PM	1,752,998	Stone staircase.JPG
9/11/2007	12:18 AM	837,626	Supply Requisition Form2.xlsx
9/11/2007	12:18 AM	838,128	Supply Requisition Form3.xlsx
9/11/2007	12:19 AM	837,886	Supply Requisition Form4.xlsx
9/11/2007	12:20 AM	837,884	Supply Requisition Form5.xlsx
1/24/2008	10:20 AM	1,463,296	Test methodology.doc
1/16/2000	5:48 PM	3,941,355	test.mp3
9/9/2007	9:56 PM	90,037	Title of Training Presentation.pptx
9/9/2007	10:01 PM	58,226	Title of Training Presentation2.pptx
9/9/2007	12:29 AM	281,104	TomSawyer.docx
9/9/2007	12:27 AM	124,045	TomSawyerAbroad.docx
9/9/2007	10:03 PM	172,469	Training Presentation.pptx
12/19/2003	11:42 PM	18,944	transport.xls
12/19/2003	11:42 PM	16,384	transporttemp.xls
9/9/2007	1:14 AM	25,007	Treasury analysis worksheet1.xlsx
7/28/2003	7:56 AM	27,136	TreeOrders.xls
9/9/2007	12:24 AM	504,476	TwoCities.docx

12/19/2003	11:42 PM	177,664	valentine.xls
12/19/2003	11:43 PM	13,824	valentinetemp.xls
9/9/2007	1:58 AM	357,867	Welcome!.pptx
9/9/2007	2:21 AM	121,946	Welcome!2.pptx
9/9/2007	10:56 AM	174,213	Widescreen Presentation.pptx
9/3/2007	6:13 PM	38,404	worker hours10.xlsx

Appendix D – SPEC CPU2006 configuration file

This appendix contains the benchmark configuration file we used to test the desktop workstations.

```
############################################################################
# CPU2006 - Windows (32-bit) Config file for Intel Processors
#
# Intel C++/FORTRAN Compiler 11.1
############################################################################
action        = validate
tune          = base

# Works only on Vista32, Server2003 and all x64 Windows operating systems.
# Does *not* work on Win XP32
# submit= specperl -e "system sprintf qq{start /b /wait /affinity %x %s}, (1<<$SPECCOPYNUM), q{ $command
} "

PATHSEP       = /
check_md5     = 1
reportable    = 1
backup_config = 0
output_format = asc,html

flagsurl000   = dell.flags.ic11.0.win.xml

mean_anyway   = 1

%ifdef %{fast_opt}
fast_opt      = -Qx%{fast_opt}
%else
%define fast_opt
fast_opt      =
%endif
ext           = ic11.1.046.win32_x%{fast_opt}.exe

# --------------------------
#  Edit fields as necessary
# --------------------------
default:

hw_cpu_name        =
hw_cpu_char        =
hw_cpu_mhz         =
hw_disk            =
hw_fpu             =
hw_memory          =
hw_model           =

hw_ncpuorder       =
hw_ncores          =
hw_nthreadspercore =
hw_nchips          =
hw_ncoresperchip   =

hw_ocache          =
hw_other           =
hw_pcache          =

hw_scache          =
hw_tcache          =

sw_file            =
sw_os              =
sw_state           =

hw_avail           =
sw_avail           =

#
# This section only needed if there are non-default BIOS settings
```

```
#
#notes_plat_010 = BIOS Settings
#notes_plat_012 =   Hyper-Threading set to ON.
#notes_plat_013 =   Adjacent Cache Line Prefetch set to ON.

#notes_os_010   = KMP_AFFINITY set to granularity=fine,scatter.
#notes_os_020   = OMP_NUM_THREADS set to number of available cores.

license_num   = 3184
hw_vendor     = Dell Inc.
tester        = Principled Technologies, Inc.
test_sponsor  = Dell Inc.

############################################
# Optimizations - Windows  32-bit /RATE
############################################

sw_base_ptrsize = 32-bit
sw_peak_ptrsize = 32-bit

all_c,all_cpp=default:
EXTRA_LDFLAGS  = /F512000000

all_fortran,all_mixed=default:
EXTRA_LDFLAGS  = /F1000000000


# ================================
#  Compiler description/information
# ================================
default:

sw_compiler000 = Intel C++ Compiler for IA-32, Version 11.1
sw_compiler001 =    Build 20090903 Package ID: w_cproc_p_11.1.046

fp:
sw_compiler010 = Intel Visual FORTRAN Compiler for IA-32, Version 11.1
sw_compiler011 =    Build 20090903 Package ID: w_cproc_p_11.1.046

default:
sw_compiler002 = Microsoft Visual Studio 2008 SP1
sw_other       = MicroQuill SmartHeap Library 8.0

notes_000= Binaries were built on Windows XP Profession SP3 (32-bit)

# =================
#  Portability
# =================
default:

403.gcc=default=default=default:
CPORTABILITY      = -DSPEC_CPU_WIN32
EXTRA_CFLAGS      = -Dalloca=_alloca

436.cactusADM=default=default=default:
FPORTABILITY      = -Qlowercase /assume:underscore

444.namd=default=default=default:
CXXPORTABILITY    =  -TP

447.dealII=default=default=default:
PORTABILITY       = -DDEAL_II_MEMBER_VAR_SPECIALIZATION_BUG

453.povray=default=default=default:
CXXPORTABILITY    = -DSPEC_CPU_WINDOWS_ICL

454.calculix=default=default=default:
FPORTABILITY     = -Qlowercase
PORTABILITY      = -DSPEC_CPU_NOZMODIFIER

464.h264ref=default=default=default:
```

```
PORTABILITY       = -DSPEC_CPU_NO_INTTYPES -DWIN32

481.wrf=default:
CPORTABILITY     = -DSPEC_CPU_WINDOWS_ICL

483.xalancbmk=default=default=default:
CXXPORTABILITY    = -Qoption,cpp,--no_wchar_t_keyword

######################################################################
# Compiler Setup
######################################################################
default:

CC  = icl -Qvc9 -Qstd=c99
CXX = icl -Qvc9
FC  = ifort
OBJ = .obj

# ============================================
# Library Tuning Flags
# ============================================
all_cpp=default:
EXTRA_LIBS = shlw32m.lib
LDOUT = -Fe$@ -link /FORCE:MULTIPLE

# ============================================
# Baseline Tuning Flags
# ============================================

int=base:
OPTIMIZE=       $[fast_opt] -Qipo -O3 -Qprec-div- -Qopt-prefetch
CXXOPTIMIZE=    -Qcxx_features

fp=base:
OPTIMIZE=       $[fast_opt] -Qipo -O3 -Qprec-div- -Qopt-prefetch
CXXOPTIMIZE=    -Qcxx_features

# ============================================
# Peak Tuning Flags
# ============================================

default=peak:
basepeak=yes
```

Appendix E – SPECint_rate_base2006 output

This appendix provides the output of the benchmark for each of the test desktop workstations.

Current Dell Precision T3500: Intel Xeon Processor-based desktop workstation system

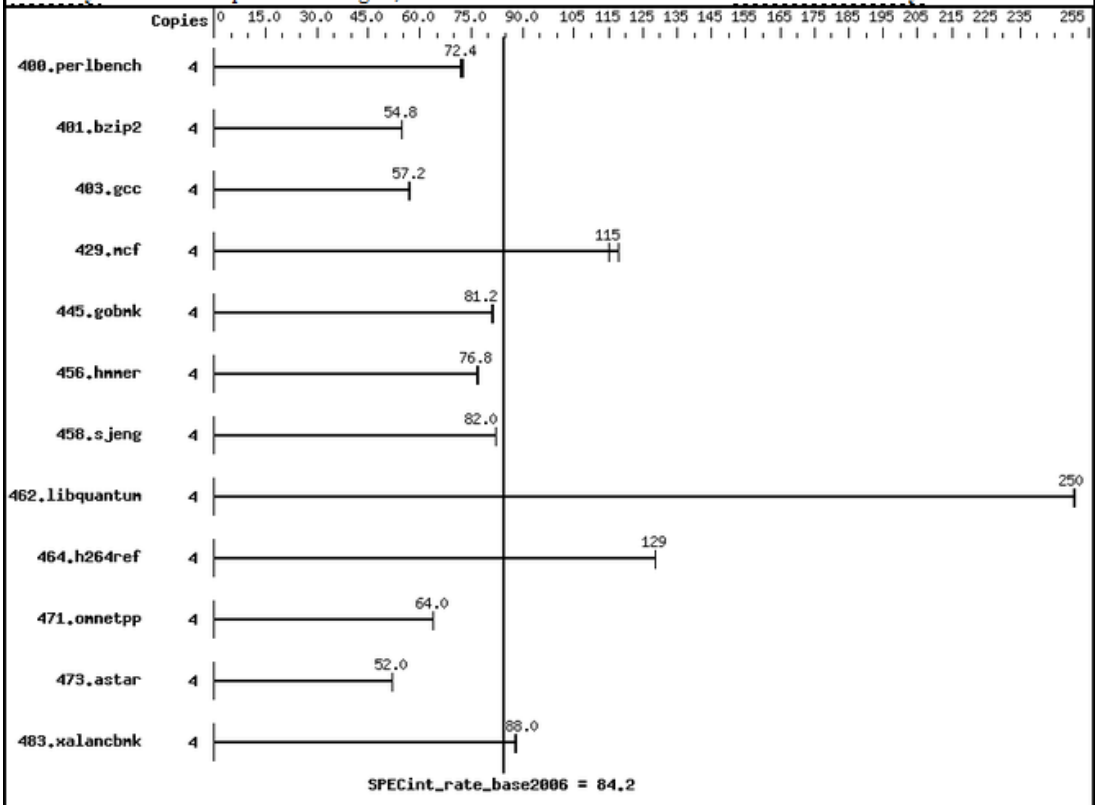
SPEC® CINT2006 Result

Copyright 2006-2008 Standard Performance Evaluation Corporation

Dell Inc.
Dell Precision T3500 (Intel Xeon W3520, 2.67 GHz)

SPECint® rate2006 = Not Run
SPECint rate base2006 = 84.2

CPU2006 license:	3184	**Test date:**	Oct-2009
Test sponsor:	Dell Inc.	**Hardware Availability:**	Aug-2009
Tested by:	Principled Technologies, Inc.	**Software Availability:**	Feb-2009



Hardware

CPU Name:	Intel Xeon W3520
CPU Characteristics:	Intel Turbo Boost Technology up to 2.67 GHz
CPU MHz:	2667
FPU:	Integrated
CPU(s) enabled:	4 cores, 1 chip, 4 cores/chip, 2 threads/core
CPU(s) orderable:	1 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core
L3 Cache:	8 MB I+D on chip per chip
Other Cache:	None
Memory:	4 GB (2x2 GB PC3-10600E)
Disk Subsystem:	1 x 80GB SATA 7200 RPM
Other Hardware:	None

Software

Operating System:	Windows XP Professional SP3 (64-bit)
Compiler:	Intel C++ Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046 Microsoft Visual Studio 2008 SP1
Auto Parallel:	No
File System:	NTFS
System State:	Default
Base Pointers:	32-bit
Peak Pointers:	32-bit
Other Software:	MicroQuill SmartHeap Library 8.0

SPEC® CINT2006 Result

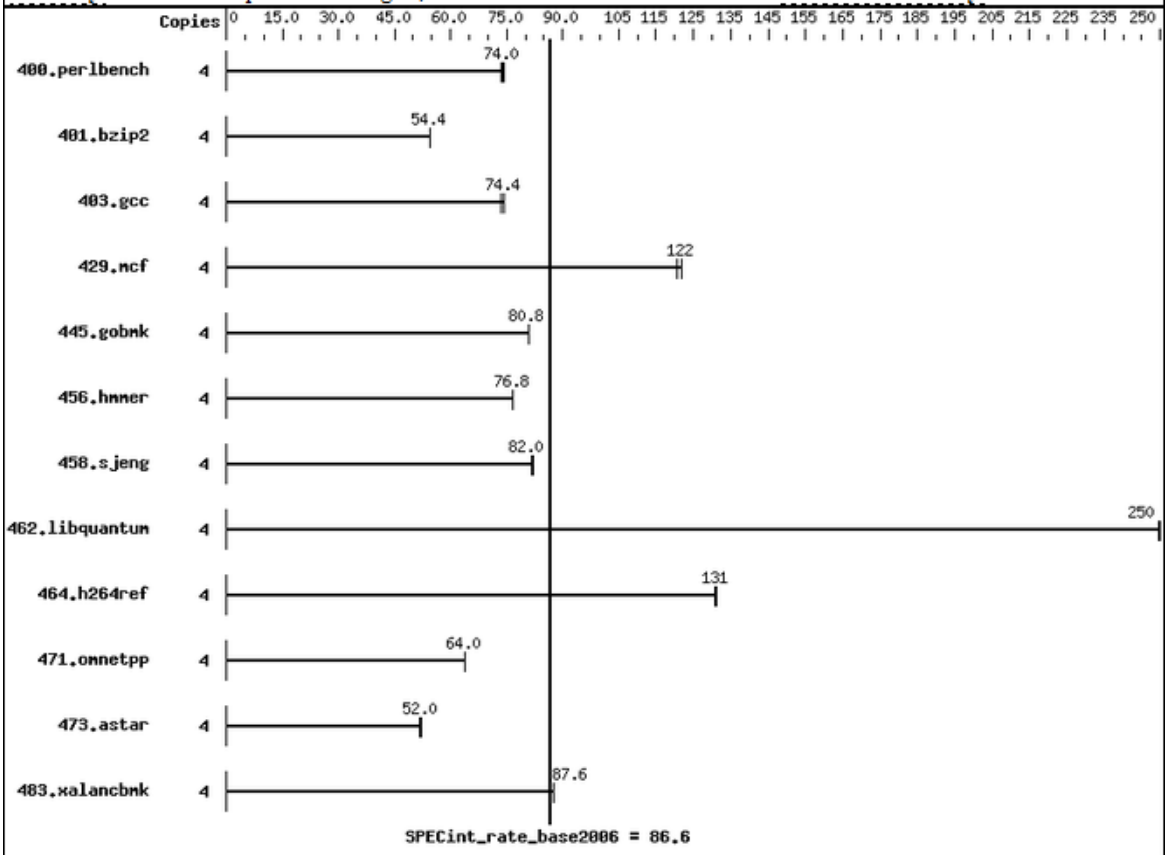
Copyright 2006-2008 Standard Performance Evaluation Corporation

Dell Inc.
Dell Precision T3500 (Intel Xeon W3520, 2.67 GHz)

SPECint®_rate2006 = Not Run
SPECint_rate_base2006 = 86.6

CPU2006 license: 3184
Test sponsor: Dell Inc.
Tested by: Principled Technologies, Inc.

Test date: Oct-2009
Hardware Availability: Aug-2009
Software Availability: Feb-2009



Hardware

CPU Name:	Intel Xeon W3520
CPU Characteristics:	Intel Turbo Boost Technology up to 2.67 GHz
CPU MHz:	2667
FPU:	Integrated
CPU(s) enabled:	4 cores, 1 chip, 4 cores/chip, 2 threads/core
CPU(s) orderable:	1 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core
L3 Cache:	8 MB I+D on chip per chip
Other Cache:	None
Memory:	4 GB (2x2 GB PC3-10600E)
Disk Subsystem:	1 x 80GB SATA 7200 RPM
Other Hardware:	None

Software

Operating System:	Windows Vista Ultimate SP2 (64-bit)
Compiler:	Intel C++ Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046 Microsoft Visual Studio 2008 SP1
Auto Parallel:	No
File System:	NTFS
System State:	Default
Base Pointers:	32-bit
Peak Pointers:	32-bit
Other Software:	MicroQuill SmartHeap Library 8.0

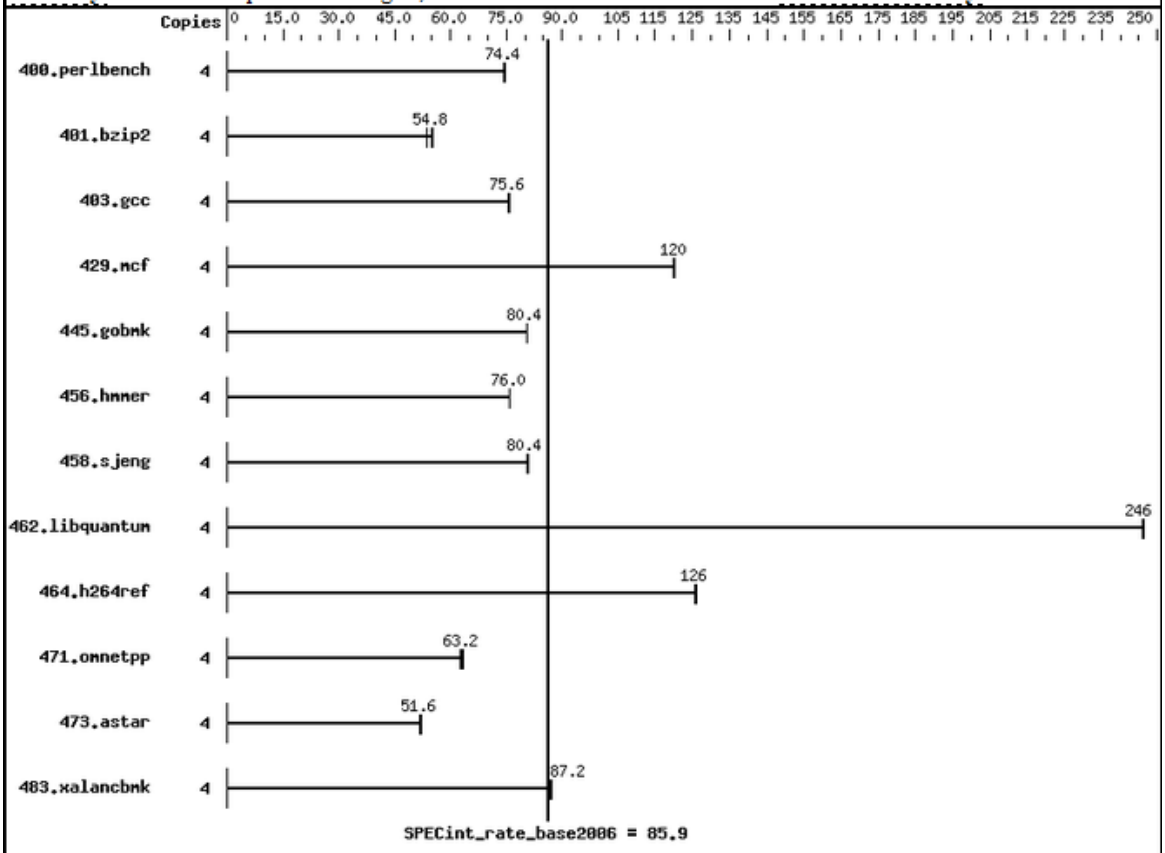
SPEC® CINT2006 Result

Copyright 2006-2008 Standard Performance Evaluation Corporation

Dell Inc.
Dell Precision T3500 (Intel Xeon W3520, 2.67 GHz)

SPECint®_rate2006 = Not Run
SPECint_rate_base2006 = 85.9

CPU2006 license:	3184	**Test date:**	Oct-2009
Test sponsor:	Dell Inc.	**Hardware Availability:**	Aug-2009
Tested by:	Principled Technologies, Inc.	**Software Availability:**	Feb-2009



Hardware

CPU Name:	Intel Xeon W3520
CPU Characteristics:	Intel Turbo Boost Technology up to 2.67 GHz
CPU MHz:	2667
FPU:	Integrated
CPU(s) enabled:	4 cores, 1 chip, 4 cores/chip, 2 threads/core
CPU(s) orderable:	1 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core
L3 Cache:	8 MB I+D on chip per chip
Other Cache:	None
Memory:	4 GB (2x2 GB PC3-10600E)
Disk Subsystem:	1 x 80GB SATA 7200 RPM
Other Hardware:	None

Software

Operating System:	Windows 7 Ultimate (64-bit)
Compiler:	Intel C++ Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046 Microsoft Visual Studio 2008 SP1
Auto Parallel:	No
File System:	NTFS
System State:	Default
Base Pointers:	32-bit
Peak Pointers:	32-bit
Other Software:	MicroQuill SmartHeap Library 8.0

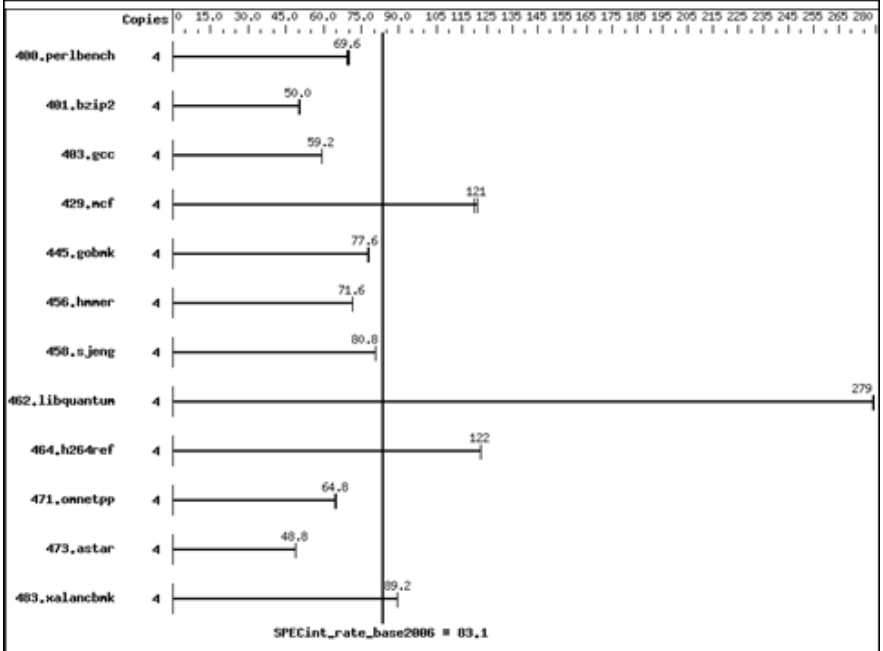
Current Dell Precision T1500: Intel Core i5 Processor-based desktop workstation system

SPEC®·CINT2006·Result¶

Copyright·2006-2008·Standard·Performance·Evaluation·Corporation¶

Dell·Inc.¶
Dell·Precision·T1500·(Intel·Core·i5·750,·2.67·GHz)¶
SPECint®_rate2006·=·Not·Run¶
SPECint_rate_base2006·=·83.1¶

CPU2006·license:¤	3184¤	**Test·date:**¤	Nov-2009¤
Test·sponsor:¤	Dell·Inc.¤	**Hardware·Availability:**¤	Aug-2009¤
Tested·by:¤	Principled·Technologies,·Inc.¤	**Software·Availability:**¤	Feb-2009¤



Hardware¤

CPU·Name:¤	Intel·Core·i5·750¤
CPU·Characteristics:¤	Intel·Turbo·Boost·Technology·up·to·2.67·GHz¤
CPU·MHz:¤	2667¤
FPU:¤	Integrated¤
CPU(s)·enabled:¤	4·cores,·1·chip,·4·cores/chip,·2·threads/core¤
CPU(s)·orderable:¤	1·chip¤
Primary·Cache:¤	32·KB·I·+·32·KB·D·on·chip·per·core¤
Secondary·Cache:¤	256·KB·I+D·on·chip·per·core¤
L3·Cache:¤	8·MB·I+D·on·chip·per·chip¤
Other·Cache:¤	None¤
Memory:¤	4·GB·(2x2·GB·PC3-10600)¤
Disk·Subsystem:¤	1·x·1600GB·SATA·7200·RPM¤
Other·Hardware:¤	None¤

Software¤

Operating·System:¤	Windows·XP·Professional·SP3·(64-bit)¤
Compiler:¤	Intel·C++·Compiler·for·IA-32,·Version·11.1↵ Build·20090903·Package·ID:·w_cproc_p_11.1.046↵ Microsoft·Visual·Studio·2008·SP1¤
Auto·Parallel:¤	No¤
File·System:¤	NTFS¤
System·State:¤	Default¤
Base·Pointers:¤	64-bit¤
Peak·Pointers:¤	64-bit¤
Other·Software:¤	MicroQuill·SmartHeap·Library·8.0¤

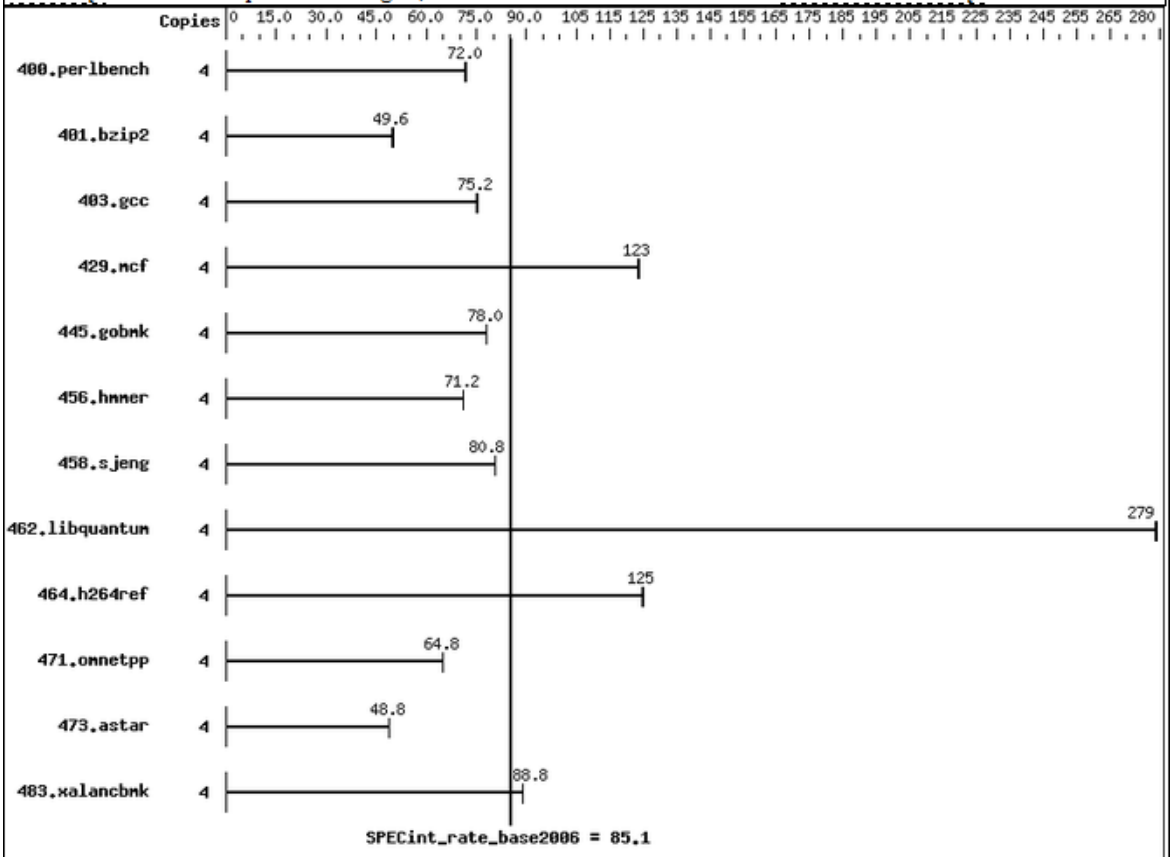
SPEC® CINT2006 Result

Copyright 2006-2008 Standard Performance Evaluation Corporation

Dell Inc.
Dell Precision T1500 (Intel Core i5 750, 2.67 GHz)

SPECint®_rate2006 = Not Run
SPECint_rate_base2006 = 85.1

CPU2006 license:	3184	**Test date:**	Nov-2009
Test sponsor:	Dell Inc.	**Hardware Availability:**	Aug-2009
Tested by:	Principled Technologies, Inc.	**Software Availability:**	Feb-2009



Hardware

CPU Name:	Intel Core i5 750
CPU Characteristics:	Intel Turbo Boost Technology up to 2.67 GHz
CPU MHz:	2667
FPU:	Integrated
CPU(s) enabled:	4 cores, 1 chip, 4 cores/chip, 2 threads/core
CPU(s) orderable:	1 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core
L3 Cache:	8 MB I+D on chip per chip
Other Cache:	None
Memory:	4 GB (2x2 GB PC3-10600)
Disk Subsystem:	1 x 160GB SATA 7200 RPM
Other Hardware:	None

Software

Operating System:	Windows Vista Ultimate SP2 (64-bit)
Compiler:	Intel C++ Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046 Microsoft Visual Studio 2008 SP1
Auto Parallel:	No
File System:	NTFS
System State:	Default
Base Pointers:	32-bit
Peak Pointers:	32-bit
Other Software:	MicroQuill SmartHeap Library 8.0

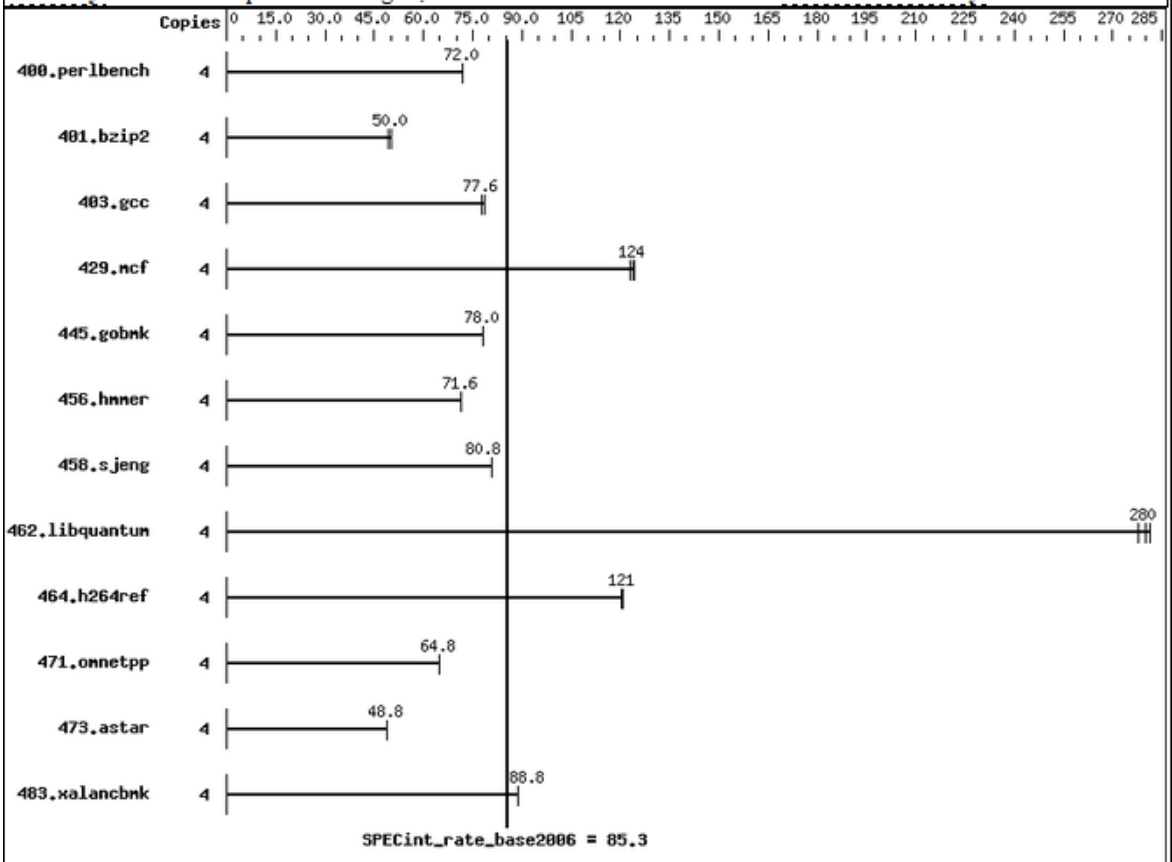
SPEC® CINT2006 Result

Copyright 2006-2008 Standard Performance Evaluation Corporation

Dell Inc.
Dell Precision T1500 (Intel Core i5 750, 2.67 GHz)

SPECint®_rate2006 = Not Run
SPECint_rate_base2006 = 85.3

CPU2006 license:	3184	Test date:	Nov-2009
Test sponsor:	Dell Inc.	Hardware Availability:	Aug-2009
Tested by:	Principled Technologies, Inc.	Software Availability:	Feb-2009



Hardware

CPU Name:	Intel Core i5 750
CPU Characteristics:	Intel Turbo Boost Technology up to 2.67 GHz
CPU MHz:	2667
FPU:	Integrated
CPU(s) enabled:	4 cores, 1 chip, 4 cores/chip, 2 threads/core
CPU(s) orderable:	1 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core
L3 Cache:	8 MB I+D on chip per chip
Other Cache:	None
Memory:	4 GB (2x2 GB PC3-10600)
Disk Subsystem:	1 x 160GB SATA 7200 RPM
Other Hardware:	None

Software

Operating System:	Windows 7 Ultimate (64-bit)
Compiler:	Intel C++ Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046 Microsoft Visual Studio 2008 SP1
Auto Parallel:	No
File System:	NTFS
System State:	Default
Base Pointers:	32-bit
Peak Pointers:	32-bit
Other Software:	MicroQuill SmartHeap Library 8.0

Previous-generation Dell Precision 390: Intel Pentium D Processor 950-based desktop workstation system

SPEC® CINT2006 Result

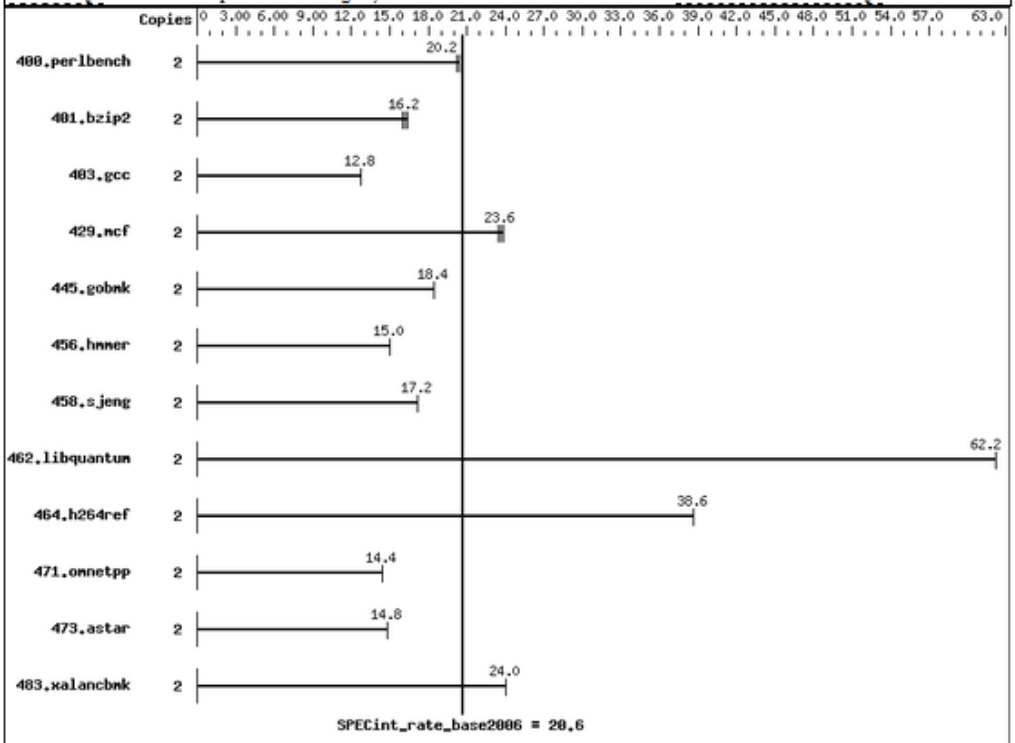
Copyright 2006-2008 Standard Performance Evaluation Corporation

Dell Inc.
Dell Precision 390 (Intel Pentium D 950, 3.40 GHz)

SPECint® rate2006 = Not Run
SPECint rate base2006 = 20.6

CPU2006 license: 3184
Test sponsor: Dell Inc.
Tested by: Principled Technologies, Inc.

Test date: Oct-2009
Hardware Availability: Aug-2009
Software Availability: Feb-2009



Hardware

CPU Name:	Intel Pentium D 950
CPU Characteristics:	Intel Turbo Boost Technology up to 3.40 GHz
CPU MHz:	3400
FPU:	Integrated
CPU(s) enabled:	2 cores, 1 chip, 2 cores/chip, 1 thread/core
CPU(s) orderable:	1 chip
Primary Cache:	16 KB I + 12 KB D on chip per core
Secondary Cache:	4 MB I+D on chip per core
Other Cache:	None
Memory:	2 GB (2x1 GB PC2-5300)
Disk Subsystem:	1 x 80GB SATA 7200 RPM
Other Hardware:	None

Software

Operating System:	Windows XP Professional SP3 (32-bit)
Compiler:	Intel C++ Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046 Microsoft Visual Studio 2008 SP1
Auto Parallel:	No
File System:	NTFS
System State:	Default
Base Pointers:	32-bit
Peak Pointers:	32-bit
Other Software:	MicroQuill SmartHeap Library 8.0

Appendix F – SPECfp_rate_base2006 output

This appendix provides the output of the benchmark for each of the test desktop workstations.

Current Dell Precision T3500: Intel Xeon Processor-based desktop workstation system

SPEC® CFP2006 Result

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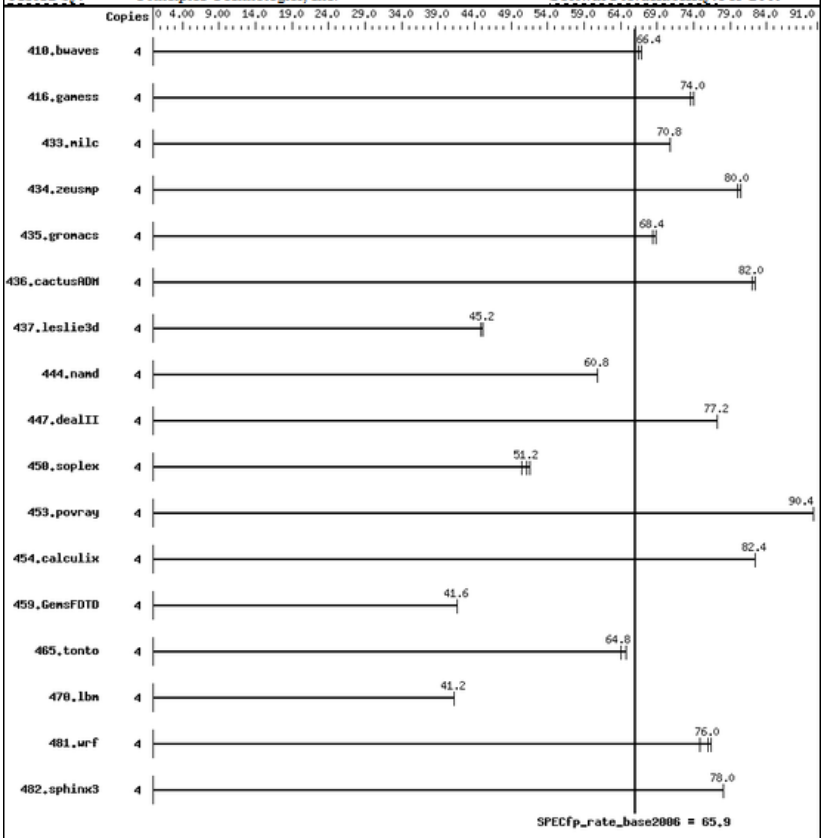
Dell Inc.
Dell Precision T3500 (Intel Xeon W3520, 2.67 GHz)

SPECfp®_rate2006 = Not Run
SPECfp_rate_base2006 = 65.9

CPU2006 license: 3184
Test sponsor: Dell Inc.
Tested by: Principled Technologies, Inc.

Test date: Oct-2009
Hardware Availability: Aug-2009
Software Availability: Feb-2009



Hardware

CPU Name:	Intel Xeon W3520
CPU Characteristics:	Intel Turbo Boost Technology up to 2.67 GHz
CPU MHz:	2667
FPU:	Integrated
CPU(s) enabled:	4 cores, 1 chip, 4 cores/chip, 2 threads/core
CPU(s) orderable:	1 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core
L3 Cache:	8 MB I+D on chip per chip
Other Cache:	None
Memory:	4 GB (2x2 GB PC3-10600E)
Disk Subsystem:	1 x 80GB SATA 7200 RPM
Other Hardware:	None

Software

Operating System:	Windows XP Professional SP3 (64-bit)
Compiler:	Intel C++ Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046 Microsoft Visual Studio 2008 SP1 Intel Visual FORTRAN Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046
Auto Parallel:	No
File System:	NTFS
System State:	Default
Base Pointers:	32-bit
Peak Pointers:	32-bit
Other Software:	MicroQuill SmartHeap Library 8.0

SPEC® CFP2006 Result

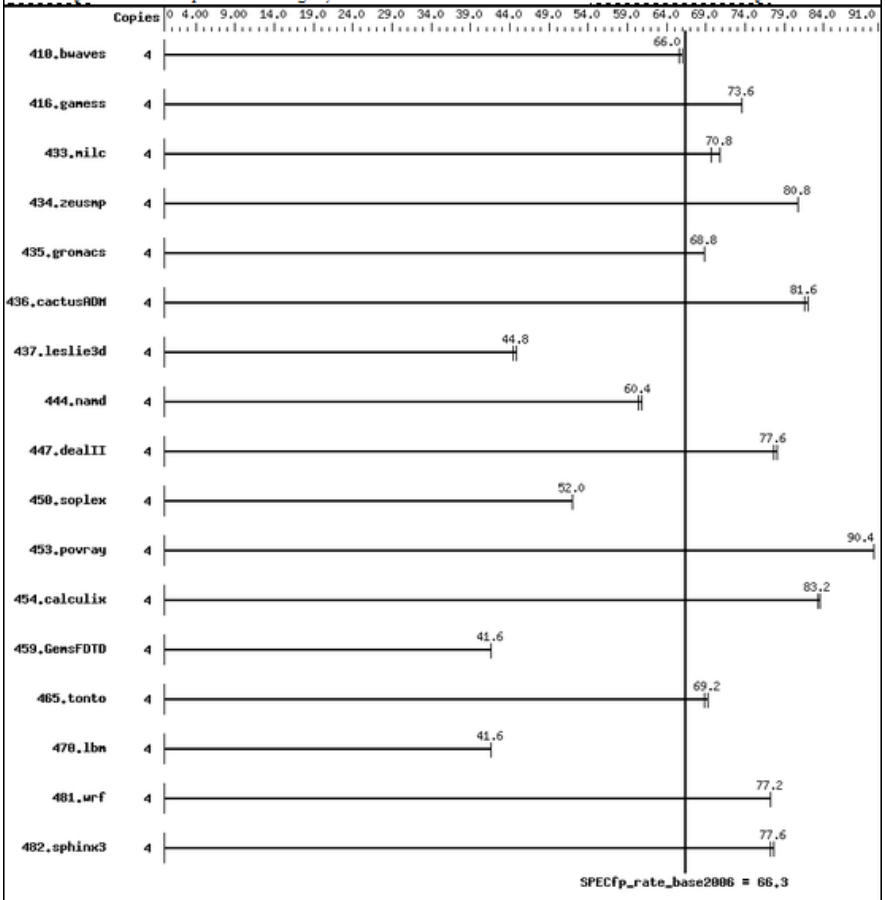
Copyright 2006-2008 Standard Performance Evaluation Corporation

Dell Inc.
Dell Precision T3500 (Intel Xeon W3520, 2.67 GHz)

SPECfp®_rate2006 = Not Run
SPECfp_rate_base2006 = 66.3

CPU2006 license: 3184
Test sponsor: Dell Inc.
Tested by: Principled Technologies, Inc.

Test date: Oct-2009
Hardware Availability: Aug-2009
Software Availability: Feb-2009



Hardware

CPU Name:	Intel Xeon W3520
CPU Characteristics:	Intel Turbo Boost Technology up to 2.67 GHz
CPU MHz:	2667
FPU:	Integrated
CPU(s) enabled:	4 cores, 1 chip, 4 cores/chip, 2 threads/core
CPU(s) orderable:	1 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core
L3 Cache:	8 MB I+D on chip per chip
Other Cache:	None
Memory:	4 GB (2X2 GB PC3-10600E)
Disk Subsystem:	1 x 80GB SATA 7200 RPM
Other Hardware:	None

Software

Operating System:	Windows Vista Ultimate SP2 (64-bit)
Compiler:	Intel C++ Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046 Microsoft Visual Studio 2008 SP1 Intel Visual FORTRAN Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046
Auto Parallel:	No
File System:	NTFS
System State:	Default
Base Pointers:	32-bit
Peak Pointers:	32-bit
Other Software:	MicroQuill SmartHeap Library 8.0

SPEC® CFP2006 Result

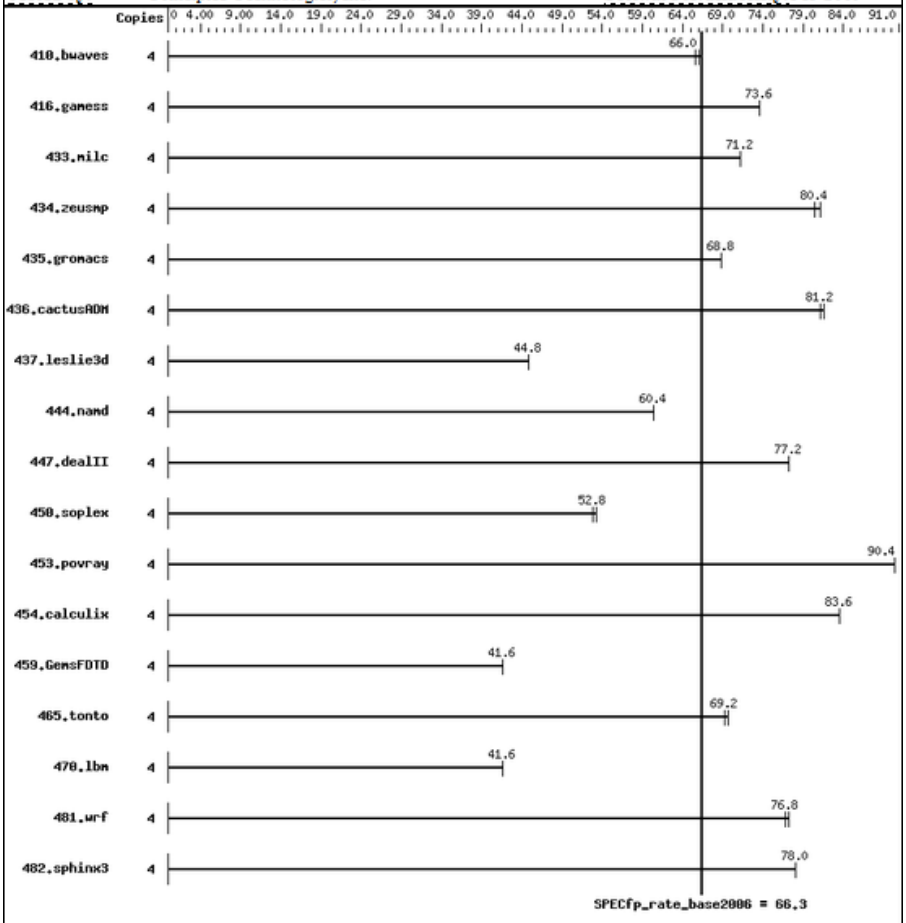
Copyright 2006-2008 Standard Performance Evaluation Corporation

Dell Inc.
Dell Precision T3500 (Intel Xeon W3520, 2.67 GHz)

SPECfp®_rate2006 = Not Run
SPECfp_rate_base2006 = 66.3

CPU2006 license: 3184
Test sponsor: Dell Inc.
Tested by: Principled Technologies, Inc.

Test date: Oct-2009
Hardware Availability: Aug-2009
Software Availability: Feb-2009



Hardware

CPU Name:	Intel Xeon W3520
CPU Characteristics:	Intel Turbo Boost Technology up to 2.67 GHz
CPU MHz:	2667
FPU:	Integrated
CPU(s) enabled:	4 cores, 1 chip, 4 cores/chip, 2 threads/core
CPU(s) orderable:	1 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core
L3 Cache:	8 MB I+D on chip per chip
Other Cache:	None
Memory:	4 GB (2x2 GB PC3-10600E)
Disk Subsystem:	1 x 80GB SATA 7200 RPM
Other Hardware:	None

Software

Operating System:	Windows 7 Ultimate (64-bit)
Compiler:	Intel C++ Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046 Microsoft Visual Studio 2008 SP1 Intel Visual FORTRAN Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046
Auto Parallel:	No
File System:	NTFS
System State:	Default
Base Pointers:	32-bit
Peak Pointers:	32-bit
Other Software:	MicroQuill SmartHeap Library 8.0

Current Dell Precision T1500: Intel Core i5-based desktop workstation system

SPEC® CFP2006 Result

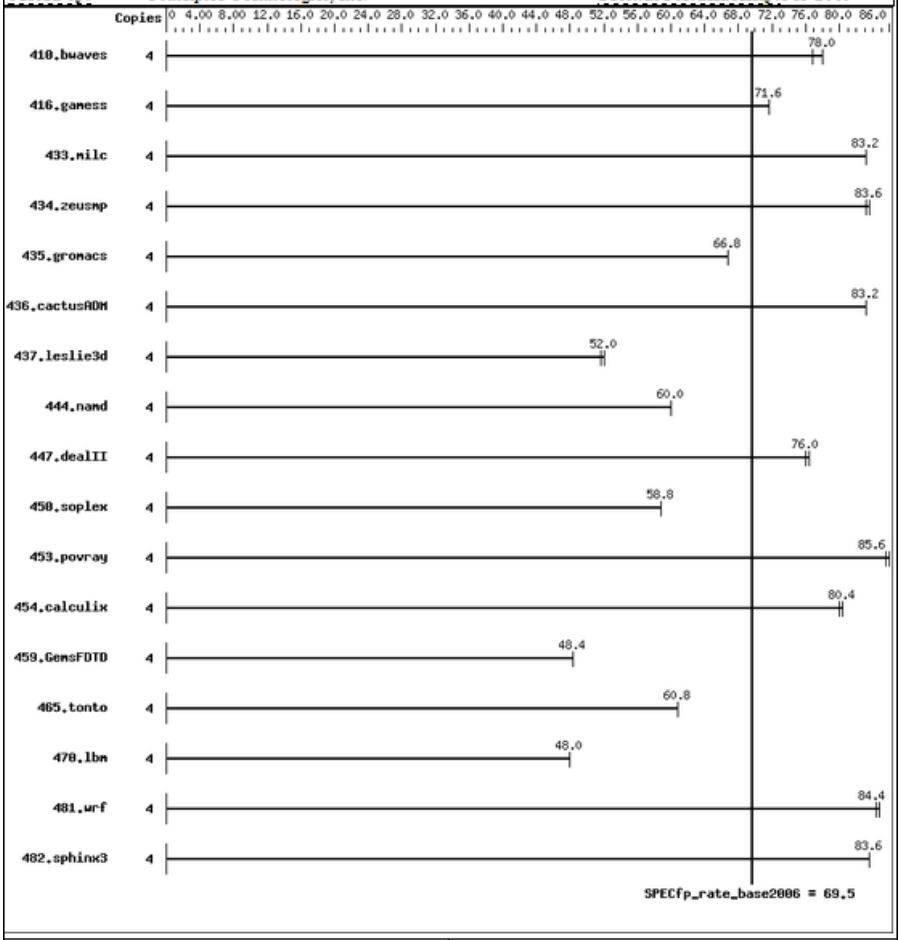
Copyright 2006-2008 Standard Performance Evaluation Corporation

Dell Inc.
Dell Precision T1500 (Intel Core i5 750, 2.67 GHz)

SPECfp® rate2006 = Not Run
SPECfp_rate_base2006 = 69.5

CPU2006 license: 3184
Test sponsor: Dell Inc.
Tested by: Principled Technologies, Inc.

Test date: Nov-2009
Hardware Availability: Aug-2009
Software Availability: Feb-2009



Hardware

CPU Name:	Intel Core i5 750
CPU Characteristics:	Intel Turbo Boost Technology up to 2.67 GHz
CPU MHz:	2667
FPU:	Integrated
CPU(s) enabled:	4 cores, 1 chip, 4 cores/chip, 2 threads/core
CPU(s) orderable:	1 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core
L3 Cache:	8 MB I+D on chip per chip
Other Cache:	None
Memory:	4 GB (2x2 GB PC3-10600)
Disk Subsystem:	1 x 160GB SATA 7200 RPM
Other Hardware:	None

Software

Operating System:	Windows XP Professional SP3 (64-bit)
Compiler:	Intel C++ Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046 Microsoft Visual Studio 2008 SP1 Intel Visual FORTRAN Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046
Auto Parallel:	No
File System:	NTFS
System State:	Default
Base Pointers:	32-bit
Peak Pointers:	32-bit
Other Software:	MicroQuill SmartHeap Library 8.0

SPEC® CFP2006 Result

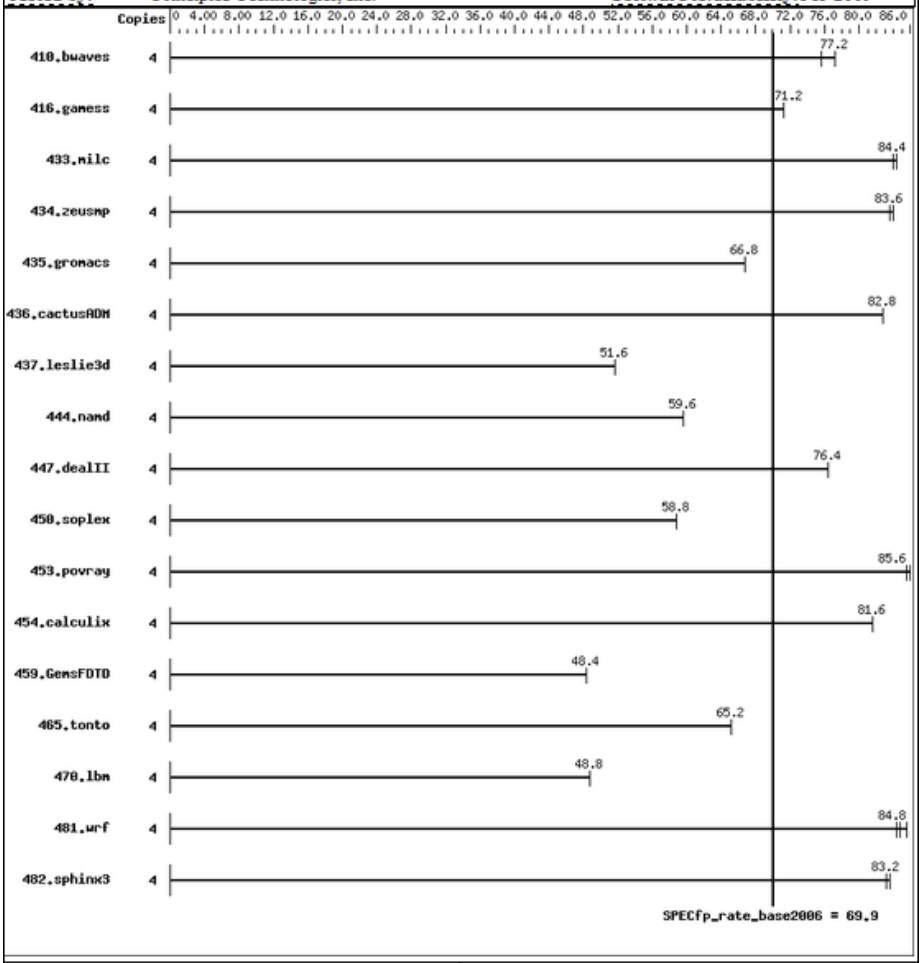
Copyright 2006-2008 Standard Performance Evaluation Corporation

Dell Inc.
Dell Precision T1500 (Intel Core i5, 2.67 GHz)

SPECfp®_rate2006 = Not Run
SPECfp_rate_base2006 = 69.9

CPU2006 license: 3184
Test sponsor: Dell Inc.
Tested by: Principled Technologies, Inc.

Test date: Nov-2009
Hardware Availability: Aug-2009
Software Availability: Feb-2009



Hardware

CPU Name:	Intel Core i5
CPU Characteristics:	Intel Turbo Boost Technology up to 2.67 GHz
CPU MHz:	2667
FPU:	Integrated
CPU(s) enabled:	4 cores, 1 chip, 4 cores/chip, 2 threads/core
CPU(s) orderable:	1 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core
L3 Cache:	8 MB I+D on chip per chip
Other Cache:	None
Memory:	4 GB (2x2 GB PC3-10600)
Disk Subsystem:	1 x 160GB SATA 7200 RPM
Other Hardware:	None

Software

Operating System:	Windows Vista Ultimate SP2 (64-bit)
Compiler:	Intel C++ Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046 Microsoft Visual Studio 2008 SP1 Intel Visual FORTRAN Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046
Auto Parallel:	No
File System:	NTFS
System State:	Default
Base Pointers:	32-bit
Peak Pointers:	32-bit
Other Software:	MicroQuill SmartHeap Library 8.0

SPEC® CFP2006 Result

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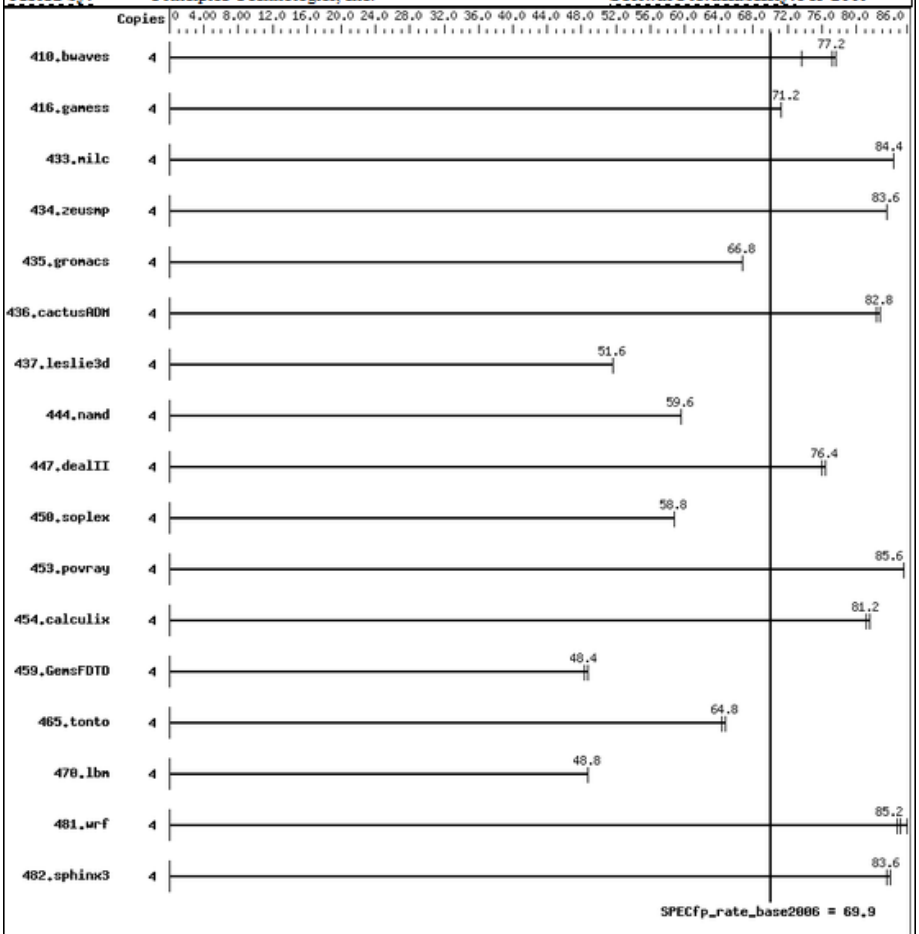
Dell Inc.
Dell Precision T1500 (Intel Core i5 750, 2.67 GHz)

SPECfp®_rate2006 = Not Run
SPECfp_rate_base2006 = 69.9

CPU2006 license: 3184
Test sponsor: Dell Inc.
Tested by: Principled Technologies, Inc.

Test date: Nov-2009
Hardware Availability: Aug-2009
Software Availability: Feb-2009



Hardware

CPU Name:	Intel Core i5 750
CPU Characteristics:	Intel Turbo Boost Technology up to 2.67 GHz
CPU MHz:	2667
FPU:	Integrated
CPU(s) enabled:	4 cores, 1 chip, 4 cores/chip, 2 threads/core
CPU(s) orderable:	1 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core
L3 Cache:	8 MB I+D on chip per chip
Other Cache:	None
Memory:	4 GB (2x2 GB PC3-10600)
Disk Subsystem:	1 x 160GB SATA 7200 RPM
Other Hardware:	None

Software

Operating System:	Windows 7 Ultimate (64-bit)
Compiler:	Intel C++ Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046 Microsoft Visual Studio 2008 SP1 Intel Visual FORTRAN Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046
Auto Parallel:	No
File System:	NTFS
System State:	Default
Base Pointers:	32-bit
Peak Pointers:	32-bit
Other Software:	MicroQuill SmartHeap Library 8.0

Previous-generation Dell Precision 390: Intel Pentium D Processor 950-based desktop workstation system

SPEC® CFP2006 Result

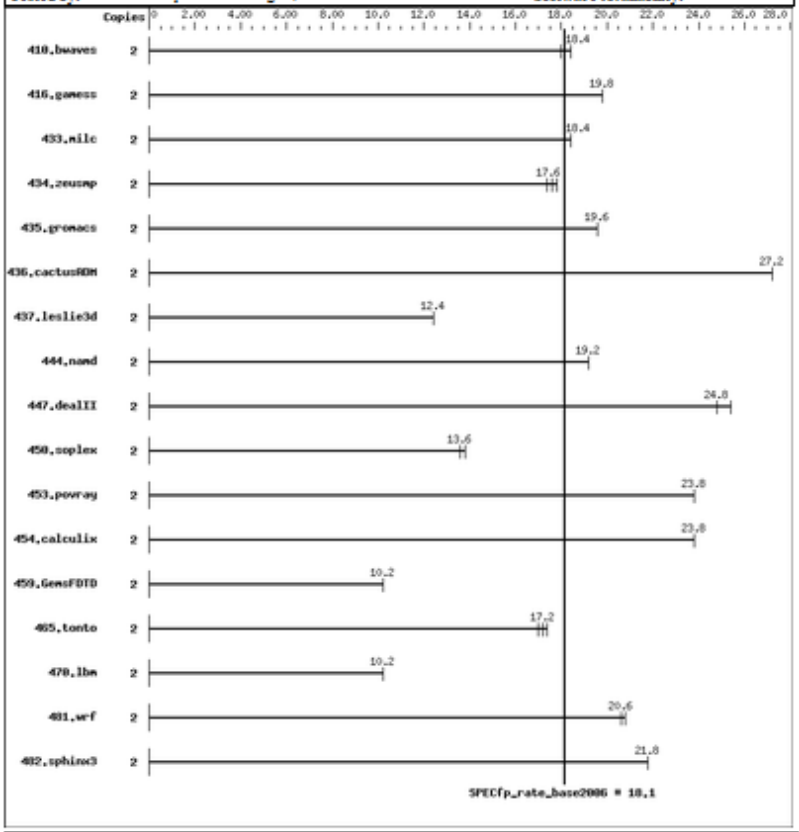
Copyright 2006-2008 Standard Performance Evaluation Corporation

Dell Inc.
Dell Precision 390 (Intel Pentium D 950, 3.40 GHz)

SPECfp®_rate2006 = Not Run
SPECfp_rate_base2006 = 18.1

CPU2006 license: 3184
Test sponsor: Dell Inc.
Tested by: Principled Technologies, Inc.

Test date: Oct-2009
Hardware Availability: Aug-2009
Software Availability: Feb-2009



Hardware

CPU Name:	Intel Pentium D 950
CPU Characteristics:	Intel Turbo Boost Technology up to 3.40 GHz
CPU MHz:	3400
FPU:	Integrated
CPU(s) enabled:	2 cores, 1 chip, 2 cores/chip, 1 thread/core
CPU(s) orderable:	1 chip
Primary Cache:	16 KB I + 12 KB D on chip per core
Secondary Cache:	4 MB I+D on chip per core
Other Cache:	None
Memory:	2 GB (2x1 GB PC2-5300)
Disk Subsystem:	1 x 80GB SATA 7200 RPM
Other Hardware:	None

Software

Operating System:	Windows XP Professional SP3 (32-bit)
Compiler:	Intel C++ Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046 Microsoft Visual Studio 2008 SP1 Intel Visual FORTRAN Compiler for IA-32, Version 11.1 Build 20090903 Package ID: w_cproc_p_11.1.046
Auto Parallel:	No
File System:	NTFS
System State:	Default
Base Pointers:	32-bit
Peak Pointers:	32-bit
Other Software:	MicroQuill SmartHeap Library 8.0

About Principled Technologies

We provide industry-leading technology assessment and fact-based marketing services. We bring to every assignment extensive experience with and expertise in all aspects of technology testing and analysis, from researching new technologies, to developing new methodologies, to testing with existing and new tools.
When the assessment is complete, we know how to present the results to a broad range of target audiences. We provide our clients with the materials they need, from market-focused data to use in their own collateral to custom sales aids, such as test reports, performance assessments, and white papers. Every document reflects the results of our trusted independent analysis.

We provide customized services that focus on our clients' individual requirements. Whether the technology involves hardware, software, Web sites, or services, we offer the experience, expertise, and tools to help you assess how it will fare against its competition, its performance, whether it's ready to go to market, and its quality and reliability.

Our founders, Mark L. Van Name and Bill Catchings, have worked together in technology assessment for over 20 years. As journalists, they published over a thousand articles on a wide array of technology subjects. They created and led the Ziff-Davis Benchmark Operation, which developed such industry-standard benchmarks as Ziff Davis Media's Winstone and WebBench. They founded and led eTesting Labs, and after the acquisition of that company by Lionbridge Technologies were the head and CTO of VeriTest.

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