Principled Technologies®

TEST REPORT
JUNE 2006

SPEC CPU2000 SPECint_rate_base performance and power consumption on uniprocessor Intel-processor-based servers

Executive summary:

Intel Corporation (Intel) commissioned Principled Technologies (PT) to measure the SPEC CPU2000 SPECint_rate_base performance of servers using the following three processors:

- Intel Pentium D processor 840
- Intel Pentium D processor 950
- Intel Xeon processor 3070

SPEC CPU2000 is an industry-standard benchmark created by the Standard Performance Evaluation Corp. (SPEC) to measure a server's compute-intensive performance. The benchmark consequently stresses the CPU and memory subsystems of the system under test. (For more information on SPEC CPU2000 and other SPEC benchmarks, see www.spec.org.)

The SPEC CPU2000 benchmark consists of two benchmark suites, each of which focuses on a different aspect of compute-intensive performance. CINT2000 measures and compares compute-intensive integer performance, while CFP2000 measures and compares compute-intensive floating-point performance. A "rate" version of each, which runs multiple instances of the benchmark to assess server throughput, is also available. We ran only the CINT2000 SPECint_rate_base benchmark.

KEY FINDINGS

- The Intel Xeon processor 3070-based server delivered almost 111.8 percent more peak performance/watt than the Intel Pentium D processor 950-based server (see Figure 1). (We calculated performance/watt using system-level power measurements.)
- The Intel Xeon processor 3070-based server delivered almost 50.9 percent higher peak performance than the Intel Pentium D processor 950-based server (see Figure 2).
- The Intel Xeon processor 3070-based server had 28.7 percent lower average power usage while delivering its peak performance on the benchmark than the Intel Pentium D processor 950-based server (see Figures 3 and 6).

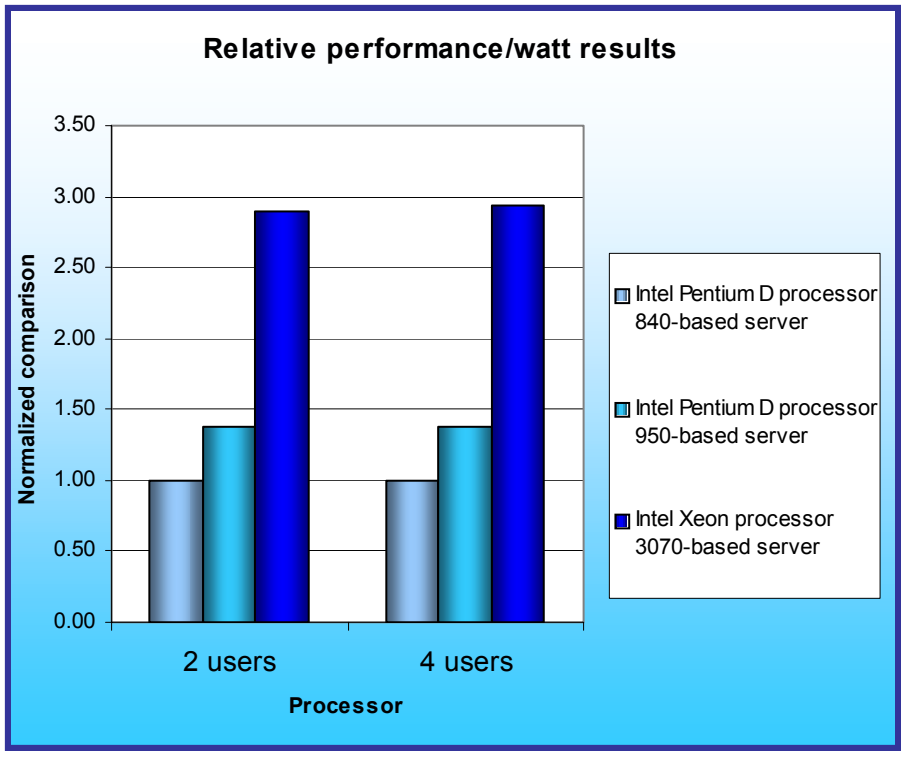


Figure 1: Normalized performance/watt results of the test servers running the SPECint_rate_base2000 workload. Higher numbers indicate better performance/watt.

In this section, we discuss the best results for each server. For details of the performance of each server with each number of benchmark instances (or, in SPEC CPU2000 terms, users), see the Test results section.

Figure 1 illustrates the performance/watt for each of the three servers. In this chart, we normalized the results for each system to the lowest performance/watt configuration. The lowest system's performance/watt result is thus always 1.00. By normalizing, we make each data point in these charts a comparative number, with higher results indicating better performance/watt.

To calculate the performance/watt we used the following formula:

Performance/watt = the benchmark's score / average power consumption in watts during the time period in which the benchmark was delivering peak performance

As Figure 1 illustrates, the Intel Xeon processor 3070-based server delivered almost 111.8 percent more performance/watt than the Intel Pentium D processor 950-based server and almost 193.2 percent more performance/watt than the Intel Pentium D processor 840-based server for SPECint_rate_base2000 with four users. The Intel Xeon processor 3070-based server also delivered dramatically more performance/watt than the other servers on the SPECint_rate_base2000 test with two users.

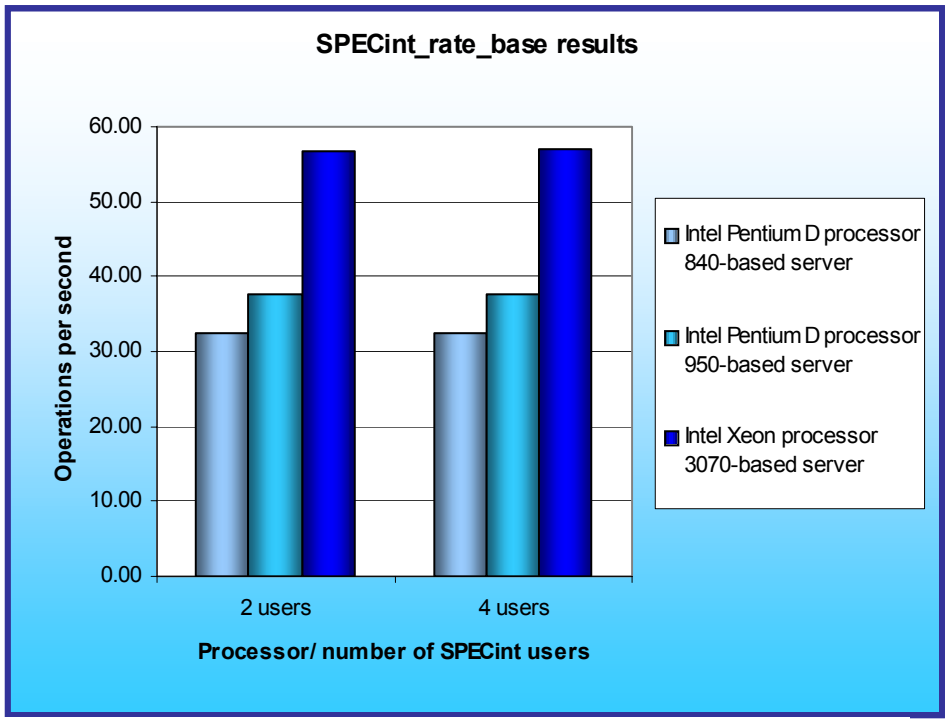


Figure 2: SPECint_rate_base2000 results for the three test servers. Higher numbers are better.

Figure 2 shows the SPECint_rate_base2000 results of the three test servers for two- and four-user runs. Each result is the SPECint_rate_base score in operations per second. By default, the benchmark performs three runs and uses the median result. A higher score is better.

For the four-user SPECint_rate_base2000 test, the Intel Xeon processor 3070-based server produced the highest results (56.9) and yielded a 50.9 percent performance increase over the Intel Pentium D processor 950-based server (37.7) and almost a 75.1 percent increase over the Intel Pentium D processor 840-based server (32.5).

Figure 3 shows a plot of the power usage of the three servers as they were running the benchmark with four users. The red lines indicate the power measurement interval, the time during which the server was delivering peak performance and during which we captured power measurements. Lower power consumption is better. The Intel Xeon processor 3070-based server achieved its peak performance while drawing less power—28.7 percent less—than the Intel Pentium D processor 950-based server. (The drop in power consumption back to the idle state for both the Intel Xeon processor 3070-based server and the Intel Pentium D processor 950-based server occurred when each of those servers finished the workload.)

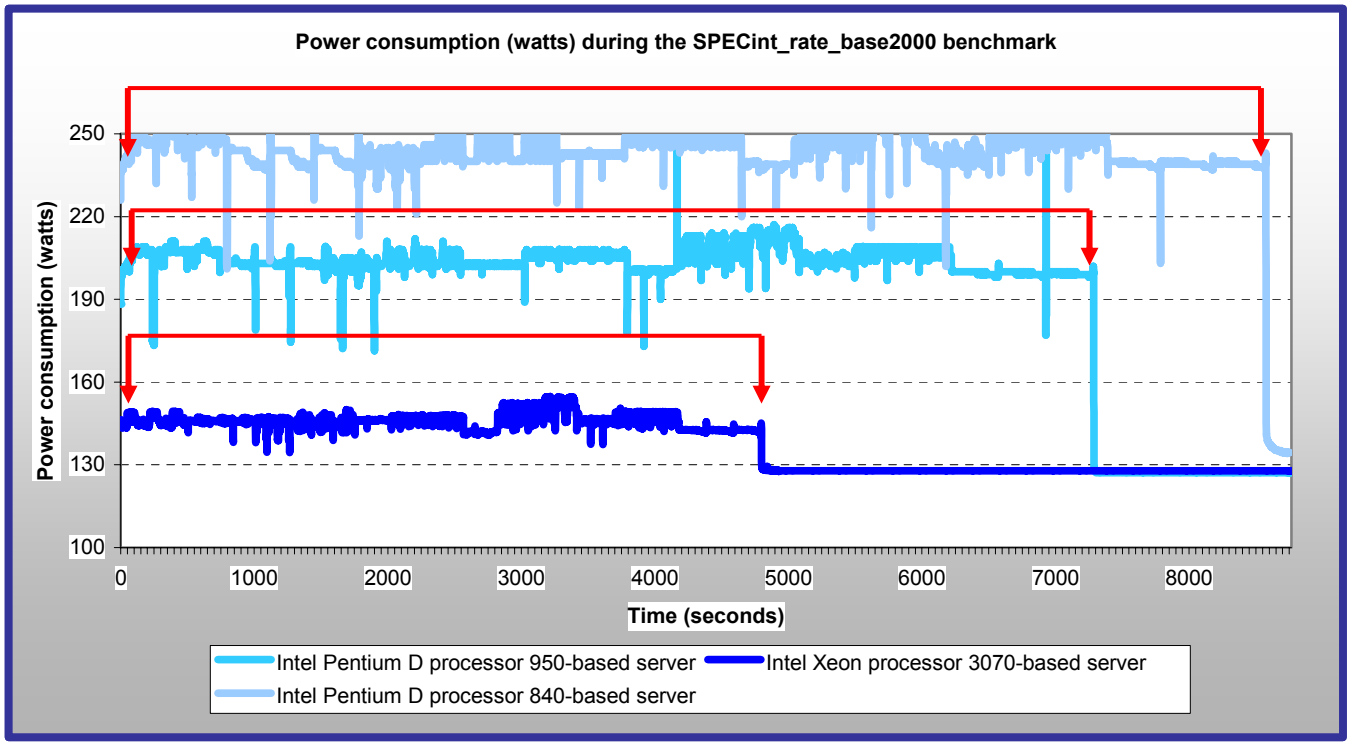


Figure 3: Power consumption (in watts) of each of the servers throughout the course of executing the SPECint_rate_base2000 benchmark with four users. Lower power consumption is better.

SPEC CPU2000 Workload

The SPEC CPU2000 workload includes two benchmark suites: CINT2000 and CFP2000. We ran only the CINT2000 benchmark, which focuses on measuring and comparing compute-intensive integer performance. Specifically, we measured the SPECint_rate_base2000 results for the three test servers with two and four users. This workload produces results as the average of twelve normalized throughput ratios with conservative optimization for each benchmark.

Figure 4 lists the 12 applications that compose the CINT2000 benchmark. Eleven of the applications were written in C; one (252.eon) was written in C++.

Name	Reference Time	Remarks
164.gzip	1400	Data compression utility
175.vpr	1400	FPGA circuit placement and routing
176.gcc	1100	C compiler
181.mcf	1800	Minimum cost network flow solver
186.crafty	1000	Chess program
197.parser	1800	Natural language processing
252.eon	1300	Ray tracing
253.perlbmk	1800	Perl
254.gap	1100	Computational group theory
255.vortex	1900	Object Oriented Database
256.bzip2	1500	Data compression utility
300.twolf	3000	Place and route simulator

Figure 4: The applications that make up the CINT2000 benchmark.

A CINT2000 run performs each of the 12 application (tasks) three times and reports the median for each. It also calculates the geometric mean of those 12 results to produce an overall score.

Test results

Figure 5 shows the SPECint_rate_base2000 results for all three servers with two and four users. All three servers achieved their best SPECint_rate_base results with four users. (In SPEC's terms, these results are estimates, meaning we are not posting them on the SPEC Web site with all the SPEC required files. We do present here all the data necessary to reproduce these results.)

Server / # of users	2	4
Intel Pentium D processor 840-based server	32.5	32.5
Intel Pentium D processor 950-based server	37.7	37.7
Intel Xeon processor 3070-based server	56.6	56.9

Figure 5: SPECint_rate_ base2000 results of the servers with two and four users. Higher numbers are better.

Figure 6 details the average power consumption of the test servers during the median peak runs with two and four users. The Intel Xeon processor 3070-based server had 28.7 percent lower average power usage during the SPECint_rate_base2000 four-user test than the Intel Pentium D processor 950-based server.

Server / # of users	2	4
Intel Pentium D processor 840-based server	242.6	244.3
Intel Pentium D processor 950-based server	204.2	204.7
Intel Xeon processor 3070-based server	145.8	145.9

Figure 6: Average power usage (in watts) of the servers with varying user counts running SPECint_rate_base2000. Lower numbers are better.

Figure 7 details the power consumption, in watts, of the test servers while idle and during the peak (four-user) runs of the benchmark.

Server	Idle power (watts)	Average power (watts)
Intel Pentium D processor 840-based server	131.0	244.3
Intel Pentium D processor 950-based server	123.0	204.7
Intel Xeon processor 3070-based server	127.3	145.9

Figure 7: Average power usage (in watts) of the test servers while idle and during the runs of the SPECint_rate_base2000 test with four users. Lower numbers are better.

Test methodology

Figure 8 summarizes some of the key aspects of the configurations of the three server systems; Appendix A provides detailed configuration information.

Server	Intel Pentium D processor 840-based server	Intel Pentium D processor 950-based server	Intel Xeon processor 3070-based server
Processor frequency (GHz)	3.20GHz	3.40GHz	2.66GHz
Front-side bus frequency (MHz)	800MHz	800MHz	1066MHz
Single/Dual-Core processors	Dual	Dual	Dual
Motherboard	Intel 3000 Chipset-based internal reference board	Intel 3000 Chipset-based internal reference board	Intel 3000 Chipset-based internal reference board
Chipset	Intel 3010 Chipset	Intel 3010 Chipset	Intel 3010 Chipset
RAM (8GB in each)	4 x 2GB PC2-4200	4 x 2GB PC2-4200	4 x 2GB PC2-4200
Hard Drive	Western Digital WD1600YD	Western Digital WD1600YD	Western Digital WD1600YD

Figure 8: Summary of some key aspects of the server configurations.

Intel configured and provided all three servers.

The difference in front-side bus reflects the capabilities of the three processors: The Intel Xeon processor 3070 uses a front-side bus speed of 1066 MHz. The Intel Pentium D processor 950 and Intel Pentium D processor 840 each have a front-side bus speed of 800 MHz.

We began by installing a fresh copy of Microsoft Windows 2003 Server Enterprise Edition, Service Pack 1 on each server. We followed this process for each installation:

1. Assign a computer name of “Server”.
2. For the licensing mode, use the default setting of five concurrent connections.
3. Enter a password for the administrator log on.
4. Select Eastern Time Zone.
5. Use typical settings for the Network installation.
6. Use “Testbed” for the workgroup.

We applied the following updates from the Microsoft Windows Update site:

- Security Update for Windows Server 2003 (KB908531)
- Windows Malicious Software Removal Tool – April 2006 (KB890830)
- Cumulative Security Update for Internet Explorer for Windows Server 2003 (KB912812)
- Security Update for Windows Server 2003 (KB911562)
- Cumulative Security Update for Outlook Express for Windows Server 2003 (KB911567)
- Security Update for Windows Server 2003 (KB913446)
- Security Update for Windows Media Player Plug-in (KB911564)
- Security Update for Windows Server 2003 (KB911927)
- Security Update for Windows Server 2003 (KB908519)
- Security Update for Windows Server 2003 (KB912919)
- Security Update for Windows Server 2003 (KB904706)
- Update for Windows Server 2003 (KB910437)
- Security Update for Windows Server 2003 (KB896424)
- Security Update for Windows Server 2003 (KB900725)
- Security Update for Windows Server 2003 (KB901017)
- Security Update for Windows Server 2003 (KB899589)
- Security Update for Windows Server 2003 (KB902400)
- Security Update for Windows Server 2003 (KB905414)
- Security Update for Windows Server 2003 (KB899591)

- Security Update for Windows Server 2003 (KB890046)
- Security Update for Windows Server 2003 (KB899587)
- Security Update for Windows Server 2003 (KB896358)
- Security Update for Windows Server 2003 (KB896422)
- Security Update for Windows Server 2003 (KB896428)
- Security Update for Windows Server 2003 (KB893756)
- Security Update for Windows Server 2003 (KB899588)
- Security Update for Windows Server 2003 (KB901214)
- Update for Windows Server 2003 (KB898715)

Power measurement procedure

To record each server's power consumption during each test, we used an Extech Instruments (www.extech.com) 380803 Power Analyzer / Datalogger. We connected the power cord from the server under test to the Power Analyzer's output load power outlet. We then plugged the power cord from the Power Analyzer's input voltage connection into a power outlet.

We used the Power Analyzer's Data Acquisition Software (version 2.11) to capture all recordings. We installed the software on a separate Intel–processor-based PC, which we connected to the Power Analyzer via an RS-232 cable. We captured power consumption at one-second intervals.

To gauge the idle power usage, we recorded the power usage while each server was running the operating system but otherwise idle.

We then recorded the power usage (in watts) for each server during the testing at one-second intervals. To compute the average power usage, we averaged the power usage during the time the server was producing its peak performance results. We call this time the power measurement interval. See Figures 3 (power consumption over time), 6 (power consumption at different user counts), and 7 (idle and average peak power) for the results of these measurements.

SPECCPU2000 configuration

We followed SPEC's standard instructions for building the CINT2000 executables. After studying the best results for this benchmark on the SPEC Web site, we chose the following software tools:

- Intel C++ Compiler 9.0 for 32-bit
- Microsoft Visual Studio .Net 2003
- SmartHeap Library Version 8 (from http://www.microquill.com/)

The benchmark requires configuration files. From the SPEC Web site we chose the most recent (as of the testing for this report) SPECCPU2000 results Intel had submitted that used the above Intel compiler. We copied the configuration files for those results and used them, with modifications to reflect the appropriate system information about the server under test, in our testing. The configuration file we used appears in Appendix B.

We used one SPEC distribution zip file: IA_SPECCPU2000v1.zip. We copied the file to each server and unzipped it into the C:\SPECCPU2000v1.3 directory. We then modified the configuration files by entering the appropriate system information.

We report only the base metrics for the SPECint_rate test. SPEC requires the base metrics for all reported results and sets compilation guidelines that testers must follow in building the executables for such tests.

To begin the benchmark, we performed the following steps:

- Open a command prompt.
- Change to the SPECCPU2000v1.3 directory.

- Type ‘shrc’ at the command prompt.
- Enter "runspec -c <config file name> --reportable -T base –r -u <#> int" , where
  - <config file name> = name of the configuration file
  - <#> = is 2 or 4, depending on the number of users

When the run completes, the benchmark puts the results in the directory \SPECCPU2000v1.3\result. The result file names are of the form CINT2000.<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. CINT2000.002. asc and log.002.

Appendix A – Test server configuration information

This appendix provides detailed configuration information about each of the test server systems, which we list in alphabetical order.

Processors	Intel Pentium D processor 840	Intel Pentium D processor 950	Intel Xeon processor 3070
System configuration information			
General			
Processor and OS kernel: (physical, core, logical) / (UP, MP)	1P2C2L / UP	1P2C2L / UP	1P2C2L / UP
Number of physical processors	1	1	1
Single/Dual-Core processors	Dual	Dual	Dual
System Power Management Policy	Always On	Always On	Always On
CPU			
Vendor	Intel	Intel	Intel
Name	Intel Pentium D processor 840	Intel Pentium D processor 950	Intel Xeon processor 3070
Stepping	7	4	4
Socket type	LGA775	LGA 775	LGA775
Core frequency (GHz)	3.20 GHz	3.40 GHz	2.66 GHz
Front-side bus frequency (MHz)	800 MHz	800 MHz	1066 MHz
L1 Cache	16KB + 12KB	16KB + 12KB	32KB + 32KB
L2 Cache	2MB (1MB per core)	4MB (2MB per core)	4MB (Shared)
Platform			
Vendor and model number	Intel Pentium D processor 840 server	Intel Pentium D processor 950 server	Intel Xeon processor 3070 server
Motherboard model number	Intel 3000 Chipset-based internal reference board	Intel 3000 Chipset-based internal reference board	Intel 3000 Chipset-based internal reference board
Motherboard chipset	Intel 3010 Chipset	Intel 3010 Chipset	Intel 3010 Chipset
Motherboard revision number	C0	C0	C0
Motherboard serial number	8MWH61400065	8MWH61400065	8MWH61400139
BIOS name and version	American Megatrends Inc. EXTWM210.86P, 5/23/2006	American Megatrends Inc. EXTWM210.86P, 5/23/2006	American Megatrends Inc. EXTWM210.86P, 5/23/2006
BIOS settings	Default	Default	Default
Chipset INF driver	8.1.1.1001	8.1.1.1001	8.1.1.1001
Memory module(s)			
Vendor and model number	Kingston KVR533D2E4/2G	Kingston KVR533D2E4/2G	Kingston KVR533D2E4/2G
Type	PC2-4200	PC2-4200	PC2-4200
Speed (MHz)	533 MHz	533 MHz	533 MHz
Speed in the system currently running @ (MHz)	400 MHz	400 MHz	533 MHz
Timing/Latency (tCL-tRCD-iRP-tRASmin)	3-3-3-9	3-3-3-9	4-4-4-12
Size	8192MB	8192MB	8192MB
Number of RAM modules	4	4	4
Chip organization	Double-sided	Double-sided	Double-sided
Channel	Dual	Dual	Dual

Hard disk			
Vendor and model number	Western Digital WD1600YD	Western Digital WD1600YD	Western Digital WD1600YD
Number of disks in system	1	1	1
Size	160GB	160GB	160GB
Buffer Size	16MB	16MB	16MB
RPM	7200	7200	7200
Type	SATA	SATA	SATA
Controller	Intel 82801GB Serial ATA	Intel 82801GB Serial ATA	Intel 82801GB Serial ATA
Controller driver	Intel 7.0.0.1020	Intel 7.0.0.1020	Intel 7.0.0.1020
Operating system			
Name	Microsoft Windows 2003 Server, x32 Enterprise Edition	Microsoft Windows 2003 Server, x32 Enterprise Edition	Microsoft Windows 2003 Server, x32 Enterprise Edition
Build number	3790	3790	3790
Service Pack	SP1	SP1	SP1
Microsoft Windows update date	6/7/2006	6/7/2006	6/7/2006
File system	NTFS	NTFS	NTFS
Kernel	ACPI Multiprocessor x32-based PC	ACPI Multiprocessor x32-based PC	ACPI Multiprocessor x32-based PC
Language	English	English	English
Microsoft DirectX version	DirectX 9.0c	DirectX 9.0c	DirectX 9.0c
Graphics			
Vendor and model number	ATI ES1000	ATI ES1000	ATI ES1000
Chipset	ATI ES1000 PCI	ATI ES1000 PCI	ATI ES1000 PCI
BIOS version	01.00	01.00	01.00
Type	Integrated	Integrated	Integrated
Memory size	32MB	32MB	32MB
Resolution	1024 x 768	1024 x 768	1024 x 768
Driver	Microsoft 5.2.3790. 0	Microsoft 5.2.3790. 0	Microsoft 5.2.3790. 0
Network card/subsystem			
Vendor and model number	Intel PRO/1000 PM Dual Port Network adapter	Intel PRO/1000 PM Dual Port Network adapter	Intel PRO/1000 PM Dual Port Network adapter
Type	Integrated	Integrated	Integrated
Driver	Intel 9.3.28.0	Intel 9.3.28.0	Intel 9.3.28.0
Additional card information	2 x Intel PRO/1000 PT Dual Port Server Adapter	2 x Intel PRO/1000 PT Dual Port Server Adapter	2 x Intel PRO/1000 PT Dual Port Server Adapter
Additional card type	PCI – Express	PCI – Express	PCI – Express
Additional card driver	Intel 9.3.28.0	Intel 9.3.28.0	Intel 9.3.28.0
Optical drive			
Vendor and model number	Sony DDU1615	Sony DDU1615	Sony DDU1615
Type	DVD-ROM	DVD-ROM	DVD-ROM
Interface	Internal	Internal	Internal
USB ports			
# of ports	4	4	4
Type of ports (USB 1.1, USB 2.0)	USB 2.0	USB 2.0	USB 2.0

Figure 9: Detailed system configuration information for the three test servers.

Appendix B – Configuration file for Intel processor-based servers

This appendix contains the benchmark configuration file we used to test all three Intel processor-based servers.

```
# Invocation command line:
# runspec –c cpu2000-20051031-05025.cfg --reportable –T base –r -u <number of users> int
############################################################################
############################################################################
#
# SPEC CPU2000 1.3 Intel Windows XP 32-bit config file for Pentium 4 with SSE3
# Sep 23 2005. Intel Compiler 9.0 20050430Z
############################################################################

VENDOR      = intel
action      = validate
tune        = base
ext         = cpu2000.v1.3.ic90.win32.p4.sse3.sep232005
PATHSEP     = /
check_md5=1
reportable=1

####################################################################
# These sections are listed as benchmark-tuning-extension-machine
####################################################################

default=default=default=default:
CC  = icl
CXX = icl
F77 = ifort
FC  = ifort
OBJ = .obj
#
# portability & libraries
#
176.gcc=default=default=default:
CPORTABILITY = -Dalloca=_alloca /F10000000
EXTRA_LDFLAGS = /F10000000
notes011= 176.gcc: -Dalloca=_alloca /F10000000

178.galgel=default=default=default:
EXTRA_FFLAGS = -FI /F32000000
EXTRA_LDFLAGS = /F32000000
notes011= 178.galgel:   -FI /F32000000

186.crafty=default=default=default:
CPORTABILITY = -DNT_i386
notes012= 186.crafy: -DNT_i386


253.perlbmk=default=default=default:
CPORTABILITY = -DSPEC_CPU2000_NTOS -DPERLDLL /MT
EXTRA_LDFLAGS = /MT
notes014= 253.perlbmk: -DSPEC_CPU2000_NTOS -DPERLDLL /MT

254.gap=default=default=default:
CPORTABILITY = -DSYS_HAS_CALLOC_PROTO -DSYS_HAS_MALLOC_PROTO
notes015= 254.gap: -DSYS_HAS_CALLOC_PROTO -DSYS_HAS_MALLOC_PROTO

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

int=base=default=default:
PASS1_CFLAGS=   -fast -Qprof_gen
PASS2_CFLAGS=   -fast -Qprof_use
PASS1_LDFLAGS=  -fast -Qprof_gen
PASS2_LDFLAGS=  -fast -Qprof_use
```

```
EXTRA_LIBS=     shlW32M.lib
notes000= +FDO: PASS1=-Qprof_gen  PASS2=-Qprof_use
notes001= Base tuning for C programs:   -fast +FDO shlW32M.lib

252.eon=base=default=default:
PASS1_CXXFLAGS= -fast -Qcxx_features -Qprof_gen
PASS2_CXXFLAGS= -fast -Qcxx_features -Qprof_use
PASS1_LDFLAGS=  -fast -Qcxx_features -Qprof_gen
PASS2_LDFLAGS=  -fast -Qcxx_features -Qprof_use
notes002= Base tuning for C++ programs: -fast -Qcxx_features +FDO

fp=base=default=default:
PASS1_CFLAGS=          -fast -Qansi_alias -Qprof_gen
PASS2_CFLAGS=          -fast -Qansi_alias -Qprof_use
PASS1_FFLAGS=          -fast -Qansi_alias -Qprof_gen
PASS2_FFLAGS=          -fast -Qansi_alias -Qprof_use
PASS1_LDFLAGS=         -fast -Qansi_alias -Qprof_gen
PASS2_LDFLAGS=         -fast -Qansi_alias -Qprof_use
notes000= +FDO: PASS1=  -Qprof_gen  PASS2=-Qprof_use
notes001= Base tuning for Fortran programs:  -fast -Qansi_alias +FDO

177.mesa=base=default=default:
PASS1_CFLAGS=          -fast -Qprof_gen
PASS2_CFLAGS=          -fast -Qprof_use
PASS1_LDFLAGS=         -fast -Qprof_gen
PASS2_LDFLAGS=         -fast -Qprof_use
EXTRA_LIBS=     shlW32M.lib
notes002= Base tuning for 177.mesa:  -fast shlW32M.lib +FDO

179.art=base=default=default:
PASS1_CFLAGS=          -fast -Qprof_gen
PASS2_CFLAGS=          -fast -Qprof_use
PASS1_LDFLAGS=         -fast -Qprof_gen
PASS2_LDFLAGS=         -fast -Qprof_use
EXTRA_LIBS=     shlW32M.lib
notes003= Base tuning for 179.art:  -fast shlW32M.lib +FDO

183.equake=base=default=default:
PASS1_CFLAGS=          -fast -Qprof_gen
PASS2_CFLAGS=          -fast -Qprof_use
PASS1_LDFLAGS=         -fast -Qprof_gen
PASS2_LDFLAGS=         -fast -Qprof_use
EXTRA_LIBS=     shlW32M.lib
notes004= Base tuning for 183.equake:  -fast shlW32M.lib +FDO

188.ammp=base=default=default:
PASS1_CFLAGS=          -fast -Qprof_gen
PASS2_CFLAGS=          -fast -Qprof_use
PASS1_LDFLAGS=         -fast -Qprof_gen
PASS2_LDFLAGS=         -fast -Qprof_use
EXTRA_LIBS=     shlW32M.lib
notes005= Base tuning for 188.ammp:  -fast shlW32M.lib +FDO



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

#####################
# int2000 Peak tuning
#####################

164.gzip=peak=default=default:
PASS1_CFLAGS=          -fast -Qansi_alias -Oa -Qprof_gen
PASS2_CFLAGS=          -fast -Qansi_alias -Oa -Qprof_use
PASS1_LDFLAGS=         -fast -Qansi_alias -Oa -Qprof_gen
PASS2_LDFLAGS=         -fast -Qansi_alias -Oa -Qprof_use
notes021= 164.gzip:     -fast -Qansi_alias -Oa  +FDO
```

```
175.vpr=peak=default=default:
PASS1_CFLAGS=           -fast -Qansi_alias -Qprof_gen
PASS2_CFLAGS=           -fast -Qansi_alias -Qprof_use
PASS1_LDFLAGS=          -fast -Qansi_alias -Qprof_gen
PASS2_LDFLAGS=          -fast -Qansi_alias -Qprof_use
notes022= 175.vpr:      -fast -Qansi_alias +FDO

176.gcc=peak=default=default:
basepeak=yes
notes023= 176.gcc:      basepeak=yes

181.mcf=peak=default=default:
basepeak=yes
notes024= 181.mcf:      basepeak=yes

186.crafty=peak=default=default:
PASS1_CFLAGS=           -fast -Qansi_alias -Oa -Qprof_gen
PASS2_CFLAGS=           -fast -Qansi_alias -Oa -Qprof_use
PASS1_LDFLAGS=          -fast -Qansi_alias -Oa -Qprof_gen
PASS2_LDFLAGS=          -fast -Qansi_alias -Oa -Qprof_use
notes025= 186.crafty:   -fast -Qansi_alias -Oa +FDO

197.parser=peak=default=default:
PASS1_CFLAGS=           -fast -Qansi_alias -Qprof_gen
PASS2_CFLAGS=           -fast -Qansi_alias -Qprof_use
PASS1_LDFLAGS=          -fast -Qansi_alias -Qprof_gen
PASS2_LDFLAGS=          -fast -Qansi_alias -Qprof_use
notes026= 197.parser:   -fast -Qansi_alias  +FDO

252.eon=peak=default=default:
PASS1_CXXFLAGS=         -fast -Qprof_gen
PASS2_CXXFLAGS=         -fast -Qprof_use
PASS1_LDFLAGS=          -fast -Qprof_gen
PASS2_LDFLAGS=          -fast -Qprof_use
notes027= 252.eon:      -fast +FDO

253.perlbmk=peak=default=default:
PASS1_CFLAGS=           -fast -Qansi_alias -Qprof_gen
PASS2_CFLAGS=           -fast -Qansi_alias -Qprof_use
PASS1_LDFLAGS=          -fast -Qansi_alias -Qprof_gen
PASS2_LDFLAGS=          -fast -Qansi_alias -Qprof_use
EXTRA_LIBS=             shlW32M.lib
notes028= 253.perlbmk:  -fast -Qansi_alias +FDO shlW32M.lib

254.gap=peak=default=default:
basepeak=yes
notes029= 254.gap:      basepeak=yes

255.vortex=peak=default=default:
basepeak=yes
notes030= 255.vortex    basepeak=yes

256.bzip2=peak=default=default:
PASS1_CFLAGS=           -fast -Oa -Qunroll1 -Qprof_gen
PASS2_CFLAGS=           -fast -Oa -Qunroll1 -Qprof_use
PASS1_LDFLAGS=          -fast -Oa -Qunroll1 -Qprof_gen
PASS2_LDFLAGS=          -fast -Oa -Qunroll1 -Qprof_use
notes031= 256.bzip2:    -fast -Oa -Qunroll1 +FDO

300.twolf=peak=default=default:
PASS1_CFLAGS=           -fast -Qprof_gen
PASS2_CFLAGS=           -fast -O3 -Qprof_use
PASS1_LDFLAGS=          -fast -O3 -Qprof_gen
PASS2_LDFLAGS=          -fast -O3 -Qprof_use
EXTRA_LIBS=             shlW32M.lib
notes032= 300.twolf:    -fast -O3 +FDO shlW32M.lib

####################
```

```
# fp2000 Peak tuning
####################

168.wupwise=peak=default=default:
PASS1_F77FLAGS=         -fast -Qansi_alias -Qprof_gen
PASS2_F77FLAGS=         -fast -Qansi_alias -Qprof_use
PASS1_LDFLAGS=          -fast -Qansi_alias -Qprof_gen
PASS2_LDFLAGS=          -fast -Qansi_alias -Qprof_use
notes021= 168.wupwise:  -fast -Qansi_alias +FDO

171.swim=peak=default=default:
PASS1_F77FLAGS=         -fast -Qansi_alias -Qprof_gen
PASS2_F77FLAGS=         -fast -Qansi_alias -Qprof_use
PASS1_LDFLAGS=          -fast -Qansi_alias -Qprof_gen
PASS2_LDFLAGS=          -fast -Qansi_alias -Qprof_use
notes022= 171.swim:     -fast -Qansi_alias +FDO

172.mgrid=peak=default=default:
PASS1_F77FLAGS=         -fast -Qansi_alias -Qprof_gen
PASS2_F77FLAGS=         -fast -Qansi_alias -Qprof_use
PASS1_LDFLAGS=          -fast -Qansi_alias -Qprof_gen
PASS2_LDFLAGS=          -fast -Qansi_alias -Qprof_use
notes023= 172.mgrid:    -fast -Qansi_alias +FDO

173.applu=peak=default=default:
PASS1_F77FLAGS=       -fast -Qscalar_rep- -Qauto -Qprof_gen
PASS2_F77FLAGS=       -fast -Qscalar_rep- -Qauto -Qprof_use
PASS1_LDFLAGS=        -fast -Qscalar_rep- -Qauto -Qprof_gen
PASS2_LDFLAGS=        -fast -Qscalar_rep- -Qauto -Qprof_use
notes024= 173.applu:  -fast -Qscalar_rep- -Qauto  +FDO

177.mesa=peak=default=default:
basepeak=yes
notes025= 177.mesa:   basepeak=yes

178.galgel=peak=default=default:
PASS1_FFLAGS=           -fast -Qansi_alias -Qprof_gen
PASS2_FFLAGS=           -fast -Qansi_alias -Qprof_use
PASS1_LDFLAGS=          -fast -Qansi_alias -Qprof_gen
PASS2_LDFLAGS=          -fast -Qansi_alias -Qprof_use
notes026= 178.galgel:   -fast -Qansi_alias +FDO

179.art=peak=default=default:
basepeak=yes
notes027= 179.art:      basepeak=yes

183.equake=peak=default=default:
PASS1_CFLAGS=               -Oa -Qrcd -Qipo -Qprof_gen
PASS2_CFLAGS=           -QxP -Oa -Qrcd -Qipo -Qprof_use
PASS1_LDFLAGS=              -Oa -Qrcd -Qipo -Qprof_gen
PASS2_LDFLAGS=          -QxP -Oa -Qrcd -Qipo -Qprof_use
EXTRA_LIBS=     shlW32M.lib
notes028= 183.equake:   -QxP -Oa -Qrcd -Qipo shlW32M.lib +FDO

187.facerec=peak=default=default:
PASS1_FFLAGS=           -fast -Qunroll1 -Qscalar_rep- -Qprof_gen
PASS2_FFLAGS=           -fast -Qunroll1 -Qscalar_rep- -Qprof_use
PASS1_LDFLAGS=          -fast -Qunroll1 -Qscalar_rep- -Qprof_gen
PASS2_LDFLAGS=          -fast -Qunroll1 -Qscalar_rep- -Qprof_use
notes029= 187.facerec:  -fast -Qunroll1 -Qscalar_rep- +FDO

188.ammp=peak=default=default:
PASS1_CFLAGS=           -fast -Oa -Qprof_gen
PASS2_CFLAGS=           -fast -Oa -Qprof_use
PASS1_LDFLAGS=          -fast -Oa -Qprof_gen
PASS2_LDFLAGS=          -fast -Oa -Qprof_use
EXTRA_LIBS=     shlW32M.lib
notes030= 188.ammp:     -fast -Oa +FDO shlW32M.lib
```

```
189.lucas=peak=default=default:
PASS1_FFLAGS=           -fast -Qprefetch- -Qprof_gen
PASS2_FFLAGS=           -fast -Qprefetch- -Qprof_use
PASS1_LDFLAGS=          -fast -Qprefetch- -Qprof_gen
PASS2_LDFLAGS=          -fast -Qprefetch- -Qprof_use
notes031= 189.lucas:    -fast -Qprefetch- +FDO

191.fma3d=peak=default=default:
basepeak=yes
notes032= 191.fma3d:    basepeak=yes

200.sixtrack=peak=default=default:
PASS1_F77FLAGS=         -Qipo      -Qprof_gen
PASS2_F77FLAGS=         -Qipo -QxP -Qprof_use
PASS1_LDFLAGS=          -Qipo      -Qprof_gen
PASS2_LDFLAGS=          -Qipo -QxP -Qprof_use
notes033= 200.sixtrack: -Qipo -QxP +FDO

301.apsi=peak=default=default:
PASS1_F77FLAGS=         -fast -Qprof_gen
PASS2_F77FLAGS=         -fast -Qprof_use
PASS1_LDFLAGS=          -fast -Qprof_gen
PASS2_LDFLAGS=          -fast -Qprof_use
notes034= 301.apsi:     -fast +FDO

################################################################################
# System config information
################################################################################

default=default=default=default:
hw_vendor=
hw_model=
hw_cpu=
hw_cpu_mhz=
hw_fpu=
hw_ncpu=
hw_ncpuorder=
hw_parallel=
hw_pcache=
hw_scache=
hw_tcache=
hw_ocache=
hw_memory=
hw_disk=
hw_other=
sw_os=
sw_file=
sw_state=
company_name=
machine_name=
license_num=
tester_name=
test_date=
hw_avail=
sw_avail=
prepared_by=
config=
notes050=
notes051=
notes052=
notes053=
notes054=
notes055=

################################################################################
# Software information (Compilers and libraries)
################################################################################

int=default=default=default:
```

sw_compiler1=Intel C++ Compiler 9.0 for 32-bit
sw_compiler2=applications Build 20050430Z (32-bit)
sw_compiler3=Microsoft Visual Studio .Net 2003
sw_compiler4=SmartHeap Library Version 8 from http://www.microquill.com/
notes010= Portability flags:
notes020= Peak tuning:
notes045=

fp=default=default=default:
sw_compiler1=Intel C++ and Fortran Compiler 9.0 for 32-bit
sw_compiler2=applications Build 20050430Z (32-bit)
sw_compiler3=Microsoft Visual Studio .Net 2003
sw_compiler4=SmartHeap Library Version 8 from http://www.microquill.com/
notes010= Portability:
notes020= Peak tuning:

__MD5__
164.gzip=base=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=e5f122f50354d112be7948cbd000bf80
exemd5=a07b70a8c37aa6ee3bb80330eca87093

164.gzip=peak=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=a99c01d176dd023e61a90e35357aa1c6
exemd5=bf622341e9a758259ca557ae15486074

175.vpr=base=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=eba35ab8b77ec87dfa048807c29dc44f
exemd5=26504ec96d557f892225021c07123f1b

175.vpr=peak=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=2d55fc2721d333aed0a2376b36a816a2
exemd5=c31713dd4e5e40a4c75889b6e47b74a0

176.gcc=base=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=18f35abd0cf5e7330db4146a6ed5af20
exemd5=8dbb84478731c0a5a0de63e18733b89e

181.mcf=base=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=1961e891a253e50d2991d8d64690031f
exemd5=d27b8c00eb5751417875d72dbc385456

186.crafty=base=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=97d8c5ba4fab50bc502352c74fcb3ad9
exemd5=00322afeab8b958f5b4a77241641c3d0

186.crafty=peak=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=d559c581b88e2edfb5824055769f4b02
exemd5=6f7bba1b170166c7a30a2712d836ad3a

197.parser=base=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=dfa6d9f60bc6090b49d75734c4fbbcc1
exemd5=c7544595cbf6804f3632bd9854ac0e72

197.parser=peak=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=d6092d19db59057bb78ea8938c889fc1
exemd5=09205a08c3017d4277b4c022f89c7ce8

252.eon=base=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=a65ed3e6cb7afc2e36ecfeb00f3a5330
exemd5=8f7ea2f10d623bc08eaed2b64c3bbc4c

252.eon=peak=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=ce9a07da7b4901429ca22b342dd260f6
exemd5=178c57ba8bacf24c8b56ff2ee7f03131

253.perlbmk=base=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=d9fce91f31f3243109ed23a7c5f77184
exemd5=7c3daccbd134557179b5c644bdffeadc

253.perlbmk=peak=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=75b0938d99c88208b671c508b467da1c
exemd5=82d41eb3934602059c49664e986373d7

254.gap=base=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=d5570ef93927f01f46e3da2f361e3765
exemd5=79407387294a91a15e914385852cc840

255.vortex=base=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=71f0d392cb71fb3e159847c9880b8f3f
exemd5=90a17611a352b98371382aaf2bc150fe

256.bzip2=base=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=ac2ac34824963ca151d29a64924918a0
exemd5=6ce674a24cb9d435506987986cfbaea5

256.bzip2=peak=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=ae5144166a2727e6b6a224133e808edf
exemd5=06661daecc731d0f1a13e6c016828668

300.twolf=base=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=b66e50cc6f379af293222b1760ac5b53
exemd5=88aef334fc5388922fc7c757d2069df4

300.twolf=peak=cpu2000.v1.3.ic90.win32.p4.sse3.sep232005=default:
# Last updated Sat May 6 17:17:46 2006
optmd5=c751dedbf5b87bc0990dcebfaa3d4eb1
exemd5=3c11745c189d44505c52508e203e44a8

Appendix C – SPECint_rate output

This appendix provides the output of the benchmark for both the two-user and four-user runs on each of the three test servers.

Intel Pentium D processor 840-based server (2 users)

CINT2000 Result

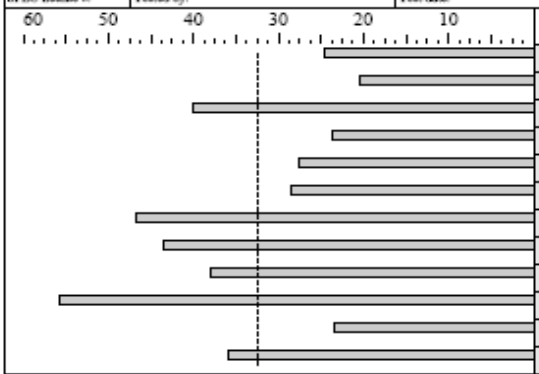
Intel Corporation

Intel Pentium D processor 840-based server(3.2GHz, Pentium D processor)

SPECint_rate2000 = --

SPECint_rate_base2000 = 32.5

SPEC license #: | Tested by: | Test date: | Hardware Avail: | Software Avail:



Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
164.gzip	2	132	24.6			
175.vpr	2	159	20.5			
176.gcc	2	63.7	40.1			
181.mcf	2	176	23.7			
186.crafty	2	84.2	27.5			
197.parser	2	146	28.6			
252.eon	2	64.5	46.7			
253.perlbmk	2	95.8	43.6			
254.gap	2	67.2	38.0			
255.vortex	2	79.3	55.6			
256.bzip2	2	149	23.4			
300.twolf	2	194	36.0			

Hardware

CPU:	Pentium D processor (3.2GHz, 800 MHz bus)
CPU MHz:	3200
FPU:	Integrated
CPU(s) enabled:	2 core, 1 chip, 2 core/chip
CPU(s) orderable:	1
Parallel:	No
Primary Cache:	16KB + 12KB
Secondary Cache:	2MB (1MB per core)
L3 Cache:	N/A
Other Cache:	N/A
Memory:	4x2GB DDR2-SDRAM PC2-4200 ECC registered
Disk Subsystem:	1x160GB SATA
Other Hardware:	

Software

Operating System:	Microsoft Server 2003 Enterprise Edition SP1
Compiler:	Intel C++ Compiler 9.0 for 32-bit applications Build 20050402Z (32-bit) Microsoft Visual Studio .Net 2003 SmartHeap Library Version 8 from http://www.microquill.com/
File System:	NTFS
System State:	Default

Notes/Tuning Information

```
+FDO: PASS1=-Qprof_gen  PASS2=-Qprof_use
Base tuning for C programs:   -fast +FDO shlW32M.lib
Base tuning for C++ programs: -fast -Qcxx_features +FDO
Portability flags:
176.gcc: -Dalloca=_alloca /F10000000
186.crafy: -DNT_i386
253.perlbmk: -DSPEC_CPU2000_NTOS -DPERLDLL /MT
254.gap: -DSYS_HAS_CALLOC_PROTO -DSYS_HAS_MALLOC_PROTO
Peak tuning:
164.gzip:     -fast -Qansi_alias -Oa  +FDO
175.vpr:      -fast -Qansi_alias +FDO
176.gcc:      basepeak=yes
181.mcf:      basepeak=yes
186.crafty:   -fast -Qansi_alias -Oa +FDO
197.parser:   -fast -Qansi_alias  +FDO
252.eon:      -fast +FDO
253.perlbmk:  -fast -Qansi_alias +FDO shlW32M.lib
254.gap:      basepeak=yes
255.vortex    basepeak=yes
256.bzip2:   -fast -Oa -Qunroll1 +FDO
```

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CINT2000 Result

Intel Corporation

Intel Pentium D processor 840-based server(3.2GHz, Pentium D processor)

SPECint_rate2000 = --

SPECint_rate_base2000 = 32.5

SPEC license #	Tested by:	Test date:	Hardware Avail:	Software Avail:

Notes/Tuning Information (Continued)

```
300.twolf:    -fast -O3 +FDO shlW32M.lib
```

Intel Pentium D processor 840-based server (4 users)

CINT2000 Result

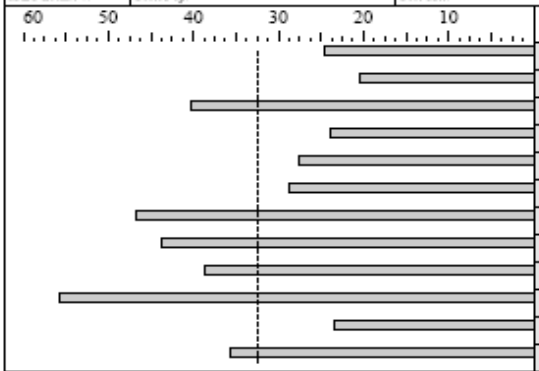
Intel Corporation

Intel Pentium D processor 840-based server(3.2GHz, Pentium D processor)

SPECint_rate2000 = --

SPECint_rate_base2000 = 32.5

SPEC license #: | Tested by: | Test date: | Hardware Avail: | Software Avail:



Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
164.gzip	4	265	24.5			
175.vpr	4	318	20.4			
176.gcc	4	127	40.2			
181.mcf	4	350	23.9			
186.crafty	4	169	27.5			
197.parser	4	292	28.6			
252.eon	4	129	46.7			
253.perlbmk	4	191	43.6			
254.gap	4	132	38.6			
255.vortex	4	158	55.7			
256.bzip2	4	296	23.5			
300.twolf	4	390	35.7			

Hardware

CPU:	Pentium D processor (3.2GHz, 800 MHz bus)
CPU MHz:	3200
FPU:	Integrated
CPU(s) enabled:	2 core, 1 chip, 2 core/chip
CPU(s) orderable:	1
Parallel:	No
Primary Cache:	16KB + 12KB
Secondary Cache:	2MB (1MB per core)
L3 Cache:	N/A
Other Cache:	N/A
Memory:	4x2GB DDR2-SDRAM PC2-4200 ECC registered
Disk Subsystem:	1x160GB SATA
Other Hardware:	

Software

Operating System:	Microsoft Server 2003 Enterprise Edition SP1
Compiler:	Intel C++ Compiler 9.0 for 32-bit applications Build 20050402 (32-bit) Microsoft Visual Studio .Net 2003 SmartHeap Library Version 8 from http://www.microquill.com/
File System:	NTFS
System State:	Default

Notes/Tuning Information

```
+FDO: PASS1=-Qprof_gen  PASS2=-Qprof_use
Base tuning for C programs:   -fast +FDO shlW32M.lib
Base tuning for C++ programs: -fast -Qcxx_features +FDO
Portability flags:
176.gcc: -Dalloca=_alloca /F10000000
186.crafy: -DNT_i386
253.perlbmk: -DSPEC_CPU2000_NTOS -DPERLDLL /MT
254.gap: -DSYS_HAS_CALLOC_PROTO -DSYS_HAS_MALLOC_PROTO
Peak tuning:
164.gzip:     -fast -Qansi_alias -Oa  +FDO
175.vpr:      -fast -Qansi_alias +FDO
176.gcc:      basepeak=yes
181.mcf:      basepeak=yes
186.crafty:   -fast -Qansi_alias -Oa +FDO
197.parser:   -fast -Qansi_alias  +FDO
252.eon:      -fast +FDO
253.perlbmk:  -fast -Qansi_alias +FDO shlW32M.lib
254.gap:      basepeak=yes
255.vortex    basepeak=yes
256.bzip2:   -fast -Oa -Qunroll1 +FDO
```

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CINT2000 Result

Intel Corporation

Intel Pentium D processor 840-based server(3.2GHz, Pentium D processor)

SPECint_rate2000 = --

SPECint_rate_base2000 = 32.5

SPEC license #	Tested by:	Test date:	Hardware Avail:	Software Avail:

Notes/Tuning Information (Continued)

```
300.twolf:    -fast -O3 +FDO shlW32M.lib
```

Intel Pentium D processor 950-based server (2 users)

CINT2000 Result

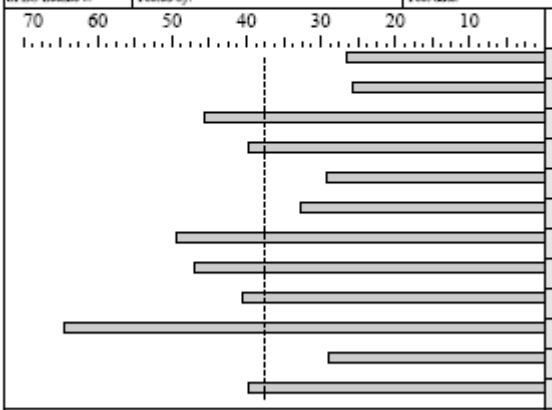
Intel Corporation

Intel Pentium D processor 950-based server(3.4GHz, Pentium D processor)

SPECint_rate2000 = --

SPECint_rate_base2000 = 37.7

SPEC license #: | Tested by: | Test date: | Hardware Avail: | Software Avail:



Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
164.gzip	2	122	26.5			
175.vpr	2	126	25.7			
176.gcc	2	55.9	45.6			
181.mcf	2	105	39.8			
186.crafty	2	79.5	29.2			
197.parser	2	128	32.7			
252.eon	2	61.0	49.4			
253.perlbmk	2	89.1	46.9			
254.gap	2	63.1	40.4			
255.vortex	2	68.5	64.4			
256.bzip2	2	121	28.9			
300.twolf	2	175	39.7			

Hardware

CPU:	Pentium D processor (3.4GHz, 800 MHz bus)
CPU MHz:	3400
FPU:	Integrated
CPU(s) enabled:	2 core, 1 chip, 2 core/chip
CPU(s) orderable:	1
Parallel:	No
Primary Cache:	16KB + 12KB
Secondary Cache:	4MB (2MB per core)
L3 Cache:	N/A
Other Cache:	N/A
Memory:	4x2GB DDR2-SDRAM PC2-4200 ECC registered
Disk Subsystem:	1x160GB SATA
Other Hardware:	

Software

Operating System:	Microsoft Server 2003 Enterprise Edition SP1
Compiler:	Intel C++ Compiler 9.0 for 32-bit applications Build 20050302 (32-bit) Microsoft Visual Studio .Net 2003 SmartHeap Library Version 8 from http://www.microquill.com/
File System:	NTFS
System State:	Default

Notes/Tuning Information

```
+FDO: PASS1=-Qprof_gen  PASS2=-Qprof_use
Base tuning for C programs:   -fast +FDO shlW32M.lib
Base tuning for C++ programs: -fast -Qcxx_features +FDO
Portability flags:
176.gcc: -Dalloca=_alloca /F10000000
186.crafy: -DNT_i386
253.perlbmk: -DSPEC_CPU2000_NTOS -DPERLDLL /MT
254.gap: -DSYS_HAS_CALLOC_PROTO -DSYS_HAS_MALLOC_PROTO
Peak tuning:
164.gzip:     -fast -Qansi_alias -Oa  +FDO
175.vpr:      -fast -Qansi_alias +FDO
176.gcc:      basepeak=yes
181.mcf:      basepeak=yes
186.crafty:   -fast -Qansi_alias -Oa +FDO
197.parser:   -fast -Qansi_alias  +FDO
252.eon:      -fast +FDO
253.perlbmk:  -fast -Qansi_alias +FDO shlW32M.lib
254.gap:      basepeak=yes
255.vortex    basepeak=yes
256.bzip2:   -fast -Oa -Qunroll1 +FDO
```

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CINT2000 Result

Intel Corporation	SPECint_rate2000 = --
Intel Pentium D processor 950-based server(3.4GHz, Pentium D processor)	SPECint_rate_base2000 = 37.7

SPEC license #:	Tested by:	Test date:	Hardware Avail:	Software Avail:

Notes/Tuning Information (Continued)

```
300.twolf:    -fast -O3 +FDO shlW32M.lib
```

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Intel Pentium D processor 950-based server (4 users)

CINT2000 Result

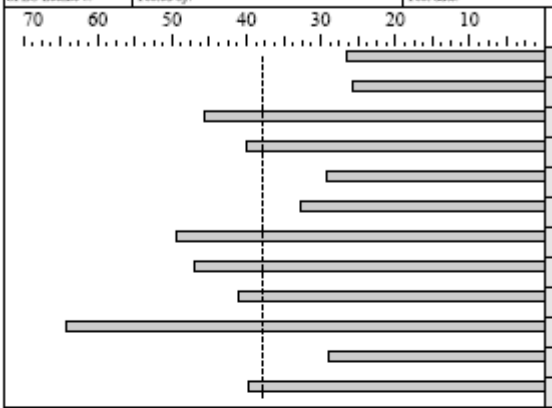
Intel Corporation

SPECint_rate2000 = --

SPECint_rate_base2000 = 37.7

Intel Pentium D processor 950-based server(3.4GHz, Pentium D processor)

SPEC license #: | Tested by: | Test date: | Hardware Avail: | Software Avail:



Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
164.gzip	4	244	26.6			
175.vpr	4	253	25.6			
176.gcc	4	112	45.6			
181.mcf	4	209	40.0			
186.crafty	4	159	29.1			
197.parser	4	256	32.6			
252.eon	4	122	49.4			
253.perlbmk	4	178	47.0			
254.gap	4	125	41.0			
255.vortex	4	137	64.3			
256.bzip2	4	240	29.0			
300.twolf	4	351	39.7			

Hardware

CPU:	Pentium D processor (3.4GHz, 800 MHz bus)
CPU MHz:	3400
FPU:	Integrated
CPU(s) enabled:	2 core, 1 chip, 2 core/chip
CPU(s) orderable:	1
Parallel:	No
Primary Cache:	16KB + 12KB
Secondary Cache:	4MB (2MB per core)
L3 Cache:	N/A
Other Cache:	N/A
Memory:	4x2GB DDR2-SDRAM PC2-4200 ECC registered
Disk Subsystem:	1x160GB SATA
Other Hardware:	

Software

Operating System:	Microsoft Server 2003 Enterprise Edition SP1
Compiler:	Intel C++ Compiler 9.0 for 32-bit applications Build 200504302 (32-bit) Microsoft Visual Studio .Net 2003 SmartHeap Library Version 8 from http://www.microquill.com/
File System:	NTFS
System State:	Default

Notes/Tuning Information

```
+FDO: PASS1=-Qprof_gen  PASS2=-Qprof_use
Base tuning for C programs:   -fast +FDO shlW32M.lib
Base tuning for C++ programs: -fast -QcXX_features +FDO
Portability flags:
176.gcc: -Dalloca=_alloca /F10000000
186.crafy: -DNT_i386
253.perlbmk: -DSPEC_CPU2000_NTOS -DPERLDLL /MT
254.gap: -DSYS_HAS_CALLOC_PROTO -DSYS_HAS_MALLOC_PROTO
Peak tuning:
164.gzip:     -fast -Qansi_alias -Oa  +FDO
175.vpr:      -fast -Qansi_alias +FDO
176.gcc:      basepeak=yes
181.mcf:      basepeak=yes
186.crafty:   -fast -Qansi_alias -Oa +FDO
197.parser:   -fast -Qansi_alias  +FDO
252.eon:      -fast +FDO
253.perlbmk:  -fast -Qansi_alias +FDO shlW32M.lib
254.gap:      basepeak=yes
255.vortex    basepeak=yes
256.bzip2:   -fast -Oa -Qunroll1 +FDO
```

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http://www.spec.org/

CINT2000 Result

Intel Corporation	SPECint_rate2000 = --
Intel Pentium D processor 950-based server(3.4GHz, Pentium D processor)	SPECint_rate_base2000 = 37.7

SPEC license #:	Tested by:	Test date:	Hardware Avail:	Software Avail:

Notes/Tuning Information (Continued)

```
300.twolf:    -fast -O3 +FDO shlW32M.lib
```

Standard Performance Evaluation Corporation
info@spec.org
http://www.spec.org/

Intel Xeon processor 3070-based server (2 users)

CINT2000 Result

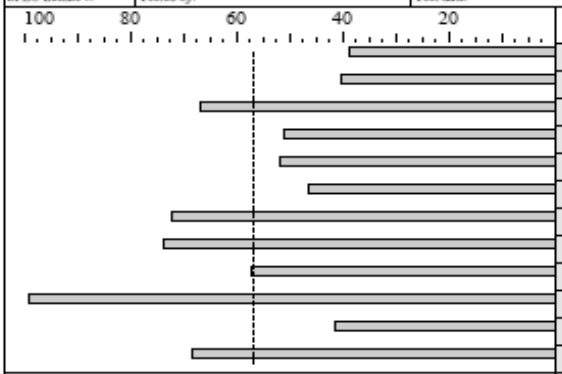
Intel Corporation

Intel Xeon Processor 3070-based server(2.66GHz, Xeon processor 3070)

SPECint_rate2000 = --

SPECint_rate_base2000 = 56.6

SPEC license #: | Tested by: | Test date: | Hardware Avail: | Software Avail:



Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
164.gzip	2	84.1	38.6			
175.vpr	2	80.6	40.3			
176.gcc	2	38.3	66.6			
181.mcf	2	81.7	51.1			
186.crafty	2	45.0	51.6			
197.parser	2	90.0	46.4			
252.eon	2	41.9	72.0			
253.perlbmk	2	56.7	73.6			
254.gap	2	44.6	57.2			
255.vortex	2	44.5	99.0			
256.bzip2	2	83.8	41.5			
300.twolf	2	102	68.2			

Hardware

CPU:	Intel Xeon processor 3070 (2.66GHz, 1066 MHz bus)
CPU MHz:	2666
FPU:	Integrated
CPU(s) enabled:	2 core, 1 chip, 2 core/chip
CPU(s) orderable:	1
Parallel:	No
Primary Cache:	32KB + 32KB
Secondary Cache:	4MB (Shared)
L3 Cache:	N/A
Other Cache:	N/A
Memory:	4x2GB DDR2-SDRAM PC2-4200 ECC registered
Disk Subsystem:	1x160GB SATA
Other Hardware:	

Software

Operating System:	Microsoft Server 2003 Enterprise Edition SP1
Compiler:	Intel C++ Compiler 9.0 for 32-bit applications Build 20050402Z (32-bit) Microsoft Visual Studio .Net 2003 SmartHeap Library Version 8 from http://www.microquill.com/
File System:	NTFS
System State:	Default

Notes/Tuning Information

```
+FDO: PASS1=-Qprof_gen  PASS2=-Qprof_use
Base tuning for C programs:   -fast +FDO shlW32M.lib
Base tuning for C++ programs: -fast -QcxX_features +FDO
Portability flags:
176.gcc: -Dalloca=_alloca /F10000000
186.crafy: -DNT_i386
253.perlbmk: -DSPEC_CPU2000_NTOS -DPERLDLL /MT
254.gap: -DSYS_HAS_CALLOC_PROTO -DSYS_HAS_MALLOC_PROTO
Peak tuning:
164.gzip:     -fast -Qansi_alias -Oa  +FDO
175.vpr:      -fast -Qansi_alias +FDO
176.gcc:      basepeak=yes
181.mcf:      basepeak=yes
186.crafty:   -fast -Qansi_alias -Oa +FDO
197.parser:   -fast -Qansi_alias  +FDO
252.eon:      -fast +FDO
253.perlbmk:  -fast -Qansi_alias +FDO shlW32M.lib
254.gap:      basepeak=yes
255.vortex    basepeak=yes
256.bzip2:   -fast -Oa -Qunroll1 +FDO
```

CINT2000 Result

Intel Corporation	SPECint_rate2000 = --
Intel Xeon Processor 3070-based server(2.66GHz, Xeon processor 3070)	SPECint_rate_base2000 = 56.6

SPEC license #	Tested by:	Test date:	Hardware Avail:	Software Avail:

Notes/Tuning Information (Continued)

```
300.twolf:    -fast -O3 +FDO shlW32M.lib
```

Intel Xeon processor 3070-based server (4 users)

CINT2000 Result

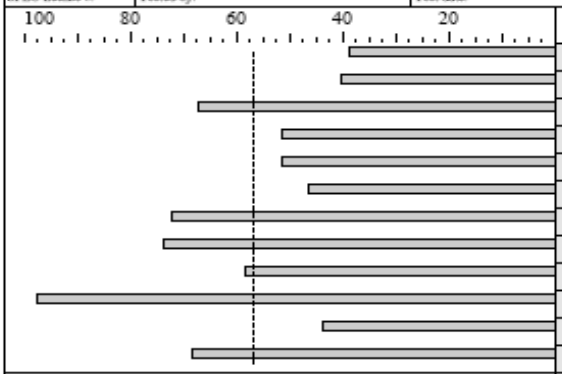
Intel Corporation

Intel Xeon Processor 3070-based server(2.66GHz, Xeon processor 3070)

SPECint_rate2000 = --

SPECint_rate_base2000 = 56.9

SPEC license #: | Tested by: | Test date: | Hardware Avail: | Software Avail:



Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
164.gzip	4	168	38.7			
175.vpr	4	161	40.2			
176.gcc	4	76.1	67.0			
181.mcf	4	162	51.4			
186.crafty	4	90.4	51.3			
197.parser	4	180	46.4			
252.eon	4	83.8	72.0			
253.perlbmk	4	113	73.7			
254.gap	4	87.8	58.1			
255.vortex	4	90.3	97.7			
256.bzip2	4	159	43.8			
300.twolf	4	204	68.1			

Hardware

CPU:	Intel Xeon processor 3070(2.66GHz, 1066 MHz bus)
CPU MHz:	2666
FPU:	Integrated
CPU(s) enabled:	2 core, 1 chip, 2 core/chip
CPU(s) orderable:	1
Parallel:	No
Primary Cache:	32KB + 32KB
Secondary Cache:	4MB (Shared)
L3 Cache:	N/A
Other Cache:	N/A
Memory:	4x2GB DDR2-SDRAM PC2-4200 ECC registered
Disk Subsystem:	1x160GB SATA
Other Hardware:	

Software

Operating System:	Microsoft Server 2003 Enterprise Edition SP1
Compiler:	Intel C++ Compiler 9.0 for 32-bit applications Build 20050402Z (32-bit) Microsoft Visual Studio .Net 2003 SmartHeap Library Version 8 from http://www.microquill.com/
File System:	NTFS
System State:	Default

Notes/Tuning Information

```
+FDO: PASS1=-Qprof_gen  PASS2=-Qprof_use
Base tuning for C programs:   -fast +FDO shlW32M.lib
Base tuning for C++ programs: -fast -QcxX_features +FDO
Portability flags:
176.gcc: -Dalloca=_alloca /F10000000
186.crafy: -DNT_i386
253.perlbmk: -DSPEC_CPU2000_NTOS -DPERLDLL /MT
254.gap: -DSYS_HAS_CALLOC_PROTO -DSYS_HAS_MALLOC_PROTO
Peak tuning:
164.gzip:     -fast -Qansi_alias -Oa  +FDO
175.vpr:      -fast -Qansi_alias +FDO
176.gcc:      basepeak=yes
181.mcf:      basepeak=yes
186.crafty:   -fast -Qansi_alias -Oa +FDO
197.parser:   -fast -Qansi_alias  +FDO
252.eon:      -fast +FDO
253.perlbmk:  -fast -Qansi_alias +FDO shlW32M.lib
254.gap:      basepeak=yes
255.vortex    basepeak=yes
256.bzip2:   -fast -Oa -Qunroll1 +FDO
```

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CINT2000 Result

Intel Corporation

Intel Xeon Processor 3070-based server(2.66GHz, Xeon processor 3070)

SPECint_rate2000 = --

SPECint_rate_base2000 = 56.9

SPEC license #	Tested by:	Test date:	Hardware Avail:	Software Avail:

Notes/Tuning Information (Continued)

```
300.twolf:    -fast -O3 +FDO shlW32M.lib
```

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