Principled Technologies®

TEST REPORT
JUNE 2006

SPEC CPU2000 SPECfp_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 SPECfp_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 CFP2000 SPECfp_rate_base benchmark.

KEY FINDINGS

- The Intel Xeon processor 3070-based server delivered almost 66 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 21 percent higher peak performance than the Intel Pentium D processor 950-based server (see Figure 2).
- The Intel Xeon processor 3070-based server had 26.8 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).

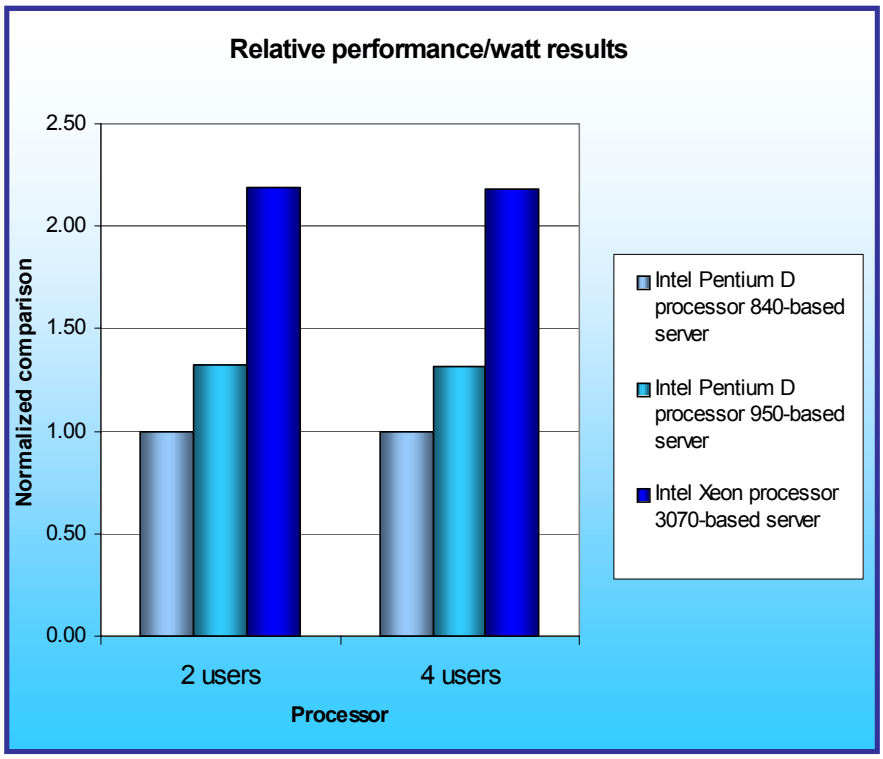


Figure 1: Normalized performance/watt results of the test servers running the SPECfp_rate_base2000 workload. Higher numbers indicate better performance/watt.

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 66 percent more performance/watt than the Intel Pentium D processor 950-based server and almost 118 percent more performance/watt than the Intel Pentium D processor 840-based server for SPECfp_rate_base2000 with four users. The Intel Xeon processor 3070-based server also delivered dramatically more performance/watt than the other servers on the SPECfp_rate_base2000 test with two users.

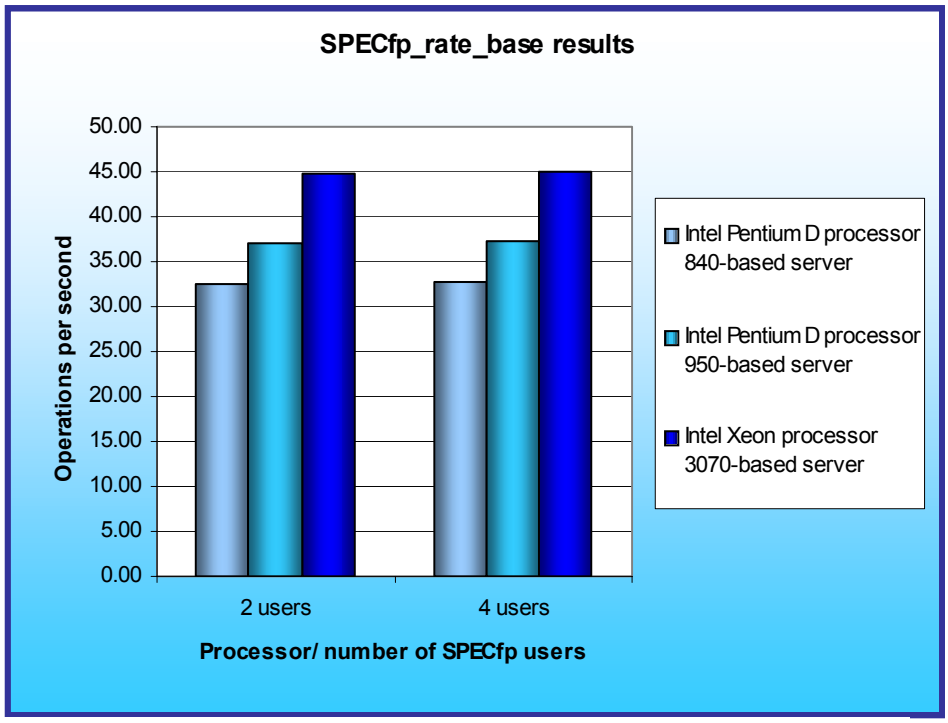


Figure 2: SPECfp_rate_base2000 results for the three test servers. Higher numbers are better.

Figure 2 shows the SPECfp_rate_base2000 results of the three test servers for two- and four-user runs. Each result is the SPECfp_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 SPECfp_rate_base2000 test, the Intel Xeon processor 3070-based server produced the highest results (45.0) and yielded a 21 percent performance increase over the Intel Pentium D processor 950-based server (37.2) and a 37.2 percent increase over the Intel Pentium D processor 840-based server (32.8).

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—26.8 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.)

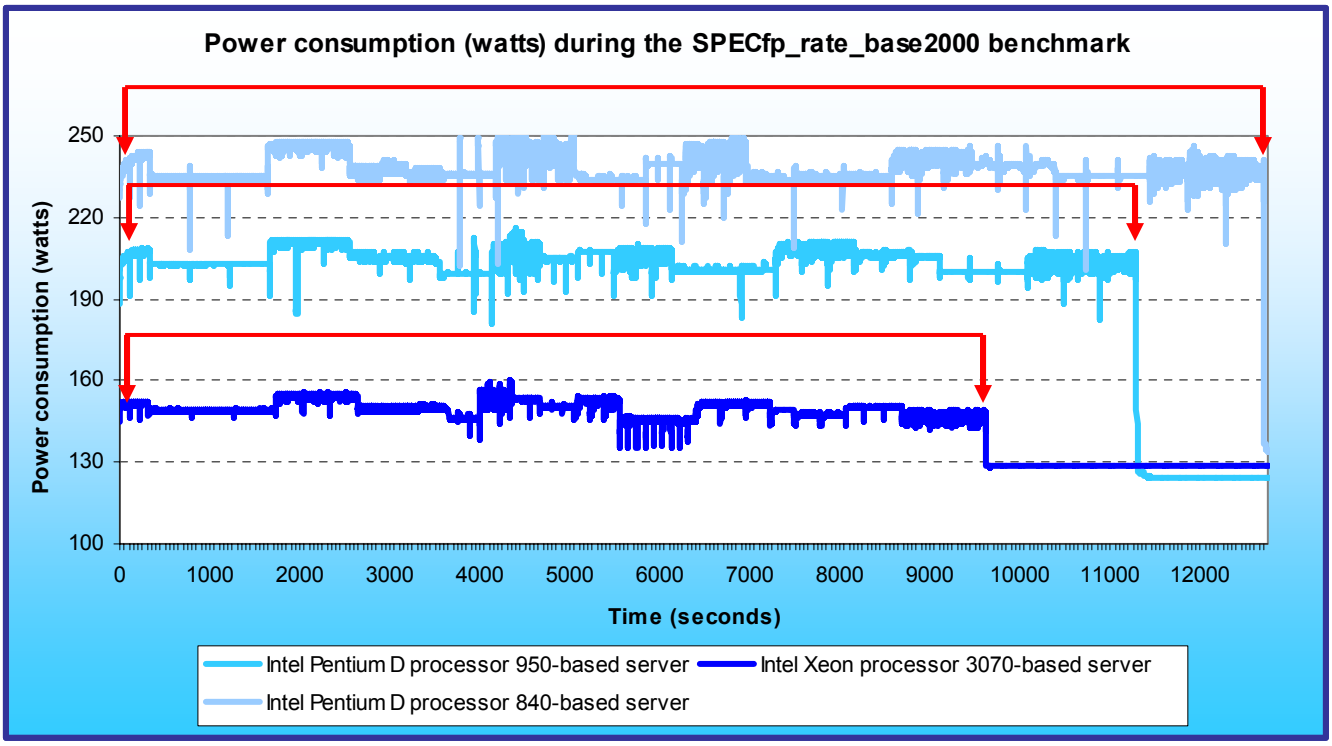


Figure 3: Power consumption (in watts) of each of the servers throughout the course of executing the SPECfp_rate_base2000 benchmark with four users. Lower power consumption is better.

SPEC CPU2000 Workload

The SPEC CPU2000 workload includes two benchmark suites: CINT2000 and CFP2000. We ran only the CFP2000 benchmark, which focuses on measuring and comparing compute-intensive floating point performance. Specifically, we measured the SPECfp_rate_base2000 results for the three test servers with two and four users. This workload produces results as the average of fourteen normalized throughput ratios with conservative optimization for each benchmark. Figure 4 lists the 14 applications that compose the CFP2000 benchmark.

Name	Reference Time	Remarks
164.wupwise	1600	Quantum chromodynamics
171.swim	3100	Shallow water modeling
172.mgrid	1800	Multi-grid solver in 3D potential field
173.applu	2100	Parabolic/elliptic partial differential equations
177.mesa	1400	3D Graphics library
178.galgel	2900	Fluid dynamics: analysis of oscillatory instability
179.art	2600	Neural network simulation; adaptive resonance theory
183.equake	1300	Finite element simulation; earthquake modeling
187.facerec	1900	Computer vision: recognizes faces
188.ammp	2200	Computational chemistry
189.lucas	2000	Number theory: primality testing
191.fma3d	2100	Finite element crash simulation
200.sixtrack	1100	Particle accelerator model
301.apsi	2600	Solves problems regarding temperature, wind, velocity and distribution of pollutants

Figure 4: The applications that make up the CFP2000 benchmark.

A CFP2000 run performs each of the 14 application (tasks) three times and reports the median for each. It also calculates the geometric mean of those 14 results to produce an overall score.

Test results

Figure 5 shows the SPECfp_rate_base2000 results for all three servers with two and four users. All three servers achieved their best SPECfp_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	32.6	32.8
Intel Pentium D processor 950-based server	37.0	37.2
Intel Xeon processor 3070-based server	44.7	45.0

Figure 5: SPECfp_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 26.8 percent lower average power usage during the SPECfp_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	237.6	237.5
Intel Pentium D processor 950-based server	203.5	204.3
Intel Xeon processor 3070-based server	148.8	149.6

Figure 6: Average power usage (in watts) of the servers with varying user counts running SPECfp_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	237.5
Intel Pentium D processor 950-based server	123.0	204.3
Intel Xeon processor 3070-based server	127.3	149.6

Figure 7: Average power usage (in watts) of the test servers while idle and during the runs of the SPECfp_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 9.1 for 32-bit
- Intel Fortran Compiler 9.1 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 SPECfp_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 <#> fp" , 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 CFP2000.<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. CFP2000.002. 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.

```
#####################################################################
# Principled Technologies                                           #
#                                                                   #
# SPEC CPU2000 v1.3                                                 #
# Windows XP Config File                                            #
#                                                                   #
# Optimized for the Intel Processors Supporting SSE3                #
#                                                                   #
# Compiler Support:                                                 #
#   Intel C/C++/Visual Fortran Compiler 9.1                         #
#   Microsoft Visual Studio .NET 2003(7.1.3088)                     #
#   MicroQuill SmartHeap Library 8.0                                #
#####################################################################

#########################
#  Config File Options  #
#########################
action        = validate
tune          = base
ext           = cpu2000.ic91.QxP.20060323
PATHSEP       = /
check_md5     = 1
reportable    = 1
backup_config = 0

####################
#  GENERAL Setup  #
####################
default=default=default=default:

# Company Info
hw_vendor    = Intel
company_name = Principled Technologies
license_num  = 0
tester_name  = PT
prepared_by  = Principled Technologies

# Compiler
CC        = icl
CXX       = icl
F77       = ifort
FC        = ifort
OBJ       = .obj

# ONESTEP for all
ONESTEP   = yes

#####################################################################
#  EDIT - System Under Test (SUT) Configuration Description  #
#####################################################################
default=default=default=default:

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=
machine_name=
test_date=
hw_avail=
sw_avail=
config=

# Uncomment when Hardware Prefetcher is enabled in the system BIOS.
notes100=NOTES
notes101=  Hardware Prefetcher enabled in the system BIOS.

####################
#  General Notes  #
####################
default=default=default=default:

sw_compiler000=Intel C/C++ Compiler 9.1 for IA32(20060323Z)
sw_compiler010=Microsoft Visual Studio .NET 2003(7.1.3088)

sw_compiler015=MicroQuill SmartHeap Library 8.0

notes000= GENERAL
notes001=   ONESTEP=yes
notes002=   +FDO:   PASS1=-Qprof_gen  PASS2=-Qprof_use

##############################################################################################################
####    SPECint                                                                                           ####
##############################################################################################################

int=default=default=default:

notes010= PORTABILITY FLAGS

176.gcc=default=default=default:
CPORTABILITY  =          -Dalloca=_alloca /F10000000
notes011=   176.gcc:     -Dalloca=_alloca /F10000000

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

253.perlbmk=default=default=default:
CPORTABILITY  =          -DSPEC_CPU2000_NTOS -DPERLDLL /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 --------------------------------

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
notes020= BASE TUNING
notes021=   C:           -fast +FDO shlW32M.lib

# Exception handling required for C++ Programs in base
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
```

```
EXTRA_LIBS     =
notes022=   C++:         -fast -Qcxx_features +FDO

#---------------------------- PEAK --------------------------------

int=default=default=default:
notes040= PEAK TUNING

164.gzip=peak=default=default:
PASS1_CFLAGS=            -fast -Qprof_gen
PASS2_CFLAGS=            -fast -Qprof_use
PASS1_LDFLAGS=           -fast -Qprof_gen
PASS2_LDFLAGS=           -fast -Qprof_use
notes041=   164.gzip:    -fast +FDO

175.vpr=peak=default=default:
PASS1_CFLAGS=            -fast -Qprof_gen
PASS2_CFLAGS=            -fast -Qprof_use
PASS1_LDFLAGS=           -fast -Qprof_gen
PASS2_LDFLAGS=           -fast -Qprof_use
notes042=   175.vpr:     -fast +FDO

176.gcc=peak=default=default:
basepeak=yes
notes043=   176.gcc:     basepeak=yes

181.mcf=peak=default=default:
basepeak=yes
notes044=   181.mcf:     basepeak=yes

186.crafty=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
notes045=   186.crafty:  -fast -Oa +FDO shlW32M.lib

197.parser=peak=default=default:
PASS1_CFLAGS=            -fast -Qprof_gen
PASS2_CFLAGS=            -fast -Qprof_use
PASS1_LDFLAGS=           -fast -Qprof_gen
PASS2_LDFLAGS=           -fast -Qprof_use
notes046=   197.parser:  -fast +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
notes047=   252.eon:     -fast +FDO

253.perlbmk=peak=default=default:
basepeak=yes
notes048=   253.perlbmk: basepeak=yes

254.gap=peak=default=default:
PASS1_CFLAGS=            -fast -Qprof_gen
PASS2_CFLAGS=            -fast -Qprof_use
PASS1_LDFLAGS=           -fast -Qprof_gen
PASS2_LDFLAGS=           -fast -Qprof_use
notes049=   254.gap:     -fast +FDO

255.vortex=peak=default=default:
basepeak=yes
notes050=   255.vortex   basepeak=yes

256.bzip2=peak=default=default:
PASS1_CFLAGS=            -fast -Qunroll1 -Oa -Qprof_gen
PASS2_CFLAGS=            -fast -Qunroll1 -Oa -Qprof_use
```

```
PASS1_LDFLAGS=           -fast -Qunroll1 -Oa -Qprof_gen
PASS2_LDFLAGS=           -fast -Qunroll1 -Oa -Qprof_use
notes051=   256.bzip2:   -fast -Qunroll1 -Oa +FDO

300.twolf=peak=default=default:
basepeak=yes
notes052=   300.twolf:   basepeak=yes

###############################################################################################
####    SPECfp                                                                            ####
###############################################################################################
fp=default=default=default:
sw_compiler005=Intel Fortran Compiler 9.1 for IA32(20060323)

notes010= PORTABILITY

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

#---------------------------- BASELINE --------------------------------

fp=base=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
notes020= BASE TUNING
notes021=   FORTRAN:      -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
notes030=   177.mesa:     -fast +FDO shlW32M.lib

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
notes031=   179.art:      -fast +FDO shlW32M.lib

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
notes032=   183.equake:   -fast +FDO shlW32M.lib

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
notes033=   188.ammp:     -fast +FDO shlW32M.lib

#---------------------------- PEAK --------------------------------

fp=default=default=default:
notes040= PEAK TUNING

168.wupwise=peak=default=default:
basepeak=yes
```

```
notes041=   168.wupwise:  basepeak=yes

171.swim=peak=default=default:
basepeak=yes
notes042=   171.swim:     basepeak=yes

172.mgrid=peak=default=default:
basepeak=yes
notes043=   172.mgrid:    basepeak=yes

173.applu=peak=default=default:
PASS1_F77FLAGS=           -fast -Qansi_alias -Qscalar_rep- -Qauto -Qprof_gen
PASS2_F77FLAGS=           -fast -Qansi_alias -Qscalar_rep- -Qauto -Qprof_use
PASS1_LDFLAGS=            -fast -Qansi_alias -Qscalar_rep- -Qauto -Qprof_gen
PASS2_LDFLAGS=            -fast -Qansi_alias -Qscalar_rep- -Qauto -Qprof_use
notes044=   173.applu:    -fast -Qansi_alias -Qscalar_rep- -Qauto +FDO

177.mesa=peak=default=default:
basepeak=yes
notes045=   177.mesa:     basepeak=yes

178.galgel=peak=default=default:
basepeak=yes
notes046=   178.galgel:   basepeak=yes

179.art=peak=default=default:
basepeak=yes
notes047=   179.art:      basepeak=yes

183.equake=peak=default=default:
PASS1_CFLAGS=             -fast -Oa -Qrcd -Qprof_gen
PASS2_CFLAGS=             -fast -Oa -Qrcd -Qprof_use
PASS1_LDFLAGS=            -fast -Oa -Qrcd -Qprof_gen
PASS2_LDFLAGS=            -fast -Oa -Qrcd -Qprof_use
EXTRA_LIBS=     shlW32M.lib
notes048=   183.equake:   -fast -Oa -Qrcd +FDO shlW32M.lib

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
notes049=   187.facerec:  -fast -Qunroll1 -Qscalar_rep- +FDO

188.ammp=peak=default=default:
CFLAGS =                  -fast -Oa
EXTRA_LIBS=   shlW32M.lib
notes050=   188.ammp:     -fast -Oa shlW32M.lib

189.lucas=peak=default=default:
basepeak=yes
notes051=   189.lucas:    basepeak=yes

191.fma3d=peak=default=default:
basepeak=yes
notes052=   191.fma3d:    basepeak=yes

200.sixtrack=peak=default=default:
PASS1_F77FLAGS=           -fast -Qprof_gen
PASS2_F77FLAGS=           -fast -Qprof_use
PASS1_LDFLAGS=            -fast -Qprof_gen
PASS2_LDFLAGS=            -fast -Qprof_use
notes053=   200.sixtrack: -fast +FDO

301.apsi=peak=default=default:
basepeak=yes
notes054=   301.apsi:     basepeak=yes

__MD5__
168.wupwise=base=cpu2000.ic91.QxP.20060323=default:
```

```
# Last updated Tue Jun 27 18:08:26 2006
optmd5=130b1457be2d3ceb7f299b85b06ccda8
exemd5=2debc1c09a3321cc808e176167af9562

171.swim=base=cpu2000.ic91.QxP.20060323=default:
# Last updated Tue Jun 27 18:08:26 2006
optmd5=c65b49312692fd9d0c028adfd1e03305
exemd5=8f89ca200adc454516eb7a6959a65193

172.mgrid=base=cpu2000.ic91.QxP.20060323=default:
# Last updated Tue Jun 27 18:08:26 2006
optmd5=3eecc5e3966bb510d3401783cbe70ae4
exemd5=1e9a6fd48d21e66d4bf979cb4f2539ba

173.applu=base=cpu2000.ic91.QxP.20060323=default:
# Last updated Tue Jun 27 18:08:26 2006
optmd5=d393d91a0da5cf9d17ba5c44e3cbbc83
exemd5=ef7dc3ac5123b2e880c167396fef2b4b

173.applu=peak=cpu2000.ic91.QxP.20060323=default:
# Last updated Tue Jun 27 18:08:26 2006
optmd5=2babfa1b99499e7c504222c6a01a177d
exemd5=dd176182bfa8ce60fa67c4515393ab99

177.mesa=base=cpu2000.ic91.QxP.20060323=default:
# Last updated Tue Jun 27 18:08:26 2006
optmd5=895f056540d5d290d5716e858b239d68
exemd5=3cbc3139d9745de356535609c06d52cb

178.galgel=base=cpu2000.ic91.QxP.20060323=default:
# Last updated Tue Jun 27 18:08:26 2006
optmd5=02d770b18c89da6873f3824ae651316e
exemd5=96c1a5f4aabb0b7c709c1a0087f14843

179.art=base=cpu2000.ic91.QxP.20060323=default:
# Last updated Tue Jun 27 18:08:26 2006
optmd5=2bb4069eb68fd28384c0a7fd26a92c32
exemd5=fd9d10243fe16eaa320876c05b2a703b

183.equake=base=cpu2000.ic91.QxP.20060323=default:
# Last updated Tue Jun 27 18:08:26 2006
optmd5=b2dbded0a4e27466b7a0e0c885554f63
exemd5=221016409e35f8d83badc25cc0b81848

183.equake=peak=cpu2000.ic91.QxP.20060323=default:
# Last updated Tue Jun 27 18:08:26 2006
optmd5=4e866a174e222a7057a3d6d793d2db02
exemd5=c2c37518981182f337f627ba9e68b18b

187.facerec=base=cpu2000.ic91.QxP.20060323=default:
# Last updated Tue Jun 27 18:08:26 2006
optmd5=8be1109beeab5be766e244b4123ac534
exemd5=069a470e6469066b2c15bdedece63376

187.facerec=peak=cpu2000.ic91.QxP.20060323=default:
# Last updated Tue Jun 27 18:08:26 2006
optmd5=2ea8dce6465c7c7fe93e877bd765bf2d
exemd5=bc7182fc89d97025e01f5cb664a2cf85

188.ammp=base=cpu2000.ic91.QxP.20060323=default:
# Last updated Tue Jun 27 18:08:26 2006
optmd5=8108724e5994d2f77a481d5a8c746a94
exemd5=f8d08c3f3fb98031722ed2e438338b72

188.ammp=peak=cpu2000.ic91.QxP.20060323=default:
# Last updated Tue Jun 27 18:08:26 2006
optmd5=d24c2bee0840ff1f6d0faa9e5a4a0c9b
exemd5=f8ebcd8d1ab49f0f53e394e8b7159507

189.lucas=base=cpu2000.ic91.QxP.20060323=default:
```

```
# Last updated Tue Jun 27 18:08:26 2006
optmd5=dde17e05d007eee8bdc82b9964136032
exemd5=476882bed4dc38618903fd0e02163008

191.fma3d=base=cpu2000.ic91.QxP.20060323=default:
# Last updated Tue Jun 27 18:08:26 2006
optmd5=ea76e0eef6c92539b044445d6cc84693
exemd5=f8763847fd3ceb218852ad48ed4f961b

200.sixtrack=base=cpu2000.ic91.QxP.20060323=default:
# Last updated Tue Jun 27 18:08:26 2006
optmd5=a6e1ddca235b75514a0aeadfee3dfce4
exemd5=5e9f0b8938168adcce2f809493652a1e

200.sixtrack=peak=cpu2000.ic91.QxP.20060323=default:
# Last updated Tue Jun 27 18:08:26 2006
optmd5=911378f50c13a84a9dca0f201a1c1501
exemd5=96b1d2d25a0edf8b6cb03a5936c9e19a

301.apsi=base=cpu2000.ic91.QxP.20060323=default:
# Last updated Tue Jun 27 18:08:26 2006
optmd5=88bafaa6a5abced47336e3b4545fb7c9
exemd5=83eb454dc00dde4f237430c5c34f73a4
```

Appendix C – SPECfp_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)

CFP2000 Result

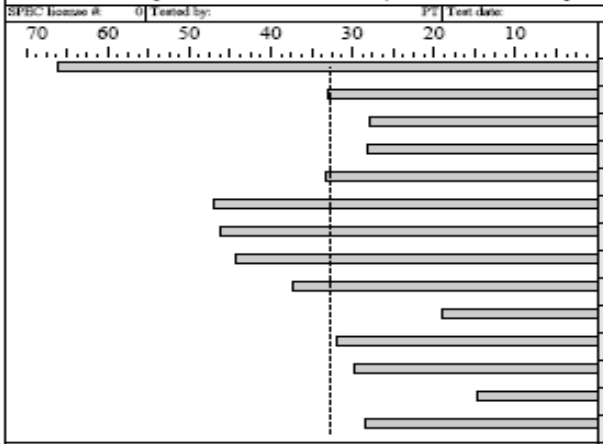
Intel

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

SPECfp_rate2000 = --

SPECfp_rate_base2000 = 32.6

SPEC license #: 0 Tested by: PT Test date: Hardware Avail: Software Avail:



Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
168.wupwise	2	56.1	66.2			
171.swim	2	218	33.1			
172.mgrid	2	149	28.0			
173.applu	2	174	28.1			
177.mesa	2	97.7	33.2			
178.galgel	2	143	46.9			
179.art	2	131	46.1			
183.equake	2	67.9	44.4			
187.facerec	2	118	37.2			
188.ammp	2	269	18.9			
189.lucas	2	145	32.0			
191.fma3d	2	164	29.7			
200.sixtrack	2	174	14.7			
301.apsi	2	212	28.5			

Hardware

CPU:	Pentium D processor (3.2GHz, 800 MHz bus)
CPU MHz:	3200
FPU:	Integrated
CPU(s) enabled:	2 cores, 1 chip, 2 cores/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:	Windows Server 2003, Enterprise Edition, Service Pack 1
Compiler:	Intel C/C++ Compiler 9.1 for IA32(20060323Z) Intel Fortran Compiler 9.1 for IA32(20060323) Microsoft Visual Studio .NET 2003(7.1.3088) MicroQuill SmartHeap Library 8.0
File System:	NTFS
System State:	Default

Notes/Tuning Information

```
GENERAL
  ONESTEP=yes
  +FDO:   PASS1=-Qprof_gen  PASS2=-Qprof_use
PORTABILITY
  178.galgel:   -FI /F32000000
BASE TUNING
  FORTRAN:      -fast -Qansi_alias +FDO
  177.mesa:     -fast +FDO shlW32M.lib
  179.art:      -fast +FDO shlW32M.lib
  183.equake:   -fast +FDO shlW32M.lib
  188.ammp:     -fast +FDO shlW32M.lib
PEAK TUNING
  168.wupwise:  basepeak=yes
  171.swim:     basepeak=yes
  172.mgrid:    basepeak=yes
  173.applu:    -fast -Qansi_alias -Qscalar_rep- -Qauto +FDO
  177.mesa:     basepeak=yes
```

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CFP2000 Result

Intel

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

SPECfp_rate2000 = --

SPECfp_rate_base2000 = 32.6

SPEC license # 0 | Tested by: | PT | Test date: | Hardware Avail: | Software Avail:

Notes/Tuning Information (Continued)

```
      178.galgel:   basepeak=yes
      179.art:      basepeak=yes
      183.equake:   -fast -Oa -Qrcd +FDO shlW32M.lib
      187.facerec:  -fast -Qunroll1 -Qscalar_rep- +FDO
      188.ammp:     -fast -Oa shlW32M.lib
      189.lucas:    basepeak=yes
      191.fma3d:    basepeak=yes
      200.sixtrack: -fast +FDO
      301.apsi:     basepeak=yes
   NOTES
     Hardware Prefetcher enabled in the system BIOS.
```

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

CFP2000 Result

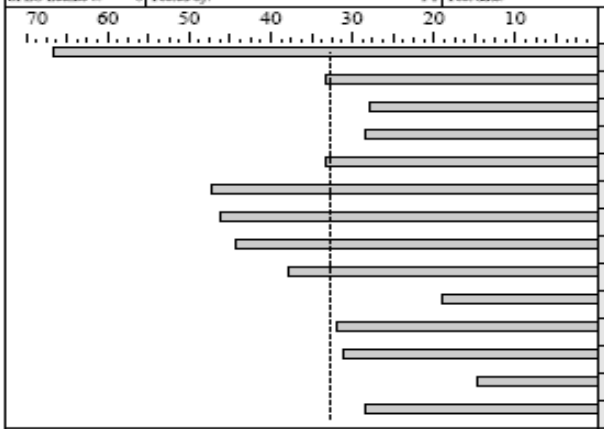
Intel

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

SPECfp_rate2000 = --

SPECfp_rate_base2000 = 32.8

SPEC license #: 0 Tested by: PT Test date: Hardware Avail: Software Avail:



Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
168.wupwise	4	111	66.6			
171.swim	4	434	33.1			
172.mgrid	4	299	28.0			
173.applu	4	342	28.5			
177.mesa	4	195	33.3			
178.galgel	4	285	47.2			
179.art	4	261	46.2			
183.equake	4	136	44.4			
187.facerec	4	233	37.8			
188.ammp	4	539	18.9			
189.lucas	4	290	32.0			
191.fma3d	4	314	31.0			
200.sixtrack	4	347	14.7			
301.apsi	4	423	28.5			

Hardware

CPU:	Pentium D processor (3.2GHz, 800 MHz bus)
CPU MHz:	3200
FPU:	Integrated
CPU(s) enabled:	2 cores, 1 chip, 2 cores/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:	Windows Server 2003, Enterprise Edition, Service Pack 1
Compiler:	Intel C/C++ Compiler 9.1 for IA32(20060323Z) Intel Fortran Compiler 9.1 for IA32(20060323) Microsoft Visual Studio .NET 2003(7.1.3088) MicroQuill SmartHeap Library 8.0
File System:	NTFS
System State:	Default

Notes/Tuning Information

```
GENERAL
  ONESTEP=yes
  +FDO:   PASS1=-Qprof_gen  PASS2=-Qprof_use
PORTABILITY
  178.galgel:   -FI /F32000000
BASE TUNING
  FORTRAN:      -fast -Qansi_alias +FDO
  177.mesa:     -fast +FDO shlW32M.lib
  179.art:      -fast +FDO shlW32M.lib
  183.equake:   -fast +FDO shlW32M.lib
  188.ammp:     -fast +FDO shlW32M.lib
PEAK TUNING
  168.wupwise:  basepeak=yes
  171.swim:     basepeak=yes
  172.mgrid:    basepeak=yes
  173.applu:    -fast -Qansi_alias -Qscalar_rep- -Qauto +FDO
  177.mesa:     basepeak=yes
```

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CFP2000 Result

Intel

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

SPECfp_rate2000 = --

SPECfp_rate_base2000 = 32.8

SPEC license # 0 | Tested by: | PT | Test date: | Hardware Avail: | Software Avail:

Notes/Tuning Information (Continued)

```
      178.galgel:   basepeak=yes
      179.art:      basepeak=yes
      183.equake:   -fast -Oa -Qrcd +FDO shlW32M.lib
      187.facerec:  -fast -Qunroll1 -Qscalar_rep- +FDO
      188.ammp:     -fast -Oa shlW32M.lib
      189.lucas:    basepeak=yes
      191.fma3d:    basepeak=yes
      200.sixtrack: -fast +FDO
      301.apsi:     basepeak=yes
   NOTES
     Hardware Prefetcher enabled in the system BIOS.
```

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

CFP2000 Result

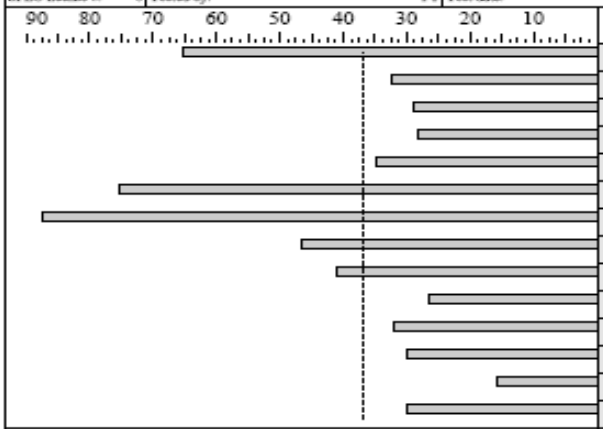
Intel

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

SPECfp_rate2000 = --

SPECfp_rate_base2000 = 37.0

SPEC license #: 0 Tested by: PT Test date: Hardware Avail: Software Avail:



Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
168.wupwise	2	57.0	65.1			
171.swim	2	222	32.5			
172.mgrid	2	144	28.9			
173.applu	2	173	28.1			
177.mesa	2	93.3	34.8			
178.galgel	2	89.2	75.4			
179.art	2	69.0	87.4			
183.equake	2	64.7	46.6			
187.facerec	2	107	41.1			
188.ammp	2	192	26.6			
189.lucas	2	146	31.9			
191.fma3d	2	162	30.0			
200.sixtrack	2	163	15.7			
301.apsi	2	200	30.1			

Hardware

CPU:	Pentium D processor (3.4GHz, 800 MHz bus)
CPU MHz:	3400
FPU:	Integrated
CPU(s) enabled:	2 cores, 1 chip, 2 cores/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:	Windows Server 2003, Enterprise Edition, Service Pack 1
Compiler:	Intel C/C++ Compiler 9.1 for IA32(20060323Z) Intel Fortran Compiler 9.1 for IA32(20060323) Microsoft Visual Studio .NET 2003(7.1.3088) MicroQuill SmartHeap Library 8.0
File System:	NTFS
System State:	Default

Notes/Tuning Information

```
GENERAL
  ONESTEP-yes
  +FDO:   PASS1--Qprof_gen  PASS2--Qprof_use
PORTABILITY
  178.galgel:   -FI /F32000000
BASE TUNING
  FORTRAN:      -fast -Qansi_alias +FDO
  177.mesa:     -fast +FDO shlW32M.lib
  179.art:      -fast +FDO shlW32M.lib
  183.equake:   -fast +FDO shlW32M.lib
  188.ammp:     -fast +FDO shlW32M.lib
PEAK TUNING
  168.wupwise:  basepeak-yes
  171.swim:     basepeak-yes
  172.mgrid:    basepeak-yes
  173.applu:    -fast -Qansi_alias -Qscalar_rep- -Qauto +FDO
  177.mesa:     basepeak-yes
```

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CFP2000 Result

Intel

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

SPECfp_rate2000 = --

SPECfp_rate_base2000 = 37.0

SPEC license # 0 | Tested by: | PT | Test date: | Hardware Avail: | Software Avail:

Notes/Tuning Information (Continued)

```
      178.galgel:   basepeak=yes
      179.art:      basepeak=yes
      183.equake:   -fast -Oa -Qrcd +FDO shlW32M.lib
      187.facerec:  -fast -Qunroll1 -Qscalar_rep- +FDO
      188.ammp:     -fast -Oa shlW32M.lib
      189.lucas:    basepeak=yes
      191.fma3d:    basepeak=yes
      200.sixtrack: -fast +FDO
      301.apsi:     basepeak=yes
   NOTES
     Hardware Prefetcher enabled in the system BIOS.
```

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

CFP2000 Result

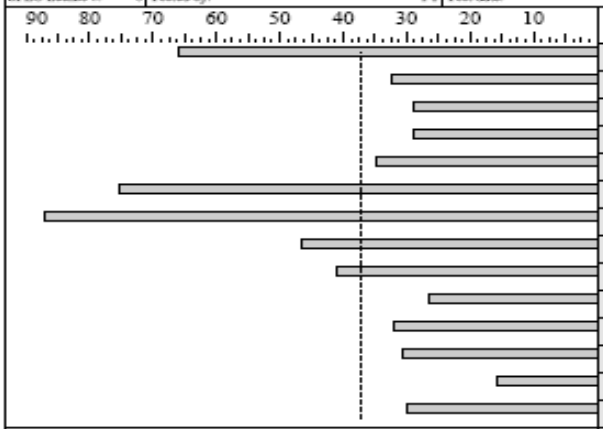
Intel

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

SPECfp_rate2000 = --

SPECfp_rate_base2000 = 37.2

SPEC license #: 0 Tested by: PT Test date: Hardware Avail: Software Avail:



Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
168.wupwise	4	112	66.0			
171.swim	4	443	32.5			
172.mgrid	4	289	28.9			
173.applu	4	336	29.0			
177.mesa	4	186	34.9			
178.galgel	4	179	75.4			
179.art	4	139	87.1			
183.equake	4	129	46.7			
187.facerec	4	215	40.9			
188.ammp	4	384	26.6			
189.lucas	4	291	31.9			
191.fma3d	4	317	30.8			
200.sixtrack	4	325	15.7			
301.apsi	4	401	30.1			

Hardware

CPU:	Pentium D processor (3.4GHz, 800 MHz bus)
CPU MHz:	3400
FPU:	Integrated
CPU(s) enabled:	2 cores, 1 chip, 2 cores/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:	Windows Server 2003, Enterprise Edition, Service Pack 1
Compiler:	Intel C/C++ Compiler 9.1 for IA32(20060323Z) Intel Fortran Compiler 9.1 for IA32(20060323) Microsoft Visual Studio .NET 2003(7.1.3088) MicroQuill SmartHeap Library 8.0
File System:	NTFS
System State:	Default

Notes/Tuning Information

```
GENERAL
  ONESTEP=yes
  +FDO:   PASS1=-Qprof_gen  PASS2=-Qprof_use
PORTABILITY
  178.galgel:   -FI /F32000000
BASE TUNING
  FORTRAN:      -fast -Qansi_alias +FDO
  177.mesa:     -fast +FDO shlW32M.lib
  179.art:      -fast +FDO shlW32M.lib
  183.equake:   -fast +FDO shlW32M.lib
  188.ammp:     -fast +FDO shlW32M.lib
PEAK TUNING
  168.wupwise:  basepeak=yes
  171.swim:     basepeak=yes
  172.mgrid:    basepeak=yes
  173.applu:    -fast -Qansi_alias -Qscalar_rep- -Qauto +FDO
  177.mesa:     basepeak=yes
```

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CFP2000 Result

Intel

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

SPECfp_rate2000 = --

SPECfp_rate_base2000 = 37.2

SPEC license # 0 | Tested by: | PT | Test date: | Hardware Avail: | Software Avail:

Notes/Tuning Information (Continued)

```
      178.galgel:   basepeak=yes
      179.art:      basepeak=yes
      183.equake:   -fast -Oa -Qrcd +FDO shlW32M.lib
      187.facerec:  -fast -Qunroll1 -Qscalar_rep- +FDO
      188.ammp:     -fast -Oa shlW32M.lib
      189.lucas:    basepeak=yes
      191.fma3d:    basepeak=yes
      200.sixtrack: -fast +FDO
      301.apsi:     basepeak=yes
   NOTES
     Hardware Prefetcher enabled in the system BIOS.
```

Intel Xeon processor 3070-based server (2 users)

CFP2000 Result

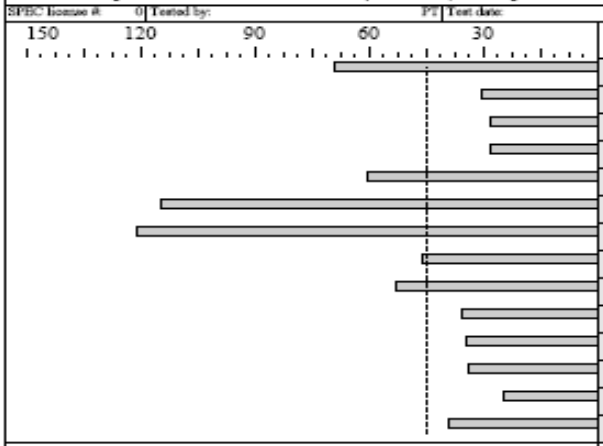
Intel

Intel Xeon processor 3070-based server(2.6 GHz, Xeon processor 3070)

SPECfp_rate2000 = --

SPECfp_rate_base2000 = 44.7

SPEC license #: 0 Tested by: PT Test date: Hardware Avail: Software Avail:



Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
168.wupwise	2	53.9	68.8			
171.swim	2	236	30.5			
172.mgrid	2	150	27.9			
173.applu	2	173	28.2			
177.mesa	2	53.6	60.6			
178.galgel	2	58.9	114			
179.art	2	49.9	121			
183.equake	2	66.0	45.7			
187.facerec	2	83.8	52.6			
188.ammp	2	144	35.4			
189.lucas	2	136	34.1			
191.fma3d	2	144	33.8			
200.sixtrack	2	105	24.3			
301.apsi	2	156	38.7			

Hardware

CPU:	Intel Xeon processor 3070 (2.6 GHz, 1067 MHz bus)
CPU MHz:	2667
FPU:	Integrated
CPU(s) enabled:	2 cores, 1 chip, 2 cores/chip
CPU(s) orderable:	1
Parallel:	No
Primary Cache:	32k micro-ops I + 32KBD on chip per core
Secondary Cache:	4MB shared
L3 Cache:	N/A
Other Cache:	N/A
Memory:	8x1GB DDR2-SDRAM PC2-4200 ECC registered
Disk Subsystem:	1x160GB SATA
Other Hardware:	

Software

Operating System:	Windows Windows 2003 Server, Enterprise Edition, Service Pack 1
Compiler:	Intel C/C++ Compiler 9.1 for IA32(20060323Z) Intel Fortran Compiler 9.1 for IA32(20060323) Microsoft Visual Studio .NET 2003(7.1.3088) MicroQuill SmartHeap Library 8.0
File System:	NTFS
System State:	Default

Notes/Tuning Information

```
GENERAL
  ONESTEP=yes
  +FDO:   PASS1=-Qprof_gen  PASS2=-Qprof_use
PORTABILITY
  178.galgel:   -FI /F32000000
BASE TUNING
  FORTRAN:      -fast -Qansi_alias +FDO
  177.mesa:     -fast +FDO shlW32M.lib
  179.art:      -fast +FDO shlW32M.lib
  183.equake:   -fast +FDO shlW32M.lib
  188.ammp:     -fast +FDO shlW32M.lib
PEAK TUNING
  168.wupwise:  basepeak=yes
  171.swim:     basepeak=yes
  172.mgrid:    basepeak=yes
  173.applu:    -fast -Qansi_alias -Qscalar_rep- -Qauto +FDO
  177.mesa:     basepeak=yes
```

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CFP2000 Result

Intel

Intel Xeon processor 3070-based server(2.6 GHz, Xeon processor 3070)

SPECfp_rate2000 = --

SPECfp_rate_base2000 = 44.7

SPEC license # 0 | Tested by: | PT | Test date: | Hardware Avail: | Software Avail:

Notes/Tuning Information (Continued)

```
      178.galgel:   basepeak=yes
      179.art:      basepeak=yes
      183.equake:   -fast -Oa -Qrcd +FDO shlW32M.lib
      187.facerec:  -fast -Qunroll1 -Qscalar_rep- +FDO
      188.ammp:     -fast -Oa shlW32M.lib
      189.lucas:    basepeak=yes
      191.fma3d:    basepeak=yes
      200.sixtrack: -fast +FDO
      301.apsi:     basepeak=yes
   NOTES
     Hardware Prefetcher enabled in the system BIOS.
```

Intel Xeon processor 3070-based server (4 users)

CFP2000 Result

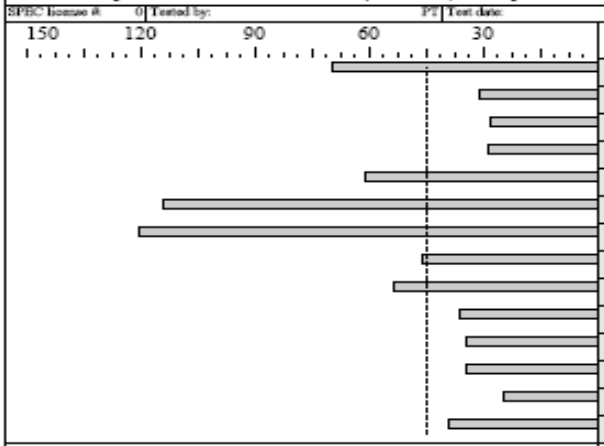
Intel

Intel Xeon processor 3070-based server(2.6 GHz, Xeon processor 3070)

SPECfp_rate2000 = --

SPECfp_rate_base2000 = 45.0

SPEC license #: 0 Tested by: PT Test date: Hardware Avail: Software Avail:



Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
168.wupwise	4	107	69.4			
171.swim	4	469	30.7			
172.mgrid	4	299	27.9			
173.applu	4	341	28.6			
177.mesa	4	107	60.6			
178.galgel	4	118	114			
179.art	4	100	121			
183.equake	4	132	45.8			
187.facerec	4	166	53.1			
188.ammp	4	283	36.0			
189.lucas	4	271	34.2			
191.fma3d	4	285	34.2			
200.sixtrack	4	210	24.3			
301.apsi	4	309	39.0			

Hardware

CPU:	Intel Xeon processor 3070 (2.6 GHz, 1067 MHz bus)
CPU MHz:	2667
FPU:	Integrated
CPU(s) enabled:	2 cores, 1 chip, 2 cores/chip
CPU(s) orderable:	1
Parallel:	No
Primary Cache:	32k micro-ops I + 32KBD on chip per core
Secondary Cache:	4MB shared
L3 Cache:	N/A
Other Cache:	N/A
Memory:	8x1GB DDR2-SDRAM PC2-4200 ECC registered
Disk Subsystem:	1x160GB SATA
Other Hardware:	

Software

Operating System:	Windows Server 2003, Enterprise Edition, Service Pack 1
Compiler:	Intel C/C++ Compiler 9.1 for IA32(20060323Z) Intel Fortran Compiler 9.1 for IA32(20060323) Microsoft Visual Studio .NET 2003(7.1.3088) MicroQuill SmartHeap Library 8.0
File System:	NTFS
System State:	Default

Notes/Tuning Information

```
GENERAL
  ONESTEP=yes
  +FDO:   PASS1=-Qprof_gen  PASS2=-Qprof_use
PORTABILITY
  178.galgel:   -FI /F32000000
BASE TUNING
  FORTRAN:      -fast -Qansi_alias +FDO
  177.mesa:     -fast +FDO shlW32M.lib
  179.art:      -fast +FDO shlW32M.lib
  183.equake:   -fast +FDO shlW32M.lib
  188.ammp:     -fast +FDO shlW32M.lib
PEAK TUNING
  168.wupwise:  basepeak=yes
  171.swim:     basepeak=yes
  172.mgrid:    basepeak=yes
  173.applu:    -fast -Qansi_alias -Qscalar_rep- -Qauto +FDO
  177.mesa:     basepeak=yes
```

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CFP2000 Result

Intel

Intel Xeon processor 3070-based server(2.6 GHz, Xeon processor 3070)

SPECfp_rate2000 = --

SPECfp_rate_base2000 = 45.0

SPEC license # 0 | Tested by: | PT | Test date: | Hardware Avail: | Software Avail:

Notes/Tuning Information (Continued)

```
      178.galgel:   basepeak=yes
      179.art:      basepeak=yes
      183.equake:   -fast -Oa -Qrcd +FDO shlW32M.lib
      187.facerec:  -fast -Qunroll1 -Qscalar_rep- +FDO
      188.ammp:     -fast -Oa shlW32M.lib
      189.lucas:    basepeak=yes
      191.fma3d:    basepeak=yes
      200.sixtrack: -fast +FDO
      301.apsi:     basepeak=yes
   NOTES
     Hardware Prefetcher enabled in the system BIOS.
```

Principled Technologies, Inc.
4813 Emperor Blvd., Suite 100
Durham, NC 27703
www.principledtechnologies.com
info@principledtechnologies.com