Principled Technologies®

TEST REPORT
AUGUST 2007

SPEC CPU2006 SPECint_rate_base performance and power consumption on multi-processor Intel- and AMD-based servers

Executive summary

Intel® Corporation (Intel) commissioned Principled Technologies (PT) to measure the performance of SPEC* CPU2006 on multi-processor servers using the following four processors:

- Dual-Core AMD* Opteron* processor 8220 (2.80GHz, 95W)
- Dual-Core Intel Xeon® processor 7140M (3.40GHz, 150W)
- Quad-Core Intel Xeon processor E7340 (2.40GHz, 80W)
- Quad-Core Intel Xeon processor L7345 (1.86GHz, 50W)

SPEC CPU2006 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 CPU2006 and other SPEC benchmarks, see www.spec.org.)

The SPEC CPU2006 benchmark consists of two benchmark suites, each of which focuses on a different aspect of compute-intensive performance. CINT2006 measures and compares compute-intensive integer performance, while CFP2006 measures and compares compute-intensive floating-point performance. A "rate" version of each, which runs multiple instances of the benchmark to assess server throughput, is also available. We ran only the CINT2006 SPECint_rate_base benchmark.

KEY FINDINGS

- The Quad-Core Intel® Xeon® processor E7340-based server delivered 208.9 percent more performance/watt than the Dual-Core Intel Xeon processor 7140M-based server (see Figure 1). (We calculated performance/watt using system-level power measurements.)
- The Quad-Core Intel Xeon processor L7345-based server delivered 207.9 percent more performance/watt than the Dual-Core Intel Xeon processor 7140M-based server (see Figure 1).
- The Quad-Core Intel Xeon processor E7340-based server delivered 88.0 percent more performance/watt than the Dual-Core AMD* Opteron* processor 8220-based server (see Figure 1).
- The Quad-Core Intel Xeon processor L7345-based server delivered 87.3 percent more performance/watt than the Dual-Core AMD Opteron processor 8220-based server (see Figure 1).

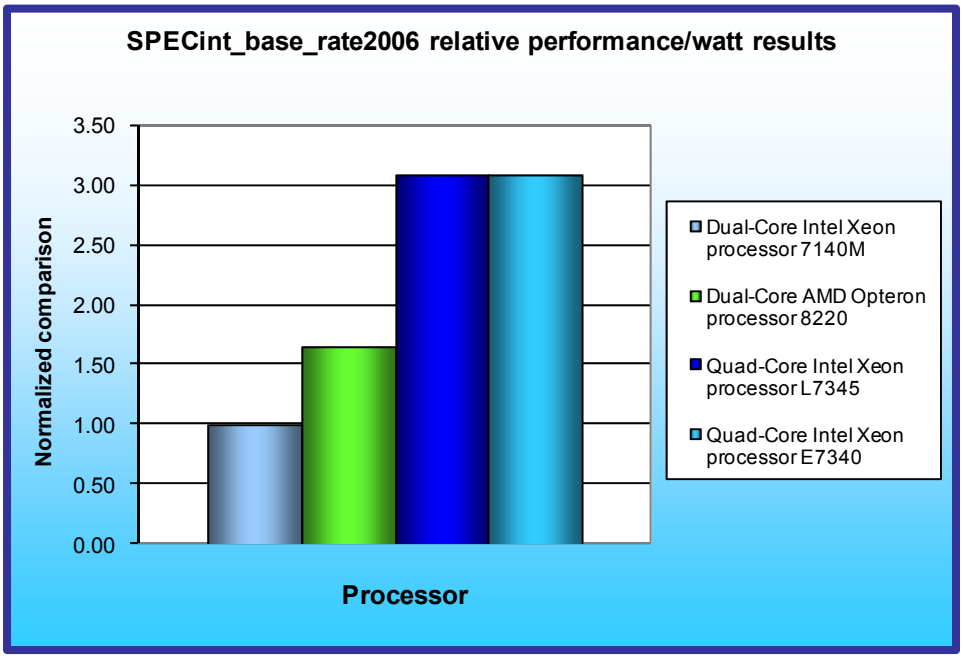


Figure 1: Performance/watt results of the test servers. Higher numbers are better.

In this section, we discuss the best results for each server. For complete details of the performance of each server with varying thread counts, see the Test results section.

Figure 1 illustrates the performance/watt for each of the four servers. In this chart we normalized the results for each system to the system with the lowest performance/watt, which is set to 1.00. By normalizing, we make each data point in these charts a comparative number, with higher results indicating better

performance/watt. Thus, higher numbers are better.

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

$$\frac{\text{benchmark score}}{\text{average power consumption in watts during period of peak performance}}$$

As Figure 1 illustrates, the Quad-Core Intel Xeon processor E7340-based server delivered 208.9 percent more performance/watt than the Dual-Core Intel Xeon processor 7140M-based server and 88.0 percent more performance/watt than the Dual-Core AMD Opteron processor 8220-based server. The Quad-Core Intel Xeon processor L7345-based server delivered 207.9 percent more performance/watt than the Dual-Core Intel Xeon processor 7140M-based server and 87.3 percent more performance/watt than the Dual-Core AMD Opteron processor 8220-based server.

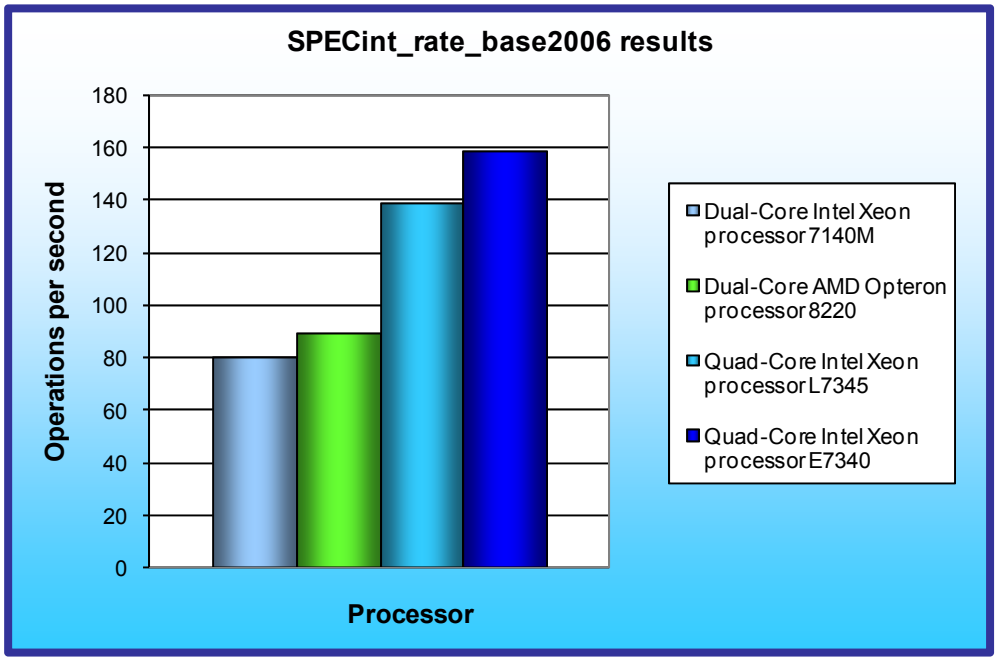


Figure 2: SPECint_rate_base2006 results of the test servers. Higher numbers are better.

Figure 2 shows the SPECint_rate_base2006 peak performance of each server. The Quad-Core Intel Xeon processor E7340-based server achieved a score of 159.0. This is a 98.8 percent performance increase over the Dual-Core Intel Xeon processor 7140M-based server, which achieved a score of 80.0. The Quad-Core Intel Xeon processor E7340-based server showed a 78.7 percent performance increase over the Dual-Core AMD Opteron processor 8220-based server, which achieved an 89.0.

The Quad-Core Intel Xeon processor L7345-based server achieved a SPECint_rate_base2006 score of 139.0, which is a 73.7 percent performance increase over the Dual-Core Intel Xeon processor 7140M-based server and a 56.2 percent performance increase over the Dual-Core AMD Opteron processor 8220-based server.

Workload

The SPEC CPU2006 workload includes two benchmark suites: CINT2006 and CFP2006. We ran only the CINT2006 benchmark, which focuses on measuring and comparing compute-intensive integer performance. Specifically, we measured the SPECint_rate_base2000 results for the test servers with 8 or 16 users.

Generally the best SPECint_rate_base2006 score is produced by using the same number of users as execution units for a given server. The optimum user count for our testing was 8 on the Dual-Core AMD Opteron processor 8220 server and 16 on the remaining servers: Dual-Core Intel Xeon processor 7140M, Quad-Core Intel Xeon processor E7340, and Quad-Core Intel Xeon processor L7345. The difference in user counts between the servers is due to the different number or execution units (logical or physical processors) on those servers.

Figure 3 lists the 12 applications that compose the CINT2006 benchmark. SPEC wrote nine of the applications in C and three (471.omnetpp, 473.astar, 483.xalancbmk) in C++.

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

Figure 3: The applications that make up the CINT2006 benchmark.

A CINT2006 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 4 details the results of our tests with 8 or 16 users for SPECint_rate_base2006. We determined the number of users based on the number of execution units in a given server. We used the same number of SPECint_rate_base2006 users as processor execution units, so there is a one-to-one ratio.

SPECint_rate_base2006 performs three runs of each benchmark in the test suite and records the median, so the final score is a median of three runs. Higher scores are better.

Figure 4 details the power consumption, in watts, of the test servers while idle and during the benchmark. The idle power is an average of a two-minute power recording while the server was idle. The average power is an average power for the duration of the benchmark run.

Number of users	Server	SPECint_rate_base 2006 results	Idle power	Average power
8 users	Dual-Core AMD Opteron processor 8220	89.0	324.1	549.7
16 users	Dual-Core Intel Xeon processor 7140M	80.0	546.3	812.0
	Quad-Core Intel Xeon processor L7345	139.0	355.3	458.3
	Quad-Core Intel Xeon processor E7340	159.0	364.2	522.5

Figure 4: Power consumption, in watts, of the test servers while idle and during the benchmark.

Test methodology

Figure 5 summarizes some of the key aspects of the configurations of the server systems; Appendix A provides detailed configuration information.

Server	Dual-Core AMD Opteron processor 8220	Dual-Core Intel Xeon processor 7140M	Quad-Core Intel Xeon processor E7340	Quad-Core Intel Xeon processor L7345
Processor frequency (GHz)	2.8 GHz	3.4 GHz	2.4 GHz	1.86 GHz
Front-side bus frequency (MHz)	2,000 MHz HyperTransport	800 MHz	1,066 MHz	1,066 MHz
Number of processor packages	4	4	4	4
Number of cores per processor package	2	2	4	4
Number of hardware threads per core	1	2	1	1
Motherboard	HP* PB729AE9QUDO 49	Intel SE8500HW4	Intel S7000FC4UR	Intel S7000FC4UR
Chipset	NVIDIA* nForce*4	Intel SE8500	Intel ID3600	Intel ID3600
RAM (16 GB in each)	16GB (16 x 1GB) PC2-5300 DDR2	16GB (16 x 1GB) PC2-5300 DDR2	16GB (16 x 1GB) PC2-5300 FB-DDR2	16GB (16 x 1GB) PC2-5300 FB-DDR2
Hard Drive	HP DH072ABAA6	Seagate* ST3146854LC	Seagate ST973401SS	Seagate ST973401SS

Figure 5: Summary of some key aspects of the server configurations.

Intel configured and provided all four servers.

We used the default BIOS settings on each server.

We began by installing a fresh copy of Red Hat* Enterprise Linux* 5. We installed only the Software Development package, disabled the firewall and SELinux, and did not install kdump. We made no additional changes to the default installation options.

SPECCPU2006 configuration

We followed SPEC's standard instructions for building the CINT2006 executables. After studying the best results for this benchmark on the SPEC Web site, we chose the following software tools:

- Intel C/C++ Compiler 10.0.023 for EM64T (Intel-based servers)
- PathScale* 3.0 (AMD-based server)

The benchmark requires configuration files. From the SPEC Web site we chose the most recent (as of the testing for this report) SPECCPU2006 results that used the above compilers. 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 files we used appear in Appendix B.

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 cpu2006 directory.
- Type ". ./shrc" at the command prompt.
- Enter "runspec -c <config file name> -r <#> -T base -v 10 int" where
  - <config file name> = name of the configuration file
  - <#> = 8 or 16 depending on the number of users

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

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 for two minutes 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 Figure 4 (idle and average peak power) for the results of these measurements.

Appendix A – Test system configuration information

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

Servers	Dual-Core AMD Opteron processor 8220	Dual-Core Intel Xeon processor 7140M	Quad-Core Intel Xeon processor E7340	Quad-Core Intel Xeon processor L7345
General processor setup				
Number of processor packages	4	4	4	4
Number of cores per processor package	2	2	4	4
Number of hardware threads per core	1	2	1	1
System Power Management Policy	Always on	Always on	Always on	Always on
CPU				
Vendor	AMD	Intel	Intel	Intel
Name	AMD Opteron 8220	Dual-Core Intel Xeon MP 7140M	Quad-Core Intel Xeon E7340	Quad-Core Intel Xeon L7345
Stepping	3	8	B	B
Socket type	Socket F (1207)	mPGA604	mPGA604	mPGA604
Core frequency (GHz)	2.8 GHz	3.4 GHz	2.4 GHz	1.86 GHz
Front-side bus frequency (MHz)	2,000 MHz HyperTransport	800 MHz	1,066 MHz	1,066 MHz
L1 Cache	64 KB + 64 KB (per core)	12 KB + 16 KB	32 KB + 32 KB (per core)	32 KB + 32 KB (per core)
L2 Cache	2 x 1 MB	2 x 1 MB	2 x 4 MB (each 4 MBs shared by 2 cores)	2 x 4 MB (each 4 MBs shared by 2 cores)
L3 Cache	NA	16 MB	NA	NA
Thermal Design Power (TDP, in watts)	95	150	80	50
Platform				
Vendor and model number	HP ProLiant* DL585G2	Intel	Intel	Intel
Motherboard model number	PB729AE9QUDO 49	SR4850HW4x	S7000FC4UR	S7000FC4UR
Motherboard chipset	NVIDIA nForce4	Intel SE8501	Intel ID3600	Intel ID3600
Motherboard revision number	A4	11	01	01
BIOS name and version	HP BIOS A07 (v2.10)	Intel SHW40.86B.P.12 .00.0076, 02/15/2007	Intel SFC4UR.86B.01. 00.0010.0504200 71510	Intel SFC4UR.86B.01. 00.0010.0504200 71510
BIOS settings	Default	Default	Default	Default

Servers	Dual-Core AMD Opteron processor 8220	Dual-Core Intel Xeon processor 7140M	Quad-Core Intel Xeon processor E7340	Quad-Core Intel Xeon processor L7345
Memory module(s)				
Vendor and model number	Micron* MT18HTF12872PDY-667D2	ELPIDA* EBE10RD4AGFA-6E-E	Kingston* KVR667D2D8F5/1G	Kingston KVR667D2D8F5/1G
Type	PC2-5300 DDR2	PC2-5300 DDR2	PC2-5300 FB-DDR2	PC2-5300 FB-DDR2
Speed (MHz)	667 MHz	667 MHz	667 MHz	667 MHz
Speed in the system currently running @ (MHz)	667 MHz	400 MHz	667 MHz	667 MHz
Timing/Latency (tCL-tRCD-iRP-tRASmin)	5-5-5-15	3-3-3-9	5-5-5-15	5-5-5-15
Size	16,382 MB	16,382 MB	16,382 MB	16,382 MB
Number of RAM modules	16	16	16	16
Chip organization	Double-sided	Double-sided	Double-sided	Double-sided
Hard disk				
Vendor and model number	HP DH072ABAA6	Seagate ST3146854LC	Seagate ST973401SS	Seagate ST973401SS
Number of disks in system	1	1	1	1
Size	72 GB	146.8 GB	73.4 GB	73.4 GB
Buffer Size	16 MB	8 MB	8 MB	8 MB
RPM	15,000	15,000	10,000	10,000
Type	SAS	SCSI	SAS	SAS
Controller	Smart Array* P400 Controller	LSI* Logic PCI-X Ultra320 SCSI	Intel 631xESB/6321ESB/3100 Chipset Serial ATA Storage Controller – 2680	Intel 631xESB/6321ESB/3100 Chipset Serial ATA Storage Controller – 2680
Driver version	Driver version still to come	LSI 53c1030 rev 08	LSI MegaRAID rev 03	LSI MegaRAID rev 03
Operating system				
Name	Red Hat Enterprise Linux 5	Red Hat Enterprise Linux 5	Red Hat Enterprise Linux 5	Red Hat Enterprise Linux 5
File system	EXT3	EXT3	EXT3	EXT3
Kernel	2.6.18-8.e15	2.6.18-8.e15	2.6.18-8.e15	2.6.18-8.e15
Language	English	English	English	English
Graphics				
Vendor and model number	ATI* ES1000	ATI Radeon* 7000	ATI ES1000	ATI ES1000
Chipset	ES1000	ATI Radeon 7000 PCI	ES1000	ES1000
BIOS version	BK-ATI VER008.005.013.000	BK-ATI VER008.004.037.001	BK-ATI VER008.005.031.000	BK-ATI VER008.005.031.000
Type	Integrated	Integrated	Integrated	Integrated
Memory size	32 MB	16 MB	32 MB	32 MB

Servers	Dual-Core AMD Opteron processor 8220	Dual-Core Intel Xeon processor 7140M	Quad-Core Intel Xeon processor E7340	Quad-Core Intel Xeon processor L7345
Resolution	1,024x768	1,024x768	1,024x768	1,024x768
Driver version	Driver version still to come	ATI Radeon RV100	ATI ES1000 rev 02	ATI ES1000 rev 02
Network card/subsystem				
Vendor and model number	HP NC371i Multifunction Gigabit Server Adapter	Broadcom* BCM5704 dual NetXtreme* Gigabit Adapter	Intel PRO/1000 EB/Intel 82575EB	Intel PRO/1000 EB/Intel 82575EB
Type	Integrated	Integrated	Integrated	Integrated
Driver version	Driver version still to come	Broadcom rev 10	Intel 80003ESLAN rev 01	Intel 80003ESLAN rev 01
Optical drive				
Vendor and model number	TEAC* DW-224E-R	Philips* SDR089	Optiarc* DVD-ROM DDU810A	Optiarc DVD-ROM DDU810A
USB ports				
Total number	4	5	5	5
Type	USB 2.0	USB 2.0	USB 2.0	USB 2.0
Power supplies				
Total number	1	1	1	1
Wattage of each	1,300	1,470	1,570	1,570
Cooling fans				
Total number	6	4	8	8
Dimensions	120 mm	120 mm	4x80 mm + 4x120mm	4x80 mm + 4x120mm
Voltage	12 V	12 V	12 V	12 V
Amps	3.9 A	3.3 A	4 x 1.76 A + 4 x 3.3 A	4 x 1.76 A + 4 x 3.3 A

Figure 6: Detailed system configuration information for the four test servers.

Appendix B – SPECint_rate configuration files

This appendix contains the benchmark configuration files we used to test the servers.

Dual-Core AMD Opteron processor 8220

```
############################################################################
# AMD64 (64-bit) Linux Pathscale v3.0 config file
#  for CPU2006
#
# If you are building and running on a newer Linux distro that
# uses the GCC v4.x compilers by default, then you need to either
# use "--define gnu4_fe" on the runspec command line or uncomment
# the "%define gnu4_fe" line below:
#
%define gnu4_fe
# %define gnu3_fe
#
#  gnu3_fe is the default, so really does not need to be defined.
############################################################################

flagsurl=http://www.spec.org/cpu2006/flags/CPU2006_flags.20070515.xml
tune          = base
ext           = amd64
output_format = all
teeout        = no
teerunout     = no
mean_anyway   = yes
reportable    = yes
verbose       = 6

# Include machine-specific section
#include: AMDsut.inc
#  ----- Begin inclusion of 'AMDsut.inc'
############################################################################
####################################################################
# Machine-specific section
####################################################################
hw_cpu_name  =
hw_cpu_mhz   =
hw_disk      =
hw_fpu       =
hw_memory    =
hw_vendor    =
hw_model     =
hw_avail     =
hw_nchips    =
hw_ncores    =
hw_ncoresperchip=
hw_nthreadspercore =
hw_ncpuorder =
hw_pcache    =
hw_scache    =
hw_tcache    =
hw_ocache    =
hw_other     =
sw_file      =
sw_os000     =
sw_os001     =
sw_state     =
license_num    =
test_date      =
prepared_by    =
test_sponsor   =
tester         =

submit                  = taskset -c $SPECCOPYNUM $command

# ---- End inclusion of '/cpu2006/config/AMDsut.inc'
```

```
####################################################
sw_compiler000 = QLogic PathScale
sw_compiler001 =  Compiler Suite, Release 3.0
sw_other       = SmartHeap 8.0 32 bit Library for Linux
sw_auto_parallel    = No
sw_avail       = Apr-2007
test_date      = Apr-2007


default=default=default:
#############################################################################
# Compiler selection
#
#
CC           = pathcc
CXX          = pathCC
FC           = pathf95

#  If compiling on a machine NOT having the target machine's
#  AMD64 architecture, then uncomment the following
#  compiler define variables.
# CC           = pathcc -march=opteron
# CXX          = pathCC -march=opteron
# FC           = pathf95 -march=opteron

SMARTHEAP_DIR = /opt/SmartHeap_8.1/lib


#############################################################################
# Portability for default 64-bit code generation
#############################################################################

default=default=default:
PORTABILITY = -DSPEC_CPU_LP64

#############################################################################
# INT Portability
#############################################################################

400.perlbench=default=default:
CPORTABILITY = -DSPEC_CPU_LINUX_X64

462.libquantum=default=default:
CPORTABILITY=  -DSPEC_CPU_LINUX

471.omnetpp=default=default:
# Needed to avoid -DSPEC_CPU_LP64 on -m32 C++ base codes
PORTABILITY =

473.astar=default=default:
# Needed to avoid -DSPEC_CPU_LP64 on -m32 C++ base codes
PORTABILITY =

483.xalancbmk=default=default:
CXXPORTABILITY= -DSPEC_CPU_LINUX
# Needed to avoid -DSPEC_CPU_LP64 on -m32 C++ base codes
PORTABILITY =

#############################################################################
#                                                                           #
#          SPECint Tuning & Notes                                           #
#                                                                           #
#############################################################################

int=base:
COPTIMIZE    = -Ofast -OPT:malloc_alg=1 -static
CXXOPTIMIZE  = -Ofast -m32
EXTRA_CXXLIBS= -L$(SMARTHEAP_DIR) -lsmartheap
sw_base_ptrsize  = 64-bit
```

```
sw_peak_ptrsize  = 32/64-bit

#######################################################################
# INT Peak Tuning
#######################################################################

int=peak=default:
OPTIMIZE = -static
COPTIMIZE    = -Ofast -OPT:malloc_alg=1
CXXOPTIMIZE  = -Ofast -m32
EXTRA_CXXLIBS= -L$(SMARTHEAP_DIR) -lsmartheap
PASS1_CFLAGS  = -fb_create fbdata
PASS1_CXXFLAGS  = -fb_create fbdata
PASS1_LDFLAGS = -fb_create fbdata
PASS2_CFLAGS  = -fb_opt fbdata
PASS2_CXXFLAGS  = -fb_opt fbdata
PASS2_LDFLAGS = -fb_opt fbdata

400.perlbench=peak=default:
COPTIMIZE=-Ofast -LNO:opt=0

401.bzip2=peak=default:
COPTIMIZE=-O3 -LNO:ou_prod_max=10 -OPT:Ofast:alias=disjoint
feedback=0

403.gcc=peak=default:
PORTABILITY =
COPTIMIZE=-m32 -O3 -OPT:Ofast

429.mcf=peak=default:
PORTABILITY =
COPTIMIZE=-m32 -O3 -ipa
feedback=0
EXTRA_CLIBS = -L$(SMARTHEAP_DIR) -lsmartheap

445.gobmk=peak=default:
COPTIMIZE=-O3 -OPT:alias=disjoint -LNO:simd=0:minvariant=off -WOPT:retype_expr=on

456.hmmer=peak=default:
COPTIMIZE=-O2 -OPT:alias=disjoint:malloc_alg=1 -CG:cflow=0
feedback=0

458.sjeng=peak=default:
COPTIMIZE=-O3 -IPA:plimit=50000 -IPA:pu_reorder=2

462.libquantum=peak=default:
COPTIMIZE=-O3 -ipa -CG:local_fwd_sched=on -IPA:space=1000
feedback=0

464.h264ref=peak=default:
COPTIMIZE=-O3 -IPA:plimit=20000 -OPT:alias=disjoint -LNO:prefetch=0

471.omnetpp=peak=default:
CXXOPTIMIZE= -Ofast -CG:gcm=off -m32
feedback=0

473.astar=peak=default:
basepeak=true

483.xalancbmk=peak=default:
CXXOPTIMIZE=-Ofast -m32 -OPT:unroll_times_max=8
feedback=0

#######################################################################
# FP Portability
#######################################################################

436.cactusADM=default=default:
FPORTABILITY=  -fno-second-underscore
```

```
%ifdef %{gnu4_fe}
447.dealII=default=default:
CXXPORTABILITY =
%else
447.dealII=default=default:
CXXPORTABILITY = -DSPEC_CPU_TABLE_WORKAROUND
%endif

481.wrf=default=default:
FPORTABILITY= -fno-second-underscore
CPORTABILITY= -DSPEC_CPU_LINUX

######################################################################
#                                                                    #
#                        SPECfp Tuning                               #
#                                                                    #
######################################################################

fp=base:
COPTIMIZE    = -Ofast
CXXOPTIMIZE  = -Ofast
FOPTIMIZE    = -Ofast -OPT:malloc_alg=1

sw_base_ptrsize  = 64-bit
sw_peak_ptrsize  = 32/64-bit

######################################################################
# FP Peak Tuning
######################################################################

fp=peak=default:
COPTIMIZE    = -Ofast
CXXOPTIMIZE  = -Ofast
FOPTIMIZE    = -Ofast -OPT:malloc_alg=1
PASS1_CFLAGS   = -fb_create fbdata
PASS2_CFLAGS   = -fb_opt fbdata
PASS1_CXXFLAGS = -fb_create fbdata
PASS2_CXXFLAGS = -fb_opt fbdata
PASS1_FFLAGS   = -fb_create fbdata
PASS2_FFLAGS   = -fb_opt fbdata
PASS1_LDFLAGS  = -fb_create fbdata
PASS2_LDFLAGS  = -fb_opt fbdata

410.bwaves=peak=default:
FOPTIMIZE=-O3 -OPT:Ofast:IEEE_arith=3 -LNO:blocking=off:ignore_feedback=off

416.gamess=peak=default:
FOPTIMIZE=-O2 -OPT:Ofast:ro=3:unroll_size=256

433.milc=peak=default:
COPTIMIZE=-Ofast -CG:cflow=off -LNO:prefetch=1 -OPT:malloc_alg=1
feedback=0

434.zeusmp=peak=default:
FOPTIMIZE=-Ofast -CG:local_fwd_sched=on -LNO:blocking=off:interchange=off:fu=10:full_unroll_outer=on
feedback=0

435.gromacs=peak=default:
FOPTIMIZE=-O3 -OPT:rsqrt=2:ro=3
COPTIMIZE=-O3 -OPT:rsqrt=2:ro=3
feedback=0

436.cactusADM=peak=default:
COPTIMIZE=-O3 -LNO:prefetch=3:prefetch_ahead=5:ou_prod_max=10:full_unroll=5 -ipa
FOPTIMIZE=-O3 -LNO:prefetch=3:prefetch_ahead=5:ou_prod_max=10:full_unroll=5 -ipa

437.leslie3d=peak=default:
basepeak=true

444.namd=peak=default:
```

```
CXXOPTIMIZE=-Ofast -fno-exceptions

447.dealII=peak=default:
# Needed to avoid -DSPEC_CPU_LP64
PORTABILITY =
%ifdef %{gnu4_fe}
CXXOPTIMIZE=-Ofast -static -INLINE:aggressive=on -OPT:malloc_alg=1 -m32 -fno-exceptions
feedback=0
%else
CXXOPTIMIZE=-Ofast -INLINE:aggressive=on -LNO:opt=0 -OPT:alias=disjoint -m32 -fno-exceptions
feedback=0
%endif

450.soplex=peak=default:
CXXOPTIMIZE=-m32 -O3 -OPT:IEEE_arith=3 -CG:load_exe=0:movnti=1 -LNO:minvariant=off:prefetch=1 -fno-
exceptions
# Needed to avoid -DSPEC_CPU_LP64
PORTABILITY =

453.povray=peak=default:
CXXOPTIMIZE=-Ofast -fno-fast-math

454.calculix=peak=default:
FOPTIMIZE=-Ofast -LNO:simd=0 -WOPT:mem_opnds=on
COPTIMIZE=$(FOPTIMIZE)
feedback=0

459.GemsFDTD=peak=default:
FOPTIMIZE=-Ofast -LNO:fission=2:prefetch=0
feedback=0

465.tonto=peak=default:
basepeak=true

470.lbm=peak=default:
basepeak=true

481.wrf=peak=default:
basepeak=true

482.sphinx3=peak=default:
%ifdef %{gnu4_fe}
COPTIMIZE=-O3 -OPT:Ofast -WOPT:aggstr=0 -m32
%else
basepeak=true
%endif

# The following section was added automatically, and contains settings that
# did not appear in the original configuration file, but were added to the
# raw file after the run.
default:
notes_plat_000 =Node interleaving is disabled
notes_plat_005 =taskset utility used to bind CPU(s) to processes
notes_plat_010 =ulimit -s unlimited set
```

Intel Xeon processor based servers

The following configuration file was used for the Dual-Core Intel Xeon® processor 7140M-, Quad-Core Intel Xeon processor E7340-, and Quad-Core Intel Xeon processor L7345-based servers.

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

action      = validate
tune        = base or peak
ext         = SLES10x64_ic10.0_em64t_Jun042007
PATHSEP     = /
flagsurl    = http://www.spec.org/cpu2006/flags/FSC_Intel_flags.xml.xml
```

```
check_md5   = 1
mean_anyway = 1
reportable  = 1

#include: SUT.inc
#  ----- Begin inclusion of 'SUT.inc'
###############################################################################
# File to be included into config file for SPEC CPU2006

# This include file specifies the "System Under Test" (Hardware,
# OS, BIOS, etc.)
# Any information about the binaries is elsewhere.

# To avoid conflicts in the numbering of the notes,
# please use only 900 and higher numbers.

###############################################################################
# System information                                                          #
# If some remarks about BIOS or Firmware are needed, place them here. #
###############################################################################

default=default=default=default:
notes_000=
notes_020=
notes_025= BIOS configuration:
notes_030=

int=default=default=default:
notes_005= All binaries were built with 32-bit Intel compiler except:
notes_010= 401.bzip2 and 456.hmmer in peak were built with 64-bit Intel
notes_015= compiler by changing the path for include and library files.

#fp=default=default=default:
#notes901= All binaries were built with 64-bit Intel compiler except:
#notes902= 433.milc, 434.zeusmp, 450.soplex, 470.lbm and 482.sphinx3 in peak were built with
#notes903= 32-bit Intel compiler by changing the path for include and library files.

###################################
# About Fujitsu Siemens Computers #
###################################

default=default=default=default:
notes_035=
notes_040=
notes_045=

#####################################
# Description Hardware and Software #
#####################################

default=default=default=default:
hw_vendor          =
hw_model000        =
hw_model001 =
hw_cpu_name        =
hw_cpu_char        =
hw_cpu_mhz         =
hw_fpu             =
#
hw_nchips          =
hw_ncores          =
hw_ncoresperchip   =
hw_nthreadspercore =
#
hw_ncpuorder       =
hw_pcache          =
hw_scache          =
hw_tcache          =
hw_ocache          =
hw_memory000       =
```

```
hw_memory001 =
hw_disk            =
hw_other           =

sw_file            = reiserfs
sw_state           = Multiuser, Runlevel 3

license_num        =
test_sponsor       =
tester             =
test_date          =
hw_avail           =
prepared_by        =
config             =
# ---- End inclusion of '/cpu2006/config/SUT.inc'

default=default=default=default:
CC  = icc
CXX = icpc
FC  = ifort
OBJ = .o

SMARTHEAP_DIR = /opt/SmartHeap_8_1/lib

#submit= MYMASK=`printf '0x%x' \$((1<<\$SPECCOPYNUM))`; /usr/bin/taskset \$MYMASK $command

############################
# portability & libraries #
############################

400.perlbench=default=default=default:
CPORTABILITY = -DSPEC_CPU_LINUX_IA32

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

462.libquantum=default=default=default:
CPORTABILITY = -DSPEC_CPU_LINUX

483.xalancbmk=default=default=default:
CXXPORTABILITY = -DSPEC_CPU_LINUX

435.gromacs=default=default=default:
LDPORTABILITY = -nofor_main

436.cactusADM=default=default=default:
LDPORTABILITY = -nofor_main
PORTABILITY = -DSPEC_CPU_LP64

454.calculix=default=default=default:
LDPORTABILITY = -nofor_main

481.wrf=default=default=default:
CPORTABILITY = -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX

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

int=base=default=default:
COPTIMIZE= -fast
CXXOPTIMIZE= -xT -O3 -ipo -no-prec-div -ansi-alias
EXTRA_CXXLIBS= -L$(SMARTHEAP_DIR) -lsmartheap

fp=base=default=default:
OPTIMIZE= -fast

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

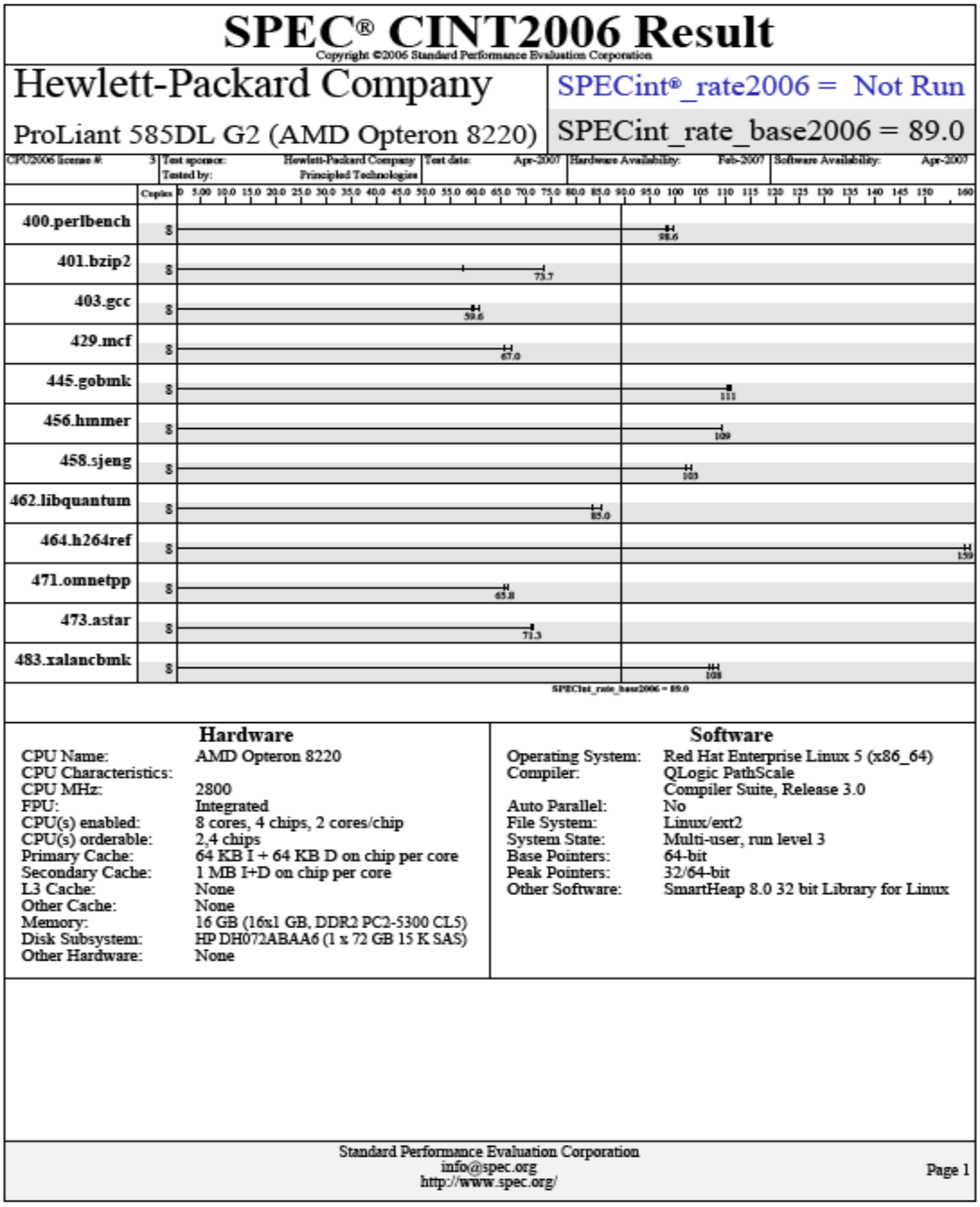
```
int=peak=default=default:
COPTIMIZE= -fast
CXXOPTIMIZE= -fast -ansi-alias
EXTRA_CXXLIBS= -L$(SMARTHEAP_DIR) -lsmartheap

PASS1_CFLAGS   = -prof_gen
PASS2_CFLAGS   = -prof_use
PASS1_CXXFLAGS = -prof_gen
PASS2_CXXFLAGS = -prof_use
PASS1_LDFLAGS  = -prof_gen
PASS2_LDFLAGS  = -prof_use

fp=peak=default=default:
OPTIMIZE= -fast

PASS1_CFLAGS   = -prof_gen
PASS2_CFLAGS   = -prof_use
PASS1_FFLAGS   = -prof_gen
PASS2_FFLAGS   = -prof_use
PASS1_CXXFLAGS = -prof_gen
PASS2_CXXFLAGS = -prof_use
PASS1_LDFLAGS  = -prof_gen
PASS2_LDFLAGS  = -prof_use

401.bzip2=peak=default=default:
CC=/opt/intel/cce/10.0.023/bin/icc -I/opt/intel/cce/10.0.023/include -L/opt/intel/cce/10.0.023/lib
PORTABILITY=-DSPEC_CPU_LP64
feedback=0

403.gcc=peak=default=default:
basepeak=yes

429.mcf=peak=default=default:
COPTIMIZE= -fast -prefetch
EXTRA_LIBS= -L$(SMARTHEAP_DIR) -lsmartheap

456.hmmer=peak=default=default:
COPTIMIZE= -fast -unroll2
CC=/opt/intel/cce/10.0.023/bin/icc -I/opt/intel/cce/10.0.023/include -L/opt/intel/cce/10.0.023/lib
PORTABILITY=-DSPEC_CPU_LP64

458.sjeng=peak=default=default:
COPTIMIZE= -fast -unroll4

462.libquantum=peak=default=default:
COPTIMIZE= -fast -prefetch -opt-streaming-stores always

464.h264ref=peak=default=default:
OPTIMIZE= -fast -unroll2 -ansi-alias

483.xalancbmk=peak=default=default:
basepeak=yes

#410.bwaves=peak=default=default:
#basepeak=yes

#416.gamess=peak=default=default:
#basepeak=yes

#433.milc=peak=default=default:
#PORTABILITY=
#CC=/opt/intel/cc/9.1.047/bin/icc -I/opt/intel/cc/9.1.047/include -L/opt/intel/cc/9.1.047/lib

#434.zeusmp=peak=default=default:
#PORTABILITY=
#FC=/opt/intel/fc/9.1.043/bin/ifort -I/opt/intel/fc/9.1.043/include -L/opt/intel/fc/9.1.043/lib
#feedback=0

#436.cactusADM=peak=default=default:
```

```
#basepeak=yes

#437.leslie3d=peak=default=default:
#basepeak=yes

#444.namd=peak=default=default:
#basepeak=yes

#450.soplex=peak=default=default:
#PORTABILITY=
#CXX=/opt/intel/cc/9.1.047/bin/icpc -I/opt/intel/cc/9.1.047/include -L/opt/intel/cc/9.1.047/lib

#459.GemsFDTD=peak=default=default:
#basepeak=yes

#470.lbm=peak=default=default:
#PORTABILITY=
#CC=/opt/intel/cc/9.1.047/bin/icc -I/opt/intel/cc/9.1.047/include -L/opt/intel/cc/9.1.047/lib

#481.wrf=peak=default=default:
#basepeak=yes

#482.sphinx3=peak=default=default:
#PORTABILITY=
#CC=/opt/intel/cc/9.1.047/bin/icc -I/opt/intel/cc/9.1.047/include -L/opt/intel/cc/9.1.047/lib
#feedback=0

#########################
# Used Compilers and OS #
#########################

int=default=default=default:
sw_compiler000   = Intel C++ Compiler for IA32/EM64T application,
sw_compiler001   = Version 10.0 - Build 20070308, Package-ID:
sw_compiler002 = l_cc_p_10.0.023
sw_other000      = Smart Heap Library, Version 8.1
sw_other001      = binutils-2.17.tar.gz, Version 2.17
sw_base_ptrsize  = 32-bit
sw_peak_ptrsize  = 32/64-bit

fp=default=default=default:
sw_compiler001   = Intel C++ Compiler for IA32/EM64T application,
sw_compiler002   = Version 10.0 - Build 20070308, Package-ID: l_cc_p_10.0.017
sw_compiler003   = Intel Fortran Compiler for IA32/EM64T application,
sw_compiler004   = Version 10.0 - Build 20070308, Package-ID: l_fc_p_10.0.017
sw_other         = None
sw_base_ptrsize  = 64-bit
sw_peak_ptrsize  = 64-bit

default=default=default=default:
sw_os000         = SUSE LINUX Enterprise Server 10 (x86_64), Kernel
sw_os001 = 2.6.16.21-0.8-smp
sw_avail         = Jun-2007
sw_auto_parallel = No

######################
# End of config-file #
######################
```

Appendix C – SPECint_rate output

This appendix provides the output of the benchmark for each of the test servers.

Dual-Core AMD Opteron processor 8220



SPEC® CINT2006 Result

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Hewlett-Packard Company

ProLiant 585DL G2 (AMD Opteron 8220)

SPECint®_rate2006 = Not Run

SPECint_rate_base2006 = 89.0

CPU2006 license #: 3 | Test sponsor: Hewlett-Packard Company | Tested by: Principled Technologies | Test date: Apr-2007 | Hardware Availability: Feb-2007 | Software Availability: Apr-2007

	Copies	0 5.00 10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0 50.0 55.0 60.0 65.0 70.0 75.0 80.0 85.0 90.0 95.0 100 105 110 115 120 125 130 135 140 145 150 160
400.perlbench	8	98.6
401.bzip2	8	73.7
403.gcc	8	59.6
429.mcf	8	67.0
445.gobmk	8	111
456.hmmer	8	109
458.sjeng	8	103
462.libquantum	8	85.0
464.h264ref	8	159
471.omnetpp	8	65.8
473.astar	8	71.3
483.xalancbmk	8	103

SPECint_rate_base2006 = 89.0

Hardware

CPU Name:	AMD Opteron 8220
CPU Characteristics:	
CPU MHz:	2800
FPU:	Integrated
CPU(s) enabled:	8 cores, 4 chips, 2 cores/chip
CPU(s) orderable:	2,4 chips
Primary Cache:	64 KB I + 64 KB D on chip per core
Secondary Cache:	1 MB I+D on chip per core
L3 Cache:	None
Other Cache:	None
Memory:	16 GB (16x1 GB, DDR2 PC2-5300 CL5)
Disk Subsystem:	HP DH072ABAA6 (1 x 72 GB 15 K SAS)
Other Hardware:	None

Software

Operating System:	Red Hat Enterprise Linux 5 (x86_64)
Compiler:	QLogic PathScale Compiler Suite, Release 3.0
Auto Parallel:	No
File System:	Linux/ext2
System State:	Multi-user, run level 3
Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other Software:	SmartHeap 8.0 32 bit Library for Linux

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Page 1

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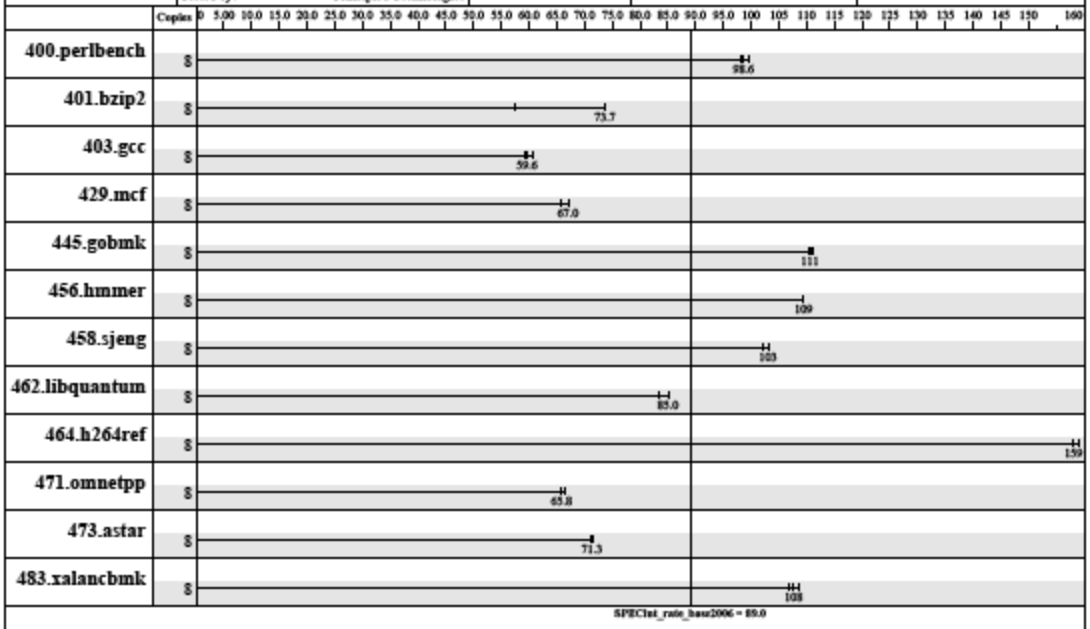
Hewlett-Packard Company

ProLiant 585DL G2 (AMD Opteron 8220)

SPECint®_rate2006 = Not Run

SPECint_rate_base2006 = 89.0

CPU2006 license #: 3 | Test sponsor: Hewlett-Packard Company | Tested by: Principled Technologies | Test date: Apr-2007 | Hardware Availability: Feb-2007 | Software Availability: Apr-2007



Hardware

CPU Name:	AMD Opteron 8220
CPU Characteristics:	
CPU MHz:	2800
FPU:	Integrated
CPU(s) enabled:	8 cores, 4 chips, 2 cores/chip
CPU(s) orderable:	2,4 chips
Primary Cache:	64 KB I + 64 KB D on chip per core
Secondary Cache:	1 MB I+D on chip per core
L3 Cache:	None
Other Cache:	None
Memory:	16 GB (16x1 GB, DDR2 PC2-5300 CL5)
Disk Subsystem:	HP DH072ABAA6 (1 x 72 GB 15 K SAS)
Other Hardware:	None

Software

Operating System:	Red Hat Enterprise Linux 5 (x86_64)
Compiler:	QLogic PathScale Compiler Suite, Release 3.0
Auto Parallel:	No
File System:	Linux/ext2
System State:	Multi-user, run level 3
Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other Software:	SmartHeap 8.0 32 bit Library for Linux

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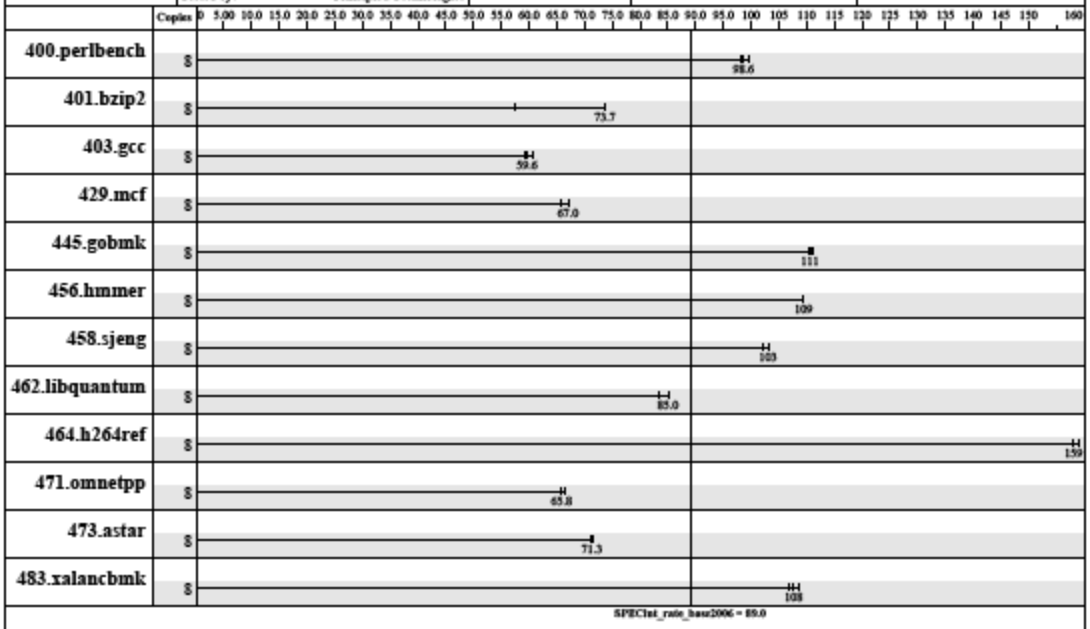
Hewlett-Packard Company

ProLiant 585DL G2 (AMD Opteron 8220)

SPECint®_rate2006 = Not Run

SPECint_rate_base2006 = 89.0

CPU2006 license #: 3 | Test sponsor: Hewlett-Packard Company | Tested by: Principled Technologies | Test date: Apr-2007 | Hardware Availability: Feb-2007 | Software Availability: Apr-2007



Hardware

CPU Name:	AMD Opteron 8220
CPU Characteristics:	
CPU MHz:	2800
FPU:	Integrated
CPU(s) enabled:	8 cores, 4 chips, 2 cores/chip
CPU(s) orderable:	2,4 chips
Primary Cache:	64 KB I + 64 KB D on chip per core
Secondary Cache:	1 MB I+D on chip per core
L3 Cache:	None
Other Cache:	None
Memory:	16 GB (16x1 GB, DDR2 PC2-5300 CL5)
Disk Subsystem:	HP DH072ABAA6 (1 x 72 GB 15 K SAS)
Other Hardware:	None

Software

Operating System:	Red Hat Enterprise Linux 5 (x86_64)
Compiler:	QLogic PathScale Compiler Suite, Release 3.0
Auto Parallel:	No
File System:	Linux/ext2
System State:	Multi-user, run level 3
Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other Software:	SmartHeap 8.0 32 bit Library for Linux

Dual-Core Intel Xeon processor 7140M

SPEC® CINT2006 Result

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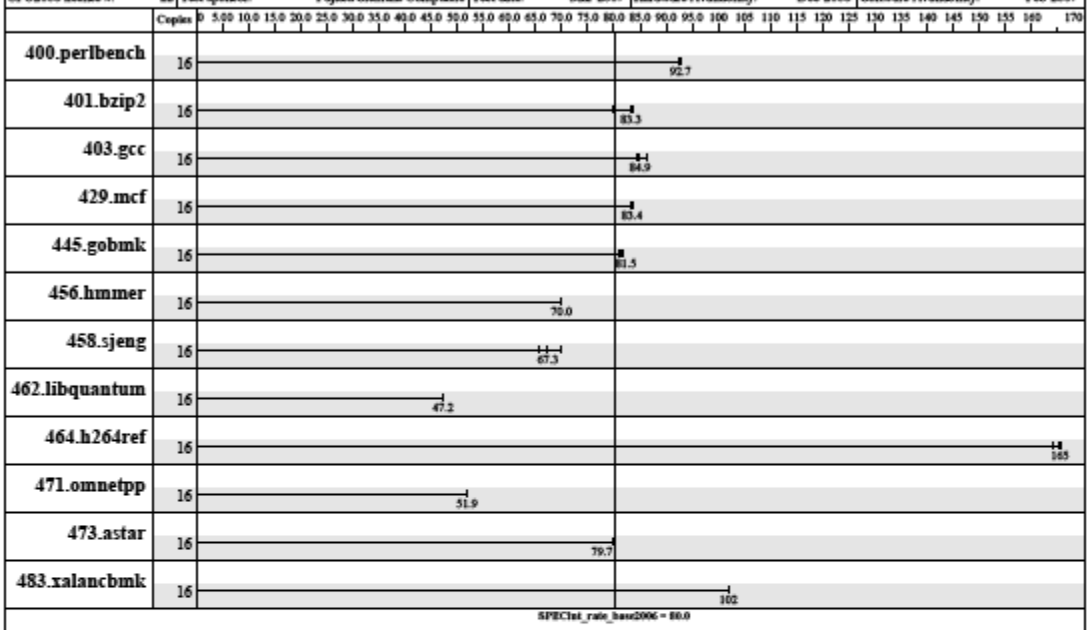
Intel

Dual Core Intel Xeon processor 7140M,
3.40 GHz

SPECint®_rate2006 = Not Run

SPECint_rate_base2006 = 80.0

CPU2006 license #: 22 | Test sponsor: Fujitsu Siemens Computers | Test date: Mar-2007 | Hardware Availability: Dec-2006 | Software Availability: Feb-2007



Hardware

CPU Name:	Intel Xeon 7140M
CPU Characteristics:	800 MHz system bus
CPU MHz:	3400
FPU:	Integrated
CPU(s) enabled:	8 cores, 4 chips, 2 cores/chip, 2 threads/core
CPU(s) orderable:	1,2,4 chips
Primary Cache:	12 KB + 16 KB (per core)
Secondary Cache:	1 MB (per core)
L3 Cache:	16 MB (per chip)
Other Cache:	None
Memory:	16 GB (16x1 GB DDR2 PC2-3200, 1 rank, CAS 3-3-3, with ECC)
Disk Subsystem:	Seagate ST3146854LC (SCSI 73GB 15 krpm)
Other Hardware:	None

Software

Operating System:	Red Hat Enterprise Linux 5 (x86_64)
Compiler:	Intel C++ Compiler for IA32/EM64T application, Version 10.0, Package-ID: l_cc_p_10.0.023
Auto Parallel:	No
File System:	reiserfs
System State:	Multiuser, Runlevel 3
Base Pointers:	32-bit
Peak Pointers:	32/64-bit
Other Software:	Smart Heap Library, Version 8.1

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SPEC® CINT2006 Result

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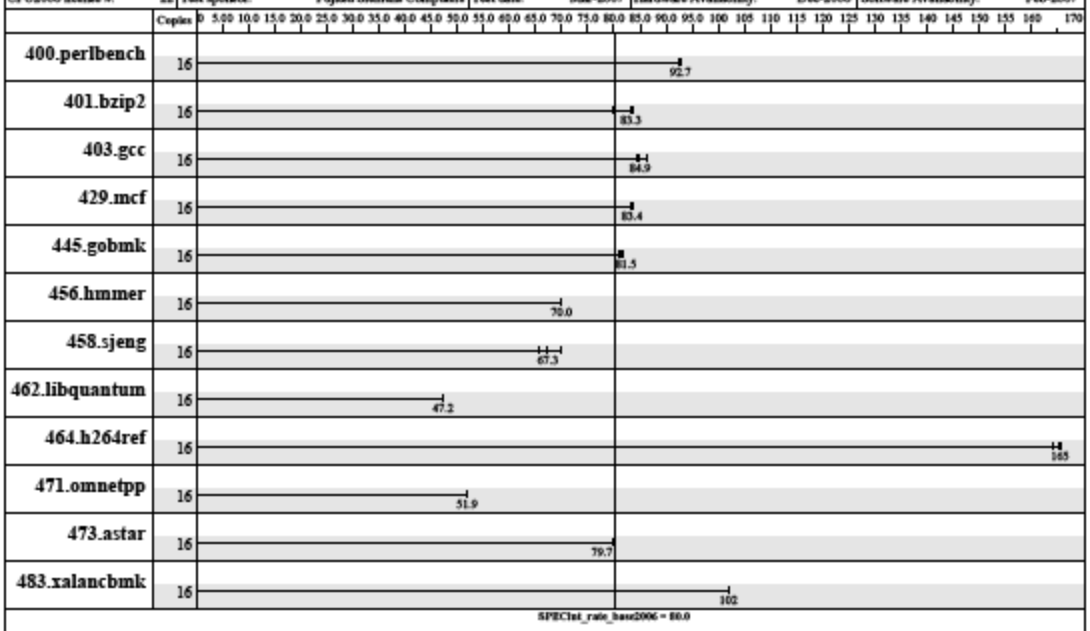
Intel

Dual Core Intel Xeon processor 7140M,
3.40 GHz

SPECint®_rate2006 = Not Run

SPECint_rate_base2006 = 80.0

CPU2006 license #: 22 | Test sponsor: Fujitsu Siemens Computers | Test date: Mar-2007 | Hardware Availability: Dec-2006 | Software Availability: Feb-2007



Hardware

CPU Name:	Intel Xeon 7140M
CPU Characteristics:	800 MHz system bus
CPU MHz:	3400
FPU:	Integrated
CPU(s) enabled:	8 cores, 4 chips, 2 cores/chip, 2 threads/core
CPU(s) orderable:	1,2,4 chips
Primary Cache:	12 KB + 16 KB (per core)
Secondary Cache:	1 MB (per core)
L3 Cache:	16 MB (per chip)
Other Cache:	None
Memory:	16 GB (16x1 GB DDR2 PC2-3200, 1 rank, CAS 3-3-3, with ECC)
Disk Subsystem:	Seagate ST3146854LC (SCSI 73GB 15 krpm)
Other Hardware:	None

Software

Operating System:	Red Hat Enterprise Linux 5 (x86_64)
Compiler:	Intel C++ Compiler for IA32/EM64T application, Version 10.0, Package-ID: l_cc_p_10.0.023
Auto Parallel:	No
File System:	reiserfs
System State:	Multiuser, Runlevel 3
Base Pointers:	32-bit
Peak Pointers:	32/64-bit
Other Software:	Smart Heap Library, Version 8.1

SPEC® CINT2006 Result

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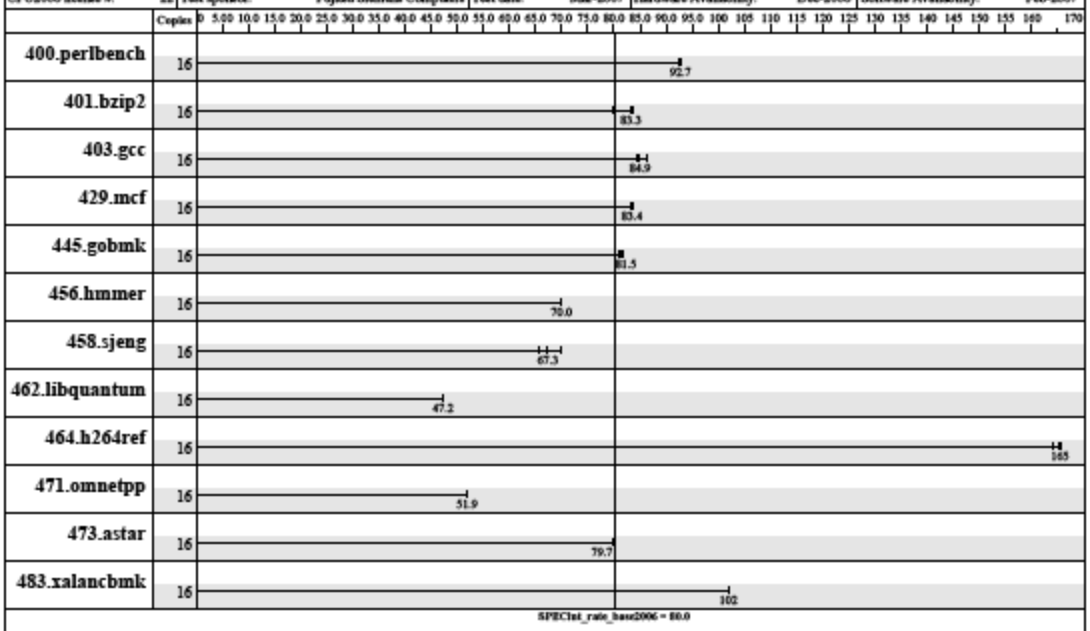
Intel

Dual Core Intel Xeon processor 7140M,
3.40 GHz

SPECint®_rate2006 = Not Run

SPECint_rate_base2006 = 80.0

CPU2006 license #: 22 | Test sponsor: Fujitsu Siemens Computers | Test date: Mar-2007 | Hardware Availability: Dec-2006 | Software Availability: Feb-2007



Hardware

CPU Name:	Intel Xeon 7140M
CPU Characteristics:	800 MHz system bus
CPU MHz:	3400
FPU:	Integrated
CPU(s) enabled:	8 cores, 4 chips, 2 cores/chip, 2 threads/core
CPU(s) orderable:	1,2,4 chips
Primary Cache:	12 KB + 16 KB (per core)
Secondary Cache:	1 MB (per core)
L3 Cache:	16 MB (per chip)
Other Cache:	None
Memory:	16 GB (16x1 GB DDR2 PC2-3200, 1 rank, CAS 3-3-3, with ECC)
Disk Subsystem:	Seagate ST3146854LC (SCSI 73GB 15 krpm)
Other Hardware:	None

Software

Operating System:	Red Hat Enterprise Linux 5 (x86_64)
Compiler:	Intel C++ Compiler for IA32/EM64T application, Version 10.0, Package-ID: l_cc_p_10.0.023
Auto Parallel:	No
File System:	reiserfs
System State:	Multiuser, Runlevel 3
Base Pointers:	32-bit
Peak Pointers:	32/64-bit
Other Software:	Smart Heap Library, Version 8.1

Quad-Core Intel Xeon processor E7340

SPEC® CINT2006 Result

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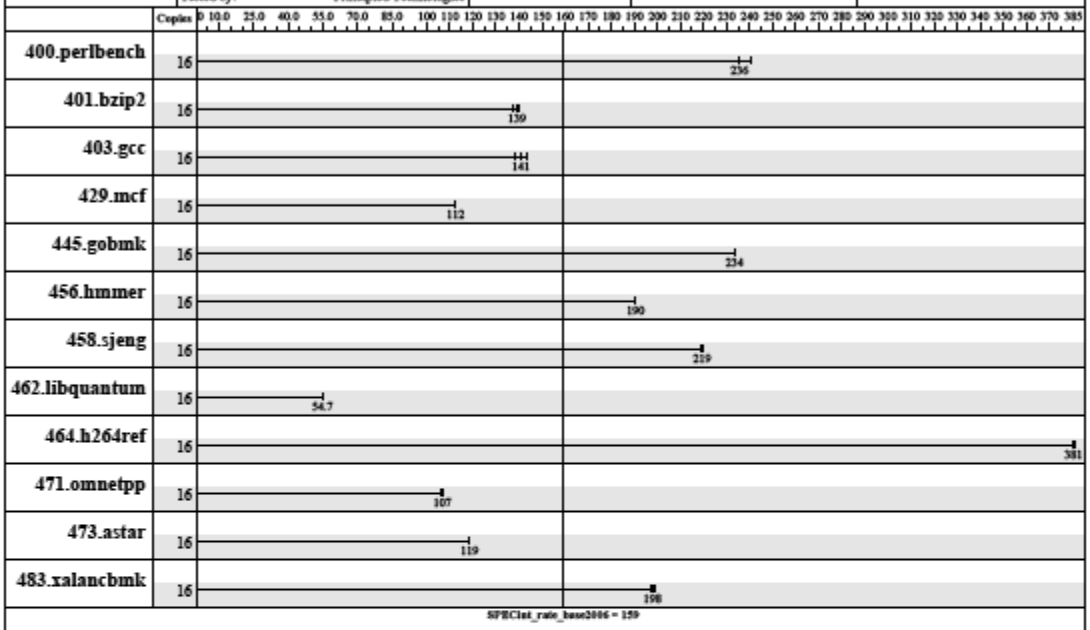
Intel

Quad-Core Intel Xeon Processor E7340,
2.4 GHz

SPECint®_rate2006 = Not Run

SPECint_rate_base2006 = 159

CPU2006 license #: 22 | Test sponsor: Intel | Test date: Aug-2007 | Hardware Availability: Aug-2007 | Software Availability: Jun-2007
Tested by: Principled Technologies



Hardware

CPU Name:	Intel Xeon E7340
CPU Characteristics:	1066 MHz system bus
CPU MHz:	2400
FPU:	Integrated
CPU(s) enabled:	16 cores, 4 chips, 4 cores/chip
CPU(s) orderable:	1,2,4 chips
Primary Cache:	32 KB + 32 KB (per core)
Secondary Cache:	2 x 4 MB (each 4 MBs shared by 2 cores)
L3 Cache:	None
Other Cache:	None
Memory:	16 GB (16x1 GB FB DDR2 PC2-5300, 2 rank, CAS 5-5-5)
Disk Subsystem:	Seagate ST973401SS (SAS, 73GB, 10000rpm)
Other Hardware:	None

Software

Operating System:	Red Hat Enterprise Linux 5 (x86_64)
Compiler:	Intel C++ Compiler for IA32/EM64T application, Version 10.0, Package-ID: l_cc_p_10.0.023
Auto Parallel:	No
File System:	reiserfs
System State:	Multiuser, Runlevel 3
Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other Software:	Smart Heap Library, Version 8.1

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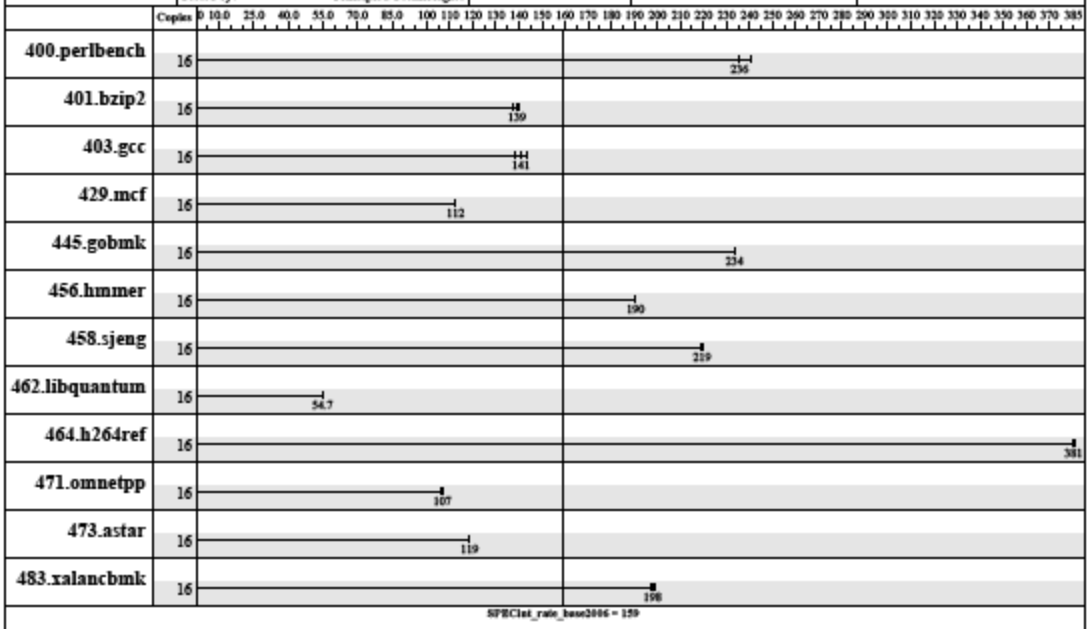
Intel

Quad-Core Intel Xeon Processor E7340, 2.4 GHz

SPECint®_rate2006 = Not Run

SPECint_rate_base2006 = 159

CPU2006 license #: 22 | Test sponsor: Intel | Tested by: Principled Technologies | Test date: Aug-2007 | Hardware Availability: Aug-2007 | Software Availability: Jun-2007



Hardware

CPU Name:	Intel Xeon E7340
CPU Characteristics:	1066 MHz system bus
CPU MHz:	2400
FPU:	Integrated
CPU(s) enabled:	16 cores, 4 chips, 4 cores/chip
CPU(s) orderable:	1,2,4 chips
Primary Cache:	32 KB + 32 KB (per core)
Secondary Cache:	2 x 4 MB (each 4 MBs shared by 2 cores)
L3 Cache:	None
Other Cache:	None
Memory:	16 GB (16x1 GB FB DDR2 PC2-5300, 2 rank, CAS 5-5-5)
Disk Subsystem:	Seagate ST973401SS (SAS, 73GB, 10000rpm)
Other Hardware:	None

Software

Operating System:	Red Hat Enterprise Linux 5 (x86_64)
Compiler:	Intel C++ Compiler for IA32/EM64T application, Version 10.0, Package-ID: l_cc_p_10.0.023
Auto Parallel:	No
File System:	reiserfs
System State:	Multiuser, Runlevel 3
Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other Software:	Smart Heap Library, Version 8.1

SPEC® CINT2006 Result

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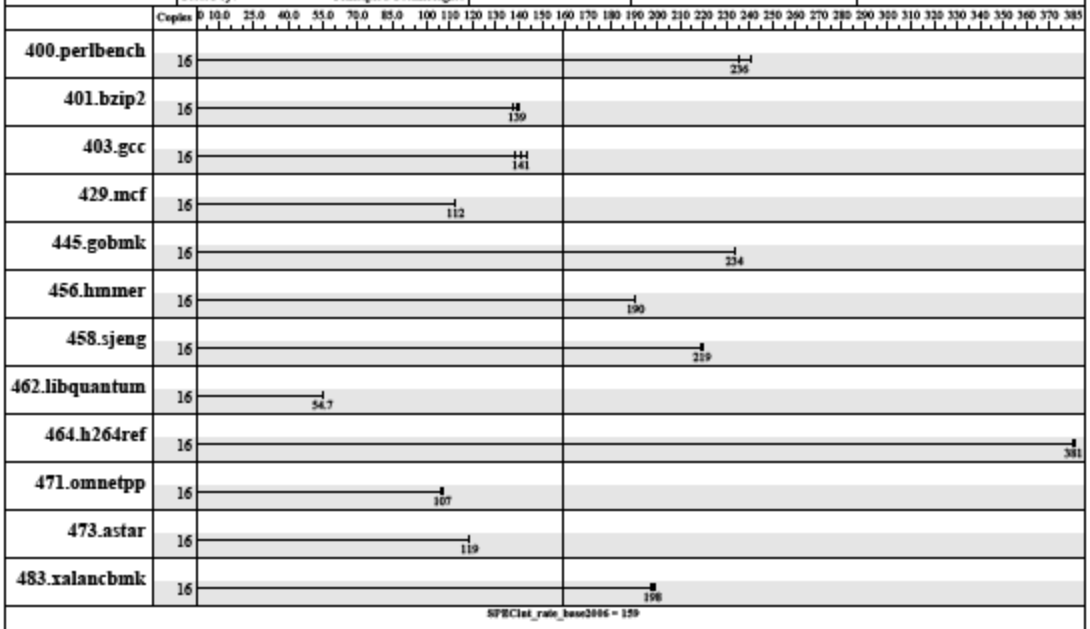
Intel

Quad-Core Intel Xeon Processor E7340, 2.4 GHz

SPECint®_rate2006 = Not Run

SPECint_rate_base2006 = 159

CPU2006 license #: 22 | Test sponsor: Intel | Tested by: Principled Technologies | Test date: Aug-2007 | Hardware Availability: Aug-2007 | Software Availability: Jun-2007



Hardware

CPU Name:	Intel Xeon E7340
CPU Characteristics:	1066 MHz system bus
CPU MHz:	2400
FPU:	Integrated
CPU(s) enabled:	16 cores, 4 chips, 4 cores/chip
CPU(s) orderable:	1,2,4 chips
Primary Cache:	32 KB + 32 KB (per core)
Secondary Cache:	2 x 4 MB (each 4 MBs shared by 2 cores)
L3 Cache:	None
Other Cache:	None
Memory:	16 GB (16x1 GB FB DDR2 PC2-5300, 2 rank, CAS 5-5-5)
Disk Subsystem:	Seagate ST973401SS (SAS, 73GB, 10000rpm)
Other Hardware:	None

Software

Operating System:	Red Hat Enterprise Linux 5 (x86_64)
Compiler:	Intel C++ Compiler for IA32/EM64T application, Version 10.0, Package-ID: l_cc_p_10.0.023
Auto Parallel:	No
File System:	reiserfs
System State:	Multiuser, Runlevel 3
Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other Software:	Smart Heap Library, Version 8.1

Quad-Core Intel Xeon processor L7345

SPEC® CINT2006 Result

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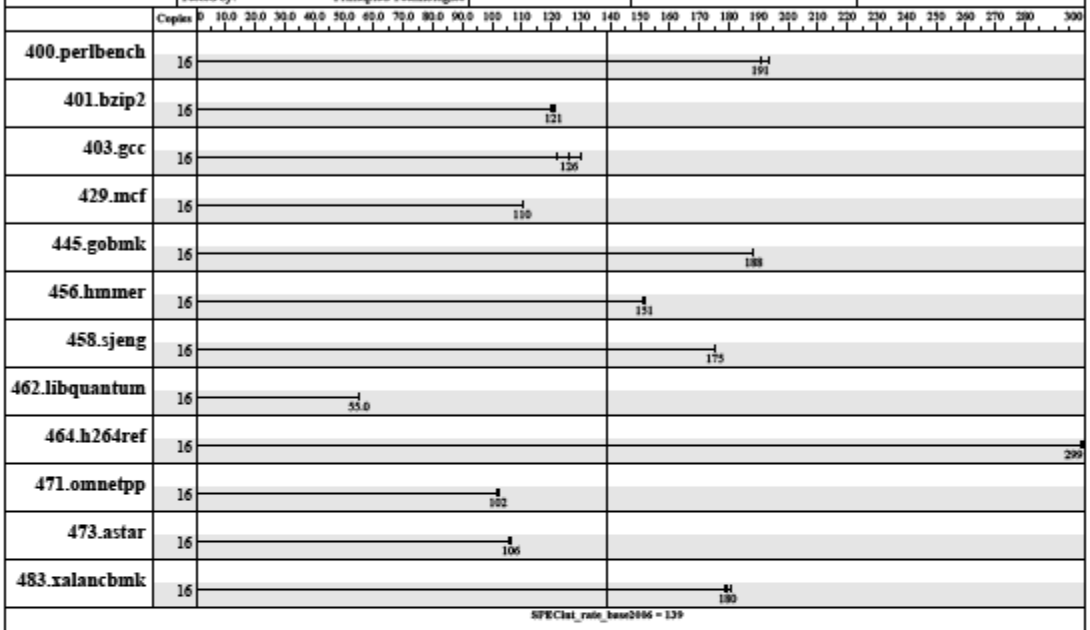
Intel

Quad-Core Intel Xeon Processor L7345,
1.86 GHz

SPECint®_rate2006 = Not Run

SPECint_rate_base2006 = 139

CPU2006 license #: 22 | Test sponsor: Intel | Tested by: Principled Technologies | Test date: Jun-2007 | Hardware Availability: Aug-2007 | Software Availability: Jun-2007



Hardware

CPU Name:	Intel Xeon L7345
CPU Characteristics:	1066 MHz system bus
CPU MHz:	1866
FPU:	Integrated
CPU(s) enabled:	16 cores, 4 chips, 4 cores/chip
CPU(s) orderable:	1,2,4 chips
Primary Cache:	32 KB + 32 KB (per core)
Secondary Cache:	2 x 4 MB (each 4 MBs shared by 2 cores)
L3 Cache:	None
Other Cache:	None
Memory:	16 GB (16x1 GB FB-DDR2 PC2-5300, 2 rank, CAS 5-5-5)
Disk Subsystem:	Seagate ST973401SS (SAS, 73GB, 10000rpm)
Other Hardware:	None

Software

Operating System:	Red Hat Enterprise Linux 5 (x86_64)
Compiler:	Intel C++ Compiler for IA32/EM64T application, Version 10.0, Package-ID: l_cc_p_10.0.023
Auto Parallel:	No
File System:	reiserfs
System State:	Multiuser, Runlevel 3
Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other Software:	Smart Heap Library, Version 8.1 binutils-2.17.tar.gz, Version 2.17

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http://www.spec.org/

SPEC® CINT2006 Result

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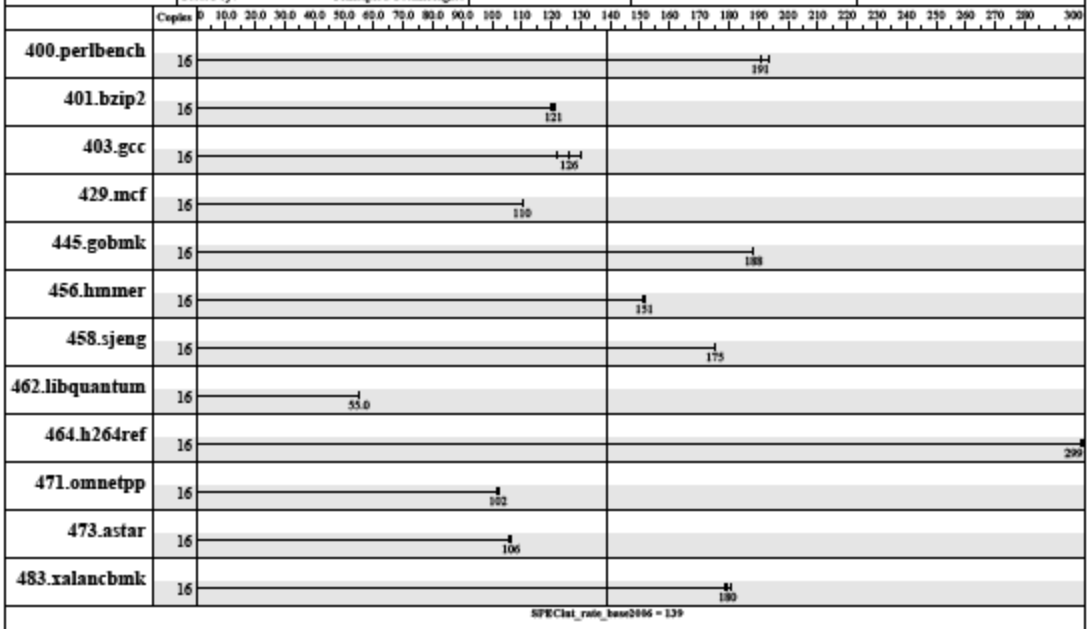
Intel

Quad-Core Intel Xeon Processor L7345, 1.86 GHz

SPECint®_rate2006 = Not Run

SPECint_rate_base2006 = 139

CPU2006 license #: 22 | Test sponsor: Intel | Tested by: Principled Technologies | Test date: Jun-2007 | Hardware Availability: Aug-2007 | Software Availability: Jun-2007



Hardware

CPU Name:	Intel Xeon L7345
CPU Characteristics:	1066 MHz system bus
CPU MHz:	1866
FPU:	Integrated
CPU(s) enabled:	16 cores, 4 chips, 4 cores/chip
CPU(s) orderable:	1,2,4 chips
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Other Hardware:	None

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Operating System:	Red Hat Enterprise Linux 5 (x86_64)
Compiler:	Intel C++ Compiler for IA32/EM64T application, Version 10.0, Package-ID: l_cc_p_10.0.023
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System State:	Multiuser, Runlevel 3
Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other Software:	Smart Heap Library, Version 8.1 binutils-2.17.tar.gz, Version 2.17

SPEC® CINT2006 Result

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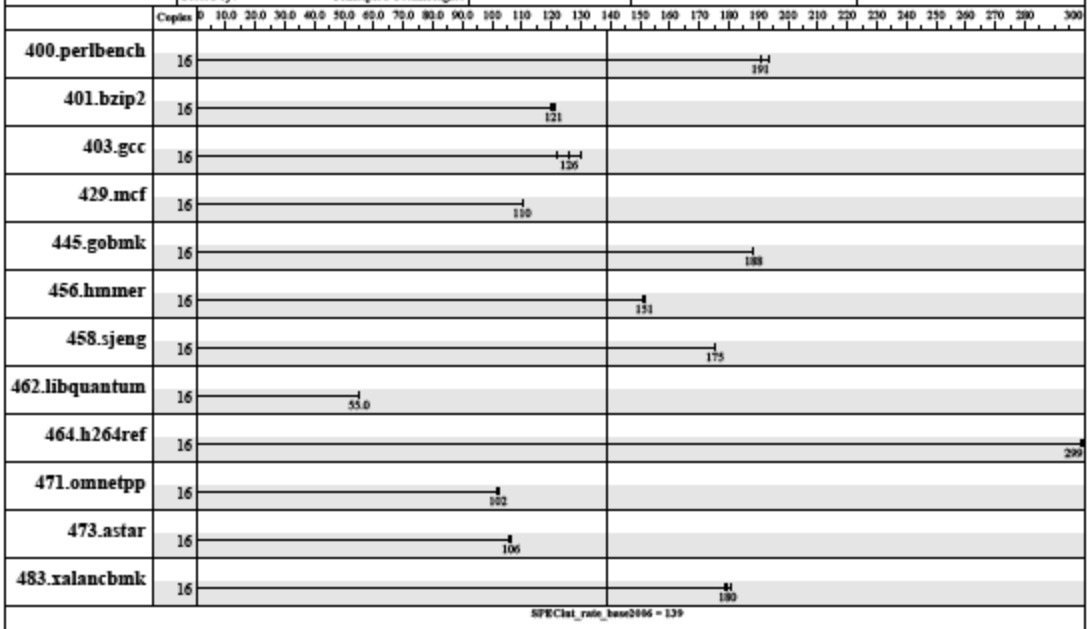
Intel

Quad-Core Intel Xeon Processor L7345, 1.86 GHz

SPECint®_rate2006 = Not Run

SPECint_rate_base2006 = 139

CPU2006 license #: 22 | Test sponsor: Intel | Tested by: Principled Technologies | Test date: Jun-2007 | Hardware Availability: Aug-2007 | Software Availability: Jun-2007



Hardware

CPU Name:	Intel Xeon L7345
CPU Characteristics:	1066 MHz system bus
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Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other Software:	Smart Heap Library, Version 8.1 binutils-2.17.tar.gz, Version 2.17

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