Principled Technologies®

TEST REPORT
SEPTEMBER 2007

SPEC CPU2006 SPECfp_rate performance on Dell, HP, and IBM servers

Executive summary

Dell Inc. (Dell) commissioned Principled Technologies (PT) to measure the SPEC CPU2006 SPECfp_rate2006 performance of the following three servers:

- Dell PowerEdge 2970 with two Dual-Core AMD Opteron 2222 SE processors
- HP ProLiant DL380 G5 with two Dual-Core Intel Xeon 5160 processors
- IBM System x3650 with two Dual-Core Intel Xeon 5160 processors

KEY FINDINGS

The Dell PowerEdge 2970 achieved a SPECfp_rate2006 score of 51.6, a 21.1 percent performance increase over the HP ProLiant DL380 G5, which achieved a score of 42.6, and a 25.2 percent performance increase over the IBM System x3650, which achieved a score of 41.2 (see Figure 1).

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 CFP2006 SPECfp_rate benchmark.

Figure 1 shows the relative SPECfp_rate2006 performance of each server normalized to that of the poorest-performing server. The Dell PowerEdge 2970 achieved a score of 51.6, a 21.1 percent performance increase over the HP ProLiant DL380 G5, which achieved a score of 42.6, and a 25.2 percent performance increase over the IBM System x3650, which achieved a score of 41.2.

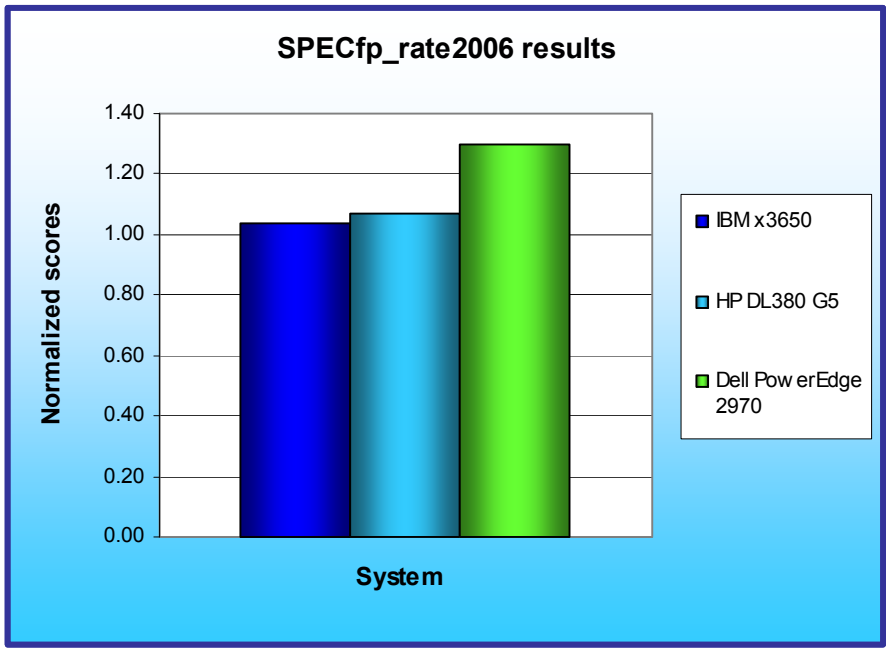


Figure 1: Normalized performance results of the test servers. Higher numbers are better.

Workload

The SPEC CPU2006 workload includes two benchmark suites: CINT2006 and CFP2006. We ran only the CFP2006 benchmark, which focuses on measuring and comparing compute-intensive floating-point performance. Specifically, we measured the SPECfp_rate2006 results for the test servers with four users.

Figure 2 lists the 17 applications that compose the CFP2006 benchmark. SPEC wrote six of the applications using Fortran, three using C, four using both Fortran and C, and four using C++.

Name	Application area
410.bwaves	Fluid dynamics
416.gamess	Quantum chemistry
433.mic	Physics/Quantum chromodynamics
434.zeusmp	Physics/CFD
435.gromacs	Biochemistry/Molecular dynamics
436.cactusADM	Physics/General relativity
437.leslie3d	Fluid Dynamics
444.namd	Biology/Molecular dynamics
447.dealII	Finite element analysis
450.soplex	Linear programming, Optimization
453.povray	Image ray-tracing
454.calculix	Structural mechanics
459.GemsFDTD	Computational electromagnetics
465.tonto	Quantum chemistry
470.lBM	Fluid dynamics
481.wrf	Weather
482.sphinx3	Speech recognition

Figure 2: The applications that make up the CFP2006 benchmark.

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

Test results

Figure 3 details the results of our tests with four users for SPECfp_rate2006. We determined the number of users based on the number of execution units in a given server. We used the same number of SPECfp_rate2006 users as processor execution units, so there is a one-to-one ratio.

SPECfp_rate2006 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.

Server	SPECfp_rate2006 results	SPECfp_base_rate2006 results
Dell PowerEdge 2970	51.6	48.7
HP DL380 G5	42.6	41.3
IBM x3650	41.2	39.8

Figure 3: SPECfp_rate2006 results for the three servers.

Test methodology

Figure 4 summarizes some of the key aspects of the configurations of the server systems; Appendix A provides detailed configuration information.

Server	Dell PowerEdge 2970 with two Dual-Core AMD Opteron 2222 SE processors	HP ProLiant DL380 G5 with two Dual-Core Intel Xeon 5160 processors	IBM System x3650 with two Dual-Core Intel Xeon 5160 processors
Processor frequency (GHz)	3.0 GHz	3.0 GHz	3.0 GHz
Front-side bus frequency (MHz)	1,000 MHz	1,333 MHz	1,333 MHz
Number of processor packages	2	2	2
Number of cores per processor package	2	2	2
Number of hardware threads per core	1	1	1
Motherboard	Dell CN-OFP973-69702-74H-0091	HP P3021ADMQUN203	IBM 7979AC1
Chipset	Broadcom HT-2100 and HT-1000 Chipset	Intel 5000 Series Chipset	Intel 5000 Series Chipset
RAM (16 GB in each)	16 GB (8 x 2GB) PC2-5300 DDR2	16 GB (8 x 2GB) PC2-5300 FBDIMM	16 GB (8 x 2GB) PC2-5300 FBDIMM
Hard drive	5 x 73GB Seagate ST973451SS	5 x 73GB Seagate ST973451SS	5 x 73GB Seagate ST973451SS

Figure 4: Summary of some key aspects of the server configurations.

Dell configured and provided all of the systems.

With the exception of disabling the Hardware Prefetcher and Adjacent Sector Prefetcher settings on the Intel-based servers, we used the default BIOS settings on each server. We changed those two settings to match those on similar systems with published SPEC CPU2006 results.

For all systems we used the default power settings, which were the following:

- Dell PowerEdge 2970—Demand-Based Power Management (PowerNow) disabled
- Dell PowerEdge 2970 Energy Smart—Demand-Based Power Management (PowerNow) enabled
- HP ProLiant DL380 G5—HP Dynamic Power Savings Mode enabled
- IBM System x3650—PowerExecutive Power Capping enabled

We began by installing a fresh copy of SuSE Linux Enterprise Server 10 SP1. We made no additional changes to the default installation options.

SPECCPU2006 configuration

We followed SPEC's standard instructions for building the CFP2006 executables. After studying the best results for this benchmark on the SPEC Web site, we chose the following software tools:

- HP ProLiant DL380 G5 and IBM System x3650
  - Intel C/C++ Compiler 9.1.051 for EM64T
  - Intel Fortran Compiler 9.1.051 for EM64T
- Dell PowerEdge 2970

- PathScale 3.0 C Compiler
- PathScale 3.0 C++ Compiler
- PathScale 3.0 Fortran Compiler

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 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 files we used appear in Appendix B.

To begin the benchmark, we performed the following steps:

- Open a command prompt.
- Change to the cpu2006 directory.
- Type ". ./shrc" at the command prompt.
- Type "ulimit -s unlimited" at the command prompt.
- Enter "runspec -c <config file name> -r 4 -T all -v 10 fp" where
  - <config file name> = name of the configuration file

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

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.

Systems	Dell PowerEdge 2970 with two Dual-Core AMD Opteron 2222 SE processors	HP ProLiant DL380 G5 with two Dual-Core Intel Xeon 5160 processors	IBM System x3650 with two Dual-Core Intel Xeon 5160 processors
General processor setup			
Number of processor packages	2	2	2
Number of cores per processor package	2	2	2
Number of hardware threads per core	1	1	1
CPU			
Vendor	AMD	Intel	Intel
Name	Opteron 2222 SE	Xeon 5160	Xeon 5160
Stepping	F2	B2	B2
Socket type	Socket F	LGA771	LGA771
Core frequency (GHz)	3.0 GHz	3.0 GHz	3.0 GHz
Front-side bus frequency (MHz)	1,000 MHz HyperTransport technology	1,333 MHz	1,333 MHz
L1 cache	64 KB + 64 KB (per core)	32 KB + 32KB (per core)	32 KB + 32KB (per core)
L2 cache	2 x 1 MB	4 MB (shared)	4 MB (shared)
Platform			
Vendor and model number	Dual-Core AMD Opteron processor model 2222 SE-based server	Dual-Core Intel Xeon processor model 5160-based server	Dual-Core Intel Xeon processor model 5160-based server
Motherboard model number	Dell CN-OFP973-69702-74H-0091	HP P3021ADMQUN203	IBM 7979AC1
Motherboard chipset	Broadcom HT-2100 and HT-1000 Chipset	Intel 5000 Series Chipset	Intel 5000 Series Chipset
Motherboard serial number	F3G57D1	013096-001	KQHRHY0
BIOS name and version	Dell BIOS 1.0.0	HP BIOS P56	IBM BIOS 1.05
BIOS settings	Default	Default	Default
Power settings (default)	Demand-Based Power Management (PowerNow) disabled	HP Dynamic Power Savings Mode enabled	PowerExecutive Power Capping enabled
Memory module(s)			
Vendor and model number	Infineon HYS72T256220HP-3S-A	Kingston KTH-XW667/4G	Kingston KTM5780/4G
Type	PC2-5300 DDR2	PC2-5300 FBDIMM	PC2-5300 FBDIMM
Speed (MHz)	667 MHz	667 MHz	667 MHz
Speed in the system currently running @ (MHz)	333 MHz	333 MHz	333 MHz
Timing/Latency (tCL-tRCD-iRP-tRASmin)	5-5-5-12	5-5-5-10	5-5-5-11

Systems	Dell PowerEdge 2970 with two Dual-Core AMD Opteron 2222 SE processors	HP ProLiant DL380 G5 with two Dual-Core Intel Xeon 5160 processors	IBM System x3650 with two Dual-Core Intel Xeon 5160 processors
Size	16 GB	16 GB	16 GB
Number of RAM modules	8 x 2,048 MB	8 x 2,048 MB	8 x 2,048 MB
Chip organization	Double-sided	Double-sided	Double-sided
Hard disk			
Vendor and model number	Seagate ST973451SS	Seagate ST973451SS	Seagate ST973451SS
Number of disks in system	5	5	5
Size	73 GB	73 GB	73 GB
Buffer size	16 MB	16 MB	16 MB
RPM	15,000	15,000	15,000
Type	SAS	SAS	SAS
Controller	PERC 5i	Smart Array P400	IBM ServeRAID 8K
Remote management	Dell Remote Access Controller – N/A	iLO2 Standard Management –N/A	N/A
Total number	2	2	1
Wattage of each	750	900	835

Figure 5: Detailed system configuration information for the test servers.

Appendix B – SPECfp_rate2006 configuration files

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

AMD processor based servers

```
############################################################################
# AMD64 (64-bit) Linux Pathscale v3.0 config file
#  for CPU2006
############################################################################

flagsurl=http://www.spec.org/cpu2006/flags/CPU2006_flags.20070501.xml
tune          = base
ext           = amd514K8
output_format = asc,html
teeout        = yes
teerunout     = yes
mean_anyway   = yes
reportable    = yes
sw_avail       = Sep-2007

submit                   = taskset -c $SPECCOPYNUM $command

sw_compiler000 = QLogic PathScale
sw_compiler001 = Compiler Suite, Release 3.0
sw_other000    = SmartHeap 8.1 32 bit Library for Linux
sw_auto_parallel    = No

############################################################################
# Macro section
############################################################################
# Modify this section to use the appropriate architecture flags.
# Leave these commented out if you are defining them from the
#   runspec command.

%define gnu4_fe
# %define gnu3_fe


default=default=default:
############################################################################
# Compiler selection
#
#
CC           = pathcc
CXX          = pathCC
FC           = pathf95
SMARTHEAP_DIR = /cpu2006/mpaton/1.0/amd514K8.lib/32


############################################################################
# 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 -DSPEC_CPU_LP64

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
CXXOPTIMIZE  = -Ofast -m32
EXTRA_CXXLIBS= -L$(SMARTHEAP_DIR) -lsmartheap

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

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

int=peak=default:
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
sw_other001= None

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

Intel processor based servers

```
#####################################################
# SPEC CPU2006 Intel SLES10 x64 (64-bit) config file #
# Intel Compiler 9.1 for Linux Intel64               #
#####################################################

action      = validate
tune        = base or peak
ext         = cpu2006.1.0.SLES10x64.ic91.em64t
PATHSEP     = /
flagsurl    = CPU2006_flags.20070417.xml

check_md5   = 1
mean_anyway = 1
reportable  = 1

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 #
############################

fp=default=default=default:
PORTABILITY = -DSPEC_CPU_LP64

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

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

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= -xP -O3 -ipo -no-prec-div
EXTRA_CXXLIBS= -L$(SMARTHEAP_DIR) -lsmartheap

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

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

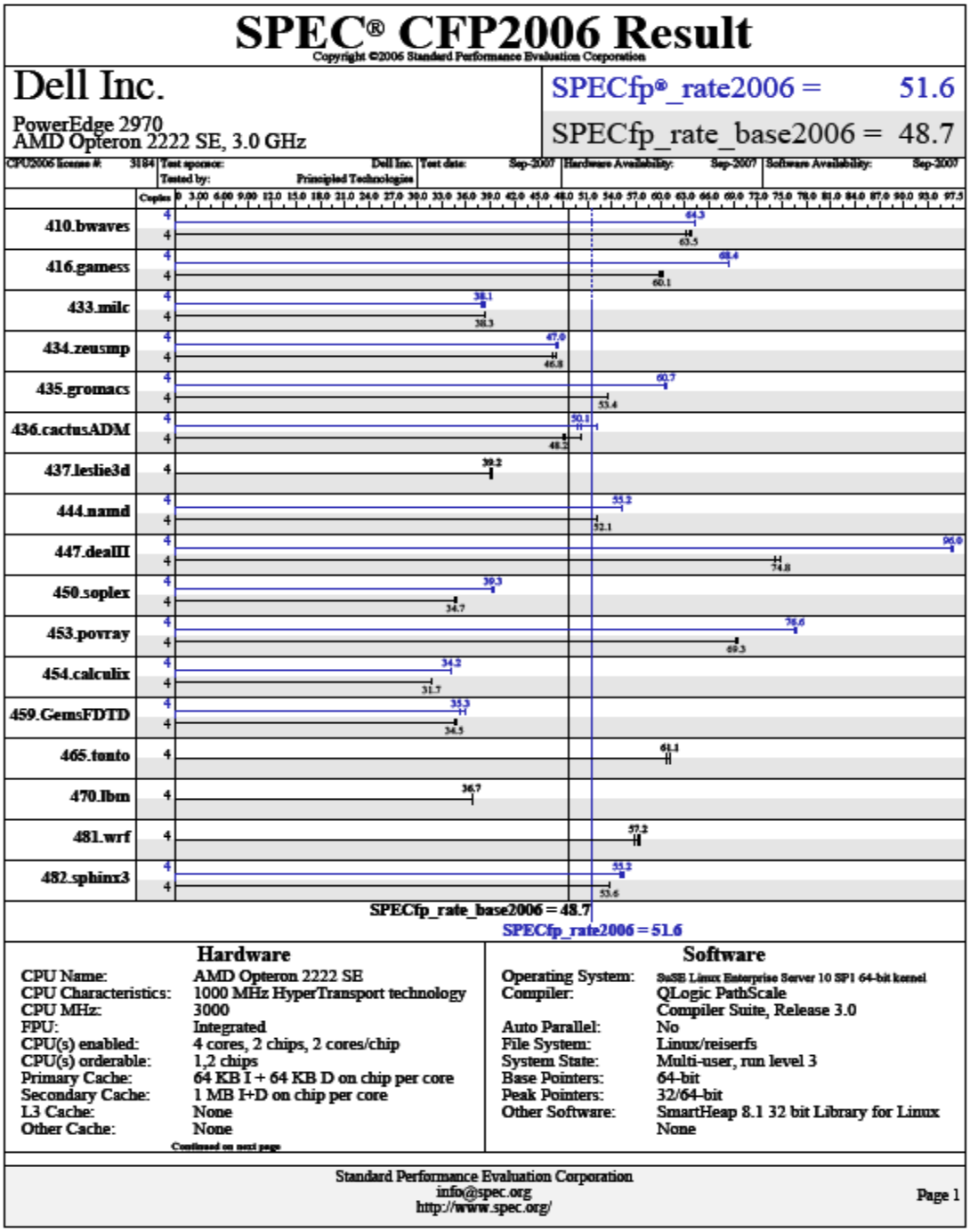
```
int=peak=default=default:
OPTIMIZE= -fast
EXTRA_LIBS= -L$(SMARTHEAP_DIR) -lsmartheap

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

400.perlbench=peak=default=default:
EXTRA_LIBS=

401.bzip2=peak=default=default:
CC=/opt/intel/cce/9.1.051/bin/icc -I/opt/intel/cce/9.1.051/include -L/opt/intel/cce/9.1.051/lib
PORTABILITY=-DSPEC_CPU_LP64
EXTRA_LIBS=
feedback=0

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

456.hmmer=peak=default=default:
CC=/opt/intel/cce/9.1.051/bin/icc -I/opt/intel/cce/9.1.051/include -L/opt/intel/cce/9.1.051/lib
PORTABILITY=-DSPEC_CPU_LP64
EXTRA_LIBS=

462.libquantum=peak=default=default:
CC=/opt/intel/cce/9.1.051/bin/icc -I/opt/intel/cce/9.1.051/include -L/opt/intel/cce/9.1.051/lib
PORTABILITY=-DSPEC_CPU_LP64
EXTRA_LIBS=

471.omnetpp=peak=default=default:
OPTIMIZE=-xP -O3 -ipo -no-prec-div

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/9.1.051/bin/icc -I/opt/intel/cc/9.1.051/include -L/opt/intel/cc/9.1.051/lib

434.zeusmp=peak=default=default:
PORTABILITY=
FC=/opt/intel/fc/9.1.051/bin/ifort -I/opt/intel/fc/9.1.051/include -L/opt/intel/fc/9.1.051/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/9.1.051/bin/icpc -I/opt/intel/cc/9.1.051/include -L/opt/intel/cc/9.1.051/lib

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

470.lbm=peak=default=default:
PORTABILITY=
CC=/opt/intel/cc/9.1.051/bin/icc -I/opt/intel/cc/9.1.051/include -L/opt/intel/cc/9.1.051/lib

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

482.sphinx3=peak=default=default:
PORTABILITY=
CC=/opt/intel/cc/9.1.051/bin/icc -I/opt/intel/cc/9.1.051/include -L/opt/intel/cc/9.1.051/lib
feedback=0

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

int=default=default=default:
sw_compiler001   = Intel C++ Compiler for IA32/EM64T application,
sw_compiler002   = Version 9.1 - Build 20070215, Package-ID: l_cc_p_9.1.051
sw_other         = Smart Heap Library, Version 8.1
sw_base_ptrsize  = 32-bit
sw_peak_ptrsize  = 32/64-bit

fp=default=default=default:
sw_compiler000   = Intel C++ Compiler for IA32/EM64T application,
sw_compiler001   = Version 9.1 - Build 20070215, Package-ID:
sw_compiler002   = l_cc_p_9.1.051
sw_compiler003   = Intel Fortran Compiler for IA32/EM64T application,
sw_compiler004   = Version 9.1 - Build 20070215, Package ID:
sw_compiler005   = l_fc_p_9.1.051
sw_other000      = SmartHeap 8.1 32 bit Library for Linux
sw_other001      = None
sw_base_ptrsize  = 64-bit
sw_peak_ptrsize  = 32/64-bit

default=default=default=default:
sw_os            = SuSE Linux Enterprise Server 10 SP1 64-bit kernel
sw_avail         = Sep-2007
sw_auto_parallel = No
```

Appendix C – SPECfp_rate2006 output

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

Dell PowerEdge 2970 with two Dual-Core AMD Opteron 2222 SE processors



SPEC® CFP2006 Result

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Dell Inc.

PowerEdge 2970
AMD Opteron 2222 SE, 3.0 GHz

SPECfp®_rate2006 = 51.6

SPECfp_rate_base2006 = 48.7

CPU2006 license #: 3184 | Test sponsor: Dell Inc. | Test date: Sep-2007 | Hardware Availability: Sep-2007 | Software Availability: Sep-2007
Tested by: Principled Technologies

Hardware

CPU Name:	AMD Opteron 2222 SE
CPU Characteristics:	1000 MHz HyperTransport technology
CPU MHz:	3000
FPU:	Integrated
CPU(s) enabled:	4 cores, 2 chips, 2 cores/chip
CPU(s) orderable:	1,2 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

Continued on next page

Software

Operating System:	SuSE Linux Enterprise Server 10 SP1 64-bit kernel
Compiler:	QLogic PathScale Compiler Suite, Release 3.0
Auto Parallel:	No
File System:	Linux/reiserfs
System State:	Multi-user, run level 3
Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other Software:	SmartHeap 8.1 32 bit Library for Linux None

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SPEC CFP2006 Result

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Dell Inc.

PowerEdge 2970
AMD Opteron 2222 SE, 3.0 GHz

SPECfp_rate2006 = 51.6

SPECfp_rate_base2006 = 48.7

CPU2006 license #: 3184 | Test sponsor: Dell Inc. | Tested by: Principled Technologies | Test date: Sep-2007 | Hardware Availability: Sep-2007 | Software Availability: Sep-2007

Hardware (Continued)

Memory: 16 GB (8x2 GB DDR2 PC2-5300)
Disk Subsystem: SAS, 73 GB
Other Hardware: None

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	4	854	63.7	**857**	**63.5**	862	63.0	4	**846**	**64.3**	846	64.2	846	64.3
416.gamess	4	1300	60.2	1310	59.9	**1300**	**60.1**	4	1140	68.5	**1150**	**68.4**	1150	68.3
433.milc	4	960	38.2	**960**	**38.3**	958	38.3	4	967	38.0	960	38.2	**963**	**38.1**
434.zeusmp	4	775	47.0	**778**	**46.8**	781	46.6	4	775	47.0	771	47.2	**774**	**47.0**
435.gromacs	4	**534**	**53.4**	535	53.4	534	53.5	4	471	60.6	**471**	**60.7**	470	60.8
436.cactusADM	4	995	48.1	**991**	**48.2**	951	50.3	4	963	49.6	**954**	**50.1**	918	52.1
437.leslie3d	4	**959**	**39.2**	958	39.3	968	38.9	4	**959**	**39.2**	958	39.3	968	38.9
444.namd	4	**616**	**52.1**	616	52.0	616	52.1	4	**581**	**55.2**	581	55.2	581	55.2
447.dealII	4	611	74.9	**611**	**74.8**	618	74.1	4	477	95.9	**476**	**96.0**	476	96.0
450.soplex	4	**961**	**34.7**	964	34.6	960	34.8	4	849	39.3	848	39.3	**848**	**39.3**
453.povray	4	**307**	**69.3**	307	69.4	308	69.2	4	278	76.7	278	76.6	**278**	**76.6**
454.calculix	4	1040	31.7	**1040**	**31.7**	1040	31.7	4	**965**	**34.2**	964	34.2	965	34.2
459.GemsFDTD	4	**1230**	**34.5**	1220	34.7	1230	34.5	4	1200	35.2	**1200**	**35.3**	1180	35.9
465.tonto	4	643	61.2	**644**	**61.1**	648	60.8	4	643	61.2	**644**	**61.1**	648	60.8
470.lbm	4	1490	36.8	1500	36.7	**1500**	**36.7**	4	1490	36.8	1500	36.7	**1500**	**36.7**
481.wrf	4	778	57.4	**781**	**57.2**	789	56.7	4	778	57.4	**781**	**57.2**	789	56.7
482.sphinx3	4	**1450**	**53.6**	1460	53.6	1450	53.6	4	**1410**	**55.2**	1420	55.0	1410	55.4

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Invocation

C benchmarks:
`pathcc`

C++ benchmarks:
`pathCC`

Fortran benchmarks:
`pathf95`

Benchmarks using both Fortran and C:
`pathcc pathf95`

SPEC CFP2006 Result

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Dell Inc.

PowerEdge 2970
AMD Opteron 2222 SE, 3.0 GHz

SPECfp_rate2006 = 51.6

SPECfp_rate_base2006 = 48.7

CPU2006 license #: 3184	Test sponsor: Dell Inc.	Test date: Sep-2007	Hardware Availability: Sep-2007	Software Availability: Sep-2007
	Tested by: Principled Technologies			

Base Portability Flags

C benchmarks:
-DSPEC_CPU_LP64

C++ benchmarks (except as noted below):
-DSPEC_CPU_LP64

453.povray: -DSPEC_CPU_LP64

Fortran benchmarks:
-DSPEC_CPU_LP64

Benchmarks using both Fortran and C (except as noted below):
-DSPEC_CPU_LP64

436.cactusADM: -DSPEC_CPU_LP64 -fno-second-underscore

481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX -fno-second-underscore

Peak Portability Flags

C benchmarks (except as noted below):
-DSPEC_CPU_LP64

C++ benchmarks (except as noted below):
No flags used

444.namd: -DSPEC_CPU_LP64

453.povray: -DSPEC_CPU_LP64

Fortran benchmarks (except as noted below):
-DSPEC_CPU_LP64

Benchmarks using both Fortran and C (except as noted below):
-DSPEC_CPU_LP64

436.cactusADM: -DSPEC_CPU_LP64 -fno-second-underscore

Base Optimization Flags

C benchmarks:
-Ofast

C++ benchmarks:
-Ofast

Fortran benchmarks:
-Ofast -OPT:malloc_alg=1

Continued on next page

SPEC CFP2006 Result

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Dell Inc.

PowerEdge 2970
AMD Opteron 2222 SE, 3.0 GHz

SPECfp_rate2006 = 51.6

SPECfp_rate_base2006 = 48.7

CPU2006 license #: 3184	Test sponsor: Dell Inc.	Test date: Sep-2007	Hardware Availability: Sep-2007	Software Availability: Sep-2007
	Tested by: Principled Technologies			

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:
-Ofast -OPT:malloc_alg=1

Peak Optimization Flags

C benchmarks:

433.milc: -Ofast -CG:cflow=off -LNO:prefetch=1 -OPT:malloc_alg=1

470.lbm: basepeak = yes

482.sphinx3: -O3 -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2) -m32
-OPT:Ofast -WOPT:aggstr=0

C++ benchmarks:

444.namd: -Ofast -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2)
-fno-exceptions

447.dealII: -Ofast -fno-exceptions -INLINE:aggressive=on -m32
-OPT:malloc_alg=1

450.soplex: -O3 -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2)
-fno-exceptions -CG:load_exe=0 -CG:movnti=1
-LNO:minvariant=off -LNO:prefetch=1 -m32 -OPT:IEEE_arith=3

453.povray: -Ofast -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2)
-fno-fast-math

Fortran benchmarks (except as noted below):
basepeak = yes

410.bwaves: -O3 -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2)
-LNO:blocking=off -LNO:ignore_feedback=off -OPT:IEEE_arith=3
-OPT:Ofast

416.gamess: -O2 -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2)
-OPT:Ofast -OPT:ro=3 -OPT:unroll_size=256

434.zeusmp: -Ofast -CG:local_fwd_sched=on -LNO:blocking=off -LNO:fu=10
-LNO:full_unroll_outer=on -LNO:interchange=off

459.GemsFDTD: -Ofast -LNO:fission=2 -LNO:prefetch=0

Benchmarks using both Fortran and C:

435.gromacs: -O3 -OPT:ro=3 -OPT:rsqrt=2

436.cactusADM: -O3 -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2) -ipa
-LNO:full_unroll=5 -LNO:ou_prod_max=10 -LNO:prefetch_ahead=5
-LNO:prefetch=3

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SPEC CFP2006 Result

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Dell Inc.

PowerEdge 2970
AMD Opteron 2222 SE, 3.0 GHz

SPECfp_rate2006 = 51.6

SPECfp_rate_base2006 = 48.7

CPU2006 license #: 3184	Test sponsor: Dell Inc.	Test date: Sep-2007	Hardware Availability: Sep-2007	Software Availability: Sep-2007
	Tested by: Principled Technologies			

Peak Optimization Flags (Continued)

454.calculix: -Ofast -LNO:simd=0 -WOPT:mem_opnds=on

481.wrf: basepeak = yes

Base Other Flags

C benchmarks:
No flags used

C++ benchmarks:
No flags used

Fortran benchmarks:
No flags used

Benchmarks using both Fortran and C:
No flags used

Peak Other Flags

C benchmarks (except as noted below):
No flags used

C++ benchmarks (except as noted below):
No flags used

447.dealII: -static

Fortran benchmarks (except as noted below):
No flags used

Benchmarks using both Fortran and C (except as noted below):
No flags used

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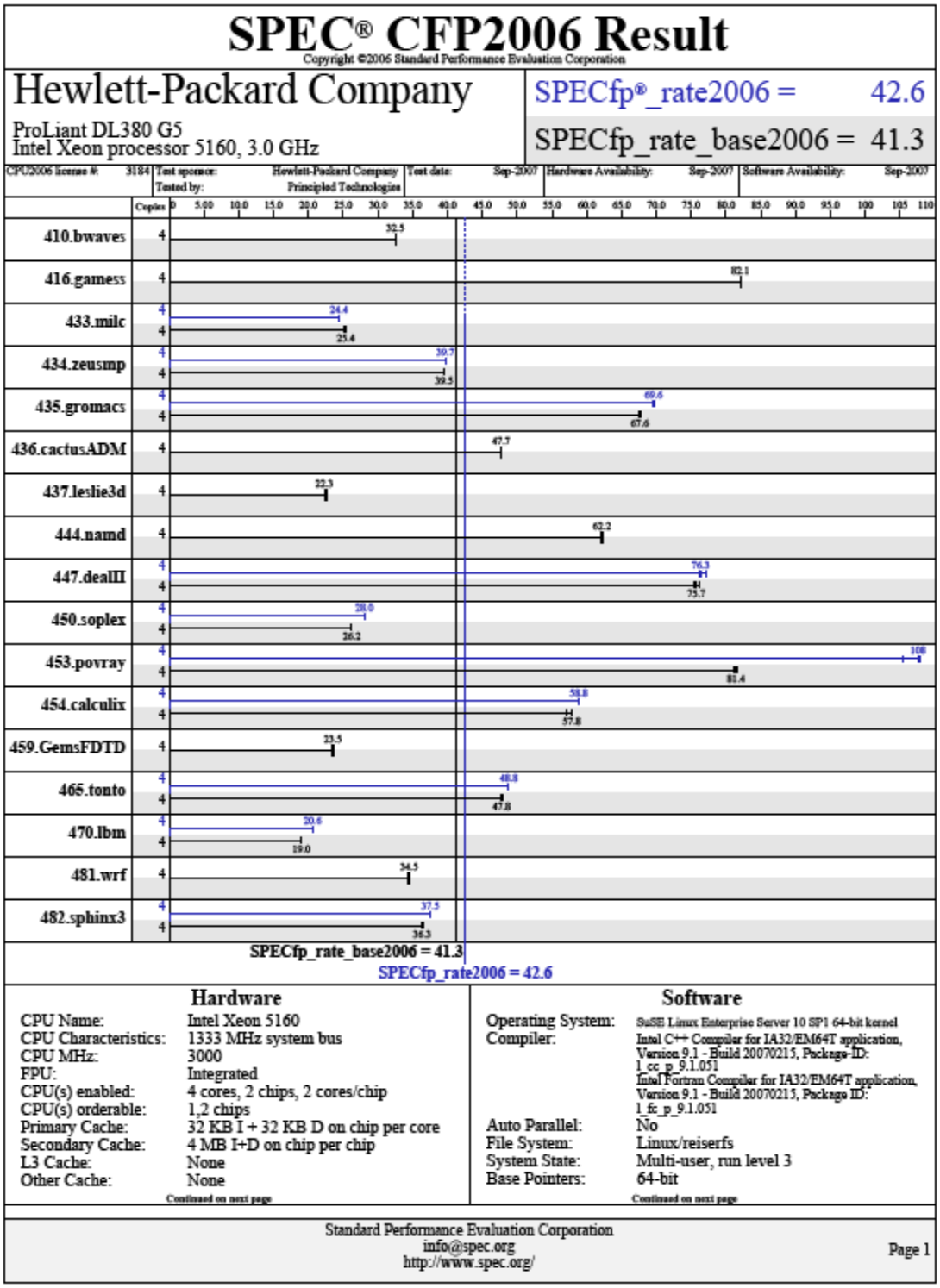
HP ProLiant DL380 G5 with two Dual-Core Intel Xeon 5160 processors



SPEC® CFP2006 Result

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Hewlett-Packard Company

ProLiant DL380 G5
Intel Xeon processor 5160, 3.0 GHz

SPECfp®_rate2006 = 42.6

SPECfp_rate_base2006 = 41.3

CPU2006 license #: 3184 | Test sponsor: Hewlett-Packard Company | Tested by: Principled Technologies | Test date: Sep-2007 | Hardware Availability: Sep-2007 | Software Availability: Sep-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
410.bwaves	4	32.5
416.gamess	4	82.1
433.milc	4	24.4
	4	25.4
434.zeusmp	4	39.7
	4	39.5
435.gromacs	4	69.6
	4	67.6
436.cactusADM	4	47.7
437.leslie3d	4	22.3
444.namd	4	62.2
447.dealII	4	76.3
	4	75.7
450.soplex	4	28.0
	4	26.2
453.povray	4	108
	4	81.4
454.calculix	4	58.8
	4	57.8
459.GemsFDTD	4	23.5
465.tonto	4	48.8
	4	47.8
470.lbm	4	20.6
	4	19.0
481.wrf	4	34.5
482.sphinx3	4	37.5
	4	36.3

SPECfp_rate_base2006 = 41.3

SPECfp_rate2006 = 42.6

Hardware

CPU Name:	Intel Xeon 5160
CPU Characteristics:	1333 MHz system bus
CPU MHz:	3000
FPU:	Integrated
CPU(s) enabled:	4 cores, 2 chips, 2 cores/chip
CPU(s) orderable:	1,2 chips
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	4 MB I+D on chip per chip
L3 Cache:	None
Other Cache:	None

Continued on next page

Software

Operating System:	SuSE Linux Enterprise Server 10 SP1 64-bit kernel
Compiler:	Intel C++ Compiler for IA32/EM64T application, Version 9.1 - Build 20070215, Package ID: l_cc_p_9.1.051 Intel Fortran Compiler for IA32/EM64T application, Version 9.1 - Build 20070215, Package ID: l_fc_p_9.1.051
Auto Parallel:	No
File System:	Linux/reiserfs
System State:	Multi-user, run level 3
Base Pointers:	64-bit

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ProLiant DL380 G5
Intel Xeon processor 5160, 3.0 GHz

SPECfp_rate2006 = 42.6

SPECfp_rate_base2006 = 41.3

CPU2006 license #: 3184 | Test sponsor: Hewlett-Packard Company | Tested by: Principled Technologies | Test date: Sep-2007 | Hardware Availability: Sep-2007 | Software Availability: Sep-2007

Hardware (Continued)

Memory: 16 GB (8x2 GB DDR2 PC2-5300)
Disk Subsystem: SAS, 73 GB
Other Hardware: None

Software (Continued)

Peak Pointers: 32/64-bit
Other Software: SmartHeap 8.1 32 bit Library for Linux
None

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	4	1670	32.6	1670	32.5	**1670**	**32.5**	4	1670	32.6	1670	32.5	**1670**	**32.5**
416.gamess	4	**954**	**82.1**	954	82.1	954	82.1	4	**954**	**82.1**	954	82.1	954	82.1
433.milc	4	1440	25.4	1460	25.2	**1450**	**25.4**	4	**1510**	**24.4**	1510	24.4	1510	24.4
434.zeusmp	4	**922**	**39.5**	922	39.5	922	39.5	4	**917**	**39.7**	917	39.7	917	39.7
435.gromacs	4	422	67.6	422	67.7	**422**	**67.6**	4	**410**	**69.6**	410	69.6	411	69.5
436.cactusADM	4	1000	47.7	1000	47.8	**1000**	**47.7**	4	1000	47.7	1000	47.8	**1000**	**47.7**
437.leslie3d	4	**1690**	**22.3**	1660	22.6	1690	22.3	4	**1690**	**22.3**	1660	22.6	1690	22.3
444.namd	4	515	62.3	**516**	**62.2**	517	62.1	4	515	62.3	**516**	**62.2**	517	62.1
447.dealII	4	600	76.3	**604**	**75.7**	607	75.4	4	**599**	**76.3**	594	77.1	600	76.2
450.soplex	4	1280	26.1	**1270**	**26.2**	1270	26.2	4	1190	28.1	**1190**	**28.0**	1190	28.0
453.povray	4	**261**	**81.4**	261	81.6	262	81.1	4	**198**	**108**	202	105	197	108
454.calculix	4	**571**	**57.8**	578	57.1	570	57.9	4	562	58.7	**561**	**58.8**	560	58.9
459.GemsFDTD	4	1800	23.5	**1800**	**23.5**	1800	23.5	4	1800	23.5	**1800**	**23.5**	1800	23.5
465.tonto	4	822	47.9	**824**	**47.8**	825	47.7	4	807	48.8	809	48.6	**807**	**48.8**
470.lbm	4	2890	19.0	**2890**	**19.0**	2890	19.0	4	2670	20.6	**2670**	**20.6**	2670	20.6
481.wrf	4	1300	34.3	1290	34.6	**1300**	**34.5**	4	1300	34.3	1290	34.6	**1300**	**34.5**
482.sphinx3	4	2150	36.3	**2140**	**36.3**	2140	36.4	4	2070	37.6	2080	37.5	**2080**	**37.5**

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

General Notes

```
BIOS configuration:
Hardware Prefetch - Disable, Adjacent Sector Prefetch - Disable
```

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Continued on next page

SPEC CFP2006 Result

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Hewlett-Packard Company

ProLiant DL380 G5
Intel Xeon processor 5160, 3.0 GHz

SPECfp_rate2006 = 42.6

SPECfp_rate_base2006 = 41.3

CPU2006 license #: 3184	Test sponsor: Hewlett-Packard Company Tested by: Principled Technologies	Test date: Sep-2007	Hardware Availability: Sep-2007	Software Availability: Sep-2007

Base Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
ifort icc

Peak Compiler Invocation

C benchmarks:
/opt/intel/cc/9.1.051/bin/icc -I/opt/intel/cc/9.1.051/include
-L/opt/intel/cc/9.1.051/lib

C++ benchmarks (except as noted below):
icpc

450.soplex: /opt/intel/cc/9.1.051/bin/icpc
-I/opt/intel/cc/9.1.051/include -L/opt/intel/cc/9.1.051/lib

Fortran benchmarks:

434.zeusmp: /opt/intel/fc/9.1.051/bin/ifort
-I/opt/intel/fc/9.1.051/include -L/opt/intel/fc/9.1.051/lib

465.tonto: ifort

Benchmarks using both Fortran and C (except as noted below):
ifort icc

Base Portability Flags

C benchmarks:
-DSPEC_CPU_LP64

C++ benchmarks (except as noted below):
-DSPEC_CPU_LP64

453.povray: -DSPEC_CPU_LP64

Fortran benchmarks:
-DSPEC_CPU_LP64

Benchmarks using both Fortran and C (except as noted below):
-DSPEC_CPU_LP64 -nofor_main

436.cactusADM: -DSPEC_CPU_LP64 -nofor_main

481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX -DSPEC_CPU_CASE_FLAG

SPEC CFP2006 Result

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Hewlett-Packard Company

ProLiant DL380 G5
Intel Xeon processor 5160, 3.0 GHz

SPECfp_rate2006 = 42.6

SPECfp_rate_base2006 = 41.3

CPU2006 license #: 3184	Test sponsor: Hewlett-Packard Company Tested by: Principled Technologies	Test date: Sep-2007	Hardware Availability: Sep-2007	Software Availability: Sep-2007

Peak Portability Flags

C benchmarks:
`No flags used`

C++ benchmarks:

447.dealII: `-DSPEC_CPU_LP64`

450.soplex: `No flags used`

453.povray: `-DSPEC_CPU_LP64`

Fortran benchmarks:

434.zeusmp: `No flags used`

465.tonto: `-DSPEC_CPU_LP64`

Benchmarks using both Fortran and C (except as noted below):
`-DSPEC_CPU_LP64 -nofor_main`

Base Optimization Flags

C benchmarks:
`-fast`

C++ benchmarks:
`-fast`

Fortran benchmarks:
`-fast`

Benchmarks using both Fortran and C:
`-fast`

Peak Optimization Flags

C benchmarks (except as noted below):
`-fast -prof_gen(pass 1) -prof_use(pass 2)`

482.sphinx3: `-fast`

C++ benchmarks (except as noted below):
`-fast -prof_gen(pass 1) -prof_use(pass 2)`

444.namd: `basepeak = yes`

Fortran benchmarks (except as noted below):
`basepeak = yes`

Continued on next page

SPEC CFP2006 Result

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Hewlett-Packard Company

ProLiant DL380 G5
Intel Xeon processor 5160, 3.0 GHz

SPECfp_rate2006 = 42.6

SPECfp_rate_base2006 = 41.3

CPU2006 license #: 3184	Test sponsor: Hewlett-Packard Company Tested by: Principled Technologies	Test date: Sep-2007	Hardware Availability: Sep-2007	Software Availability: Sep-2007

Peak Optimization Flags (Continued)

434.zeusmp: `-fast`

465.tonto: `-fast -prof_gen(pass 1) -prof_use(pass 2)`

Benchmarks using both Fortran and C (except as noted below):
`-fast -prof_gen(pass 1) -prof_use(pass 2)`

436.cactusADM: `basepeak = yes`

481.wrf: `basepeak = yes`

Other Flags

C benchmarks:
`No flags used`

C++ benchmarks:
`No flags used`

Fortran benchmarks:
`No flags used`

Benchmarks using both Fortran and C:
`No flags used`

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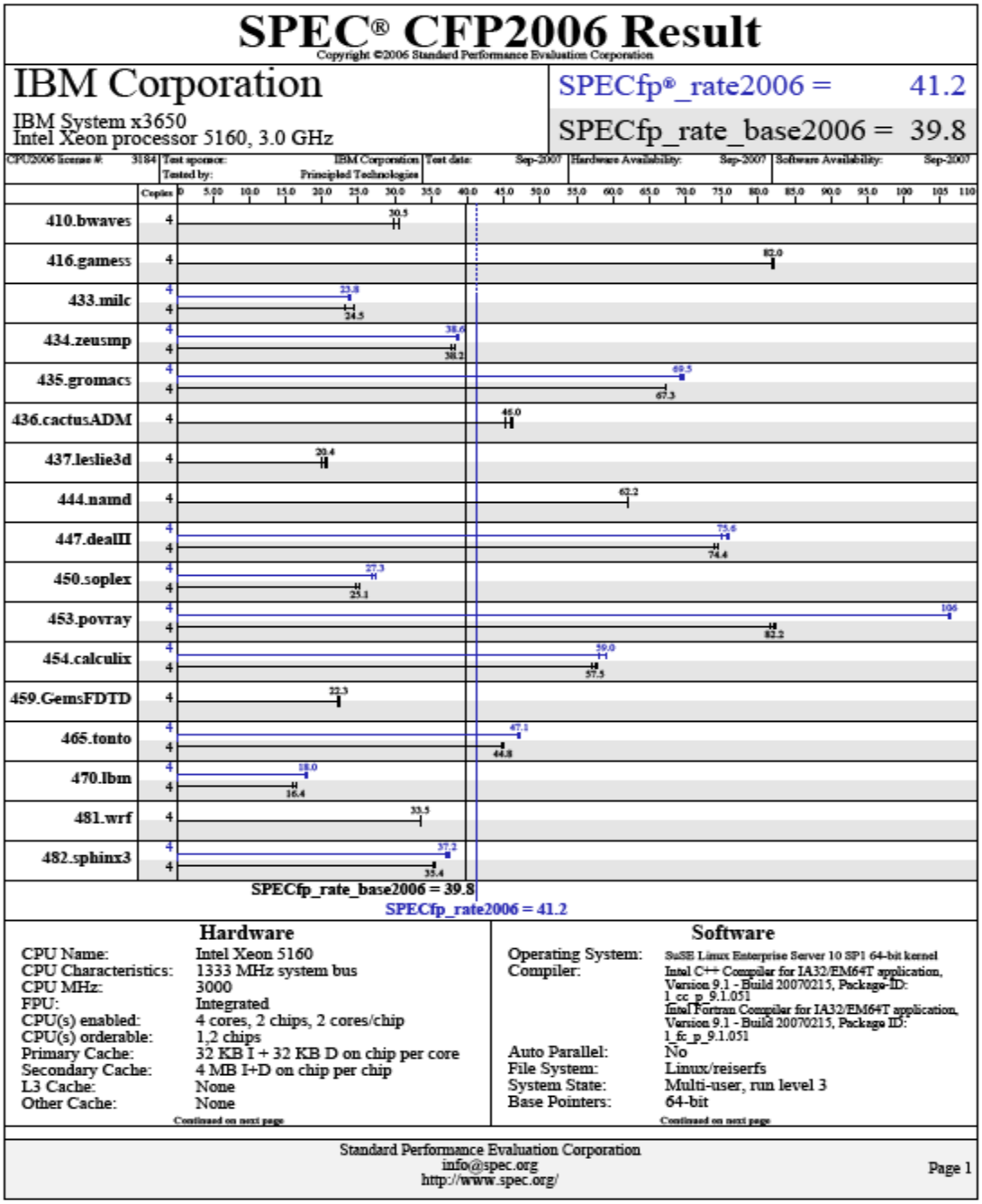
IBM System x3650 with two Dual-Core Intel Xeon 5160 processors



SPEC® CFP2006 Result

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IBM Corporation

IBM System x3650
Intel Xeon processor 5160, 3.0 GHz

SPECfp®_rate2006 = 41.2

SPECfp_rate_base2006 = 39.8

CPU2006 license #: 3184 | Test sponsor: IBM Corporation | Test date: Sep-2007 | Hardware Availability: Sep-2007 | Software Availability: Sep-2007
Tested by: Principled Technologies

	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
410.bwaves	4	30.5
416.gamess	4	82.0
433.milc	4	23.8
	4	24.5
434.zeusmp	4	38.6
	4	38.2
435.gromacs	4	69.5
	4	67.3
436.cactusADM	4	46.0
437.leslie3d	4	20.4
444.namd	4	62.2
447.dealII	4	75.6
	4	74.4
450.soplex	4	27.3
	4	25.1
453.povray	4	106
	4	82.2
454.calculix	4	59.0
	4	57.5
459.GemsFDTD	4	22.3
465.tonto	4	47.1
	4	44.8
470.lbm	4	18.0
	4	16.4
481.wrf	4	33.5
482.sphinx3	4	37.2
	4	35.4

SPECfp_rate_base2006 = 39.8
SPECfp_rate2006 = 41.2

Hardware

CPU Name:	Intel Xeon 5160
CPU Characteristics:	1333 MHz system bus
CPU MHz:	3000
FPU:	Integrated
CPU(s) enabled:	4 cores, 2 chips, 2 cores/chip
CPU(s) orderable:	1,2 chips
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	4 MB I+D on chip per chip
L3 Cache:	None
Other Cache:	None

Continued on next page

Software

Operating System:	SuSE Linux Enterprise Server 10 SP1 64-bit kernel
Compiler:	Intel C++ Compiler for IA32/EM64T application, Version 9.1 - Build 20070215, Package-ID: l_cc_p_9.1.051 Intel Fortran Compiler for IA32/EM64T application, Version 9.1 - Build 20070215, Package ID: l_fc_p_9.1.051
Auto Parallel:	No
File System:	Linux/reiserfs
System State:	Multi-user, run level 3
Base Pointers:	64-bit

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SPEC CFP2006 Result

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IBM Corporation

IBM System x3650
Intel Xeon processor 5160, 3.0 GHz

SPECfp_rate2006 = 41.2

SPECfp_rate_base2006 = 39.8

CPU2006 license #: 3184 | Test sponsor: IBM Corporation | Tested by: Principled Technologies | Test date: Sep-2007 | Hardware Availability: Sep-2007 | Software Availability: Sep-2007

Hardware (Continued)

Memory: 16 GB (8x2 GB DDR2 PC2-5300)
Disk Subsystem: SAS, 73 GB
Other Hardware: None

Software (Continued)

Peak Pointers: 32/64-bit
Other Software: SmartHeap 8.1 32 bit Library for Linux
None

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	4	1830	29.8	**1780**	**30.5**	1780	30.5	4	1830	29.8	**1780**	**30.5**	1780	30.5
416.gamess	4	955	82.0	**955**	**82.0**	955	82.0	4	955	82.0	**955**	**82.0**	955	82.0
433.milc	4	1580	23.2	1500	24.5	**1500**	**24.5**	4	1550	23.7	1530	24.0	**1540**	**23.8**
434.zeusmp	4	963	37.8	**953**	**38.2**	950	38.3	4	943	38.6	**943**	**38.6**	937	38.8
435.gromacs	4	**425**	**67.3**	424	67.4	425	67.2	4	412	69.3	410	69.6	**411**	**69.5**
436.cactusADM	4	1060	45.2	1030	46.3	**1040**	**46.0**	4	1060	45.2	1030	46.3	**1040**	**46.0**
437.leslie3d	4	1880	20.0	**1840**	**20.4**	1820	20.7	4	1880	20.0	**1840**	**20.4**	1820	20.7
444.namd	4	**516**	**62.2**	517	62.1	516	62.2	4	**516**	**62.2**	517	62.1	516	62.2
447.dealII	4	**615**	**74.4**	614	74.5	618	74.0	4	**605**	**75.6**	603	75.9	611	74.9
450.soplex	4	1360	24.5	1330	25.1	**1330**	**25.1**	4	1240	26.9	1220	27.3	**1220**	**27.3**
453.povray	4	261	81.6	**259**	**82.2**	258	82.4	4	200	106	200	106	**200**	**106**
454.calculix	4	571	57.8	578	57.1	**574**	**57.5**	4	569	58.0	560	59.0	**560**	**59.0**
459.GemsFDTD	4	1920	22.1	1900	22.3	**1900**	**22.3**	4	1920	22.1	1900	22.3	**1900**	**22.3**
465.tonto	4	881	44.7	**878**	**44.8**	877	44.9	4	837	47.0	**836**	**47.1**	833	47.3
470.lbm	4	3430	16.0	**3360**	**16.4**	3340	16.5	4	3090	17.8	**3050**	**18.0**	3040	18.1
481.wrf	4	1340	33.4	1330	33.5	**1330**	**33.5**	4	1340	33.4	1330	33.5	**1330**	**33.5**
482.sphinx3	4	2210	35.3	2190	35.6	**2200**	**35.4**	4	2110	36.9	**2090**	**37.2**	2070	37.6

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

General Notes

```
BIOS configuration:
Hardware Prefetch = Disable, Adjacent Sector Prefetch = Disable
```

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Continued on next page

SPEC CFP2006 Result

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IBM Corporation

IBM System x3650
Intel Xeon processor 5160, 3.0 GHz

SPECfp_rate2006 = 41.2

SPECfp_rate_base2006 = 39.8

CPU2006 license #: 3184	Test sponsor: IBM Corporation Tested by: Principled Technologies	Test date: Sep-2007	Hardware Availability: Sep-2007	Software Availability: Sep-2007

Base Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
ifort icc

Peak Compiler Invocation

C benchmarks:
/opt/intel/cc/9.1.051/bin/icc -I/opt/intel/cc/9.1.051/include
-L/opt/intel/cc/9.1.051/lib

C++ benchmarks (except as noted below):
icpc

450.soplex: /opt/intel/cc/9.1.051/bin/icpc
-I/opt/intel/cc/9.1.051/include -L/opt/intel/cc/9.1.051/lib

Fortran benchmarks:

434.zeusmp: /opt/intel/fc/9.1.051/bin/ifort
-I/opt/intel/fc/9.1.051/include -L/opt/intel/fc/9.1.051/lib

465.tonto: ifort

Benchmarks using both Fortran and C (except as noted below):
ifort icc

Base Portability Flags

C benchmarks:
-DSPEC_CPU_LP64

C++ benchmarks (except as noted below):
-DSPEC_CPU_LP64

453.povray: -DSPEC_CPU_LP64

Fortran benchmarks:
-DSPEC_CPU_LP64

Benchmarks using both Fortran and C (except as noted below):
-DSPEC_CPU_LP64 -nofor_main

436.cactusADM: -DSPEC_CPU_LP64 -nofor_main

481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX -DSPEC_CPU_CASE_FLAG

SPEC CFP2006 Result

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Peak Portability Flags

C benchmarks:
`No flags used`

C++ benchmarks:

447.dealII: `-DSPEC_CPU_LP64`

450.soplex: `No flags used`

453.povray: `-DSPEC_CPU_LP64`

Fortran benchmarks:

434.zeusmp: `No flags used`

465.tonto: `-DSPEC_CPU_LP64`

Benchmarks using both Fortran and C (except as noted below):
`-DSPEC_CPU_LP64 -nofor_main`

Base Optimization Flags

C benchmarks:
`-fast`

C++ benchmarks:
`-fast`

Fortran benchmarks:
`-fast`

Benchmarks using both Fortran and C:
`-fast`

Peak Optimization Flags

C benchmarks (except as noted below):
`-fast -prof_gen(pass 1) -prof_use(pass 2)`

482.sphinx3: `-fast`

C++ benchmarks (except as noted below):
`-fast -prof_gen(pass 1) -prof_use(pass 2)`

444.namd: `basepeak = yes`

Fortran benchmarks (except as noted below):
`basepeak = yes`

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SPEC CFP2006 Result

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IBM System x3650
Intel Xeon processor 5160, 3.0 GHz

SPECfp_rate2006 = 41.2

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Peak Optimization Flags (Continued)

434.zeusmp: `-fast`

465.tonto: `-fast -prof_gen(pass 1) -prof_use(pass 2)`

Benchmarks using both Fortran and C (except as noted below):
`-fast -prof_gen(pass 1) -prof_use(pass 2)`

436.cactusADM: `basepeak = yes`

481.wrf: `basepeak = yes`

Other Flags

C benchmarks:
`No flags used`

C++ benchmarks:
`No flags used`

Fortran benchmarks:
`No flags used`

Benchmarks using both Fortran and C:
`No flags used`

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1007 Slater Road, Suite 250
Durham, NC 27703
www.principledtechnologies.com
info@principledtechnologies.com

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