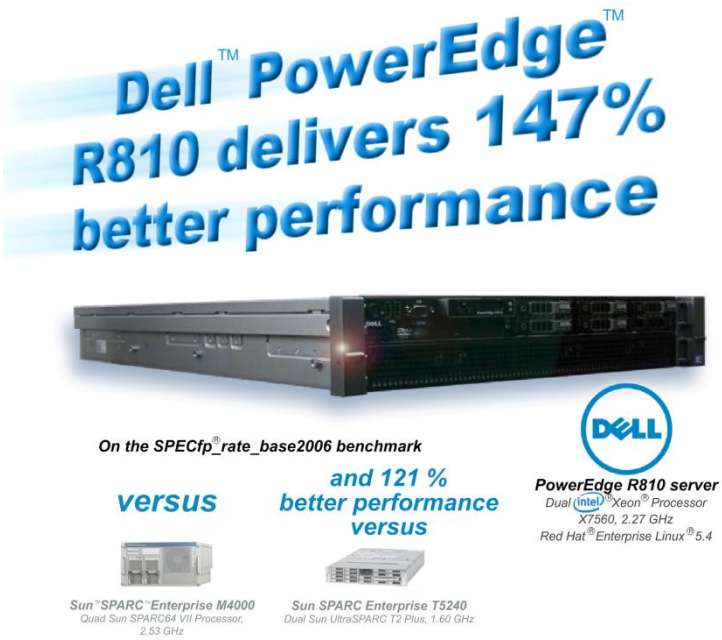
DELL VS. SUN SERVERS: R910 & R810 PERFORMANCE COMPARISON SPECfp_rate_base2006



OUR FINDINGS

The latest, most powerful Dell PowerEdge servers deliver better performance than Sun SPARC Enterprise servers. In Principled Technologies' tests in our labs, the Dell PowerEdge R910 and R810 servers, each with two Intel Xeon Processor X7560s, delivered higher performance results than the publicly available benchmark scores of the Sun SPARC Enterprise M4000 and T5240 servers. These results demonstrate the potential performance improvements of the Dell servers.

OUR PROCESS

We used the SPECfp_rate_base2006 test of the industry-standard SPEC CPU2006 benchmark to focus on and measure the processor performance of the Dell PowerEdge R910 and R810 servers. We then compared our results to publicly available SPECfp_rate_base2006 results of the two Sun servers.

PROJECT OVERVIEW

The Dell PowerEdge R910 server achieved a SPECfp_rate_base2006 score of 269, a 116.9 percent increase over the Sun SPARC Enterprise T5240 server, which achieved a SPECfp_rate_base2006 score of 124, and a 142.3 percent increase over the Sun SPARC Enterprise M4000 server, which achieved a SPECfp_rate_base2006 score of 111.[1] (See Figure 1.)

Dell PowerEdge R810 server achieved a SPECfp_rate_base2006 score of 275, a 121.8 percent increase over the Sun SPARC Enterprise T5240 server which achieved a SPECfp_rate_base2006 score of 124, and a 147.7 percent increase over the Sun SPARC Enterprise M4000 server which achieved a SPECfp_rate_base2006 score of 111.[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 workload includes 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 performance, is also available. (Note: SPEC and SPECfp are trademarks of the Standard Performance Evaluation

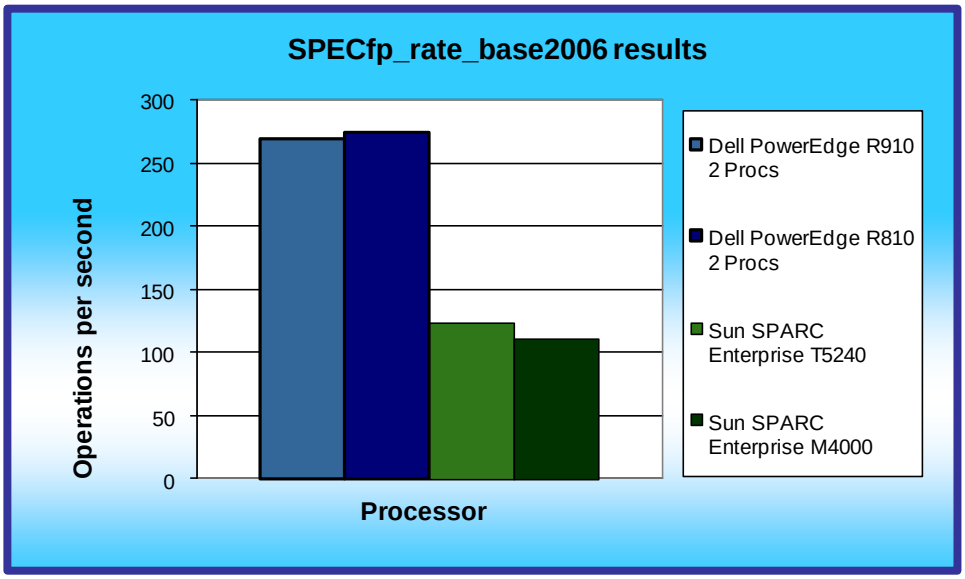


Figure 1: SPECfp_rate_base2006 results for the four servers. Higher numbers are better.

[1] Source: Principled Technologies®, Inc., "Dell vs. Sun servers: R910 & R810 performance comparison SPECfp_rate_base2006," a March 2010 report commissioned by Dell. For the latest SPECfp_rate_base2006 benchmarks, visit www.spec.org.

[2] *Ibid.*

Corporation.) For this report, we ran only the CFP2006 benchmark. Specifically, we measured the SPECfp_rate_base2006 results for the test servers with 32 users.

Due to licensing issues, we did not actually test SPECfp_rate_base2006 on the Sun SPARC Enterprise T5240 and the Sun SPARC Enterprise M4000. Instead, we used the highest posted result for each Sun system on SPEC's site, which was 124 (http://www.spec.org/cpu2006/results/res2009q3/cpu2006-20090717-08198.html) for the T5240 and 111 (http://www.spec.org/cpu2006/results/res2009q4/cpu2006-20091012-08878.html) for the M4000.

Figure 2 shows the system configuration overview for the similarly configured Dell PowerEdge R910, Dell PowerEdge R810, Sun SPARC Enterprise T5240, and Sun SPARC Enterprise M4000 servers.

Servers	Dell PowerEdge R910	Dell PowerEdge R810	Sun SPARC Enterprise T5240	Sun SPARC Enterprise M4000
Processors	Dual Intel Xeon Processor X7560, 2.27 GHz	Dual Intel Xeon Processor X7560, 2.27 GHz	Dual UltraSPARC T2 Plus, 1.60 GHz	Quad Sun SPARC64 VII Processor, 2.53 GHz
Memory	32 x 4GB PC3-8500 DDR3	32 x 4GB PC3-8500 DDR3	32 x 4GB	32 x 1GB
Hard disks	2 x 73GB, SAS 6.0 GB/s	2 x 146GB, SAS	8 x 146GB, SAS	2 x 146GB, SAS
Operating system	Red Hat Enterprise Linux 5.4 (2.6.18-164.9.1.el5)	Red Hat Enterprise Linux 5.4 (2.6.18-164.9.1.el5)	Solaris 10 10/08	Solaris 10 10/09
Compiler	Intel C/C++ and Fortran Compilers 11.1.064	Intel C/C++ and Fortran Compilers 11.1.064	Sun Studio 12	Sun Studio 12 Update 1

Figure 2: System configuration overview for the four test servers. See Appendix A for more details on the Dell PowerEdge servers.

Generally, a system achieves the best SPECfp_rate_base2006 score using the same number of users as execution units for a given server. The optimum user count for our testing on both systems was 32, the number of execution units (logical or physical processors) on those servers.

Figure 3 lists the 17 applications that compose the CFP2006 benchmark. SPEC wrote six of the applications in FORTRAN, three using C, four using both FORTRAN and C, and four in C++.

A SPEC 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.

WHAT WE FOUND

Figure 4 details the results of our tests with the optimum number of users for SPECfp_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 SPECfp_rate_base2006 users as processor execution units, so there is a one-to-one ratio.

SPECfp_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.

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 3: The applications that make up the CFP2006 benchmark.

Server	SPECfp_rate_base2006 results
Dell PowerEdge R910	269
Dell PowerEdge R810	275
Sun SPARC Enterprise T5240	124
Sun SPARC Enterprise M4000	111

Figure 4: SPECfp_rate_base2006 results for the four test servers. Higher scores are better.

HOW WE TESTED

Adjusting BIOS settings

We used all of the default BIOS settings on the Dell PowerEdge R810 and R910 servers with one exception, which was to change the Power Management to Maximum Performance. Among the default settings that we kept were the following:

- Hardware Prefetcher enabled
- Adjacent Cache Line Prefetch enabled
- Node Interleaving disabled
- C States enabled

Setting up and configuring the Dell PowerEdge R910 and R810

We began by installing a fresh copy of Red Hat Enterprise Linux Server 5.4. We installed the default packages, disabled the firewall, and disabled SELinux. We made no additional changes to the default installation options.

After the base installation, we updated the kernel on the Dell PowerEdge R910 and R810 from 2.6.18-164.el5 to 2.6.18-164.9.1.el5. This new kernel provided proper Nehalem-EX support in Red Hat for the Dell PowerEdge R910 and the Dell PowerEdge R810.

SPEC CPU2006 configuration

Intel compiled and provided the SPEC CFP2006 executables, but followed SPEC's standard instructions for building the executables using the following software tools for the Dell PowerEdge R910 and R810:

- Intel C/C++ Compiler 11.1.064 for IA32 and Intel 64
- Intel Fortran 11.1.064 for IA32 and Intel 64
- MicroQuill SmartHeap v8.1
- Binutils 2.18.50.0.7.20080502

The benchmark requires configuration files. Intel provided the configuration files used for the Dell PowerEdge R910 and R810. The configuration files we used appear in Appendix B.

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

Conducting the test

To begin the benchmark, we performed the following steps:

1. Open a command prompt.
2. Change to the cpu2006 directory.
3. Type `. ./shrc` at the command prompt.
4. Type `runspec -c <config file name> -r <#> -T base -v 10 int` where
   - <config file name> = name of the configuration file
   - <#> = number of users (we used 32 users for our server)

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.

Appendix C provides the SPECfp_rate_base2006 output results for each of the four test servers.

APPENDIX A – TEST SERVER INFORMATION

Figure 5 presents detailed information for the Dell PowerEdge test servers we used in this report.

Servers	Dell PowerEdge R910	Dell PowerEdge R810
General dimension information		
Height (inches)	7.00	3.50
Width (inches)	17.25	17.25
Depth (inches)	29.00	29.00
U size in server rack (U)	4	2
Power supplies		
Total number	4	2
Brand and model	Dell Z1100P-00	Dell L1100A-S0
Wattage (W)	1,023	1,023
Cooling fans		
Total number	6	6
Dimensions (h x w)	5” x 5”	2.5” x 2.5 “
Voltage (V)	12	12
Amps (A)	4.80	0.95
General processor setup		
Number of processor packages	2	2
Number of cores per processor package	8	8
Number of hardware threads per core	2	2
CPU		
Vendor	Intel	Intel
Name	Xeon X7560	Xeon X7560
Stepping	D0	D0
Socket type	LGA1567	LGA1567
Core frequency (GHz)	2.27	2.27
L1 cache	32 KB + 32 KB	32 KB + 32 KB
L2 cache	256 KB (per core)	256 KB (per core)
L3 cache (MB)	24	24
Platform		
Vendor and model number	Dell PowerEdge R910	Dell PowerEdge R810
Motherboard model number	0P658H	0H235N
Motherboard revision number	X23	X03
BIOS name and version	Dell 1.0.1 (02/19/2010)	Dell 1.0.3 (03/05/2010)
BIOS settings	Power Management set to Maximum Performance	Power Management set to Maximum Performance
Memory modules		
Total RAM in system (GB)	128	128

Servers	Dell PowerEdge R910	Dell PowerEdge R810
Vendor and model number	32 x Hynix HMT151R7BFR8C-G7	19 x Hynix HMT151R7BFR8C-G7 13 x Hynix HMT151R7AFP8C-G7
Type	1,066	1,066
Timing/Latency (tCL-tRCD-iRP-tRASmin)	7-7-7-20	7-7-7-20
First memory type		
Vendor and model number	Hynix HMT151R7BFR8C-G7	Hynix HMT151R7BFR8C-G7
Type	PC3-8500 DDR3	PC3-8500 DDR3
Speed (MHz)	1,066	1,066
Size (GB)	128	76
Number of RAM modules	32	19
Chip organization	Double-sided	Double-sided
Second memory type		
Vendor and model number	N/A	Hynix HMT151R7AFP8C-G7
Type	N/A	PC3-8500 DDR3
Speed (MHz)	N/A	1,066
Size (GB)	N/A	52
Number of RAM modules	N/A	13
Chip organization	N/A	Double-sided
Hard disk		
Vendor and model number	Seagate ST973452SS	Seagate ST9146852SS
Number of disks in system	2	2
Size (GB)	73	146
Buffer size (MB)	16	16
RPM	15,000	15,000
Type	SAS 6.0 GB/s	SAS
Controller	Dell PERC H700	Dell PERC H200
Operating system		
Name	Red Hat Enterprise Linux 5.4	Red Hat Enterprise Linux 5.4
Kernel release	2.6.18-164.9.1.el5 x86_64	2.6.18-164.9.1.el5 x86_64
Kernel version	SMP Wed Dec 9 03:27:37 EST 2009	SMP Wed Dec 9 03:27:37 EST 2009
File system	ext3	ext3
Language	English	English
Network card/subsystem		
Vendor and model number	Broadcom NetXtreme II 5709C Ethernet	Broadcom NetXtreme II 5709C Ethernet
Type	PCI-E	Integrated
USB		
Number	4	6
Type	2.0	2.0

Figure 5: Detailed configuration information for the Dell PowerEdge test servers.

APPENDIX B – SPECFP_RATE_BASE2006 CONFIGURATION FILES

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

Red Hat Enterprise Linux 5.4 server: Dell PowerEdge R910

```
############################################################################
# This is a sample config file. It was tested with:
#
#      Compiler name/version:       Intel Compiler 11.1
#      Operating system version:    64-Bit SUSE LINUX Enterprise Server 10 or
later
#      Hardware:                    Intel processors supporting SSE4.2
#
############################################################################
# SPEC CPU2006 Intel Linux64 config file
# Sep 2009 IC 11.1 Linux64
############################################################################
action      = validate
tune        = base
ext         = cpu2006.1.1.ic11.1.linux64.sse42.rate.jan182010
PATHSEP     = /
check_md5=1
reportable=1
bench_post_setup=sync

#
# These are listed as benchmark-tuning-extension-machine
#
int=default=default=default:
CC=  icc  -m32
CXX= icpc -m32
OBJ = .o
SMARTHEAP32_DIR = /home/cmplr/usr3/alrahate/cpu2006.1.1.ic11.1/libic11.1-32bit
SMARTHEAP64_DIR = /home/cmplr/usr3/alrahate/cpu2006.1.1.ic11.1/libic11.1-64bit

fp=default=default=default:
CC=  icc   -m64
CXX= icpc  -m64
FC=  ifort -m64
OBJ = .o

# For UP systems, we need to know if the processors are ordered across cores
first or in order
# If across cores, processors 0, 1, 2 and 3 are on distinct physical cores
# Otherwise, processors 0, 2, 4 and 6 are on distinct physical cores

default:
submit       = numactl --localalloc --physcpubind=$SPECCOPYNUM $command

%ifdef %{no-numa)
submit       = taskset -c $SPECCOPYNUM $command
```

```
%endif

############################################################################
# Compiler options
# for Nehalem use -xSSE4.2
# for processors prior to dunnington, replace -xSSE4.1 with -xSSSE3
############################################################################
default:
SSE          = -xSSE4.2
FAST         =  $(SSE) -ipo -O3 -no-prec-div -static
FASTNOSTATIC =  $(SSE) -ipo -O3 -no-prec-div

############################################################################
#
# portability & libraries
#
#################### Portability Flags and Notes ############################

400.perlbench=default:
CPORTABILITY=      -DSPEC_CPU_LINUX_IA32

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

462.libquantum=default:
CPORTABILITY=      -DSPEC_CPU_LINUX

483.xalancbmk=default:
CXXPORTABILITY=    -DSPEC_CPU_LINUX

fp=default:
PORTABILITY = -DSPEC_CPU_LP64

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


############################################################################
# Tuning Flags
############################################################################
#
# Base tuning default optimization
# Feedback directed optimization not allowed in baseline for CPU2006
```

```
# However there is no limit on the number of flags as long as the same
# flags are used in the same order for all benchmarks of a given language

471.omnetpp,473.astar,483.xalancbmk=default:
EXTRA_LIBS=  -L$(SMARTHEAP32_DIR) -lsmartheap
EXTRA_LDFLAGS= -Wl,-z,muldefs

int=base=default=default:
COPTIMIZE=    $(FAST) -opt-prefetch
CXXOPTIMIZE=  $(FASTNOSTATIC)  -opt-prefetch

fp=base=default=default:
OPTIMIZE=     $(FAST)

####################################################################
# Peak Tuning Flags int 2006 fast
####################################################################
int=peak=default:
COPTIMIZE=       -auto-ilp32 -ansi-alias
CXXOPTIMIZE=     -ansi-alias
PASS1_CFLAGS     = -prof-gen
PASS2_CFLAGS     = $(FAST) -prof-use
PASS1_CXXFLAGS   = -prof-gen
PASS2_CXXFLAGS   = $(FASTNOSTATIC) -prof-use
PASS1_LDCFLAGS   = -prof-gen
PASS2_LDCFLAGS   = $(FAST) -prof-use
PASS1_LDCXXFLAGS = -prof-gen
PASS2_LDCXXFLAGS = $(FASTNOSTATIC) -prof-use

400.perlbench=peak=default:
COPTIMIZE= -ansi-alias

401.bzip2=peak=default:
CC= icc -m64
CPORTABILITY= -DSPEC_CPU_LP64
COPTIMIZE= -opt-prefetch -ansi-alias -auto-ilp32

403.gcc=peak=default:
COPTIMIZE = $(FAST)
feedback=0

429.mcf=peak=default:
COPTIMIZE= $(FAST) -opt-prefetch
feedback=0
####################################################################################
################################################
%ifdef %{smt-on}
%ifdef %{physicallogical}
submit       = numactl --localalloc --physcpubind=`expr 2 \\* $SPECCOPYNUM`
$command
%ifdef %{no-numa)
submit       = taskset -c `expr 2 \\* $SPECCOPYNUM` $command
```

```
%endif
%endif
%endif

%ifdef %{up-dale}
copies=2
%endif
%ifdef %{up-nhm}
copies=4
%endif
%ifdef %{dp-nhm}
copies=8
%endif
%ifdef %{up-wsm-6c}
copies=6
%endif
%ifdef %{dp-wsm-6c}
copies=12
%endif
################################################################################
################################################

445.gobmk=peak=default:
COPTIMIZE= -O2 -ipo -no-prec-div -ansi-alias
PASS1_CFLAGS     = -prof-gen
PASS2_CFLAGS     = $(SSE) -prof-use
PASS1_LDCFLAGS   = -prof-gen
PASS2_LDCFLAGS   = $(SSE) -prof-use

456.hmmer=peak=default:
CC= icc -m64
CPORTABILITY= -DSPEC_CPU_LP64
COPTIMIZE=  $(FAST) -unroll2 -ansi-alias -auto-ilp32
feedback=no
################################################################################
################################################
%ifdef %{smt-on}
%ifdef %{physicallogical}
submit       = numactl --localalloc --physcpubind=`expr 2 \\* $SPECCOPYNUM`
$command
%ifdef %{no-numa)
submit       = taskset -c `expr 2 \\* $SPECCOPYNUM` $command
%endif
%endif
%endif

%ifdef %{up-dale}
copies=2
%endif
%ifdef %{up-nhm}
copies=4
%endif
```

```
%ifdef %{dp-nhm}
copies=8
%endif
%ifdef %{up-wsm-6c}
copies=6
%endif
%ifdef %{dp-wsm-6c}
copies=12
%endif
################################################################################
################################################

458.sjeng=peak=default:
CC= icc -m64
CPORTABILITY= -DSPEC_CPU_LP64
COPTIMIZE= -unroll4 -auto-ilp32

462.libquantum=peak=default:
CC= icc -m64
CPORTABILITY= -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
COPTIMIZE=    $(FAST) -auto-ilp32 -opt-prefetch
feedback=no

464.h264ref=peak=default:
COPTIMIZE= -unroll2 -ansi-alias

471.omnetpp=peak=default:
CXXOPTIMIZE=  -ansi-alias -opt-ra-region-strategy=block

473.astar=peak=default:
CXX= icpc -m64
CXXPORTABILITY= -DSPEC_CPU_LP64
EXTRA_LIBS=  -L$(SMARTHEAP64_DIR) -lsmartheap64
CXXOPTIMIZE= -ansi-alias -opt-ra-region-strategy=routine

483.xalancbmk=peak=default:
basepeak=yes

################################################################
# Peak Tuning Flags for FP
################################################################
fp=peak=default:
COPTIMIZE=       -auto-ilp32
CXXOPTIMIZE=     -auto-ilp32
PASS1_CFLAGS =   -prof-gen
PASS2_CFLAGS =   $(FAST) -prof-use
PASS1_CXXFLAGS = -prof-gen
PASS2_CXXFLAGS = $(FAST) -prof-use
PASS1_FFLAGS =   -prof-gen
PASS2_FFLAGS =   $(FAST) -prof-use
PASS1_LDFLAGS =  -prof-gen
PASS2_LDFLAGS =  $(FAST) -prof-use
```

```
410.bwaves=peak=default:
OPTIMIZE=    $(FAST)  -opt-prefetch
feedback=0
################################################################################
################################################
%ifdef %{smt-on}
%ifdef %{physicallogical}
submit       = numactl --localalloc --physcpubind=`expr 2 \\* $SPECCOPYNUM`
$command
%ifdef %{no-numa)
submit       = taskset -c `expr 2 \\* $SPECCOPYNUM` $command
%endif
%endif
%endif

%ifdef %{up-dale}
copies=2
%endif
%ifdef %{up-nhm}
copies=4
%endif
%ifdef %{dp-nhm}
copies=8
%endif
%ifdef %{up-wsm-6c}
copies=6
%endif
%ifdef %{dp-wsm-6c}
copies=12
%endif
%ifdef %{1p-nhm-ex}
copies=8
%endif
%ifdef %{2p-nhm-ex}
copies=16
%endif
%ifdef %{4p-nhm-ex}
copies=32
%endif
################################################################################
################################################

416.gamess=peak=default:
OPTIMIZE= -unroll2 -Ob0 -ansi-alias -scalar-rep-
################################################################################
################################################
%ifdef %{smt-on}
%ifdef %{physicallogical}
submit       = numactl --localalloc --physcpubind=`expr 2 \\* $SPECCOPYNUM`
$command
%ifdef %{no-numa)
```

```
submit       = taskset -c `expr 2 \\* $SPECCOPYNUM` $command
%endif
%endif
%endif

%ifdef %{up-dale}
copies=2
%endif
%ifdef %{up-nhm}
copies=4
%endif
%ifdef %{dp-nhm}
copies=8
%endif
%ifdef %{up-wsm-6c}
copies=6
%endif
%ifdef %{dp-wsm-6c}
copies=12
%endif
################################################################################
################################################

433.milc=peak=default:
OPTIMIZE= -fno-alias -opt-prefetch
COPTIMIZE=

434.zeusmp=peak=default:
basepeak=yes

435.gromacs=peak=default:
OPTIMIZE= -opt-prefetch

436.cactusADM=peak=default:
basepeak=yes

437.leslie3d=peak=default:
OPTIMIZE=     $(FAST)
feedback=no
################################################################################
################################################
%ifdef %{smt-on}
%ifdef %{physicallogical}
submit       = numactl --localalloc --physcpubind=`expr 2 \\* $SPECCOPYNUM`
$command
%ifdef %{no-numa)
submit       = taskset -c `expr 2 \\* $SPECCOPYNUM` $command
%endif
%endif
%endif

%ifdef %{up-dale}
```

```
copies=2
%endif
%ifdef %{up-nhm}
copies=4
%endif
%ifdef %{dp-nhm}
copies=8
%endif
%ifdef %{up-wsm-6c}
copies=6
%endif
%ifdef %{dp-wsm-6c}
copies=12
%endif
%ifdef %{1p-nhm-ex}
copies=8
%endif
%ifdef %{2p-nhm-ex}
copies=16
%endif
%ifdef %{4p-nhm-ex}
copies=32
%endif
################################################################################
################################################

444.namd=peak=default:
CXXOPTIMIZE= -fno-alias -auto-ilp32

447.dealII=peak=default:
CXXOPTIMIZE= -unroll2 -ansi-alias -scalar-rep-

450.soplex=peak=default:
PORTABILITY =
CXX= icpc -m32
OPTIMIZE= -opt-malloc-options=3
CXXOPTIMIZE=
################################################################################
################################################
%ifdef %{smt-on}
%ifdef %{physicallogical}
submit       = numactl --localalloc --physcpubind=`expr 2 \\* $SPECCOPYNUM`
$command
%ifdef %{no-numa)
submit       = taskset -c `expr 2 \\* $SPECCOPYNUM` $command
%endif
%endif
%endif

%ifdef %{up-dale}
copies=2
%endif
```

```
%ifdef %{up-nhm}
copies=4
%endif
%ifdef %{dp-nhm}
copies=8
%endif
%ifdef %{up-wsm-6c}
copies=6
%endif
%ifdef %{dp-wsm-6c}
copies=12
%endif
################################################################################
################################################

453.povray=peak=default:
CXXOPTIMIZE= -unroll4 -ansi-alias

454.calculix=peak=default:
basepeak=yes

459.GemsFDTD=peak=default:
OPTIMIZE= -unroll2 -Ob0
################################################################################
################################################
%ifdef %{smt-on}
%ifdef %{physicallogical}
submit       = numactl --localalloc --physcpubind=`expr 2 \\* $SPECCOPYNUM`
$command
%ifdef %{no-numa)
submit       = taskset -c `expr 2 \\* $SPECCOPYNUM` $command
%endif
%endif
%endif

%ifdef %{up-dale}
copies=2
%endif
%ifdef %{up-nhm}
copies=4
%endif
%ifdef %{dp-nhm}
copies=8
%endif
%ifdef %{up-wsm-6c}
copies=6
%endif
%ifdef %{dp-wsm-6c}
copies=12
%endif
################################################################################
################################################
```

```
465.tonto=peak=default:
OPTIMIZE= -unroll4 -auto -inline-calloc -opt-malloc-options=3

470.lbm=peak=default:
OPTIMIZE= -opt-malloc-options=3 -ansi-alias
################################################################################
################################################
%ifdef %{smt-on}
%ifdef %{physicallogical}
submit       = numactl --localalloc --physcpubind=`expr 2 \\* $SPECCOPYNUM`
$command
%ifdef %{no-numa)
submit       = taskset -c `expr 2 \\* $SPECCOPYNUM` $command
%endif
%endif
%endif

%ifdef %{up-dale}
copies=2
%endif
%ifdef %{up-nhm}
copies=4
%endif
%ifdef %{dp-nhm}
copies=8
%endif
%ifdef %{up-wsm-6c}
copies=6
%endif
%ifdef %{dp-wsm-6c}
copies=12
%endif
%ifdef %{1p-nhm-ex}
copies=7
%endif
%ifdef %{2p-nhm-ex}
copies=14
%endif
%ifdef %{4p-nhm-ex}
copies=28
%endif
################################################################################
################################################

481.wrf=peak=default:
basepeak=yes

482.sphinx3=peak=default:
PORTABILITY=
CC= icc -m32
OPTIMIZE= $(FAST)
```

```
COPTIMIZE= -unroll2
feedback=no

################################################################
# (Edit this to match your system)
################################################################

default=default=default=default:
license_num      = 3184
test_sponsor     = Dell, Inc
hw_avail         = Mar-2010
sw_avail         = Feb-2010
tester           = Principled Technologies, Inc.
hw_cpu_name      = Intel Xeon X7560
hw_cpu_char      =
hw_cpu_mhz       = 2270
hw_disk          = 73 GB SAS, 15000RPM
hw_fpu           = Integrated
hw_memory        = 128 GB (32 x 4 GB DDR3-8500) GB
hw_model         = Dell PowerEdge R910
hw_ncpuorder     = 1,2 chip
hw_ncores        = 16
hw_nchips        = 2
hw_ncoresperchip = 8
hw_nthreadspercore = 2
hw_other         = None
hw_pcache        = 32 KB I + 32 KB D on chip per core
hw_scache        = 256 MB I+D on chip per core
hw_tcache        = 24 MB I+D on chip per chip
hw_ocache        = None
hw_vendor        = Dell, Inc.
prepared_by      = Principled Technologies, Inc.
sw_file          = ext3
sw_os            = Red Hat Enterprise Linux (kernel 2.6.18-164.9.1.el5 x86_64)
sw_state         = Run level 3 (multi-user)
notes_submit_000 = numactl was used to bind copies to the cores
%ifdef %{no-numa)
notes_submit_000 = taskset was used to bind copies to the cores
%endif

int=default=default=default:
sw_compiler001   = Intel C++ Professional Compiler for IA32 and Intel 64, Version
11.1
sw_compiler002   = Build 20091130 Package ID: l_cproc_p_11.1.064
sw_base_ptrsize  = 32-bit
sw_peak_ptrsize  = 32/64-bit
sw_other001      = Microquill SmartHeap V8.1
sw_other002      = Binutils 2.18.50.0.7.20080502

fp=default=default=default:
sw_compiler001   = Intel C++ and Fortran Professional Compiler for IA32 and Intel
64, Version  11.1
```

```
sw_compiler002   = Build 20091130 Package ID: l_cproc_p_11.1.064,
l_cprof_p_11.1.064
sw_base_ptrsize  = 64-bit
sw_peak_ptrsize  = 32/64-bit
sw_other001      = Binutils 2.18.50.0.7.20080502
```

Red Hat Enterprise Linux 5.4 server: Dell PowerEdge R810

```
############################################################################
# This is a sample config file. It was tested with:
#
#      Compiler name/version:       Intel Compiler 11.1
#      Operating system version:    64-Bit SUSE LINUX Enterprise Server 10 or
later
#      Hardware:                    Intel processors supporting SSE4.2
#
############################################################################
# SPEC CPU2006 Intel Linux64 config file
# Sep 2009 IC 11.1 Linux64
############################################################################
action      = validate
tune        = base
ext         = cpu2006.1.1.ic11.1.linux64.sse42.rate.jan182010
PATHSEP     = /
check_md5=1
reportable=1
bench_post_setup=sync

#
# These are listed as benchmark-tuning-extension-machine
#
int=default=default=default:
CC=  icc  -m32
CXX= icpc -m32
OBJ = .o
SMARTHEAP32_DIR = /home/cmplr/usr3/alrahate/cpu2006.1.1.ic11.1/libic11.1-32bit
SMARTHEAP64_DIR = /home/cmplr/usr3/alrahate/cpu2006.1.1.ic11.1/libic11.1-64bit

fp=default=default=default:
CC=  icc   -m64
CXX= icpc  -m64
FC=  ifort -m64
OBJ = .o

# For UP systems, we need to know if the processors are ordered across cores
first or in order
# If across cores, processors 0, 1, 2 and 3 are on distinct physical cores
# Otherwise, processors 0, 2, 4 and 6 are on distinct physical cores

default:
submit       = numactl --localalloc --physcpubind=$SPECCOPYNUM $command

%ifdef %{no-numa)
submit       = taskset -c $SPECCOPYNUM $command
%endif

############################################################################
# Compiler options
```

```
# for Nehalem use -xSSE4.2
# for processors prior to dunnington, replace -xSSE4.1 with -xSSSE3
######################################################################
default:
SSE          = -xSSE4.2
FAST         =  $(SSE) -ipo -O3 -no-prec-div -static
FASTNOSTATIC =  $(SSE) -ipo -O3 -no-prec-div

######################################################################
#
# portability & libraries
#
#################### Portability Flags and Notes ############################

400.perlbench=default:
CPORTABILITY=      -DSPEC_CPU_LINUX_IA32

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

462.libquantum=default:
CPORTABILITY=      -DSPEC_CPU_LINUX

483.xalancbmk=default:
CXXPORTABILITY=    -DSPEC_CPU_LINUX

fp=default:
PORTABILITY = -DSPEC_CPU_LP64

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


######################################################################
# Tuning Flags
######################################################################
#
# Base tuning default optimization
# Feedback directed optimization not allowed in baseline for CPU2006
# However there is no limit on the number of flags as long as the same
# flags are used in the same order for all benchmarks of a given language

471.omnetpp,473.astar,483.xalancbmk=default:
```

```
EXTRA_LIBS=  -L$(SMARTHEAP32_DIR) -lsmartheap
EXTRA_LDFLAGS= -Wl,-z,muldefs

int=base=default=default:
COPTIMIZE=    $(FAST) -opt-prefetch
CXXOPTIMIZE=  $(FASTNOSTATIC)  -opt-prefetch

fp=base=default=default:
OPTIMIZE=     $(FAST)

#############################################################
# Peak Tuning Flags int 2006 fast
#############################################################
int=peak=default:
COPTIMIZE=       -auto-ilp32 -ansi-alias
CXXOPTIMIZE=     -ansi-alias
PASS1_CFLAGS     = -prof-gen
PASS2_CFLAGS     = $(FAST) -prof-use
PASS1_CXXFLAGS   = -prof-gen
PASS2_CXXFLAGS   = $(FASTNOSTATIC) -prof-use
PASS1_LDCFLAGS   = -prof-gen
PASS2_LDCFLAGS   = $(FAST) -prof-use
PASS1_LDCXXFLAGS = -prof-gen
PASS2_LDCXXFLAGS = $(FASTNOSTATIC) -prof-use

400.perlbench=peak=default:
COPTIMIZE= -ansi-alias

401.bzip2=peak=default:
CC= icc -m64
CPORTABILITY= -DSPEC_CPU_LP64
COPTIMIZE= -opt-prefetch -ansi-alias -auto-ilp32

403.gcc=peak=default:
COPTIMIZE = $(FAST)
feedback=0

429.mcf=peak=default:
COPTIMIZE= $(FAST) -opt-prefetch
feedback=0
#############################################################################
################################################
%ifdef %{smt-on}
%ifdef %{physicallogical}
submit       = numactl --localalloc --physcpubind=`expr 2 \\* $SPECCOPYNUM`
$command
%ifdef %{no-numa)
submit       = taskset -c `expr 2 \\* $SPECCOPYNUM` $command
%endif
%endif
%endif
```

```
%ifdef %{up-dale}
copies=2
%endif
%ifdef %{up-nhm}
copies=4
%endif
%ifdef %{dp-nhm}
copies=8
%endif
%ifdef %{up-wsm-6c}
copies=6
%endif
%ifdef %{dp-wsm-6c}
copies=12
%endif
################################################################################
################################################

445.gobmk=peak=default:
COPTIMIZE= -O2 -ipo -no-prec-div -ansi-alias
PASS1_CFLAGS     = -prof-gen
PASS2_CFLAGS     = $(SSE) -prof-use
PASS1_LDCFLAGS   = -prof-gen
PASS2_LDCFLAGS   = $(SSE) -prof-use

456.hmmer=peak=default:
CC= icc -m64
CPORTABILITY= -DSPEC_CPU_LP64
COPTIMIZE=  $(FAST) -unroll2 -ansi-alias -auto-ilp32
feedback=no
################################################################################
################################################
%ifdef %{smt-on}
%ifdef %{physicallogical}
submit       = numactl --localalloc --physcpubind=`expr 2 \\* $SPECCOPYNUM`
$command
%ifdef %{no-numa)
submit       = taskset -c `expr 2 \\* $SPECCOPYNUM` $command
%endif
%endif
%endif

%ifdef %{up-dale}
copies=2
%endif
%ifdef %{up-nhm}
copies=4
%endif
%ifdef %{dp-nhm}
copies=8
%endif
%ifdef %{up-wsm-6c}
```

```
copies=6
%endif
%ifdef %{dp-wsm-6c}
copies=12
%endif
################################################################################
################################################

458.sjeng=peak=default:
CC= icc -m64
CPORTABILITY= -DSPEC_CPU_LP64
COPTIMIZE= -unroll4 -auto-ilp32

462.libquantum=peak=default:
CC= icc -m64
CPORTABILITY= -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
COPTIMIZE=    $(FAST) -auto-ilp32 -opt-prefetch
feedback=no

464.h264ref=peak=default:
COPTIMIZE= -unroll2 -ansi-alias

471.omnetpp=peak=default:
CXXOPTIMIZE=  -ansi-alias -opt-ra-region-strategy=block

473.astar=peak=default:
CXX= icpc -m64
CXXPORTABILITY= -DSPEC_CPU_LP64
EXTRA_LIBS=  -L$(SMARTHEAP64_DIR) -lsmartheap64
CXXOPTIMIZE= -ansi-alias -opt-ra-region-strategy=routine

483.xalancbmk=peak=default:
basepeak=yes

################################################################
# Peak Tuning Flags for FP
################################################################
fp=peak=default:
COPTIMIZE=       -auto-ilp32
CXXOPTIMIZE=     -auto-ilp32
PASS1_CFLAGS =   -prof-gen
PASS2_CFLAGS =   $(FAST) -prof-use
PASS1_CXXFLAGS = -prof-gen
PASS2_CXXFLAGS = $(FAST) -prof-use
PASS1_FFLAGS =   -prof-gen
PASS2_FFLAGS =   $(FAST) -prof-use
PASS1_LDFLAGS =  -prof-gen
PASS2_LDFLAGS =  $(FAST) -prof-use

410.bwaves=peak=default:
OPTIMIZE=    $(FAST)  -opt-prefetch
feedback=0
```

```
##############################################################################
##################################################
%ifdef %{smt-on}
%ifdef %{physicallogical}
submit       = numactl --localalloc --physcpubind=`expr 2 \\* $SPECCOPYNUM`
$command
%ifdef %{no-numa)
submit       = taskset -c `expr 2 \\* $SPECCOPYNUM` $command
%endif
%endif
%endif

%ifdef %{up-dale}
copies=2
%endif
%ifdef %{up-nhm}
copies=4
%endif
%ifdef %{dp-nhm}
copies=8
%endif
%ifdef %{up-wsm-6c}
copies=6
%endif
%ifdef %{dp-wsm-6c}
copies=12
%endif
%ifdef %{1p-nhm-ex}
copies=8
%endif
%ifdef %{2p-nhm-ex}
copies=16
%endif
%ifdef %{4p-nhm-ex}
copies=32
%endif
##############################################################################
##################################################

416.gamess=peak=default:
OPTIMIZE= -unroll2 -Ob0 -ansi-alias -scalar-rep-
##############################################################################
##################################################
%ifdef %{smt-on}
%ifdef %{physicallogical}
submit       = numactl --localalloc --physcpubind=`expr 2 \\* $SPECCOPYNUM`
$command
%ifdef %{no-numa)
submit       = taskset -c `expr 2 \\* $SPECCOPYNUM` $command
%endif
%endif
%endif
```

```
%ifdef %{up-dale}
copies=2
%endif
%ifdef %{up-nhm}
copies=4
%endif
%ifdef %{dp-nhm}
copies=8
%endif
%ifdef %{up-wsm-6c}
copies=6
%endif
%ifdef %{dp-wsm-6c}
copies=12
%endif
################################################################################
################################################

433.milc=peak=default:
OPTIMIZE= -fno-alias -opt-prefetch
COPTIMIZE=

434.zeusmp=peak=default:
basepeak=yes

435.gromacs=peak=default:
OPTIMIZE= -opt-prefetch

436.cactusADM=peak=default:
basepeak=yes

437.leslie3d=peak=default:
OPTIMIZE=     $(FAST)
feedback=no
################################################################################
################################################
%ifdef %{smt-on}
%ifdef %{physicallogical}
submit       = numactl --localalloc --physcpubind=`expr 2 \\* $SPECCOPYNUM`
$command
%ifdef %{no-numa)
submit       = taskset -c `expr 2 \\* $SPECCOPYNUM` $command
%endif
%endif
%endif

%ifdef %{up-dale}
copies=2
%endif
%ifdef %{up-nhm}
copies=4
```

```
%endif
%ifdef %{dp-nhm}
copies=8
%endif
%ifdef %{up-wsm-6c}
copies=6
%endif
%ifdef %{dp-wsm-6c}
copies=12
%endif
%ifdef %{1p-nhm-ex}
copies=8
%endif
%ifdef %{2p-nhm-ex}
copies=16
%endif
%ifdef %{4p-nhm-ex}
copies=32
%endif
################################################################################
################################################

444.namd=peak=default:
CXXOPTIMIZE= -fno-alias -auto-ilp32

447.dealII=peak=default:
CXXOPTIMIZE= -unroll2 -ansi-alias -scalar-rep-

450.soplex=peak=default:
PORTABILITY =
CXX= icpc -m32
OPTIMIZE= -opt-malloc-options=3
CXXOPTIMIZE=
################################################################################
################################################
%ifdef %{smt-on}
%ifdef %{physicallogical}
submit       = numactl --localalloc --physcpubind=`expr 2 \\* $SPECCOPYNUM`
$command
%ifdef %{no-numa)
submit       = taskset -c `expr 2 \\* $SPECCOPYNUM` $command
%endif
%endif
%endif

%ifdef %{up-dale}
copies=2
%endif
%ifdef %{up-nhm}
copies=4
%endif
%ifdef %{dp-nhm}
```

```
copies=8
%endif
%ifdef %{up-wsm-6c}
copies=6
%endif
%ifdef %{dp-wsm-6c}
copies=12
%endif
################################################################################
################################################

453.povray=peak=default:
CXXOPTIMIZE= -unroll4 -ansi-alias

454.calculix=peak=default:
basepeak=yes

459.GemsFDTD=peak=default:
OPTIMIZE= -unroll2 -Ob0
################################################################################
################################################
%ifdef %{smt-on}
%ifdef %{physicallogical}
submit       = numactl --localalloc --physcpubind=`expr 2 \\* $SPECCOPYNUM`
$command
%ifdef %{no-numa)
submit       = taskset -c `expr 2 \\* $SPECCOPYNUM` $command
%endif
%endif
%endif

%ifdef %{up-dale}
copies=2
%endif
%ifdef %{up-nhm}
copies=4
%endif
%ifdef %{dp-nhm}
copies=8
%endif
%ifdef %{up-wsm-6c}
copies=6
%endif
%ifdef %{dp-wsm-6c}
copies=12
%endif
################################################################################
################################################

465.tonto=peak=default:
OPTIMIZE= -unroll4 -auto -inline-calloc -opt-malloc-options=3
```

```
470.lbm=peak=default:
OPTIMIZE= -opt-malloc-options=3 -ansi-alias
################################################################################
################################################
%ifdef %{smt-on}
%ifdef %{physicallogical}
submit       = numactl --localalloc --physcpubind=`expr 2 \\* $SPECCOPYNUM`
$command
%ifdef %{no-numa)
submit       = taskset -c `expr 2 \\* $SPECCOPYNUM` $command
%endif
%endif
%endif

%ifdef %{up-dale}
copies=2
%endif
%ifdef %{up-nhm}
copies=4
%endif
%ifdef %{dp-nhm}
copies=8
%endif
%ifdef %{up-wsm-6c}
copies=6
%endif
%ifdef %{dp-wsm-6c}
copies=12
%endif
%ifdef %{1p-nhm-ex}
copies=7
%endif
%ifdef %{2p-nhm-ex}
copies=14
%endif
%ifdef %{4p-nhm-ex}
copies=28
%endif
################################################################################
################################################

481.wrf=peak=default:
basepeak=yes

482.sphinx3=peak=default:
PORTABILITY=
CC= icc -m32
OPTIMIZE= $(FAST)
COPTIMIZE= -unroll2
feedback=no

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

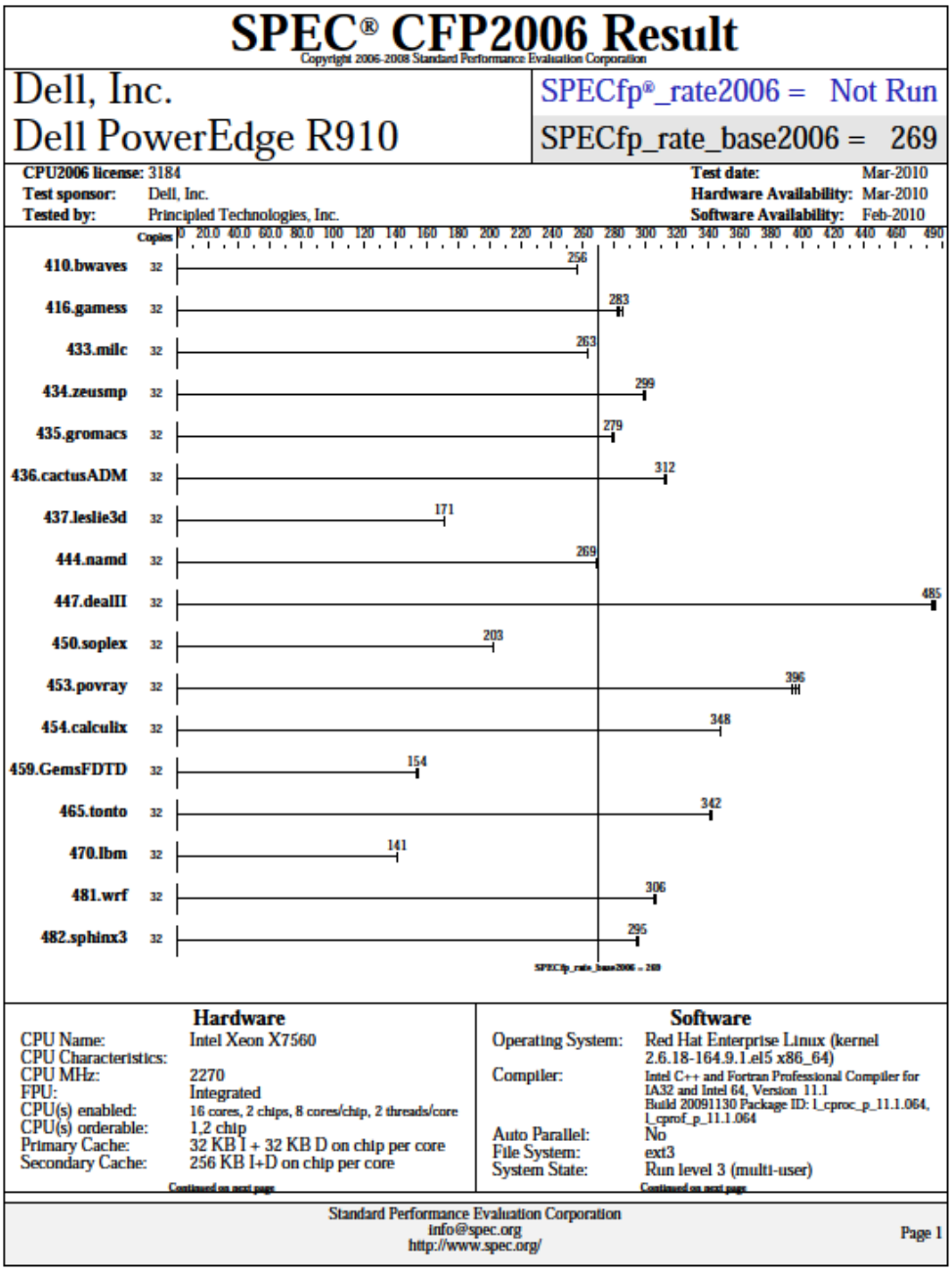
```
# (Edit this to match your system)
######################################################################

default=default=default=default:
license_num      = 3184
test_sponsor     = Dell, Inc
hw_avail         = Mar-2010
sw_avail         = Feb-2010
tester           = Principled Technologies, Inc.
hw_cpu_name      = Intel Xeon X7560
hw_cpu_char      =
hw_cpu_mhz       = 2270
hw_disk          = 146 GB SAS, 15000RPM
hw_fpu           = Integrated
hw_memory        = 128 GB (32 x 4 GB DDR3-8500) GB
hw_model         = Dell PowerEdge R810
hw_ncpuorder     = 1,2 chip
hw_ncores        = 16
hw_nchips        = 2
hw_ncoresperchip = 8
hw_nthreadspercore = 2
hw_other         = None
hw_pcache        = 32 KB I + 32 KB D on chip per core
hw_scache        = 256 MB I+D on chip per core
hw_tcache        = 24 MB I+D on chip per chip
hw_ocache        = None
hw_vendor        = Dell, Inc.
prepared_by      = Principled Technologies, Inc.
sw_file          = ext3
sw_os            = Red Hat Enterprise Linux (kernel 2.6.18-164.9.1.el5 x86_64)
sw_state         = Run level 3 (multi-user)
notes_submit_000 = numactl was used to bind copies to the cores
%ifdef %{no-numa)
notes_submit_000 = taskset was used to bind copies to the cores
%endif

int=default=default=default:
sw_compiler001   = Intel C++ Professional Compiler for IA32 and Intel 64, Version
11.1
sw_compiler002   = Build 20091130 Package ID: l_cproc_p_11.1.064
sw_base_ptrsize  = 32-bit
sw_peak_ptrsize  = 32/64-bit
sw_other001      = Microquill SmartHeap V8.1
sw_other002      = Binutils 2.18.50.0.7.20080502

fp=default=default=default:
sw_compiler001   = Intel C++ and Fortran Professional Compiler for IA32 and Intel
64, Version  11.1
sw_compiler002   = Build 20091130 Package ID: l_cproc_p_11.1.064,
l_cprof_p_11.1.064
sw_base_ptrsize  = 64-bit
sw_peak_ptrsize  = 32/64-bit
```

```
sw_other001      = Binutils 2.18.50.0.7.20080502
```

APPENDIX C – SPECFP_rate_base2006 OUTPUT

This appendix provides the SPECfp_rate_base2006 output files from the median run for the test servers.

Red Hat Enterprise Linux 5.4 server: Dell PowerEdge R910



SPEC CFP2006 Result

Dell, Inc.
Dell PowerEdge R910

SPECfp_rate2006 = Not Run

SPECfp_rate_base2006 = 269

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

Test date: Mar-2010
Hardware Availability: Mar-2010
Software Availability: Feb-2010

Hardware (Continued)

L3 Cache: 24 MB I+D on chip per chip
Other Cache: None
Memory: 128 GB (32 x 4 GB DDR3-8500)
Disk Subsystem: 73 GB SAS, 15000RPM
Other Hardware: None

Software (Continued)

Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other Software: Binutils 2.18.50.0.7.20080502

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	32	1699	256	1694	257	**1697**	**256**							
416.gamess	32	2219	282	**2215**	**283**	2192	286							
433.milc	32	1116	263	**1116**	**263**	1116	263							
434.zeusmp	32	973	299	972	300	**972**	**299**							
435.gromacs	32	820	279	818	279	**819**	**279**							
436.cactusADM	32	1224	312	**1224**	**312**	1223	313							
437.leslie3d	32	1758	171	**1758**	**171**	1754	172							
444.namd	32	953	269	**954**	**269**	954	269							
447.dealII	32	755	485	**755**	**485**	757	484							
450.soplex	32	1318	202	1318	203	**1318**	**203**							
453.povray	32	**430**	**396**	428	398	432	394							
454.calculix	32	**759**	**348**	759	348	760	348							
459.GemsFDTD	32	2205	154	**2210**	**154**	2218	153							
465.tonto	32	923	341	**921**	**342**	919	343							
470.lbm	32	**3118**	**141**	3119	141	3116	141							
481.wrf	32	1166	306	1169	306	**1167**	**306**							
482.sphinx3	32	**2116**	**295**	2113	295	2120	294							

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

Submit Notes

```
The config file option 'submit' was used.
 numactl was used to bind copies to the cores
```

Base Compiler Invocation

C benchmarks:
```
icc -m64
```

C++ benchmarks:
```
icpc -m64
```

Continued on next page

SPEC CFP2006 Result

Dell, Inc.
Dell PowerEdge R910

SPECfp_rate2006 = Not Run

SPECfp_rate_base2006 = 269

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

Test date: Mar-2010
Hardware Availability: Mar-2010
Software Availability: Feb-2010

Base Compiler Invocation (Continued)

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
icc -m64 ifort -m64

Base Portability Flags

410.bwaves: -DSPEC_CPU_LP64
416.gamess: -DSPEC_CPU_LP64
433.milc: -DSPEC_CPU_LP64
434.zeusmp: -DSPEC_CPU_LP64
435.gromacs: -DSPEC_CPU_LP64 -nofor_main
436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
447.dealII: -DSPEC_CPU_LP64
450.soplex: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64
454.calculix: -DSPEC_CPU_LP64 -nofor_main
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
470.lbm: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
482.sphinx3: -DSPEC_CPU_LP64

Base Optimization Flags

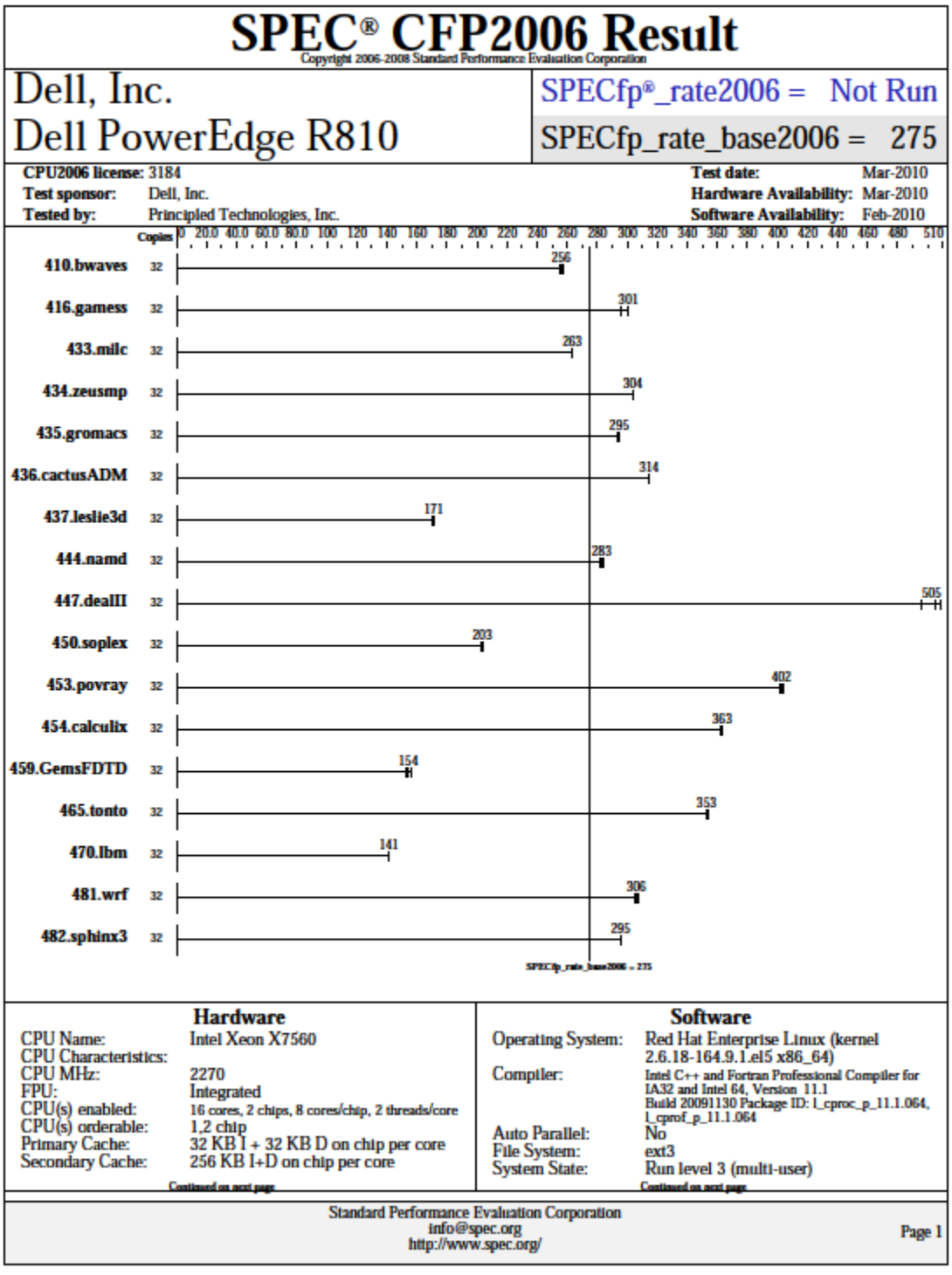
C benchmarks:
-xSSE4.2 -ipo -O3 -no-prec-div -static

C++ benchmarks:
-xSSE4.2 -ipo -O3 -no-prec-div -static

Fortran benchmarks:
-xSSE4.2 -ipo -O3 -no-prec-div -static

Benchmarks using both Fortran and C:
-xSSE4.2 -ipo -O3 -no-prec-div -static

Red Hat Enterprise Linux 5.4 server: Dell PowerEdge R810



SPEC CFP2006 Result

Dell, Inc.
Dell PowerEdge R810

SPECfp_rate2006 = Not Run

SPECfp_rate_base2006 = 275

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

Test date: Mar-2010
Hardware Availability: Mar-2010
Software Availability: Feb-2010

Hardware (Continued)

L3 Cache: 24 MB I+D on chip per chip
Other Cache: None
Memory: 128 GB (32 x 4 GB DDR3-8500)
Disk Subsystem: 146 GB SAS, 15000RPM
Other Hardware: None

Software (Continued)

Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other Software: Binutils 2.18.50.0.7.20080502

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	32	1687	258	**1700**	**256**	1708	255							
416.gamess	32	**2084**	**301**	2082	301	2116	296							
433.milc	32	1115	263	**1116**	**263**	1116	263							
434.zeusmp	32	960	303	958	304	**959**	**304**							
435.gromacs	32	778	293	**776**	**295**	775	295							
436.cactusADM	32	1218	314	**1216**	**314**	1214	315							
437.leslie3d	32	1766	170	1754	171	**1758**	**171**							
444.namd	32	909	282	**907**	**283**	904	284							
447.dealII	32	**725**	**505**	719	509	738	496							
450.soplex	32	1312	203	**1313**	**203**	1314	203							
453.povray	32	421	404	**423**	**402**	423	402							
454.calculix	32	**727**	**363**	728	362	727	363							
459.GemsFDTD	32	**2203**	**154**	2171	156	2223	153							
465.tonto	32	**893**	**353**	893	353	891	353							
470.lbm	32	3121	141	**3117**	**141**	3115	141							
481.wrf	32	1164	307	**1168**	**306**	1170	305							
482.sphinx3	32	**2111**	**295**	2109	296	2112	295							

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

Submit Notes

```
The config file option 'submit' was used.
 numactl was used to bind copies to the cores
```

Base Compiler Invocation

C benchmarks:
```
icc   -m64
```

C++ benchmarks:
```
icpc   -m64
```

Continued on next page

SPEC CFP2006 Result

Dell, Inc.
Dell PowerEdge R810

SPECfp_rate2006 = Not Run

SPECfp_rate_base2006 = 275

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

Test date: Mar-2010
Hardware Availability: Mar-2010
Software Availability: Feb-2010

Base Compiler Invocation (Continued)

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
icc -m64 ifort -m64

Base Portability Flags

410.bwaves: -DSPEC_CPU_LP64
416.gamess: -DSPEC_CPU_LP64
433.milc: -DSPEC_CPU_LP64
434.zeusmp: -DSPEC_CPU_LP64
435.gromacs: -DSPEC_CPU_LP64 -nofor_main
436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
447.dealII: -DSPEC_CPU_LP64
450.soplex: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64
454.calculix: -DSPEC_CPU_LP64 -nofor_main
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
470.lbm: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
482.sphinx3: -DSPEC_CPU_LP64

Base Optimization Flags

C benchmarks:
-xSSE4.2 -ipo -O3 -no-prec-div -static

C++ benchmarks:
-xSSE4.2 -ipo -O3 -no-prec-div -static

Fortran benchmarks:
-xSSE4.2 -ipo -O3 -no-prec-div -static

Benchmarks using both Fortran and C:
-xSSE4.2 -ipo -O3 -no-prec-div -static

SPEC CFP2006 Result

Dell, Inc.
Dell PowerEdge R810

SPECfp_rate2006 = Not Run

SPECfp_rate_base2006 = 275

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

Test date: Mar-2010
Hardware Availability: Mar-2010
Software Availability: Feb-2010

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

Tested with SPEC CPU2006 v1.1.
Report generated on Sun Mar 28 19:55:58 2010 by SPEC CPU2006 PS/PDF formatter v6128.

SPEC CFP2006 Result

Dell, Inc.
Dell PowerEdge R810

SPECfp_rate2006 = Not Run
SPECfp_rate_base2006 = 225

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

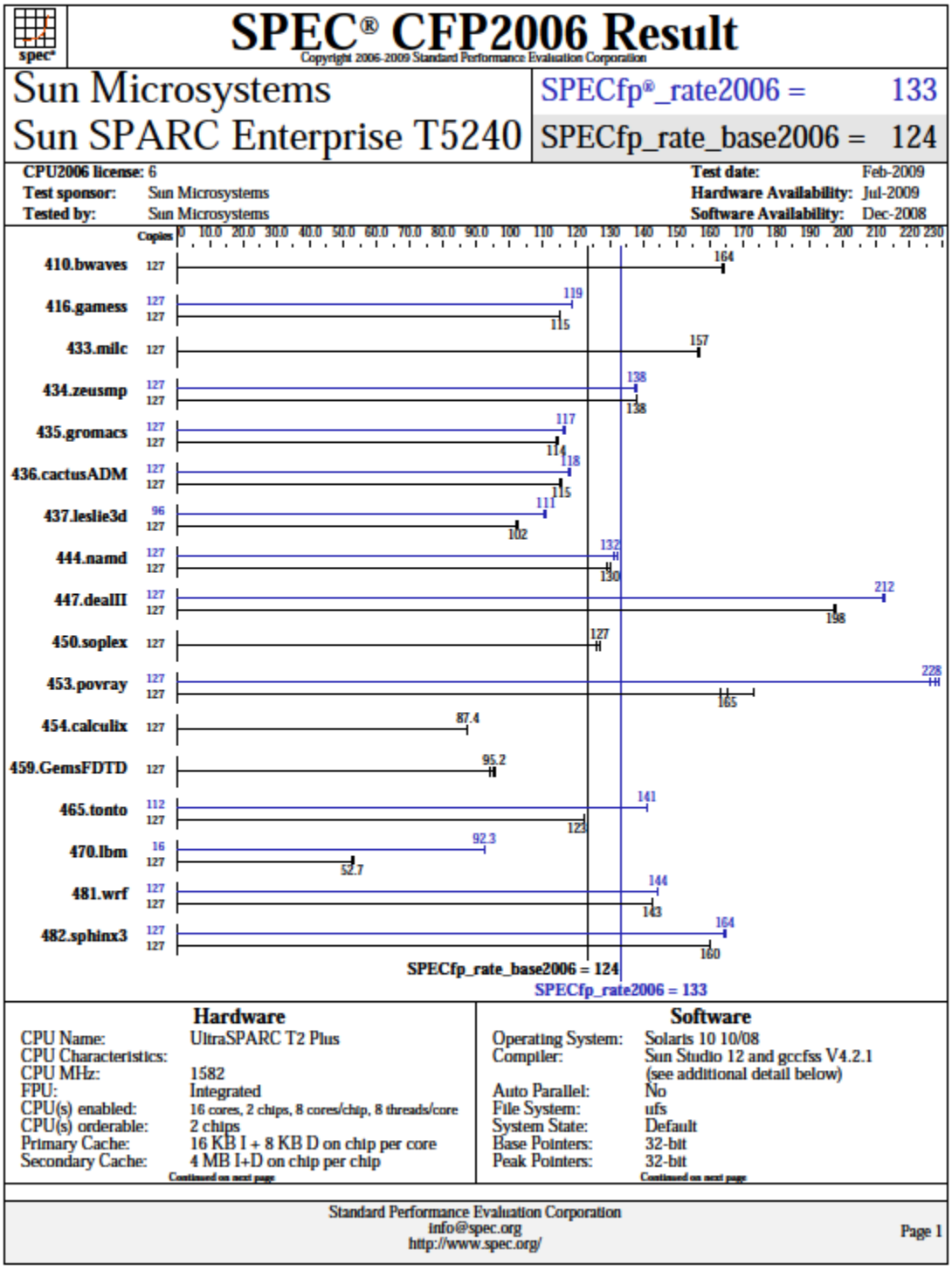
Test date: Mar-2010
Hardware Availability: Mar-2010
Software Availability: Feb-2010

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

Tested with SPEC CPU2006 v1.1.
Report generated on Thu Mar 11 20:04:22 2010 by SPEC CPU2006 PS/PDF formatter v6128.

Solaris 10 10/08 server: Sun SPARC Enterprise T5240

http://www.spec.org/cpu2006/results/res2009q3/cpu2006-20090717-08198.html



SPEC CFP2006 Result

Sun Microsystems
Sun SPARC Enterprise T5240

SPECfp_rate2006 = 133

SPECfp_rate_base2006 = 124

CPU2006 license: 6
Test sponsor: Sun Microsystems
Tested by: Sun Microsystems

Test date: Feb-2009
Hardware Availability: Jul-2009
Software Availability: Dec-2008

Hardware (Continued)

L3 Cache: None
Other Cache: None
Memory: 128 GB (32 x 4 GB)
Disk Subsystem: 748 GB RAID 0 using Solaris Volume Manager on 8x 10K RPM SUN146G SAS blocksize 384 KB
Other Hardware: None

Software (Continued)

Other Software: None

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	127	10541	164	**10507**	**164**	10492	165	127	10541	164	**10507**	**164**	10492	165
416.gamess	127	**21620**	**115**	21636	115	21617	115	127	**20912**	**119**	20912	119	20917	119
433.milc	127	**7436**	**157**	7433	157	7451	156	127	**7436**	**157**	7433	157	7451	156
434.zeusmp	127	8375	138	**8382**	**138**	8382	138	127	8408	137	**8377**	**138**	8372	138
435.gromacs	127	7924	114	7964	114	**7963**	**114**	127	7763	117	**7771**	**117**	7796	116
436.cactusADM	127	13134	116	**13148**	**115**	13173	115	127	**12858**	**118**	12854	118	12880	118
437.leslie3d	127	**11672**	**102**	11695	102	11640	103	96	8175	110	8142	111	**8145**	**111**
444.namd	127	7880	129	**7820**	**130**	7820	130	127	7709	132	**7711**	**132**	7761	131
447.dealII	127	7364	197	**7349**	**198**	7348	198	127	**6841**	**212**	6827	213	6851	212
450.soplex	127	8388	126	**8346**	**127**	8336	127	127	8388	126	**8346**	**127**	8336	127
453.povray	127	**4089**	**165**	3900	173	4142	163	127	2987	226	2952	229	**2968**	**228**
454.calculix	127	12015	87.2	11988	87.4	**11992**	**87.4**	127	12015	87.2	11988	87.4	**11992**	**87.4**
459.GemsFDTD	127	14070	95.8	**14150**	**95.2**	14357	93.9	127	14070	95.8	**14150**	**95.2**	14357	93.9
465.tonto	127	10194	123	**10200**	**123**	10223	122	112	7815	141	**7810**	**141**	7802	141
470.lbm	127	33148	52.6	32952	53.0	**33117**	**52.7**	16	2383	92.3	**2382**	**92.3**	2380	92.4
481.wrf	127	**9943**	**143**	9927	143	9947	143	127	9821	144	9839	144	**9825**	**144**
482.sphinx3	127	**15465**	**160**	15453	160	15476	160	127	15049	164	**15047**	**164**	15036	165

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

Compiler Invocation Notes

```
Sun Studio compiler patches are available at
http://developers.sun.com/sunstudio/downloads/patches/ss12_patches.jsp
The tested configuration included patch 124867-09, 124861-10,
124863-09, 127000-07

Peak also uses "GCC for SPARC Systems 4.2.1", which
combines gcc with the Sun Code Generator for SPARC
systems.  It is invoked as "gcc", and accepts source
code compatible with GCC 4.2.
For more information, including support, see
```

Continued on next page

SPEC CFP2006 Result

Sun Microsystems
Sun SPARC Enterprise T5240

SPECfp_rate2006 = 133

SPECfp_rate_base2006 = 124

CPU2006 license: 6
Test sponsor: Sun Microsystems
Tested by: Sun Microsystems

Test date: Feb-2009
Hardware Availability: Jul-2009
Software Availability: Dec-2008

Compiler Invocation Notes (Continued)

http://cooltools.sunsource.net/gcc/

Submit Notes

```
A processor set was created using
  psrset -c 1-127
and the runspec process was placed into the set using
  psrset -e 1
The config file option 'submit' was used to select specific
processors within the set, along with the pbind command.
```

Operating System Notes

```
ulimit -s 131072 was used to allow the stack to grow
up to 131072 KB (aka 128 MB).  Note that saying "131072"
is preferable to "unlimited", because there is a tradeoff
between space for the stack vs. space for the heap.


/etc/system parameters
   autoup=600
      Causes pages older than the listed number of seconds to
      be written by fsflush.
   bufhwm=3000
      Memory byte limit for caching I/O buffers
   segmap_percent=1
      Set maximum percent memory for file system cache
   tune_t_fsflushr=10
      Controls how many seconds elapse between runs of the
      page flush daemon, fsflush.
   tsb_rss_factor=128
      Suggests that the the size of the TSB (Translation Storage Buffer)
      may be increased if it is more than 25% (128/512) full.  Doing so
      may reduce TSB traps, at the cost of additional kernel memory.

The "webconsole" service was turned off using
    svcadm disable webconsole

The system had 206 GB of swap space.
The ufs fragment size was set to 8192
```

Platform Notes

```
This result was measured on a Sun SPARC Enterprise T5240.
The Sun SPARC Enterprise T5240 and the Fujitsu SPARC
Enterprise T5240 are electrically equivalent.
```

SPEC CFP2006 Result

Sun Microsystems
Sun SPARC Enterprise T5240

SPECfp_rate2006 = 133
SPECfp_rate_base2006 = 124

CPU2006 license: 6
Test sponsor: Sun Microsystems
Tested by: Sun Microsystems

Test date: Feb-2009
Hardware Availability: Jul-2009
Software Availability: Dec-2008

Base Compiler Invocation

C benchmarks:
cc

C++ benchmarks:
CC

Fortran benchmarks:
f90

Benchmarks using both Fortran and C:
cc f90

Base Optimization Flags

C benchmarks:
-g -fast -xipo=2 -xpagesize=4M -xprefetch_level=2 -xalias_level=std
-xprefetch_level=3 -xprefetch_auto_type=indirect_array_access
-M /usr/lib/ld/map.bssalign

C++ benchmarks:
-g0 -library=stlport4 -fast -xipo=2 -xpagesize=4M -xprefetch_level=2
-xdepend -xalias_level=compatible -M /usr/lib/ld/map.bssalign

Fortran benchmarks:
-g -fast -xipo=2 -xpagesize=4M -xprefetch_level=2
-M /usr/lib/ld/map.bssalign

Benchmarks using both Fortran and C:
-g -fast(cc) -fast(f90) -xipo=2 -xpagesize=4M -xprefetch_level=2
-xalias_level=std -xprefetch_level=3
-xprefetch_auto_type=indirect_array_access -M /usr/lib/ld/map.bssalign

Base Other Flags

C benchmarks:
-xjobs=32 -V -#

C++ benchmarks:
-xjobs=32 -verbose=diags,version

Fortran benchmarks:
-xjobs=32 -V -v

Benchmarks using both Fortran and C:
-xjobs=32 -V -# -v

SPEC CFP2006 Result

Sun Microsystems
Sun SPARC Enterprise T5240

SPECfp_rate2006 = 133

SPECfp_rate_base2006 = 124

CPU2006 license: 6
Test sponsor: Sun Microsystems
Tested by: Sun Microsystems

Test date: Feb-2009
Hardware Availability: Jul-2009
Software Availability: Dec-2008

Peak Compiler Invocation

C benchmarks:
cc

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

447.dealII: g++

Fortran benchmarks:
f90

Benchmarks using both Fortran and C:
cc f90

Peak Optimization Flags

C benchmarks:

433.milc: basepeak = yes

470.lbm: -g -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast -xpagesize=4M
-M /usr/lib/ld/map.bssalign -xprefetch_level=3 -xipo=2
-xrestrict

482.sphinx3: -g -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast -xpagesize=4M
-M /usr/lib/ld/map.bssalign -xinline= -xprefetch_level=2
-Wc,-Qlp-ol=1 -xrestrict -xalias_level=strong -fsimple=1
-xlinkopt=2 -lfast

C++ benchmarks:

444.namd: -g0 -library=stlport4 -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast -xpagesize=4M
-xdepend -xalias_level=compatible
-M /usr/lib/ld/map.bssalign -xprefetch_level=1 -xlinkopt=2

447.dealII: -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast -xpagesize=4M
-xdepend -Wl,-M,/usr/lib/ld/map.bssalign -xipo=2 -xrestrict
-xalias_level=std

450.soplex: basepeak = yes

453.povray: -g0 -library=stlport4 -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast -xpagesize=64K
-xdepend -xalias_level=compatible -xipo=2 -xrestrict
-xlinkopt=2

Continued on next page

SPEC CFP2006 Result

Sun Microsystems
Sun SPARC Enterprise T5240

SPECfp_rate2006 = 133
SPECfp_rate_base2006 = 124

CPU2006 license: 6
Test sponsor: Sun Microsystems
Tested by: Sun Microsystems

Test date: Feb-2009
Hardware Availability: Jul-2009
Software Availability: Dec-2008

Peak Optimization Flags (Continued)

Fortran benchmarks:

410.bwaves: basepeak = yes

416.gamess: -g -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast -xpagesize=4M
-M /usr/lib/ld/map.bssalign -xlinkopt=2

434.zeusmp: -g -fast -xpagesize=4M -M /usr/lib/ld/map.bssalign -xipo=1
-qoption cg -Qeps:enabled=1 -qoption cg -Qeps:ws=8 -lmopt

437.leslie3d: -g -fast -xpagesize_heap=4M -xpagesize_stack=64K
-M /usr/lib/ld/map.bssalign -xprefetch_level=3
-xprefetch=latx:1.6 -qoption cg -Qlp=1 -qoption cg -Qlp-fa=0
-qoption cg -Qlp-fl=1 -qoption cg -Qlp-av=448
-qoption cg -Qlp-t=4

459.GemsFDTD: basepeak = yes

465.tonto: -g -fast -xpagesize=4M -M /usr/lib/ld/map.bssalign -xipo=2
-lfast

Benchmarks using both Fortran and C:

435.gromacs: -g -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast(cc) -fast(f90)
-xpagesize=4M -M /usr/lib/ld/map.bssalign -xipo=1 -xinline=
-xarch=generic -xchip=generic -fsimple=0

436.cactusADM: -g -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast(cc) -fast(f90)
-xpagesize=4M -M /usr/lib/ld/map.bssalign -xipo=2
-fsimple=1 -xlinkopt=2

454.calculix: basepeak = yes

481.wrf: -g -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast(cc) -fast(f90)
-xpagesize=4M -M /usr/lib/ld/map.bssalign -xlinkopt=2

Peak Other Flags

C benchmarks:
-xjobs=32 -V -#

Continued on next page

SPEC CFP2006 Result

Sun Microsystems	SPECfp_rate2006 =	133
Sun SPARC Enterprise T5240	SPECfp_rate_base2006 =	124

CPU2006 license: 6
Test sponsor: Sun Microsystems
Tested by: Sun Microsystems

Test date: Feb-2009
Hardware Availability: Jul-2009
Software Availability: Dec-2008

Peak Other Flags (Continued)

C++ benchmarks (except as noted below):
`-xjobs=32 -verbose=diags,version`

447.dealII: `-v`

Fortran benchmarks:
`-xjobs=32 -V -v`

Benchmarks using both Fortran and C:
`-xjobs=32 -V -# -v`

The flags file that was used to format this result can be browsed at
`http://www.spec.org/cpu2006/flags/Sun-Solaris-Studio12-12u1-and-gccfss4.2.r3.html`

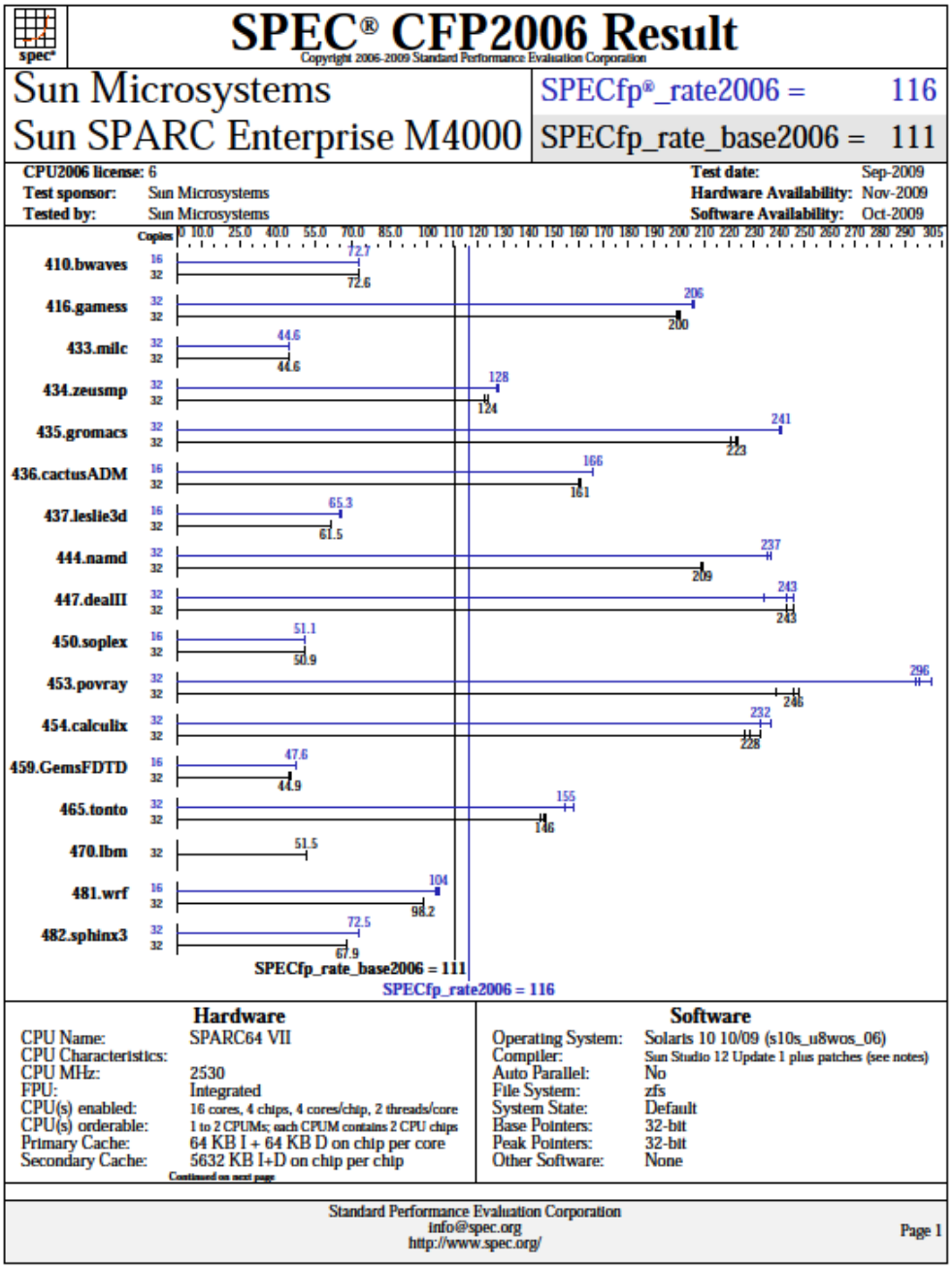
You can also download the XML flags source by saving the following link:
`http://www.spec.org/cpu2006/flags/Sun-Solaris-Studio12-12u1-and-gccfss4.2.r3.xml`

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

Tested with SPEC CPU2006 v1.1.
Report generated on Wed Aug 5 18:23:46 2009 by SPEC CPU2006 PS/PDF formatter v6323.

Solaris 10 10/09 server: Sun SPARC Enterprise M4000

http://www.spec.org/cpu2006/results/res2009q4/cpu2006-20091012-08878.html



SPEC® CFP2006 Result

Copyright 2006-2009 Standard Performance Evaluation Corporation

Sun Microsystems
Sun SPARC Enterprise M4000

SPECfp®_rate2006 = 116

SPECfp_rate_base2006 = 111

CPU2006 license: 6
Test sponsor: Sun Microsystems
Tested by: Sun Microsystems

Test date: Sep-2009
Hardware Availability: Nov-2009
Software Availability: Oct-2009

Hardware

CPU Name:	SPARC64 VII
CPU Characteristics:	
CPU MHz:	2530
FPU:	Integrated
CPU(s) enabled:	16 cores, 4 chips, 4 cores/chip, 2 threads/core
CPU(s) orderable:	1 to 2 CPUMs; each CPUM contains 2 CPU chips
Primary Cache:	64 KB I + 64 KB D on chip per core
Secondary Cache:	5632 KB I+D on chip per chip

Continued on next page

Software

Operating System:	Solaris 10 10/09 (s10s_u8wos_06)
Compiler:	Sun Studio 12 Update 1 plus patches (see notes)
Auto Parallel:	No
File System:	zfs
System State:	Default
Base Pointers:	32-bit
Peak Pointers:	32-bit
Other Software:	None

SPEC CFP2006 Result

Sun Microsystems
Sun SPARC Enterprise M4000

SPECfp_rate2006 = 116

SPECfp_rate_base2006 = 111

CPU2006 license: 6
Test sponsor: Sun Microsystems
Tested by: Sun Microsystems

Test date: Sep-2009
Hardware Availability: Nov-2009
Software Availability: Oct-2009

Hardware (Continued)

L3 Cache: None
Other Cache: None
Memory: 32 GB (32 x 1 GB), 8-way interleaved
Disk Subsystem: 2 x 146 GB SAS 10K RPM
Other Hardware: None

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	32	5992	72.6	5990	72.6	**5992**	**72.6**	16	2991	72.7	2991	72.7	**2991**	**72.7**
416.gamess	32	3127	200	**3136**	**200**	3142	199	32	3051	205	3041	206	**3043**	**206**
433.milc	32	**6592**	**44.6**	6593	44.6	6587	44.6	32	**6582**	**44.6**	6577	44.7	6583	44.6
434.zeusmp	32	**2353**	**124**	2345	124	2373	123	32	**2274**	**128**	2283	128	2266	129
435.gromacs	32	1024	223	**1025**	**223**	1037	220	32	948	241	950	240	**949**	**241**
436.cactusADM	32	2383	160	**2382**	**161**	2382	161	16	1152	166	**1154**	**166**	1156	165
437.leslie3d	32	4895	61.5	4892	61.5	**4894**	**61.5**	16	2305	65.3	**2304**	**65.3**	2303	65.3
444.namd	32	**1226**	**209**	1229	209	1226	209	32	1092	235	1083	237	**1085**	**237**
447.dealII	32	**1507**	**243**	1490	246	1508	243	32	**1505**	**243**	1566	234	1489	246
450.soplex	32	5227	51.1	5241	50.9	**5239**	**50.9**	16	2613	51.1	**2612**	**51.1**	2611	51.1
453.povray	32	**693**	**246**	714	238	687	248	32	566	301	578	295	**575**	**296**
454.calculix	32	1166	227	**1156**	**228**	1136	232	32	**1136**	**232**	1115	237	1136	232
459.GemsFDTD	32	7489	45.3	**7561**	**44.9**	7573	44.8	16	**3563**	**47.6**	3564	47.6	3562	47.7
465.tonto	32	2174	145	2144	147	**2150**	**146**	32	2033	155	1993	158	**2033**	**155**
470.lbm	32	8545	51.5	**8545**	**51.5**	8546	51.5	32	8545	51.5	**8545**	**51.5**	8546	51.5
481.wrf	32	3638	98.2	3646	98.0	**3641**	**98.2**	16	**1716**	**104**	1712	104	1727	104
482.sphinx3	32	**9190**	**67.9**	9191	67.9	9178	68.0	32	8597	72.5	**8600**	**72.5**	8627	72.3

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

Compiler Invocation Notes

```
Sun Studio 12 Update 1 was used, plus patch 119963-17

Sun Studio compiler patches are available at
  http://developers.sun.com/sunstudio/downloads/patches/ss12u1_patches.jsp
```

Submit Notes

```
Processes were assigned to specific processors using 'pbind'
commands.  The config file option 'submit' was used, along
with a list of processors in the 'BIND' variable, to generate
the pbind commands.  (For details, please see the config file.)
```

SPEC CFP2006 Result

Sun Microsystems
Sun SPARC Enterprise M4000

SPECfp_rate2006 = 116

SPECfp_rate_base2006 = 111

CPU2006 license: 6
Test sponsor: Sun Microsystems
Tested by: Sun Microsystems

Test date: Sep-2009
Hardware Availability: Nov-2009
Software Availability: Oct-2009

Operating System Notes

```
ulimit -s 131072 was used to allow the stack to grow
up to 131072 KB (aka 128 MB).  Note that saying "131072"
is preferable to "unlimited", because there is a tradeoff
between space for the stack vs. space for the heap.


System Tunables (/etc/system parameters):

tune_t_fsflushr=10
    Controls how many seconds elapse between runs of the
    page flush daemon, fsflush.
autoup=600
    Causes pages older than the listed number of seconds to
    be written by fsflush.
zfs:zfs_arc_max = 0x10000000
    Control the amount of memory used by ZFS for caching

Other System Settings:

The webconsole service was turned off using
    svcadm disable webconsole

The system had 32 GB of swap space

SPEC CPU2006 used 1 disk, with zfs gzip compression.
```

Platform Notes

```
Memory is 8-way interleaved by filling all slots with
the same capacity DIMMs.

This result is measured on a Sun SPARC Enterprise M4000
Server.  The Sun SPARC Enterprise M4000 and the Fujitsu
SPARC Enterprise M4000 are electrically equivalent.
```

General Notes

```
Environment variables set by runspec before the start of the run:
   OMP_NUM_THREADS = "32"
   SUNW_MP_PROCBIND = "true"
   SUNW_MP_THR_IDLE = "SPIN"
(Although these variables were set prior to the run
they did not affect performance, since the benchmarks
were compiled in serial mode.)

   447.dealII (peak): "apache_stdcxx_4_2_1" src.alt was used.
```

Continued on next page

SPEC CFP2006 Result

Sun Microsystems
Sun SPARC Enterprise M4000

SPECfp_rate2006 = 116
SPECfp_rate_base2006 = 111

CPU2006 license: 6
Test sponsor: Sun Microsystems
Tested by: Sun Microsystems

Test date: Sep-2009
Hardware Availability: Nov-2009
Software Availability: Oct-2009

General Notes (Continued)

447.dealII (base): "apache_stdcxx_4_2_1" src.alt was used.

Compiler Invocation

C benchmarks:
cc

C++ benchmarks:
CC

Fortran benchmarks:
f90

Benchmarks using both Fortran and C:
cc f90

Base Optimization Flags

C benchmarks:
-fast -fma=fused -xipo=2 -xpagesize=4M -xalias_level=std
-xprefetch_auto_type=indirect_array_access -xprefetch_level=3

C++ benchmarks:
-xdepend -fast -fma=fused -xipo=2 -xpagesize=4M
-xalias_level=compatible -xprefetch=latx:0.5 -library=no%Cstd
-I/export/home/apache/stdcxx-4.2.1/include
-I/export/home/apache/stdcxx-4.2.1/build/include
-L/export/home/apache/stdcxx-4.2.1/build/lib
-R/export/home/apache/stdcxx-4.2.1/build/lib -lstd8d

Fortran benchmarks:
-fast -fma=fused -xipo=2 -xpagesize=4M -xprefetch_level=2

Benchmarks using both Fortran and C:
-fast(cc) -fast(f90) -fma=fused -xipo=2 -xpagesize=4M
-xalias_level=std -xprefetch_auto_type=indirect_array_access
-xprefetch_level=3 -xprefetch_level=2

Peak Optimization Flags

C benchmarks:

433.milc: -fast -xpagesize=4M -fma=fused -xipo=2 -xprefetch_level=2
-fsimple=1 -xprefetch_auto_type=indirect_array_access
-W2,-Ainline:rs=400 -xalias_level=std

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Peak Optimization Flags (Continued)

470.lbm: basepeak = yes

482.sphinx3: -xprofile-collect:./feedback(pass 1)
-xprofile-use:./feedback(pass 2) -fast -xpagesize-4M
-fma-fused -xipo-2 -xinline- -xprefetch-no%auto
-xalias_level-strong -lfast -ll2amm

C++ benchmarks:

444.namd: -xdepend -xprofile-collect:./feedback(pass 1)
-xprofile-use:./feedback(pass 2) -fast -xpagesize-4M
-xalias_level-compatible -library-stlport4 -fma-fused
-xipo-2 -xprefetch-no%auto -xlinkopt-2

447.dealII: -xdepend -fast -xpagesize-4M -xalias_level-compatible
-library-no%Cstd -I/export/home/apache/stdcxx-4.2.1/include
-I/export/home/apache/stdcxx-4.2.1/build/include -fma-fused
-xipo-2 -xprefetch-latx:0.5
-L/export/home/apache/stdcxx-4.2.1/build/lib
-R/export/home/apache/stdcxx-4.2.1/build/lib -lstd8d

450.soplex: -xdepend -xprofile-collect:./feedback(pass 1)
-xprofile-use:./feedback(pass 2) -fast -xpagesize-4M
-xalias_level-compatible -library-stlport4 -xipo-1
-xprefetch-no -fsimple-0 -xrestrict

453.povray: -xdepend -xprofile-collect:./feedback(pass 1)
-xprofile-use:./feedback(pass 2) -fast -xpagesize-4M
-xalias_level-compatible -library-stlport4 -xipo-2
-xlinkopt-2

Fortran benchmarks:

410.bwaves: -fast -xpagesize-4M -fma-fused -xipo-2 -xprefetch_level-2

416.gamess: -xprofile-collect:./feedback(pass 1)
-xprofile-use:./feedback(pass 2) -fast -xpagesize-4M
-fma-fused -xipo-2 -xprefetch-no%auto

434.zeusmp: -fast -xpagesize-4M -fma-fused -xipo-2 -xprefetch_level-1
-ll2amm

437.leslie3d: -fast -xpagesize-4M -xprefetch-no

459.GemsFDTD: -fast -xpagesize-4M -fma-fused -fsimple-1 -xprefetch-no

465.tonto: -xprofile-collect:./feedback(pass 1)
-xprofile-use:./feedback(pass 2) -fast -xpagesize-4M
-xipo-2 -xprefetch-no -lfast -ll2amm

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Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

435.gromacs: -xprofile-collect:./feedback(pass 1)
-xprofile-use:./feedback(pass 2) -fast(cc) -fast(f90)
-xpagesize-4M -fma-fused -xipo-2 -xchip-generic -xinline-
-fsimple-0

436.cactusADM: -fast(cc) -fast(f90) -xpagesize-4M -fma-fused -xipo-2
-xprefetch-latx:0.7 -fsimple-1

454.calculix: -fast(cc) -fast(f90) -xpagesize-4M -fma-fused -xipo-2
-xprefetch_level-1 -xalias_level-std
-xprefetch_auto_type-indirect_array_access

481.wrf: -xprofile-collect:./feedback(pass 1)
-xprofile-use:./feedback(pass 2) -fast(cc) -fast(f90)
-xpagesize-4M -xipo-2 -xprefetch_level-2

Other Flags

C benchmarks:
-xjobs-32 -V -#

C++ benchmarks:
-xjobs-32 -verbose-diags,version

Fortran benchmarks:
-xjobs-32 -V -v

Benchmarks using both Fortran and C:
-xjobs-32 -V -# -v

The flags file that was used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/Sun-Solaris-Studio12-12u1-and-gccfss4.2.r4.html

You can also download the XML flags source by saving the following link:
http://www.spec.org/cpu2006/flags/Sun-Solaris-Studio12-12u1-and-gccfss4.2.r4.xml

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For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

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ABOUT PRINCIPLED TECHNOLOGIES

Principled Technologies, Inc.
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We provide industry-leading technology assessment and fact-based marketing services. We bring to every assignment extensive experience with and expertise in all aspects of technology testing and analysis, from researching new technologies, to developing new methodologies, to testing with existing and new tools.

When the assessment is complete, we know how to present the results to a broad range of target audiences. We provide our clients with the materials they need, from market-focused data to use in their own collateral to custom sales aids, such as test reports, performance assessments, and white papers. Every document reflects the results of our trusted independent analysis.

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

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