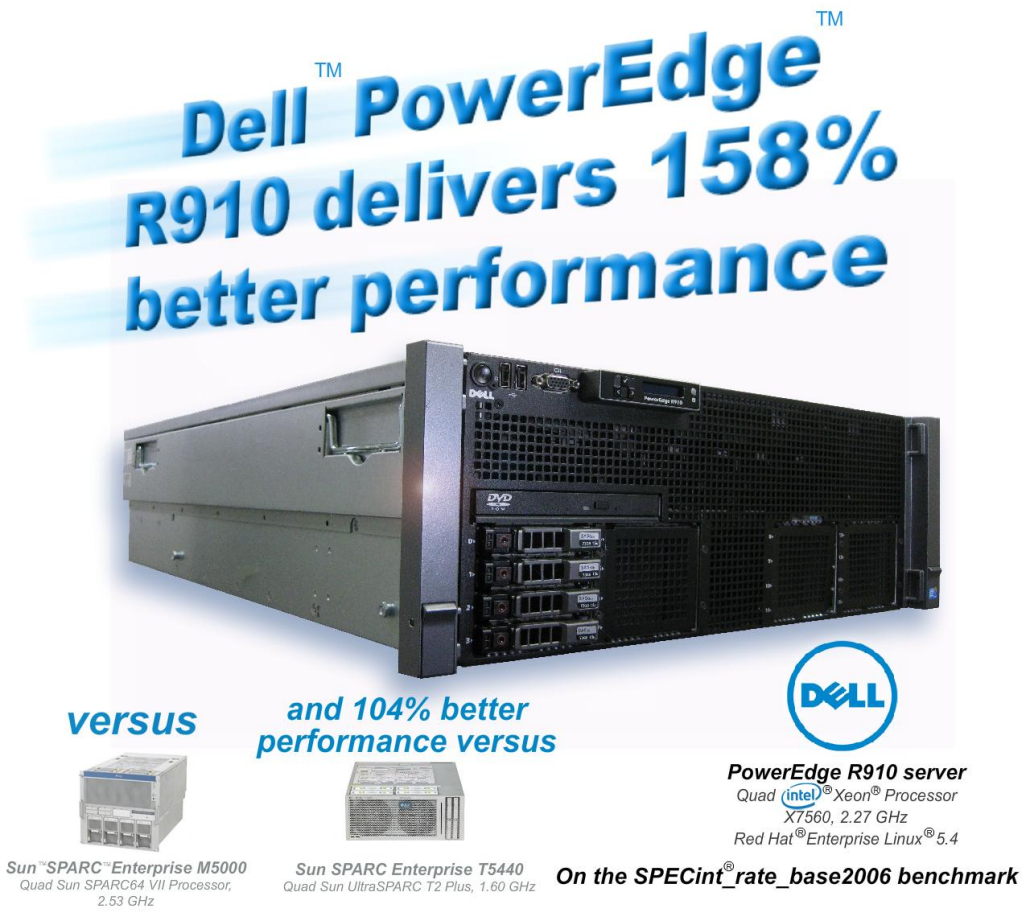
DELL VS. SUN SERVERS: R910 PERFORMANCE COMPARISON SPECint_rate_base2006



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 server with four Intel Xeon Processor X7560s delivered higher performance results than the publicly available benchmark scores of the Sun SPARC Enterprise M5000 and T5440 servers. These results demonstrate the potential performance improvements of the Dell server.

OUR PROCESS

We used the SPECint_rate_base2006 test of the industry-standard SPEC CPU2006 benchmark to focus on and measure the processor performance of the Dell PowerEdge R910 server. We then compared our results to publicly available SPECint_rate_base2006 results of the two Sun servers.

MARCH 2010
A PRINCIPLED TECHNOLOGIES TEST REPORT
Commissioned by Dell Corp.

PROJECT OVERVIEW

The Dell PowerEdge R910 server achieved a SPECint_rate_base2006 score of 691, a 104.4 percent increase over the Sun SPARC Enterprise T5440 server, which achieved a SPECint_rate_base2006 score of 338, and a 158.8 percent increase over the Sun SPARC Enterprise M5000 server, which achieved a SPECint_rate_base2006 score of 267.[1] (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 performance, is also available. For this report, we ran only the CINT2006 SPECint_rate_base2006 benchmark on three servers in similar common enterprise configurations.

Due to licensing issues, we did not actually test SPECint_rate_base2006 on the Sun SPARC Enterprise T5440 and the Sun SPARC Enterprise M5000. Instead, we used the highest posted result for each Sun system on SPEC's site, which was 338 (http://www.spec.org/cpu2006/results/res2009q3/cpu2006-20090717-08200.html) for the T5440 and 267 (http://www.spec.org/cpu2006/results/res2009q4/cpu2006-20091012-08882.html) for the M5000.

Figure 2 shows the system configuration overview

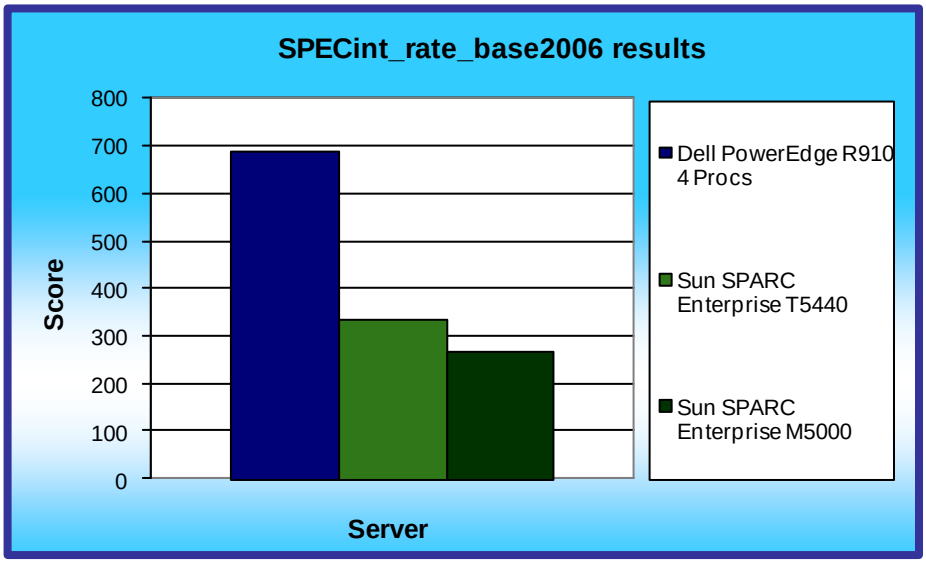


Figure 1: SPECint_rate_base2006 results for the three servers. Higher numbers are better.

[1] Source: Principled Technologies®, Inc., "Dell vs. Sun servers: R910 performance comparison SPECint_rate_base2006," a March 2010 report commissioned by Dell. For the latest SPECint_rate_base2006 benchmarks, visit www.spec.org.

for the similarly configured Dell PowerEdge R910, Sun SPARC Enterprise T5440, and Sun SPARC Enterprise M5000 servers.

Servers	Dell PowerEdge R910	Sun SPARC Enterprise T5440	Sun SPARC Enterprise M5000
Processors	Quad Intel Xeon Processor X7560, 2.27 GHz	Quad UltraSPARC T2 Plus, 1.60 GHz	Eight Sun SPARC64 VII Processor, 2.53 GHz
Memory	32 x 4GB PC3-8500 DDR3	64 x 4GB	64 x 2GB
Hard disks	2 x 73GB, SAS 6.0 GB/s	24 x 73GB, SAS	24 x 73GB, SAS
Operating system	Red Hat Enterprise Linux 5.4 (2.6.18-164.9.1.el5)	Solaris 10 5/09	Solaris 10 10/09
Compiler	Intel C/C++ Compiler 11.1.064	Sun Studio 12 Update 1	Sun Studio 12 Update 1

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

Generally, a system achieves the best SPECint_rate2006 score using the same number of users as execution units for a given server. The optimum user count for our testing on our Dell system was 64, the number of execution units (logical or physical processors) on those servers.

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

A CINT2006 run performs each of the 12 application (tasks) three times and reports the median for each. It also calculates the geometric mean of those 12 results to produce an overall score.

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

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

WHAT WE FOUND

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

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

Server	SPECint_rate_base2006 results
Dell PowerEdge R910	691
Sun SPARC Enterprise T5440	338
Sun SPARC Enterprise M5000	267

Figure 4: SPECint_rate_base2006 results for the three test servers. Higher scores are better.

HOW WE TESTED

Adjusting BIOS settings

We used all of the default BIOS settings on the Dell PowerEdge R910 server 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

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 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.

SPECCPU2006 configuration

Intel compiled and provided the SPEC CINT2006 executables, but followed SPEC's standard instructions for building the executables using the following software tools for the Dell PowerEdge R910:

- Intel C/C++ Compiler 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 we used for the Dell PowerEdge R910. The configuration file we used appears in Appendix B.

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

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 64 users on our server)

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

Appendix C provides the SPECint_rate_base2006 output results for each of the three servers.

APPENDIX A – TEST SERVER INFORMATION

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

Servers	Dell PowerEdge R910
General dimension information	
Height (inches)	7.00
Width (inches)	17.25
Depth (inches)	29.00
U size in server rack (U)	4
Power supplies	
Total number	4
Brand and model	Dell Z1100P-00
Wattage (W)	1,023
Cooling fans	
Total number	6
Dimensions (h x w)	5” x 5”
Voltage (V)	12
Amps (A)	4.80
General processor setup	
Number of processor packages	4
Number of cores per processor package	8
Number of hardware threads per core	2
CPU	
Vendor	Intel
Name	Xeon X7560
Stepping	D0
Socket type	LGA1567
Core frequency (GHz)	2.27
L1 cache	32 KB + 32 KB
L2 cache	256 KB (per core)
L3 cache (MB)	24
Platform	
Vendor and model number	Dell PowerEdge R910
Motherboard model number	0P658H
Motherboard revision number	X23
BIOS name and version	Dell 1.0.1 (02/19/2010)
BIOS settings	Power Management set to Maximum Performance
Memory modules	
Total RAM in system (GB)	128
Vendor and model number	Hynix HMT151R7BFR8C-G7
Type	PC3-8500 DDR3

Servers	Dell PowerEdge R910
Speed (MHz)	1,066
Speed in the system currently running @ (MHz)	1,066
Timing/latency (tCL-tRCD-iRP-tRASmin)	7-7-7-20
Size (GB)	128
Number of RAM modules	32
Chip organization	Double-sided
Hard disk	
Vendor and model number	Seagate ST973452SS
Number of disks in system	2
Size (GB)	73
Buffer size (MB)	16
RPM	15,000
Type	SAS 6.0 GB/s
Controller	Dell PERC H700
Operating system	
Name	Red Hat Enterprise Linux 5.4
Kernel release	2.6.18-164.9.1.el5 x86_64
Kernel version	SMP Wed Dec 9 03:27:37 EST 2009
File system	ext3
Language	English
Network card/subsystem	
Vendor and model number	Broadcom NetXtreme II 5709C Ethernet
Type	PCI-E
USB	
Number	4
Type	2.0

Figure 5: Detailed configuration information for the Dell PowerEdge R910 test server.

APPENDIX B – SPECINT_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     = 1,2,3,4 chip
hw_ncores        = 32
hw_nchips        = 4
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
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 – SPECINT2006 OUTPUT

This appendix provides the SPECint2006 output files from the median run for the test servers.

Red Hat Enterprise Linux 5.4 server: Dell PowerEdge R910

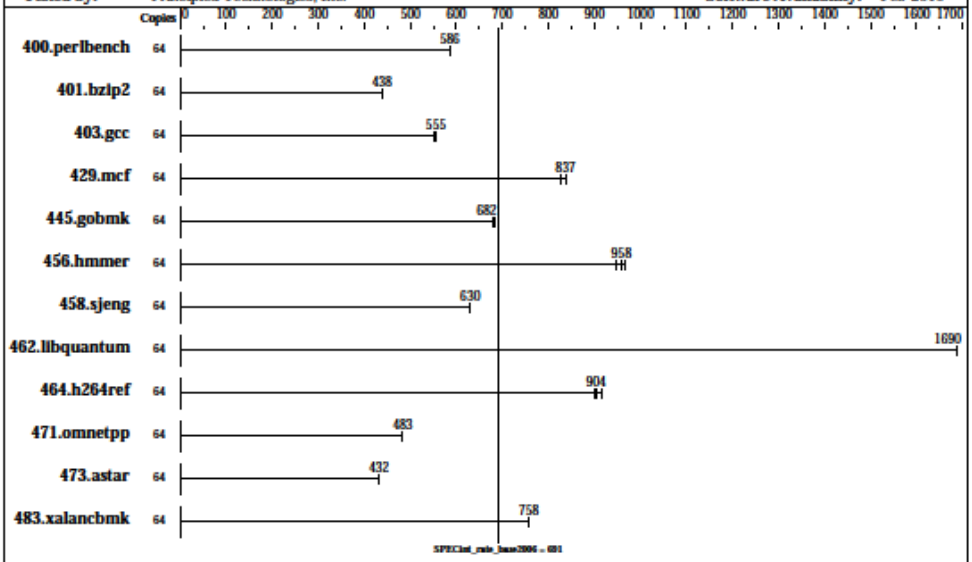
SPEC® CINT2006 Result

Dell, Inc.
Dell PowerEdge R910

SPECint®_rate2006 = Not Run
SPECint_rate_base2006 = 691

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

CPU Name:	Intel Xeon X7560
CPU Characteristics:	
CPU MHz:	2270
FPU:	Integrated
CPU(s) enabled:	32 cores, 4 chips, 8 cores/chip, 2 threads/core
CPU(s) orderable:	1,2,3,4 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core
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

Operating System:	Red Hat Enterprise Linux (kernel 2.6.18-164.9.1.el5 x86_64)
Compiler:	Intel C++ Professional Compiler for IA32 and Intel 64, Version 11.1 Build 20091130 Package ID: l_cproc_p_11.1.064
Auto Parallel:	No
File System:	ext3
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other Software:	Microquill SmartHeap V8.1 Binutils 2.18.50.0.7.20080502

SPEC CINT2006 Result

Dell, Inc.
Dell PowerEdge R910

SPECint_rate2006 = Not Run

SPECint_rate_base2006 = 691

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

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

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
400.perlbench	64	1067	586	1068	586	**1068**	**586**							
401.bzip2	64	1408	439	**1409**	**438**	1409	438							
403.gcc	64	935	551	926	557	**928**	**555**							
429.mcf	64	695	840	**697**	**837**	707	826							
445.gobmk	64	986	681	982	683	**984**	**682**							
456.hmmer	64	618	966	**623**	**958**	630	948							
458.sjeng	64	**1229**	**630**	1227	631	1231	629							
462.libquantum	64	**786**	**1690**	786	1690	787	1690							
464.h264ref	64	1572	901	**1567**	**904**	1548	915							
471.omnetpp	64	828	483	828	483	**828**	**483**							
473.astar	64	1041	432	**1041**	**432**	1039	432							
483.xalancbmk	64	583	757	**583**	**758**	583	758							

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  -m32
```

C++ benchmarks:
```
icpc -m32
```

Base Portability Flags

```
400.perlbench: -DSPEC_CPU_LINUX_IA32
462.libquantum: -DSPEC_CPU_LINUX
483.xalancbmk: -DSPEC_CPU_LINUX
```

Base Optimization Flags

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

Continued on next page

SPEC CINT2006 Result

Dell, Inc.
Dell PowerEdge R910

SPECint_rate2006 = Not Run
SPECint_rate_base2006 = 691

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 Optimization Flags (Continued)

C++ benchmarks:
-xSSE4.2 -ipo -O3 -no-prec-div -opt-prefetch -Wl,-z,muldefs
-L/home/cmplr/usr3/alrahate/cpu2006.1.1.ic11.1/libic11.1-32bit -lsmartheap

Base Other Flags

C benchmarks:

403.gcc: -Dalloca=_alloca

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 Fri Mar 12 13:02:49 2010 by SPEC CPU2006 PS/PDF formatter v6128.

Solaris 10 10/08 server: Sun SPARC Enterprise T5440
http://www.spec.org/cpu2006/results/res2009q3/cpu2006-20090717-08200.html

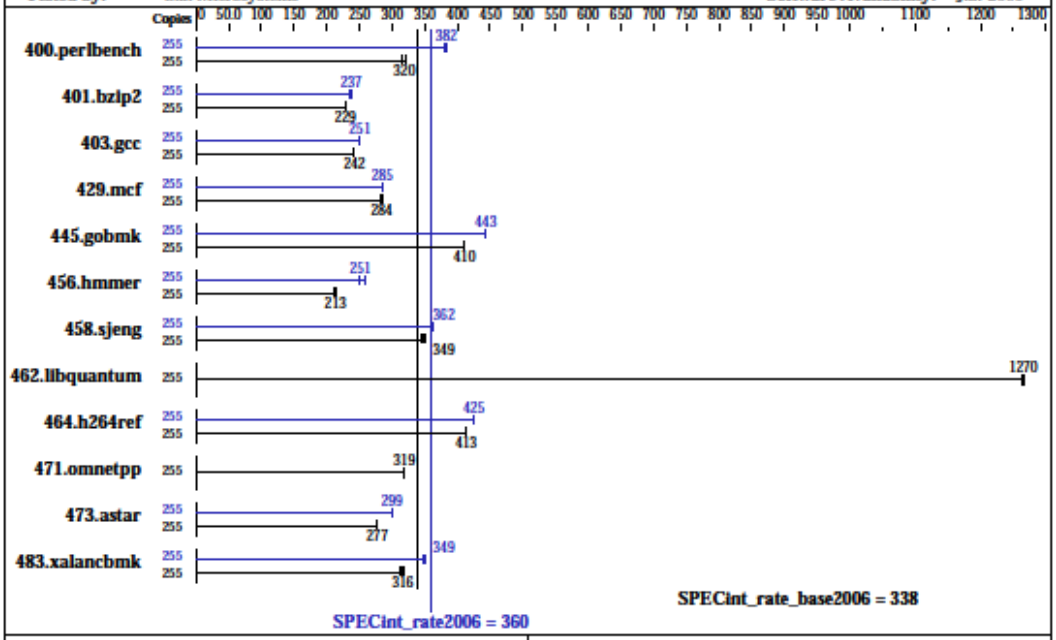
SPEC® CINT2006 Result

Sun Microsystems
Sun SPARC Enterprise T5440

SPECint®_rate2006 = 360
SPECint_rate_base2006 = 338

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

Test date: May-2009
Hardware Availability: Jul-2009
Software Availability: Jun-2009



Hardware

CPU Name:	UltraSPARC T2 Plus
CPU Characteristics:	
CPU MHz:	1596
FPU:	Integrated
CPU(s) enabled:	32 cores, 4 chips, 8 cores/chip, 8 threads/core
CPU(s) orderable:	1 to 4 chips
Primary Cache:	16 KB I + 8 KB D on chip per core
Secondary Cache:	4 MB I+D on chip per chip
L3 Cache:	None
Other Cache:	None
Memory:	256 GB (64 x 4 GB)
Disk Subsystem:	536 GB (zfs 8 x 3-way mirrors) on 24x 73GB 15000RPM FC-AL disks in 2x SE3510 enclosures
Other Hardware:	None

Software

Operating System:	Solaris 10 5/09
Compiler:	Sun Studio 12 Update 1 and gccfss V4.2.1 (see additional detail below)
Auto Parallel:	No
File System:	zfs
System State:	Default
Base Pointers:	32-bit
Peak Pointers:	32-bit
Other Software:	None

SPEC CINT2006 Result

Sun Microsystems
Sun SPARC Enterprise T5440

SPECint_rate2006 = 360

SPECint_rate_base2006 = 338

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

Test date: May-2009
Hardware Availability: Jul-2009
Software Availability: Jun-2009

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
400.perlbench	255	7771	321	**7789**	**320**	7922	314	255	6524	382	**6514**	**382**	6510	383
401.bzip2	255	10759	229	**10766**	**229**	10790	228	255	10402	237	10332	238	**10369**	**237**
403.gcc	255	8476	242	**8478**	**242**	8504	241	255	**8190**	**251**	8186	251	8199	250
429.mcf	255	**8193**	**284**	8198	284	8184	284	255	8161	285	8168	285	**8165**	**285**
445.gobmk	255	**6517**	**410**	6514	411	6523	410	255	6032	443	**6034**	**443**	6042	443
456.hmmer	255	**11162**	**213**	11210	212	11158	213	255	9212	258	9489	251	**9482**	**251**
458.sjeng	255	**8834**	**349**	8817	350	8946	345	255	**8519**	**362**	8564	360	8519	362
462.libquantum	255	4182	1260	**4175**	**1270**	4171	1270	255	4182	1260	**4175**	**1270**	4171	1270
464.h264ref	255	13671	413	13646	414	**13651**	**413**	255	**13284**	**425**	13277	425	13289	425
471.omnetpp	255	5031	317	4987	320	**5001**	**319**	255	5031	317	4987	320	**5001**	**319**
473.astar	255	6470	277	**6458**	**277**	6456	277	255	5981	299	**5978**	**299**	5977	299
483.xalancbmk	255	5535	318	5623	313	**5564**	**316**	255	5073	347	**5039**	**349**	5031	350

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 pre-release build 41.1 was used.

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

Submit Notes

```
A processor set was created using
  psrset -c 1-255
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.
```

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Operating System Notes (Continued)

```
/etc/system parameters
   autoup=600
      Causes pages older than the listed number of seconds to
      be written by fsflush.
   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.
   zfs:zfs_arc_max = 0x10000000
      Limits the consumption of memory by the zfs file system

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

The system had 137 GB of swap space.
```

Platform Notes

```
This result was measured on a Sun SPARC Enterprise T5440.
The Sun SPARC Enterprise T5440 and the Fujitsu SPARC
Enterprise T5440 are electrically equivalent.
```

Base Compiler Invocation

C benchmarks:
cc

C++ benchmarks:
CC

Base Portability Flags

400.perlbench: -DSPEC_CPU_SOLARIS_SPARC
403.gcc: -DSPEC_CPU_SOLARIS
462.libquantum: -DSPEC_CPU_SOLARIS
483.xalancbmk: -DSPEC_CPU_SOLARIS

SPEC CINT2006 Result

Sun Microsystems
Sun SPARC Enterprise T5440

SPECint_rate2006 = 360
SPECint_rate_base2006 = 338

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

Test date: May-2009
Hardware Availability: Jul-2009
Software Availability: Jun-2009

Base Optimization Flags

C benchmarks:
```
-g -fast -xipo=2 -xpagesize=4M -xprefetch=no%auto -xalias_level=std
-M /usr/lib/ld/map.bssalign
```

C++ benchmarks:
```
-g0 -library=stlport4 -fast -xipo=2 -xpagesize=4M -xprefetch=no%auto
-xdepend -xalias_level=compatible -M /usr/lib/ld/map.bssalign
```

Base Other Flags

C benchmarks:
```
-xjobs=32 -V -#
```

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

Peak Compiler Invocation

C benchmarks (except as noted below):
cc

403.gcc: gcc

456.hmmer: gcc

C++ benchmarks:
cc

Peak Portability Flags

400.perlbench: -DSPEC_CPU_SOLARIS_SPARC
462.libquantum: -DSPEC_CPU_SOLARIS
483.xalancbmk: -DSPEC_CPU_SOLARIS

Peak Optimization Flags

C benchmarks:

400.perlbench:
```
-g -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast -xpagesize=4M
-xprefetch=no%auto -M /usr/lib/ld/map.bssalign
-xalias_level=std -xipo=2 -Xc -xrestrict -lfast
```

Continued on next page

Peak Optimization Flags (Continued)

401.bzip2: -g -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast -xpagesize=4M
-M /usr/lib/ld/map.bssalign -xalias_level=strong

403.gcc: -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast -xpagesize=4M
-xprefetch=no%auto -Wl,-M,/usr/lib/ld/map.bssalign -xipo=2
-xalias_level=std

429.mcf: -g -fast -xprefetch=no%auto -M /usr/lib/ld/map.bssalign
-xipo=2 -xrestrict -xalias_level=std -lfast

445.gobmk: -g -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast -xpagesize=4M
-xprefetch=no%auto -M /usr/lib/ld/map.bssalign
-xalias_level=std -xrestrict

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

458.sjeng: -g -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast -xpagesize=4M
-xprefetch=no%auto -M /usr/lib/ld/map.bssalign -xipo=2

462.libquantum: basepeak = yes

464.h264ref: -g -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast -xpagesize=4M
-xprefetch=no%auto -M /usr/lib/ld/map.bssalign -xipo=2
-xalias_level=std

C++ benchmarks:

471.omnetpp: basepeak = yes

473.astar: -g0 -library=stlport4 -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast -xpagesize_heap=4M
-xpagesize_stack=64K -xprefetch=no%auto -xdepend
-xalias_level=compatible -M /usr/lib/ld/map.bssalign
-xipo=2 -xarch=v8plusb -lfast -lbsdmalloc

483.xalancbmk: -g0 -library=stlport4 -fast -xpagesize=4M
-xprefetch=no%auto -xdepend -xalias_level=compatible
-M /usr/lib/ld/map.bssalign -xipo=2 -lfast

SPEC CINT2006 Result

Sun Microsystems	SPECint_rate2006 = 360
Sun SPARC Enterprise T5440	SPECint_rate_base2006 = 338

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

Test date: May-2009
Hardware Availability: Jul-2009
Software Availability: Jun-2009

Peak Other Flags

C benchmarks (except as noted below):
`-xjobs=32 -V -#`

403.gcc: `-v`

456.hmmer: `-v`

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

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 18:24:24 2009 by SPEC CPU2006 PS/PDF formatter v6323.

Solaris 10 10/09 server: Sun SPARC Enterprise M5000
http://www.spec.org/cpu2006/results/res2009q4/cpu2006-20091012-08882.html

SPEC® CINT2006 Result

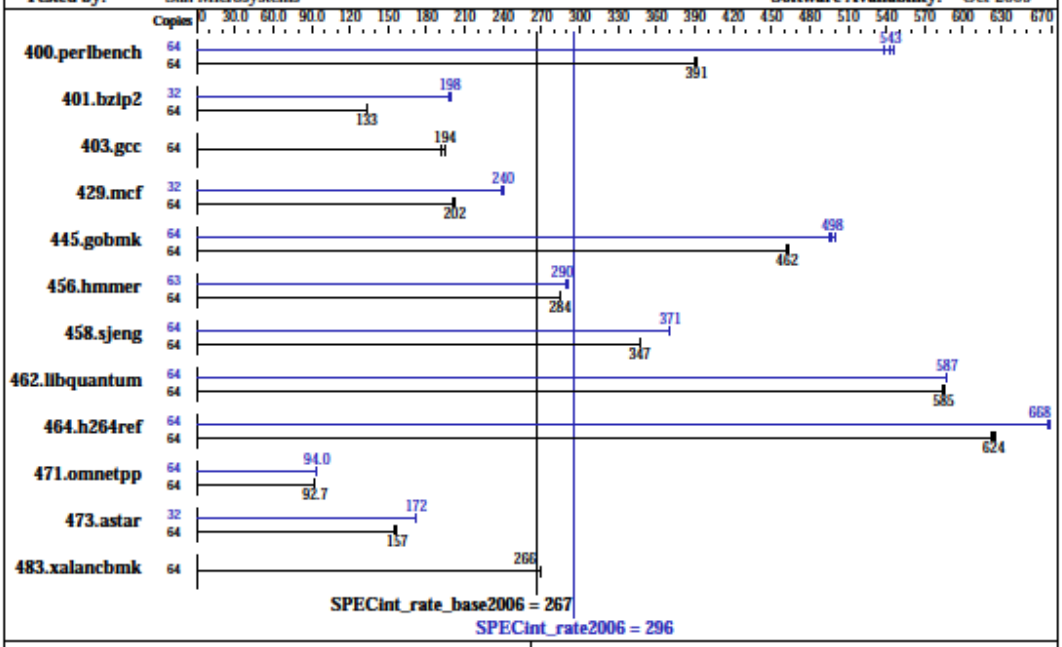
Sun Microsystems
Sun SPARC Enterprise M5000

SPECint®_rate2006 = 296

SPECint_rate_base2006 = 267

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:	32 cores, 8 chips, 4 cores/chip, 2 threads/core
CPU(s) orderable:	1 to 4 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
L3 Cache:	None
Other Cache:	None
Memory:	128 GB (64 x 2 GB), 8-way interleaved
Disk Subsystem:	536 GB (zfs 8 x 3-way mirrors) on 24 x 73GB 15000RPM FC-AL disks in 2 x SE3510 enclosures
Other Hardware:	None

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

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

SPEC CINT2006 Result

Sun Microsystems
Sun SPARC Enterprise M5000

SPECint_rate2006 = 296

SPECint_rate_base2006 = 267

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

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

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
400.perlbench	64	1601	390	**1598**	**391**	1596	392	64	1163	537	1144	547	**1151**	**543**
401.bzip2	64	4630	133	4651	133	**4640**	**133**	32	1561	198	**1558**	**198**	1548	199
403.gcc	64	2647	195	2687	192	**2651**	**194**	64	2647	195	2687	192	**2651**	**194**
429.mcf	64	**2890**	**202**	2889	202	2898	201	32	1215	240	1218	240	**1217**	**240**
445.gobmk	64	**1452**	**462**	1450	463	1453	462	64	1341	501	1354	496	**1349**	**498**
456.hmmer	64	**2099**	**284**	2099	285	2102	284	63	**2025**	**290**	2023	291	2032	289
458.sjeng	64	2234	347	**2232**	**347**	2232	347	64	2088	371	**2088**	**371**	2090	370
462.libquantum	64	2272	584	2267	585	**2268**	**585**	64	2258	587	2257	587	**2257**	**587**
464.h264ref	64	**2269**	**624**	2266	625	2275	623	64	2118	669	2125	667	**2120**	**668**
471.omnetpp	64	**4316**	**92.7**	4313	92.7	4319	92.6	64	4252	94.1	**4253**	**94.0**	4255	94.0
473.astar	64	**2863**	**157**	2892	155	2862	157	32	1305	172	1314	171	**1308**	**172**
483.xalancbmk	64	**1660**	**266**	1662	266	1643	269	64	**1660**	**266**	1662	266	1643	269

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.)
```

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
```

Continued on next page

SPEC CINT2006 Result

Sun Microsystems
Sun SPARC Enterprise M5000

SPECint_rate2006 = 296

SPECint_rate_base2006 = 267

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 (Continued)

```
    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
lpg_alloc_prefer=1
    Prefer local pages, even if not easily available

Other System Settings:

The webconsole service was turned off using
    svcadm disable webconsole

The system had 50 GB of swap space
```

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 M5000
Server.  The Sun SPARC Enterprise M5000 and the Fujitsu
SPARC Enterprise M5000 are electrically equivalent.
```

General Notes

```
Environment variables set by runspec before the start of the run:
   OMP_NUM_THREADS = "64"
   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.)
```

Compiler Invocation

C benchmarks:
    cc

C++ benchmarks:
    CC

SPEC CINT2006 Result

Sun Microsystems
Sun SPARC Enterprise M5000

SPECint_rate2006 = 296

SPECint_rate_base2006 = 267

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

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

Portability Flags

400.perlbench: -DSPEC_CPU_SOLARIS_SPARC
403.gcc: -DSPEC_CPU_SOLARIS
462.libquantum: -DSPEC_CPU_SOLARIS
483.xalancbmk: -DSPEC_CPU_SOLARIS

Base Optimization Flags

C benchmarks:
-fast -fma=fused -xipo=2 -xpagesize=4M -xarch=sparcfmaf
-xalias_level=std -ll2amm

C++ benchmarks:
-xdepend -fast -fma=fused -xipo=2 -xpagesize=4M -xarch=sparcfmaf
-xalias_level=compatible -library=stlport4 -lfast

Peak Optimization Flags

C benchmarks:

400.perlbench: -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast -xpagesize=4M
-M /usr/lib/ld/map.bssalign -fma=fused -xipo=2
-xalias_level=std -xrestrict -xprefetch=no%auto -Xc
-lfast

401.bzip2: -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast -xpagesize=4M
-fma=fused -xalias_level=strong

403.gcc: basepeak = yes

429.mcf: -fast -xpagesize=4M -xipo=2 -xalias_level=std -xrestrict
-xprefetch=no -lfast

445.gobmk: -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast -xpagesize=4M
-fma=fused -xarch=sparcfmaf -xalias_level=std -xrestrict
-ll2amm

456.hmmer: -xprofile=collect:./feedback(pass 1)
-xprofile=use:./feedback(pass 2) -fast -xpagesize=4M
-fma=fused -xipo=2

458.sjeng: Same as 456.hmmer

Continued on next page

SPEC CINT2006 Result

Sun Microsystems
Sun SPARC Enterprise M5000

SPECint_rate2006 = 296
SPECint_rate_base2006 = 267

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

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

Peak Optimization Flags (Continued)

462.libquantum: -fast -xpagesize-4M -xipo-2 -xprefetch-no -fma-fused
-lbsdmalloc

464.h264ref: -xprofile-collect:./feedback(pass 1)
-xprofile-use:./feedback(pass 2) -fast -xpagesize-4M
-xipo-2 -xarch-sparcfmaf -xalias_level-std -xprefetch-no
-ll2amm

C++ benchmarks:

471.omnetpp: -xdepend -xprofile-collect:./feedback(pass 1)
-xprofile-use:./feedback(pass 2) -fast -xpagesize-4M
-xalias_level-compatible -library-stlport4 -fma-fused
-xipo-2 -xprefetch_level-2 -Qoption cg -Qlp-av-0 -lfast

473.astar: -xdepend -xprofile-collect:./feedback(pass 1)
-xprofile-use:./feedback(pass 2) -fast -xpagesize-4M
-xalias_level-compatible -library-stlport4
-M /usr/lib/ld/map.bssalign -fma-fused -xipo-2
-xprefetch-no%auto -lfast -lbsdmalloc

483.xalancbmk: basepeak = yes

Other Flags

C benchmarks:
-xjobs-32 -V -#

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

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

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 Oct 28 11:54:04 2009 by SPEC CPU2006 PS/PDF formatter v6323.

ABOUT PRINCIPLED TECHNOLOGIES

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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.