SPEC CPU2000 SPECfp_rate_base performance on Intel- and AMD-processor-based servers running Red Hat Enterprise Linux v.4.4

Executive summary

Intel Corporation (Intel) commissioned Principled Technologies (PT) to measure the SPEC CPU2000 SPECfp_rate_base performance of the following dual-processor servers running Red Hat Enterprise Linux v.4.4:

- Supermicro A+ Server 2021M-T2R+V with dual-core AMD Opteron processor model 2220 SE
- Supermicro SuperServer 6025B-TR+V with Quad-Core Intel Xeon processor X5355

KEY FINDING

- The Supermicro SuperServer 6025B-TR+V with two Quad-Core Intel Xeon processor X5355s delivered almost 25 percent higher peak performance than the Supermicro A+ Server 2021M-T2R+V with two dual-core AMD Opteron processor model 2220 SEs (see Figure 1).

In this section, we discuss the best results for each server. For details of the performance of each server with each number of benchmark instances (or, in SPEC CPU2000 terms, users), see the Test results section.

Figure 1 shows the SPECfp_rate_base2000 results of the test servers for runs with two, four, and eight users . Each result is the SPECfp_rate_base score in operations per second. By default, the benchmark performs three runs and uses the median result. A higher score is better.

A server will typically achieve its best SPECint_rate_base2000 results when it runs the same number of users as its available execution units. The Supermicro A+ Server 2021M-T2R+V with two dual-core AMD Opteron processor model 2220 SEs has 2 physical processors with 2 cores per processor, or 4 available execution units. Thus, we expected the optimum users for this server would also be 4. In our testing, however, the optimum number of users proved to be 8, though the improvement over 4 users was tiny. Because the Supermicro A+ Server 2021M-T2R+V with two dual-core AMD Opteron processor model 2220 SEs did achieve a 0.6 percent higher score with 8 users than with 4 users, we used its 8-user score as its peak in this report. The Supermicro SuperServer 6025B-TR+V with two Quad-Core Intel Xeon processor X5355s-based server has 2 physical processors with 4 cores per processor, or 8 available execution units, so as we expected 8 users yielded its optimum results.

The Supermicro SuperServer 6025B-TR+V with two Quad-Core Intel Xeon processor X5355s produced the highest optimum results, 99.5, and yielded a 24.4 percent peak performance increase over the Supermicro A+ Server 2021M-T2R+V with two dual-core AMD Opteron processor model 2220 SEs, which achieved a score of 80.0.

SPECfp_rate_base2000 results

Legend:
- Supermicro A+ Server 2021M-T2R+V with dual-core AMD Opteron processor model 2220 SE
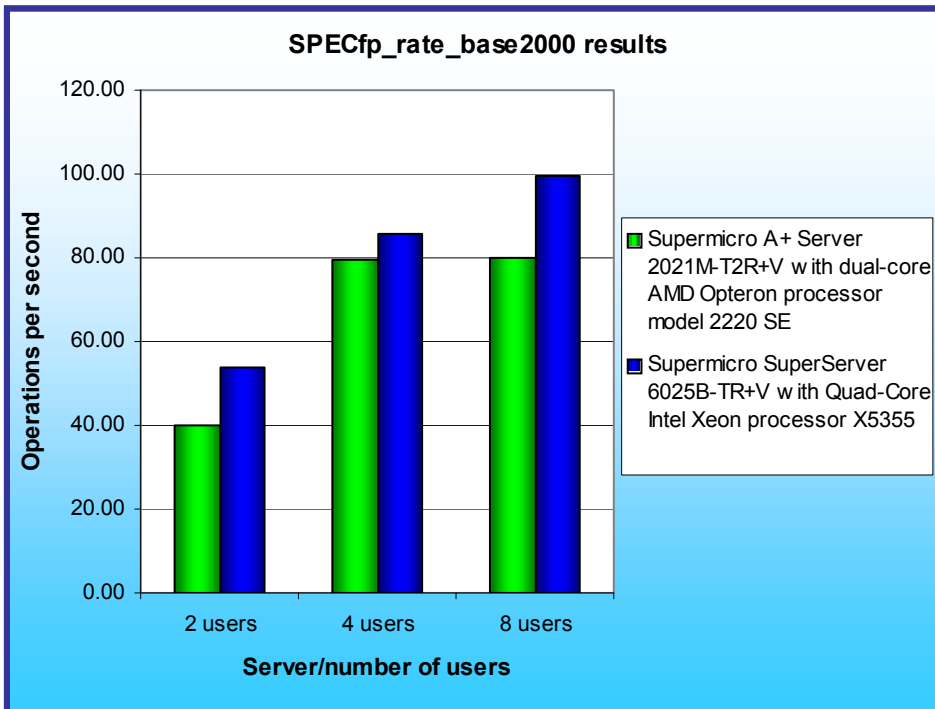- Supermicro SuperServer 6025B-TR+V with Quad-Core Intel Xeon processor X5355

Figure 1: Peak (dual-processor) performance of the servers with 2, 4, and 8 users on the SPECfp_rate_base2000 workload. Higher numbers are better.

Workload

SPEC CPU2000 is an industry-standard benchmark created by the Standard Performance Evaluation Corp. (SPEC) to measure a server's compute-intensive performance. The benchmark consequently stresses the CPU and memory subsystems of the system under test. (For more information on SPEC CPU2000 and other SPEC benchmarks, see www.spec.org.)

The SPEC CPU2000 workload includes two benchmark suites: CINT2000 and CFP2000. We ran only the CFP2000 benchmark, which focuses on measuring and comparing compute-intensive floating point performance. Specifically, we measured the SPECfp_rate_base2000 results for the test servers with 2, 4, and 8 users. This workload produces results as the average of 14 normalized throughput ratios with conservative optimization for each benchmark.

Figure 2 lists the 14 applications that compose the CFP2000 benchmark. Six of the applications were written in FORTRAN77, four in FORTRAN90, and another four in C.

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

Figure 2: The applications that make up the CFP2000 benchmark.

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

Test results

Figure 3 shows the SPECfp_rate_base2000 results for both servers with 2, 4, and 8 users. Both servers achieved the best result with 8 users. (In SPEC's terms, these results are from "compliant" runs, which means we can disclose them publicly though we are not posting them on the SPEC Web site with all the SPEC required files. We do present here all the data necessary to reproduce these results.)

Server / # of users	2	4	8
Supermicro A+ Server 2021M-T2R+V with dual-core AMD Opteron processor model 2220 SE	39.8	79.5	80.0
Supermicro SuperServer 6025B-TR+V with Quad-Core Intel Xeon processor X5355	54.0	85.8	99.5

Figure 3: SPECfp_rate_ base2000 results of the servers with 2, 4, and 8 users. Higher numbers are better.

Test methodology

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

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Server	Supermicro A+ Server 2021M-T2R+V with two dual-core AMD Opteron processor model 2220 SEs	Supermicro SuperServer 6025B-TR+V with two Quad-Core Intel Xeon processor X5355s
Processor frequency (GHz)	2.8 GHz	2.66 GHz
System bus	2000 MHz HyperTransport	1333 MHz
Number of processor packages	2	2
Number of cores per processor package	2	4
Number of hardware threads per core	1	1
Motherboard	Super H8DME-2	Supermicro X7DBE+
Chipset	NVIDIA MCP55 Pro	Intel 5000P Chipset
RAM (8GB in each)	PC2-5300	PC2-5300 FBDIMM
Hard Drive	Western Digital WD740ADFD 74 GB 10,000 RPM	Western Digital WD740ADFD 74 GB 10,000 RPM
NICs	NVIDIA MCP55 Pro Chipset Dual-Port Ethernet Controller	Intel PRO/1000 EB Network Dual Port Network Connection

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

Intel configured and provided both servers.

With the following exceptions, we used the default BIOS settings on each server: on the Supermicro A+ Server 2021M-T2R+V with two dual-core AMD Opteron processor model 2220 SEs server we changed the OS installation option to Linux.

We began by installing a fresh copy of Red Hat Enterprise Linux v.4.4 on both servers. We installed each system with the default operating system (OS) installation options.

SPECCPU2000 configuration
We followed SPEC's standard instructions for building the CFP2000 executables. After studying the best results for this benchmark on the SPEC Web site, we chose the following software tools:

- Intel C/C++ Compiler 9.1 for EM64T, build 20061101 (Intel processor-based server)
- Intel Fortran Compiler 9.1 for EM64T, build 20061101 (Intel processor-based server)
- PathScale EKOPath Compiler Suite, Release 2.3.1 (AMD processor-based server)

The benchmark requires configuration files. From the SPEC Web site we chose the most recent (as of the testing for this report) SPECCPU2000 results that used the above compilers. We copied the configuration files for those results and used them, with modifications to reflect the appropriate system information about the server under test, in our testing. The configuration files we used appear in Appendix B.

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

To begin the benchmark, we performed the following steps:

- Open a command prompt.
- Change to the cpu2000 directory.
- Type '. ./shrc' at the command prompt.
- Enter "runspec -d -c <config file name> -r -u <#> -T base -v 10 --reportable fp" , where
  - <config file name> = name of the configuration file
  - <#> = is 2, 4, or 8 depending on the number of users

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When the run completes, the benchmark puts the results in the directory \cpu2000\result. The result file names are of the form CFP2000.<number>.<suffix>. The suffixes are html, asc, raw, and pdf. The number is three digits and associates a result file with its log, e.g. CFP2000.002. asc and log.002.

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Appendix A – Test server configuration information

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

Systems	Supermicro A+ Server 2021M-T2R+V with two dual-core AMD Opteron processor model 2220 SEs	Supermicro SuperServer 6025B-TR+V with two Quad-Core Intel Xeon processor X5355s
General processor setup		
Number of processor packages	2	2
Number of cores per processor package	2	4
Number of hardware threads per core	1	1
CPU		
Vendor	AMD	Intel
Name	dual-core AMD Opteron processor model 2220 SE	Quad-Core Intel Xeon processor X5355
Stepping	2	7
Socket type	F	LGA 771
Core frequency (GHz)	2.8 GHz	2.66 GHz
Front-side bus frequency (MHz)	2000 MHz HyperTransport	1333 MHz
L1 Cache	64 KB + 64 KB (per core)	32 KB + 32 KB (per core)
L2 Cache	2 x 1 MB	2 x 4MB (each 4MB shared by 2 cores)
Platform		
Vendor and model number	dual-core AMD Opteron processor model 2220 SE-based server	Quad-Core Intel Xeon processor X5355-based server
Motherboard model number	Super H8DME-2	Supermicro X7DBE+
Motherboard chipset	NVIDIA MCP55 Pro	Intel 5000P Chipset
Motherboard revision number	A2	92
Motherboard serial number	Q5785G16010104	TM66S06520
BIOS name and version	American Megatrends Inc. AMIBIOS 08.00.14 11/28/06	Phoenix BIOS DB8A026 Rev 1.1c
BIOS settings	OS installation Linux	Default
Memory module(s)		
Vendor and model number	Hynix HYMP525P72BP4-Y5	Kingston KVR667D2D4F5/2G
Type	PC-5300	PC2-5300 FBDIMM
Speed (MHz)	667 MHz	667 MHz
Speed in the system currently running @ (MHz)	667 MHz	667 MHz
Timing/Latency (tCL-tRCD-iRP-tRASmin)	5-5-5-15	5-5-5-15
Size	8186 MB	8196 MB
Number of RAM modules	4	4
Chip organization	Double-Sided	Double-Sided
Hard disk		
Vendor and model number	Western Digital Raptor WD740ADFD	Western Digital Raptor WD740ADFD
Number of disks in system	1	1
Size	74 GB	74 GB

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Buffer Size	8 MB	8 MB
RPM	10,000	10,000
Type	SATA	SATA
Controller	NVIDIA MCP55 Pro SATA2 Controller	Intel 3100 Chipset SATA Controller
Controller driver	sata_nv	Ata_piix
Operating system		
Name	Red Hat Enterprise Linux 4 Advanced Server	Red Hat Enterprise Linux 4 Advanced Server
Build number	v.4.4	v.4.4
File system	Ext3	Ext3
Kernel	2.6.9-42.ELsmp	2.6.9-42.ELsmp
Language	English	English
Graphics		
Vendor and model number	ATI ES1000	ATI ES1000
Chipset	ATI ES1000 PCI	ATI ES1000 PCI
Type	Integrated	Integrated
Resolution	1024 x 768	1024 x 768
Driver	ATI ES1000	ATI ES1000
Network card/subsystem		
Vendor and model number	NVIDIA MCP55 Pro Chipset Dual-Port Ethernet Controller	Intel PRO/1000 EB Network Dual Port Network Connection
Type	Integrated	Integrated
Driver	eth0	eth0
Optical drive		
Vendor and model number	Matshita DVD-ROM SR-8178	Matshita DVD-ROM SR-8178
Type	DVD-ROM	CD/DVD
Interface	Internal	Internal
Dual/Single layer	Single	Single
USB ports		
Number	4	4
Type	USB 2.0	USB 2.0

Figure 5: Detailed configuration information for the test servers.

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Appendix B – SPECfp_rate configuration files

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

Supermicro A+ Server 2021M-T2R+V with two dual-core AMD Opteron processor model 2220 SEs

```
################################################################################
# pathscale-amd64.cfg
#
# Copyright 2003, 2004, 2005 PathScale, Inc.  All Rights Reserved.
#
# Configuration file for use with the PathScale compiler on x86-64

check_md5 = 1

ext=ps_amd64_R23
teeout=yes
teerunout=yes


#################################################################
# Machine-specific section
#################################################################
hw_cpu      = AMD Opteron 2220SE
hw_cpu_mhz  = 2800
hw_disk     = SATA, 74GB
hw_fpu      = Integrated
hw_memory   = 4 x 2GB PC2-5300 ECC registered
hw_vendor   = Supermicro
hw_model    = A+ Server 2021M-T2R+V
hw_avail    =
sw_avail    =
hw_ncpu     = 2 chips, 4 cores, 2 cores per chip
hw_ncpuorder = 1-2
hw_ocache   = N/A
hw_other    = None
hw_parallel = No
hw_pcache   = 64KBI+64KBD (per core)
hw_scache   = 2 x 1MB
hw_tcache   = N/A
sw_file     = Linux/ext3
sw_os       = Red Hat Enterprise Linux 4 - Update 4
sw_state    = Multi-user, run level 5
submit= MYMASK=`printf '0x%x' \$((1<<\$((\$SPECUSERNUM % 4))))`; /usr/bin/taskset \$MYMASK $command
# System setup notes
# To add notes, uncomments these lines below and add the comments
notes6000   =
#notes6010   =
#notes6020   =
#notes6030   =
#notes6040   =
#notes6050   =
#notes6060   =
#notes6070   =
#notes6080   =
#notes6090   =
notes6100   = taskset utility used to bind CPU(s) to processes.
#################################################################
# Software and license-specific section
#################################################################
license_num  = 3184
test_date    = Feb-2007
prepared_by =
company_name = Principled Technologies
tester_name  =
reportable   = 1

sw_compiler010 = PathScale EKOPath(TM) Compiler
```

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```
sw_compiler020 =  Suite, Release 2.3.1

default=default=default=default:

PS_DIR = /opt/pathscale/2.3.1/bin
ACML_PSC64_DIR = /opt/acml2.7.0/pathscale64/lib
CC=pathcc
FC=pathf95
F77=pathf95
CXX=pathCC

####################################################################
# Initial Notes
####################################################################

notes016 =
notes018 = +FDO: PASS1= -fb_create fbdata  PASS2= -fb_opt fbdata

####################################################################
# Final Notes
####################################################################

default=default=default=default:
notes5000          =

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

# Specify feedback-directed optimization for all SPECint runs.

int=default=default=default:
PASS1_CFLAGS  = -fb_create fbdata
PASS1_CXXFLAGS  = -fb_create fbdata
PASS1_LDFLAGS = -fb_create fbdata
PASS2_CFLAGS  = -fb_opt fbdata
PASS2_CXXFLAGS  = -fb_opt fbdata
PASS2_LDFLAGS = -fb_opt fbdata

int=base=default=default:
COPTIMIZE      = -Ofast
CXXOPTIMIZE    = -Ofast

notes021 =
notes022 = Baseline optimization flags:
notes023 =  C programs:      -Ofast +FDO
notes024 =  C++ programs:    -Ofast +FDO

notes100 =
notes101 = Portability Flags:
notes106 =   186.crafty:  -DLINUX_i386
notes107 =   252.eon:     -DHAS_ERRLIST -DSPEC_CPU2000_LP64
notes108 =   253.perlbmk: -DSPEC_CPU2000_LINUX_I386 -DSPEC_CPU2000_NEED_BOOL
notes109 =             -DSPEC_CPU2000_GLIBC22 -DSPEC_CPU2000_LP64
notes112 =   254.gap:     -DSYS_IS_USG -DSYS_HAS_IOCTL_PROTO -DSYS_HAS_TIME_PROTO
notes113 =             -DSYS_HAS_CALLOC_PROTO -DSPEC_CPU2000_LP64
notes116 =   255.vortex:  -DSPEC_CPU2000_LP64

####################################################################
#                                            #
#        SPECint Portability flags           #
#                                            #
####################################################################

186.crafty=default=default=default:
CPORTABILITY = -DLINUX_i386
```

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252.eon=default=default=default:
CXXPORTABILITY = -DHAS_ERRLIST -DSPEC_CPU2000_LP64

253.perlbmk=default=default=default:
CPORTABILITY = -DSPEC_CPU2000_LINUX_I386 -DSPEC_CPU2000_NEED_BOOL -DSPEC_CPU2000_GLIBC22 -
DSPEC_CPU2000_LP64

254.gap=default=default=default:
CPORTABILITY = -DSYS_IS_USG -DSYS_HAS_IOCTL_PROTO -DSYS_HAS_TIME_PROTO -DSYS_HAS_CALLOC_PROTO -
DSPEC_CPU2000_LP64

255.vortex=default=default=default:
CPORTABILITY= -DSPEC_CPU2000_LP64

notes120 =
notes125 = Peak Tuning:

164.gzip=peak=default=default:
OPTIMIZE = -O3 -ipa -WOPT:val=0 -OPT:unroll_size=0
notes205= 164.gzip: -O3 -ipa -WOPT:val=0 -OPT:unroll_size=0 +FDO

175.vpr=peak=default=default:
OPTIMIZE = -O3 -ipa -m32
notes208= 175.vpr: -O3 -ipa -m32 +FDO

176.gcc=peak=default=default:
OPTIMIZE   = -O3 -IPA:plimit=10000 -LNO:opt=0 -OPT:goto=off
notes212= 176.gcc: -O3 -IPA:plimit=10000 -LNO:opt=0 -OPT:goto=off +FDO

181.mcf=peak=default=default:
OPTIMIZE   = -O3 -ipa -IPA:field_reorder=on -m32
notes214= 181.mcf: -O3 -ipa -IPA:field_reorder=on -m32 +FDO

186.crafty=peak=default=default:
OPTIMIZE   = -Ofast -CG:local_fwd_sched=on -LNO:opt=0 -WOPT:val=0
notes217= 186.crafty: -Ofast -CG:local_fwd_sched=on -LNO:opt=0 -WOPT:val=0 +FDO

197.parser=peak=default=default:
OPTIMIZE   = -O3 -ipa -m32 -IPA:ctype=on
notes220= 197.parser: -O3 -ipa -m32 -IPA:ctype=on +FDO

252.eon=peak=default=default:
OPTIMIZE = -Ofast -CG:gcm=off:p2align_freq=1:prefetch=off -IPA:plimit=4000 -OPT:treeheight=on -TENV:X=4:frame_pointer=off -fno-
exceptions -LNO:fu=10:full_unroll_outer=on -GRA:optimize_boundary=on
notes223= 252.eon: -Ofast -CG:gcm=off:p2align_freq=1:prefetch=off -IPA:plimit=4000
notes224=   -OPT:treeheight=on -TENV:X=4:frame_pointer=off -fno-exceptions
notes225=   -LNO:fu=10:full_unroll_outer=on -GRA:optimize_boundary=on +FDO

253.perlbmk=peak=default=default:
OPTIMIZE = -O2 -ipa -OPT:Ofast:transform_to_memlib=off -fno-math-errno -IPA:plimit=10000
notes227= 253.perlbmk: -O2 -ipa -OPT:Ofast:transform_to_memlib=off
notes228=   -fno-math-errno -IPA:plimit=10000 +FDO

254.gap=peak=default=default:
basepeak = true
notes240= 254.gap: basepeak = true

255.vortex=peak=default=default:
OPTIMIZE = -Ofast -OPT:goto=off -CG:p2align=on -GRA:optimize_boundary=on -IPA:min_hotness=120
notes233= 255.vortex: -Ofast -OPT:goto=off -CG:p2align=on
notes234=   -GRA:optimize_boundary=on -IPA:min_hotness=120 +FDO

256.bzip2=peak=default=default:
basepeak = true
notes240= 256.bzip2: basepeak = true

300.twolf=peak=default=default:
OPTIMIZE   = -O2 -CG:gcm=off:p2align_freq=100000 -OPT:Ofast:unroll_times_max=8:unroll_size=256:alias=disjoint -
WOPT:mem_opnds=on -m32

```
notes245= 300.twolf:  -O2 -CG:gcm=off:p2align_freq=100000
notes246=           -OPT:Ofast:unroll_times_max=8:unroll_size=256:alias=disjoint
notes247=           -WOPT:mem_opnds=on -m32 +FDO


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

# Specify feedback-directed optimization for all SPECfp C codes.

fp=default=default=default:
COPTIMIZE       = -Ofast -WOPT:mem_opnds=on
PASS1_CFLAGS     = -fb_create fbdata
PASS2_CFLAGS     = -fb_opt fbdata
FOPTIMIZE       = -Ofast -LNO:fusion=2 -OPT:fast_complex=on
F77OPTIMIZE     = -Ofast -LNO:fusion=2 -OPT:fast_complex=on
PASS1_FFLAGS     = -fb_create fbdata
PASS2_FFLAGS     = -fb_opt fbdata
PASS1_F77FLAGS    = -fb_create fbdata
PASS2_F77FLAGS    = -fb_opt fbdata
PASS1_LDFLAGS    = -fb_create fbdata
PASS2_LDFLAGS    = -fb_opt fbdata

notes020 = +ACML  means -L<acml2.7.0-install-dir>/pathscale64/lib -lacml,
notes021 =      which causes linking with AMD Core Math Library V2.7.0
notes028 =
notes030 = Baseline optimization
notes032 =  C programs:     -Ofast -WOPT:mem_opnds=on +FDO
notes034 =  Fortran programs: -Ofast -LNO:fusion=2 -OPT:fast_complex=on +FDO
notes101     = Portability Flags:
notes102     =  178.galgel: -fixedform

178.galgel=default=default=default:
FPORTABILITY=-fixedform

notes150 =
notes155 =Peak Tuning:

168.wupwise=peak=default=default:
F77OPTIMIZE = -Ofast -LNO:prefetch_ahead=5:prefetch=3 -OPT:unroll_times_max=8:unroll_size=128:IEEE_NaN_Inf=off:ro=3 -
IPA:linear=on:plimit=50000:callee_limit=5000 -INLINE:aggressive=on
feedback = 0
notes204= 168.wupwise:  -Ofast -LNO:prefetch_ahead=5:prefetch=3
notes205=           -OPT:unroll_times_max=8:unroll_size=128:IEEE_NaN_Inf=off:ro=3
notes206=           -IPA:linear=on:plimit=50000:callee_limit=5000
notes207=           -INLINE:aggressive=on

171.swim=peak=default=default:
F77OPTIMIZE    = -Ofast -CG:local_fwd_sched=on -LNO:fusion=2 -m3dnow
feedback = 0
notes210= 171.swim:    -Ofast -CG:local_fwd_sched=on -LNO:fusion=2 -m3dnow

172.mgrid=peak=default=default:
F77OPTIMIZE = -Ofast -CG:gcm=off -OPT:IEEE_arith=3:unroll_size=200 -LNO:fusion=2:fission=1:blocking=off:prefetch_ahead=2 -
WOPT:mem_opnds=on:aggstr=0
feedback = 0
notes215= 172.mgrid:   -Ofast -CG:gcm=off -OPT:IEEE_arith=3:unroll_size=200
notes216=           -LNO:fusion=2:fission=1:blocking=off:prefetch_ahead=2
notes217=           -WOPT:mem_opnds=on:aggstr=0

173.applu=peak=default=default:
F77OPTIMIZE = -Ofast -CG:local_fwd_sched=on -OPT:ro=3 -TENV:X=3 -LNO:fusion=2:fission=2:full_unroll_size=10000
notes220= 173.applu:   -Ofast -CG:local_fwd_sched=on -OPT:ro=3 -TENV:X=3
notes221=           -LNO:fusion=2:fission=2:full_unroll_size=10000 +FDO

177.mesa=peak=default=default:
COPTIMIZE = -O2 -ipa -OPT:Ofast -fno-math-errno -CG:local_fwd_sched=on -WOPT:mem_opnds=on
```

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notes225= 177.mesa: -O2 -ipa -OPT:Ofast -fno-math-errno -CG:local_fwd_sched=on -WOPT:mem_opnds=on +FDO

178.galgel=peak=default=default:
FOPTIMIZE = -Ofast -OPT:fast_complex=on
RM_SOURCES   = lapak.f90
EXTRA_LIBS   = -L$(ACML_PSC64_DIR) -lacml
notes230= 178.galgel: -Ofast -OPT:fast_complex=on +ACML +FDO
notes232=   RM_SOURCES=lapak.f90

179.art=peak=default=default:
COPTIMIZE= -O3 -OPT:Ofast -fno-math-errno -mno-sse2 -m32
feedback = 0
notes235= 179.art: -O3 -OPT:Ofast -fno-math-errno -mno-sse2 -m32

183.equake=peak=default=default:
COPTIMIZE = -Ofast -CG:load_exe=2 -WOPT:mem_opnds=on -m32
notes240= 183.equake: -Ofast -CG:load_exe=2 -WOPT:mem_opnds=on -m32 +FDO

187.facerec=peak=default=default:
FOPTIMIZE = -Ofast -LNO:fusion=2 -OPT:fast_complex=on:IEEE_NaN_Inf=off:unroll_size=0
notes245= 187.facerec: -Ofast -LNO:fusion=2
notes246=   -OPT:fast_complex=on:IEEE_NaN_Inf=off:unroll_size=0 +FDO

188.ammp=peak=default=default:
COPTIMIZE = -O3 -OPT:alias=disjoint:unroll_times_max=8:Ofast:ro=3 -fno-math-errno -TENV:X=4
notes250= 188.ammp: -O3 -OPT:alias=disjoint:unroll_times_max=8:Ofast:ro=3
notes251=   -fno-math-errno -TENV:X=4 +FDO

189.lucas=peak=default=default:
FOPTIMIZE = -Ofast -OPT:ro=3:fast_nint=off:unroll_size=256 -WOPT:mem_opnds=on
notes255= 189.lucas: -Ofast -OPT:ro=3:fast_nint=off:unroll_size=256 -WOPT:mem_opnds=on +FDO

191.fma3d=peak=default=default:
FOPTIMIZE = -O2 -ipa -CG:load_exe=1 -OPT:Ofast:IEEE_arith=3:ro=3 -WOPT:mem_opnds=on:retype_expr=on -IPA:pu_reorder=1
notes260= 191.fma3d: -O2 -ipa -CG:load_exe=1 -OPT:Ofast:IEEE_arith=3:ro=3
notes261=   -WOPT:mem_opnds=on:retype_expr=on -IPA:pu_reorder=1 +FDO

200.sixtrack=peak=default=default:
F77OPTIMIZE = -O3 -OPT:Ofast:Olimit=6000:early_intrinsics=on -fno-math-errno -CG:load_exe=1
notes265= 200.sixtrack: -O3 -OPT:Ofast:Olimit=6000:early_intrinsics=on
notes266=   -fno-math-errno -CG:load_exe=1 +FDO

301.apsi=peak=default=default:
F77OPTIMIZE = -Ofast -CG:load_exe=0 -LNO:prefetch=0:simd=2
feedback=0
notes270= 301.apsi: -Ofast -CG:load_exe=0 -LNO:prefetch=0:simd=2

Supermicro SuperServer 6025B-TR+V with two Quad-Core Intel Xeon processor X5355s

```
#############################################################################
# Invocation command line:
# /cpu2000/bin/runspec -c cpu.cfg -r -u8 -Tall fp
#############################################################################
action     = validate
tune       = base
ext        = cpu2000.v1.3.ic90p.p4.sse3.linux64.em64t.jan2006

check_md5=1
reportable=1

default=default=default=default:
ONESTEP=YES
basepeak=yes
CC  = icc
CXX = icc
F77 = ifort
FC  = ifort
```

Principled Technologies, Inc.: SPEC CPU2000 SPECfp_rate_base performance on Intel-
and AMD-processor-based servers running Red Hat Enterprise Linux v.4.4

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default=default=default=default:
PORTABILITY = -DSPEC_CPU2000_LP64
notes002= -DSPEC_CPU20))_LP64 applied to all benchmarks

186.crafty=default=default=default:
CPORTABILITY=-DLINUX_i386
notes004= 186.crafty: -DLINUX_i386

252.eon=default=default=default:
CXXPORTABILITY=-DHAS_ERRLIST
notes005= 252.eon: -DHAS_ERRLIST

253.perlbmk=default=default=default:
CPORTABILITY=-DSPEC_CPU2000_LINUX_I386 -DSPEC_CPU2000_NEED_BOOL -DSPEC_CPU2000_GLIBC22
notes006= 253.perlbmk: -DSPEC_CPU2000_LINUX_I386 -DSPEC_CPU2000_NEED_BOOL -DSPEC_CPU2000_GLIBC22

254.gap=default=default=default:
CPORTABILITY=-DSYS_IS_USG -DSYS_HAS_IOCTL_PROTO -DSYS_HAS_TIME_PROTO -DSYS_HAS_SIGNAL_PROTO -
DSYS_HAS_ANSI -DSYS_HAS_CALLOC_PROTO
notes007= 254.gap: -DSYS_IS_USG -DSYS_HAS_IOCTL_PROTO -DSYS_HAS_TIME_PROTO -DSYS_HAS_SIGNAL_PROTO
notes008=   -DSYS_HAS_ANSI -DSYS_HAS_CALLOC_PROTO

178.galgel=default=default=default:
EXTRA_FFLAGS = -FI
notes002: 178.galgel: -FI for fixed-format Fortran

int=base=default=default:
OPTIMIZE=
PASS1_CFLAGS= -fast -prof_gen -auto_ilp32
PASS2_CFLAGS= -fast -prof_use -auto_ilp32

notes001= Portability for integer benchmarks
notes010= Optimization flags
notes011= ONESTEP=yes for all benchmarks
notes012: +FDO implies feedback-directed optimization PASS1: -prof_gen   PAS2: -prof_use
notes013: Baseline optimizations for C: -fast -auto_ilp32 +FDO
notes015: Baseline optimizations for C++: -fast -auto_ilp32 +FDO
notes016: basepeak=yes set for all benchmarks

252.eon=base=default=default:
OPTIMIZE=
PASS1_CXXFLAGS= -fast -prof_gen -auto_ilp32
PASS2_CXXFLAGS= -fast -prof_use -auto_ilp32

fp=base=default=default:
OPTIMIZE=
PASS1_CFLAGS= -fast -prof_gen
PASS2_CFLAGS= -fast -prof_use
PASS1_FFLAGS= -fast -prof_gen
PASS2_FFLAGS= -fast -prof_use

notes001= Portability for fp benchmarks
notes010= Optimization flags
notes011= ONESTEP=yes for all benchmarks
notes012: +FDO implies feedback-directed optimization PASS1: -prof_gen   PAS2: -prof_use
notes013: Baseline optimizations for C and Fortran: -fast +FDO
notes014: basepeak=yes set for all benchmarks

##
Systsem config information
##

default=default=default=default:
hw_vendor=
hw_model=
hw_cpu=

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and AMD-processor-based servers running Red Hat Enterprise Linux v.4.4

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```
hw_cpu_mhz=
hw_fpu=
hw_ncpu=
hw_ncpuorder=
hw_parallel=
hw_pcache=
hw_scache=
hw_tcache=
hw_ocache=
hw_memory=
hw_disk=
hw_other=
sw_os=
sw_file=
sw_state=
company_name=
machine_name=
license_num=
tester_name=
test_date=
hw_avail=
sw_avail=
prepared_by=
config=
notes050=
notes051=
notes052=
notes053=
notes054=
notes055=


##############################################################################
# Software information (Compilers and libraries)
##############################################################################

int=default=default=default:
sw_compiler1=Intel C++ Compiler 9.0 for EM64T Build 20061101

fp=default=default=default:
sw_compiler1=Intel C++ and Fortran Compiler 9.0 for EM64T Builds 20061101 and 20061101
```

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and AMD-processor-based servers running Red Hat Enterprise Linux v.4.4

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Appendix C – SPECfp_rate output

This appendix provides the output of the benchmark for the 2-, 4-, and 8-user runs on each of the test servers.

Supermicro A+ Server 2021M-T2R+V with two dual-core AMD Opteron processor model 2220 SEs (2 users)

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Supermicro A+ Server 2021M-T2R+V

SPECfp_rate2000 =	--
SPECfp_rate_base2000 =	39.8

SPEC license # 3184 | Tested by: | Test date: | Feb-2007 | Hardware Avail: | Software Avail:

Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
168.wupwise	2	60.0	61.9			
171.swim	2	208	34.5			
172.mgrid	2	131	31.9			
173.applu	2	119	41.1			
177.mesa	2	62.3	52.1			
178.galgel	2	104	64.7			
179.art	2	132	45.6			
183.equake	2	101	29.9			
187.facerec	2	80.2	55.0			
188.ammp	2	141	36.2			
189.lucas	2	141	32.9			
191.fma3d	2	140	34.7			
200.sixtrack	2	117	21.9			
301.apsi	2	155	38.9			

Hardware
CPU:	AMD Opteron 2220SE
CPU MHz:	2800
FPU:	Integrated
CPU(s) enabled:	2 chips, 4 cores, 2 cores per chip
CPU(s) orderable:	1-2
Parallel:	No
Primary Cache:	64KBI+64KBD (per core)
Secondary Cache:	2 x 1MB
L3 Cache:	N/A
Other Cache:	N/A
Memory:	4 x 2GB PC2-5300 ECC registered
Disk Subsystem:	SATA, 74GB
Other Hardware:	None

Software
Operating System:	Red Hat Enterprise Linux 4 - Update 4
Compiler:	PathScale EKOPath(TM) Compiler Suite, Release 2.3.1
File System:	Linux/ext3
System State:	Multi-user, run level 5

Notes/Tuning Information
Tested by Principled Technologies

+FDO: PASS1- -fb_create fbdata PASS2- -fb_opt fbdata
+ACML means -L<acml2.7.0-install-dir>/pathscale64/lib -lacml,
        which causes linking with AMD Core Math Library V2.7.0

Baseline optimization
  C programs: -Ofast -WOPT:mem_opnds=on +FDO
  Fortran programs: -Ofast -LNO:fusion=2 -OPT:fast_complex=on +FDO
Portability Flags:
  178.galgel: -fixedform

Peak Tuning:
  168.wupwise: -Ofast -LNO:prefetch_ahead=5:prefetch=3
                -OPT:unroll_times_max=8:unroll_size=128:IEEE_NaN_Inf=off:ro=3
                -IPA:linear=on:plimit=50000:callee_limit=5000
                -INLINE:aggressive=on

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Supermicro		SPECfp_rate2000 =	--
A+ Server 2021M-T2R+V		SPECfp_rate_base2000 =	39.8

SPEC license # 3184	Tested by:		Test date:	Feb-2007	Hardware Avail:		Software Avail:

Notes/Tuning Information (Continued)

```
171.swim:      -Ofast -CG:local_fwd_sched-on -LNO:fusion-2 -m3dnow
172.mgrid:     -Ofast -CG:gcm-off -OPT:IEEE_arith-3:unroll_size-200
               -LNO:fusion-2:fission-1:blocking-off:prefetch_ahead-2
               -WOPT:mem_opnds-on:aggstr-0
173.applu:     -Ofast -CG:local_fwd_sched-on -OPT:ro-3 -TENV:X-3
               -LNO:fusion-2:fission-2:full_unroll_size-10000 +FDO
177.mesa:      -O2 -ipa -OPT:Ofast -fno-math-errno -CG:local_fwd_sched-on -WOPT:mem_opnds-on +FDO
178.galgel:    -Ofast -OPT:fast_complex-on +ACML +FDO
               RM_SOURCES-lapak.f90
179.art:       -O3 -OPT:Ofast -fno-math-errno -mno-sse2 -m32
183.equake:    -Ofast -CG:load_exe-2 -WOPT:mem_opnds-on -m32 +FDO
187.facerec:   -Ofast -LNO:fusion-2
               -OPT:fast_complex-on:IEEE_NaN_Inf-off:unroll_size-0 +FDO
188.ammp:      -O3 -OPT:alias-disjoint:unroll_times_max-8:Ofast:ro-3
               -fno-math-errno -TENV:X-4 +FDO
189.lucas:     -Ofast -OPT:ro-3:fast_nint-off:unroll_size-256 -WOPT:mem_opnds-on +FDO
191.fma3d:     -O2 -ipa -CG:load_exe-1 -OPT:Ofast:IEEE_arith-3:ro-3
               -WOPT:mem_opnds-on:retype_expr-on -IPA:pu_reorder-1 +FDO
200.sixtrack:  -O3 -OPT:Ofast:Olimit-6000:early_intrinsics-on
               -fno-math-errno -CG:load_exe-1 +FDO
301.apsi:      -Ofast -CG:load_exe-0 -LNO:prefetch-0:simd-2


taskset utility used to bind CPU(s) to processes.
```

Supermicro A+ Server 2021M-T2R+V with two dual-core AMD Opteron processor model 2220 SEs (4 users)

CFP2000 Result
Copyright ©1999-2005, Standard Performance Evaluation Corporation

Supermicro A+ Server 2021M-T2R+V

SPECfp_rate2000 =	--
SPECfp_rate_base2000 =	79.5

SPEC license #: 3184 | Tested by: | Test date: | Feb-2007 | Hardware Avail: | Software Avail:

Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
168.wupwise	4	60.0	124			
171.swim	4	210	68.6			
172.mgrid	4	131	63.6			
173.applu	4	120	81.3			
177.mesa	4	62.6	104			
178.galgel	4	104	129			
179.art	4	127	95.3			
183.equake	4	103	58.6			
187.facerec	4	80.0	110			
188.ammp	4	141	72.3			
189.lucas	4	141	65.6			
191.fma3d	4	141	69.1			
200.sixtrack	4	117	43.5			
301.apsi	4	155	77.8			

Hardware
CPU: AMD Opteron 2220SE
CPU MHz: 2800
FPU: Integrated
CPU(s) enabled: 2 chips, 4 cores, 2 cores per chip
CPU(s) orderable: 1-2
Parallel: No
Primary Cache: 64KBI+64KBD (per core)
Secondary Cache: 2 x 1MB
L3 Cache: N/A
Other Cache: N/A
Memory: 4 x 2GB PC2-5300 ECC registered
Disk Subsystem: SATA, 74GB
Other Hardware: None

Software
Operating System: Red Hat Enterprise Linux 4 - Update 4
Compiler: PathScale EKOPath(TM) Compiler Suite, Release 2.3.1
File System: Linux/ext3
System State: Multi-user, run level 5

Notes/Tuning Information
Tested by Principled Technologies

```
+FDO: PASS1- -fb_create fbdata  PASS2- -fb_opt fbdata
+ACML  means -L<acml2.7.0-install-dir>/pathscale64/lib -lacml,
       which causes linking with AMD Core Math Library V2.7.0

Baseline optimization
  C programs:        -Ofast -WOPT:mem_opnds-on +FDO
  Fortran programs: -Ofast -LNO:fusion-2 -OPT:fast_complex-on +FDO
Portability Flags:
  178.galgel: -fixedform

Peak Tuning:
  168.wupwise:  -Ofast -LNO:prefetch_ahead-5:prefetch-3
                -OPT:unroll_times_max-8:unroll_size-128:IEEE_NaN_Inf-off:ro-3
                -IPA:linear-on:plimit-50000:callee_limit-5000
                -INLINE:aggressive-on
```

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Supermicro	SPECfp_rate2000 =	--
A+ Server 2021M-T2R+V	SPECfp_rate_base2000 =	79.5

| SPEC license #: 3184 | Tested by: | Test date: | Feb-2007 | Hardware Avail: | Software Avail: |

Notes/Tuning Information (Continued)

```
171.swim:      -Ofast -CG:local_fwd_sched-on -LNO:fusion-2 -m3dnow
172.mgrid:     -Ofast -CG:gcm-off -OPT:IEEE_arith-3:unroll_size-200
               -LNO:fusion-2:fission-1:blocking-off:prefetch_ahead-2
               -WOPT:mem_opnds-on:aggstr-0
173.applu:     -Ofast -CG:local_fwd_sched-on -OPT:ro-3 -TENV:X-3
               -LNO:fusion-2:fission-2:full_unroll_size-10000 +FDO
177.mesa:   -O2 -ipa -OPT:Ofast -fno-math-errno -CG:local_fwd_sched-on -WOPT:mem_opnds-on +FDO
178.galgel:    -Ofast -OPT:fast_complex-on +ACML +FDO
               RM_SOURCES-lapak.f90
179.art:       -O3 -OPT:Ofast -fno-math-errno -mno-sse2 -m32
183.equake:    -Ofast -CG:load_exe-2 -WOPT:mem_opnds-on -m32 +FDO
187.facerec:   -Ofast -LNO:fusion-2
               -OPT:fast_complex-on:IEEE_NaN_Inf-off:unroll_size-0 +FDO
188.ammp:      -O3 -OPT:alias-disjoint:unroll_times_max-8:Ofast:ro-3
               -fno-math-errno -TENV:X-4 +FDO
189.lucas:     -Ofast -OPT:ro-3:fast_nint-off:unroll_size-256 -WOPT:mem_opnds-on +FDO
191.fma3d:     -O2 -ipa -CG:load_exe-1 -OPT:Ofast:IEEE_arith-3:ro-3
               -WOPT:mem_opnds-on:retype_expr-on -IPA:pu_reorder-1 +FDO
200.sixtrack: -O3 -OPT:Ofast:Olimit-6000:early_intrinsics-on
               -fno-math-errno -CG:load_exe-1 +FDO
301.apsi:      -Ofast -CG:load_exe-0 -LNO:prefetch-0:simd-2


taskset utility used to bind CPU(s) to processes.
```

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Supermicro A+ Server 2021M-T2R+V with two dual-core AMD Opteron processor model 2220 SEs (8 users)

CFP2000 Result
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Supermicro
A+ Server 2021M-T2R+V

	SPECfp_rate2000 =	--
	SPECfp_rate_base2000 =	80.0

SPEC license # 3184 Tested by: Test date: Feb-2007 Hardware Avail: Software Avail:

Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
168.wupwise	8	121	123			
171.swim	8	414	69.4			
172.mgrid	8	263	63.6			
173.applu	8	238	81.9			
177.mesa	8	125	104			
178.galgel	8	209	129			
179.art	8	250	96.5			
183.equake	8	201	60.1			
187.facerec	8	157	112			
188.ammp	8	281	72.7			
189.lucas	8	283	65.5			
191.fma3d	8	278	70.1			
200.sixtrack	8	234	43.6			
301.apsi	8	309	78.0			

Hardware
CPU:	AMD Opteron 2220SE
CPU MHz:	2800
FPU:	Integrated
CPU(s) enabled:	2 chips, 4 cores, 2 cores per chip
CPU(s) orderable:	1-2
Parallel:	No
Primary Cache:	64KBI+64KBD (per core)
Secondary Cache:	2 x 1MB
L3 Cache:	N/A
Other Cache:	N/A
Memory:	4 x 2GB PC2-5300 ECC registered
Disk Subsystem:	SATA, 74GB
Other Hardware:	None

Software
Operating System:	Red Hat Enterprise Linux 4 - Update 4
Compiler:	PathScale EKOPath(TM) Compiler Suite, Release 2.3.1
File System:	Linux/ext3
System State:	Multi-user, run level 5

Notes/Tuning Information
```
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   +FDO: PASS1- -fb_create fbdata  PASS2- -fb_opt fbdata
   +ACML  means -L<acml2.7.0-install-dir>/pathscale64/lib -lacml,
          which causes linking with AMD Core Math Library V2.7.0

   Baseline optimization
     C programs:         -Ofast -WOPT:mem_opnds-on +FDO
     Fortran programs: -Ofast -LNO:fusion-2 -OPT:fast_complex-on +FDO
   Portability Flags:
     178.galgel: -fixedform

   Peak Tuning:
     168.wupwise:   -Ofast -LNO:prefetch_ahead-5:prefetch-3
                    -OPT:unroll_times_max-8:unroll_size-128:IEEE_NaN_Inf-off:ro-3
                    -IPA:linear-on:plimit-50000:callee_limit-5000
                    -INLINE:aggressive-on
```

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Supermicro		
A+ Server 2021M-T2R+V	SPECfp_rate2000 =	--
	SPECfp_rate_base2000 =	80.0

SPEC license #: 3184 Tested by: Test date: Feb-2007 Hardware Avail: Software Avail:

Notes/Tuning Information (Continued)

```
171.swim:      -Ofast -CG:local_fwd_sched-on -LNO:fusion-2 -m3dnow
172.mgrid:     -Ofast -CG:gcm-off -OPT:IEEE_arith-3:unroll_size-200
               -LNO:fusion-2:fission-1:blocking-off:prefetch_ahead-2
               -WOPT:mem_opnds-on:aggstr-0
173.applu:     -Ofast -CG:local_fwd_sched-on -OPT:ro-3 -TENV:X-3
               -LNO:fusion-2:fission-2:full_unroll_size-10000 +FDO
177.mesa:      -O2 -ipa -OPT:Ofast -fno-math-errno -CG:local_fwd_sched-on -WOPT:mem_opnds-on +FDO
178.galgel:    -Ofast -OPT:fast_complex-on +ACML +FDO
               RM_SOURCES-lapak.f90
179.art:       -O3 -OPT:Ofast -fno-math-errno -mno-sse2 -m32
183.equake:    -Ofast -CG:load_exe-2 -WOPT:mem_opnds-on -m32 +FDO
187.facerec:   -Ofast -LNO:fusion-2
               -OPT:fast_complex-on:IEEE_NaN_Inf-off:unroll_size-0 +FDO
188.ammp:      -O3 -OPT:alias-disjoint:unroll_times_max-8:Ofast:ro-3
               -fno-math-errno -TENV:X-4 +FDO
189.lucas:     -Ofast -OPT:ro-3:fast_nint-off:unroll_size-256 -WOPT:mem_opnds-on +FDO
191.fma3d:     -O2 -ipa -CG:load_exe-1 -OPT:Ofast:IEEE_arith-3:ro-3
               -WOPT:mem_opnds-on:retype_expr-on -IPA:pu_reorder-1 +FDO
200.sixtrack:  -O3 -OPT:Ofast:Olimit-6000:early_intrinsics-on
               -fno-math-errno -CG:load_exe-1 +FDO
301.apsi:      -Ofast -CG:load_exe-0 -LNO:prefetch-0:simd-2


taskset utility used to bind CPU(s) to processes.
```

CFP2000 Result
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Supermicro X7DBE+

	SPECfp_rate2000 =	--
	SPECfp_rate_base2000 =	54.0

SPEC license #: 13 Tested by: Test date: Hardware Avail: Software Avail:

Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
168.wupwise	2	56.5	65.7			
171.swim	2	144	49.8			
172.mgrid	2	109	38.5			
173.applu	2	126	38.6			
177.mesa	2	50.5	64.3			
178.galgel	2	47.1	143			
179.art	2	24.8	243			
183.equake	2	75.0	40.2			
187.facerec	2	68.8	64.1			
188.ammp	2	111	45.8			
189.lucas	2	111	42.0			
191.fma3d	2	112	43.4			
200.sixtrack	2	108	23.6			
301.apsi	2	183	32.9			

Hardware

CPU: Intel Xeon processor X5355 (2.66 GHz, 1333 MHz bus)
CPU MHz: 2666
FPU: Integrated
CPU(s) enabled: 2
CPU(s) orderable: 1, 2
Parallel: No
Primary Cache: 32KB (I) + 32KB (D) (on chip) per core
Secondary Cache: 2 x 4MB
L3 Cache: N/A
Other Cache: N/A
Memory: 4x2GB PC2-5300 FBDIMM
Disk Subsystem: SATA, 74GB
Other Hardware:

Software

Operating System: Red Hat Enterprise Linux 4 update 4, Kernel 2.6.9-42.EL.smp
Compiler: Intel C++ and Fortran Compiler 9.1 for EM64T Builds 20061101 and 20061101
File System: ext2
System State: Default

Notes/Tuning Information

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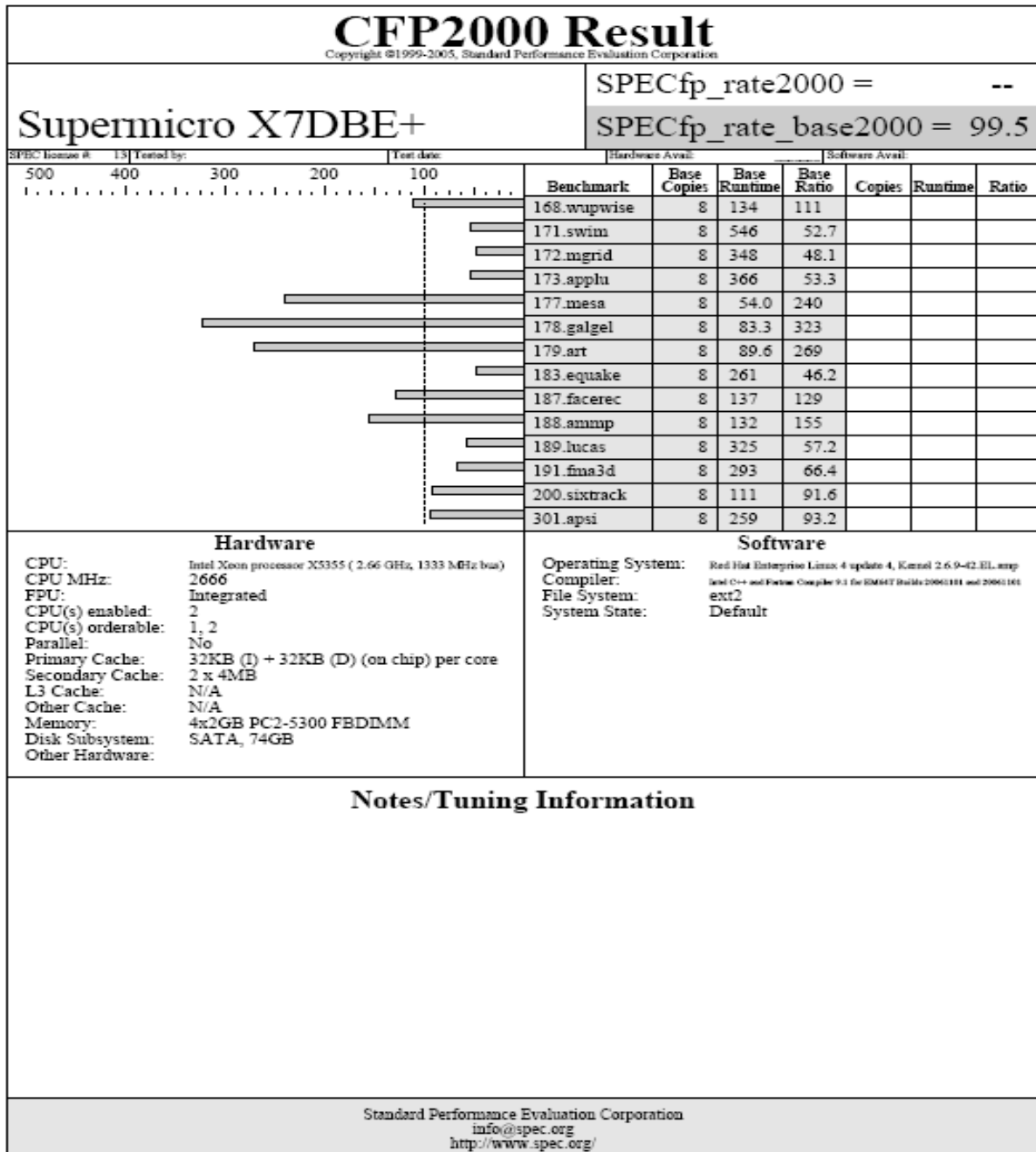
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Supermicro SuperServer 6025B-TR+V with two Quad-Core Intel Xeon processor X5355s (4 users)

CFP2000 Result
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Supermicro X7DBE+

	SPECfp_rate2000 =	--
	SPECfp_rate_base2000 =	85.8

SPEC license #: 13 Tested by: Test date: Hardware Avail: Software Avail:

Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
168.wupwise	4	70.2	106			
171.swim	4	275	52.2			
172.mgrid	4	168	49.6			
173.applu	4	189	51.7			
177.mesa	4	51.2	127			
178.galgel	4	47.2	285			
179.art	4	25.1	480			
183.equake	4	130	46.5			
187.facerec	4	74.2	119			
188.ammp	4	114	89.5			
189.lucas	4	171	54.3			
191.fma3d	4	156	62.6			
200.sixtrack	4	108	47.1			
301.apsi	4	201	60.0			

Hardware

CPU:	Intel Xeon processor X5355 (2.66 GHz, 1333 MHz bus)
CPU MHz:	2666
FPU:	Integrated
CPU(s) enabled:	2
CPU(s) orderable:	1, 2
Parallel:	No
Primary Cache:	32KB (I) + 32KB (D) (on chip) per core
Secondary Cache:	2 x 4MB
L3 Cache:	N/A
Other Cache:	N/A
Memory:	4x2GB PC2-5300 FBDIMM
Disk Subsystem:	SATA, 74GB
Other Hardware:	

Software

Operating System:	Red Hat Enterprise Linux 4 update 4, Kernel 2.6.9-42.EL.smp
Compiler:	Intel C++ and Fortran Compiler 9.1 for EM64T Builds 20061101 and 20061101
File System:	ext2
System State:	Default

Notes/Tuning Information

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CFP2000 Result
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Supermicro X7DBE+

SPECfp_rate2000 =	--
SPECfp_rate_base2000 =	99.5

SPEC license #: 13 Tested by: Test date: Hardware Avail: Software Avail:

Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
168.wupwise	8	134	111			
171.swim	8	546	52.7			
172.mgrid	8	348	48.1			
173.applu	8	366	53.3			
177.mesa	8	54.0	240			
178.galgel	8	83.3	323			
179.art	8	89.6	269			
183.equake	8	261	46.2			
187.facerec	8	137	129			
188.ammp	8	132	155			
189.lucas	8	325	57.2			
191.fma3d	8	293	66.4			
200.sixtrack	8	111	91.6			
301.apsi	8	259	93.2			

Hardware

CPU:	Intel Xeon processor X5355 (2.66 GHz, 1333 MHz bus)
CPU MHz:	2666
FPU:	Integrated
CPU(s) enabled:	2
CPU(s) orderable:	1, 2
Parallel:	No
Primary Cache:	32KB (I) + 32KB (D) (on chip) per core
Secondary Cache:	2 x 4MB
L3 Cache:	N/A
Other Cache:	N/A
Memory:	4x2GB PC2-5300 FBDIMM
Disk Subsystem:	SATA, 74GB
Other Hardware:	

Software

Operating System:	Red Hat Enterprise Linux 4 update 4, Kernel 2.6.9-42.EL.smp
Compiler:	Intel C++ and Fortran Compiler 9.1 for EM64T Builds 20061101 and 20061101
File System:	ext2
System State:	Default

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Principled Technologies, Inc.: SPEC CPU2000 SPECfp_rate_base performance on Intel- and AMD-processor-based servers running Red Hat Enterprise Linux v.4.4

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