Sun Microsystems
Sun Blade X6440 (AMD Opteron 8435 2.6GHz)

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

Hardware
CPU Name: AMD Opteron 8435
CPU Characteristics:
CPU MHz: 2600
FPU: Integrated
CPU(s) enabled: 24 cores, 4 chips, 6 cores/chip
CPU(s) orderable: 2 or 4 chips
Primary Cache: 64 KB I + 64 KB D on chip per core
Secondary Cache: 512 KB I+D on chip per core

Software
Operating System: SuSE Linux Enterprise Server 10 (x86_64) SP2, Kernel 2.6.16.60-0.21-smp
Compiler: PGI Server Complete Version 8.0 x86 Open64 4.2.2 Compiler Suite (from AMD)
Auto Parallel: Yes
File System: NFSv3
System State: Run level 3 (Full multiuser with network)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit

SPECfp_rate2006 = 247
SPECfp_rate_base2006 = 224

SPECfp_rate2006 = 247
SPECfp_rate_base2006 = 224

Continued on next page
## Sun Microsystems

**Sun Blade X6440 (AMD Opteron 8435 2.6GHz)**

**CPU2006 license:** 6

**Test sponsor:** Sun Microsystems

**Tested by:** Sun Microsystems

**L3 Cache:** 6 MB I+D on chip per chip

**Other Cache:** None

**Memory:** 64 GB (16x4GB, DDR2-667, CL5, Reg, Dual Rank)

**Disk Subsystem:** 48 x 250GB 7200RPM SATA via NFS

**Software Availability:** Jul-2009

---

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>24</td>
<td>1899</td>
<td>172</td>
<td>1899</td>
<td>172</td>
<td>1898</td>
<td>172</td>
<td>24</td>
<td>1843</td>
</tr>
<tr>
<td>416.gamess</td>
<td>24</td>
<td>1205</td>
<td>390</td>
<td>1201</td>
<td>391</td>
<td>1202</td>
<td>391</td>
<td>24</td>
<td>1121</td>
</tr>
<tr>
<td>433.milc</td>
<td>24</td>
<td>1693</td>
<td>130</td>
<td>1692</td>
<td>130</td>
<td>1692</td>
<td>130</td>
<td>24</td>
<td>1693</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>24</td>
<td>850</td>
<td>257</td>
<td>847</td>
<td>258</td>
<td>848</td>
<td>258</td>
<td>24</td>
<td>847</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>24</td>
<td>527</td>
<td>325</td>
<td>519</td>
<td>330</td>
<td>516</td>
<td>332</td>
<td>24</td>
<td>426</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>24</td>
<td>1084</td>
<td>265</td>
<td>1075</td>
<td>267</td>
<td>1074</td>
<td>267</td>
<td>4</td>
<td>146</td>
</tr>
<tr>
<td>444.namd</td>
<td>24</td>
<td>621</td>
<td>310</td>
<td>620</td>
<td>310</td>
<td>627</td>
<td>307</td>
<td>24</td>
<td>564</td>
</tr>
<tr>
<td>447.dealII</td>
<td>24</td>
<td>673</td>
<td>408</td>
<td>674</td>
<td>407</td>
<td>672</td>
<td>409</td>
<td>24</td>
<td>494</td>
</tr>
<tr>
<td>450.soplex</td>
<td>24</td>
<td>1452</td>
<td>138</td>
<td>1448</td>
<td>138</td>
<td>1444</td>
<td>139</td>
<td>24</td>
<td>1349</td>
</tr>
<tr>
<td>453.povray</td>
<td>24</td>
<td>321</td>
<td>398</td>
<td>323</td>
<td>395</td>
<td>350</td>
<td>365</td>
<td>24</td>
<td>270</td>
</tr>
<tr>
<td>454.calculix</td>
<td>24</td>
<td>478</td>
<td>414</td>
<td>481</td>
<td>412</td>
<td>478</td>
<td>414</td>
<td>24</td>
<td>426</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>24</td>
<td>2454</td>
<td>104</td>
<td>2450</td>
<td>104</td>
<td>2448</td>
<td>104</td>
<td>24</td>
<td>2377</td>
</tr>
<tr>
<td>465.tonto</td>
<td>24</td>
<td>803</td>
<td>294</td>
<td>791</td>
<td>298</td>
<td>798</td>
<td>296</td>
<td>24</td>
<td>683</td>
</tr>
<tr>
<td>470.lbm</td>
<td>24</td>
<td>3300</td>
<td>99.9</td>
<td>3299</td>
<td>100</td>
<td>3300</td>
<td>99.9</td>
<td>24</td>
<td>3290</td>
</tr>
<tr>
<td>481.wrf</td>
<td>24</td>
<td>1358</td>
<td>197</td>
<td>1358</td>
<td>197</td>
<td>1361</td>
<td>197</td>
<td>24</td>
<td>1318</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>24</td>
<td>1923</td>
<td>243</td>
<td>1856</td>
<td>252</td>
<td>1881</td>
<td>249</td>
<td>24</td>
<td>1728</td>
</tr>
</tbody>
</table>

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.

See the configuration file for details.

---

### Operating System Notes

'ulimit -s unlimited' was used to set environment stack size

'ulimit -l 2097152' was used to set environment locked pages in memory limit

Set `vm/nr_hugepages=10800` in `/etc/sysctl.conf`

`mount -t hugetlbfs nodev /mnt/hugepages`
Sun Microsystems
Sun Blade X6440 (AMD Opteron 8435 2.6GHz)

<table>
<thead>
<tr>
<th>SPECfp_rate2006</th>
<th>247</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECfp_rate_base2006</td>
<td>224</td>
</tr>
</tbody>
</table>

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

Default BIOS settings used except:
DCT Unganged Mode set to "Always" to enable Unganged Mode

**General Notes**

- Environment variables set by runspec before the start of the run:
  - `HUGETLB_LIMIT = "450"`
  - `LD_LIBRARY_PATH = "/ctmp0/gnana/pegasus-istanbul-sles10sp2/amd0905is-libs/64:/ctmp0/gnana/pegasus-istanbul-sles10sp2/amd0905is-libs/32"`
  - `NCPUS = "6"`
  - `PGI_HUGE_PAGES = "450"`

- The NFS server used was a Sun Fire X4540 containing 48 x 250GB 7200RPM SATA disks. Connections to the clients were via gigabit ethernet.

- The x86 Open64 Compiler Suite is only available from (and supported by) AMD at [http://developer.amd.com/cpu/open64](http://developer.amd.com/cpu/open64).

**Base Compiler Invocation**

- C benchmarks: `pgcc`
- C++ benchmarks: `pgcpp`
- Fortran benchmarks: `pgf95`
- Benchmarks using both Fortran and C: `pgcc pgf95`

**Base Portability Flags**

- `410.bwaves`: `-DSPEC_CPU_LP64`
- `416.gamess`: `-DSPEC_CPU_LP64`
- `430.milc`: `-DSPEC_CPU_LP64`
- `434.zeusmp`: `-DSPEC_CPU_LP64`
- `435.gromacs`: `-DSPEC_CPU_LP64` `-Mnomain`
- `436.cactusADM`: `-DSPEC_CPU_LP64` `-Mnomain`
- `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` `-Mnomain`
- `459.GemsFDTD`: `-DSPEC_CPU_LP64`

Continued on next page
Sun Microsystems
Sun Blade X6440 (AMD Opteron 8435 2.6GHz)

SPECfp_rate2006 = 247
SPECfp_rate_base2006 = 224

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

Test date: Aug-2009
Hardware Availability: Jul-2009
Software Availability: Apr-2009

Base Portability Flags (Continued)

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:
-fastsse -Msmartalloc=huge -Mfprelaxed -Mipa=fast -Mipa=inline
-tp shanghai-64 -Bstatic_pgi

C++ benchmarks:
-fastsse -Msmartalloc=huge -Mfprelaxed --zc_eh -Mipa=fast
-Mipa=inline -tp shanghai-64 -Bstatic_pgi

Fortran benchmarks:
-fastsse -Msmartalloc=huge -Mfprelaxed -Mvect=short -Mipa=fast
-Mipa=inline -tp shanghai-64 -Bstatic_pgi

Benchmarks using both Fortran and C:
-fastsse -Msmartalloc=huge -Mfprelaxed -Mipa=fast -Mipa=inline
-tp shanghai-64 -Mvect=short -Bstatic_pgi

Base Other Flags

C benchmarks:
-Mipa=jobs:4

C++ benchmarks:
-Mipa=jobs:4

Fortran benchmarks:
-Mipa=jobs:4

Benchmarks using both Fortran and C:
-Mipa=jobs:4

Peak Compiler Invocation

C benchmarks:
pgcc

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

Continued on next page
Sun MicroSystems

Sun Blade X6440 (AMD Opteron 8435 2.6GHz)

SPECfp_rate2006 = 247
SPECfp_rate_base2006 = 224

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

Test date: Aug-2009
Hardware Availability: Jul-2009
Software Availability: Apr-2009

Peak Compiler Invocation (Continued)

Fortran benchmarks (except as noted below):
openf95
410.bwaves: pgf95
434.zeusmp: pgf95
437.leslie3d: pgf95

Benchmarks using both Fortran and C (except as noted below):
pgcc pgf95
435.gromacs: opencc openf95

Peak 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
436.cactusADM: -DSPEC_CPU_LP64 -Mnomain
437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64
454.calculix: -DSPEC_CPU_LP64 -Mnomain
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

Peak Optimization Flags

C benchmarks:
433.milc: basepeak = yes
470.lbm: -fastsse -Msmartalloc=huge -Mprefetch=t0 -Mloop32
-Mpcrelaxed -Mipa=fast -Mipa=inline -tp shanghai-64
-Bstatic_pgi
482.sphinx3: -Mpf=indirect(pass 1) -Mpf=indirect(pass 2)
- Mipa=fast(pass 2) -Mipa=inline(pass 2) -fastsse
- Mfpcrelaxed -Msmartalloc -tp shanghai-64 -Bstatic_pgi

Continued on next page
Peak Optimization Flags (Continued)

C++ benchmarks:

444.namd: -Mpf1(pass 1) -Mpf0(pass 2) -Mipa=fast(pass 2)
    -Mipa:inline -fastsse -Munroll=n:4 -Munroll=m:8
-Msmartalloc=huge -Mnodepchk -Mfprelaxed --zc_eh
    -tp shanghai-64 -Bstatic_pgi

447.dealII: -march=barcelona -Ofast -static -INLINE:aggressive=on
    -LNO:opt=0 -Wf,-fno-exceptions -m32 -OPT:unroll_times_max=8
    -OPT:unroll_size=256 -OPT:unroll_level=2 -HP:bdt=2m:heap=2m
    -GRA:unspill=on -CG:cmp_peep=on -TENV:frame_pointer=off

450.soplex: -march=barcelona -fb_create fbdata(pass 1)
    -fb_opt fbdata(pass 2) -O2 -INLINE:aggressive=on
    -OPT:IEEE_arith=3 -OPT:IEEE_NaN_Inf=off
    -OPT:fold_unsigned_relops=on -OPT:malloc_alg=1
    -CG:load_exe=0 -fno-exceptions -m32 -HP:bdt=2m

453.povray: -march=barcelona -fb_create fbdata(pass 1)
    -fb_opt fbdata(pass 2) -Ofast -INLINE:aggressive=on
    -HP:bdt=2m:heap=2m

Fortran benchmarks:

410.bwaves: -fastsse -Msmartalloc -Mprefetch=nta -Mfprelaxed
    -Mipa=fast -Mipa:inline -tp shanghai-64 -Bstatic_pgi

416.gamess: -march=barcelona -fb_create fbdata(pass 1)
    -fb_opt fbdata(pass 2) -O2 -OPT:Ofast -OPT:ro=3
    -OPT:unroll_size=256 -HP:bdt=2m:heap=2m

434.zeusmp: -fastsse -Mfprelaxed -Mprefetch=distance:8 -Mprefetch=t0
    -Msmtalloc=huge -Msmtalloc=hugebss -Mipa=fast
    -Mipa:inline -tp shanghai-64 -Bstatic_pgi

437.leslie3d: -Mpf1=indirect(pass 1) -Mpf0=indirect(pass 2)
    -Mipa=fast(pass 2) -Mipa=inline(pass 2) -fastsse
    -Mvect=fuse -Msmtalloc=huge -Mprefetch=distance:8
    -Mprefetch=t0 -Mfprelaxed -tp shanghai-64 -Bstatic_pgi

459.GemsFDTD: -march=barcelona -Ofast -LNO:fission=2 -LNO:simd=2
    -LNO:prefetch_ahead=1 -CG:load_exe=0 -HP

465.tonto: -march=barcelona -Ofast -OPT:alias=no_f90_pointer_alias
    -LNO:blocking=off -CG:load_exe=1 -IPA:plimit=525 -HP

Benchmarks using both Fortran and C:
Sun Microsystems

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

SPECfp_rate2006 = 247
SPECfp_rate_base2006 = 224

Peak Optimization Flags (Continued)

435.gromacs: -march=barcelona -Ofast -OPT:rsqrt=2 -HP:bdt=2m:heap=2m

436.cactusADM: -fastsse -Mconcur -Msmartalloc=huge -Mfprelaxed -Mipa=fast
-Mipa=inline -tp shanghai-64 -Bstatic_pgi

454.calculix: -Mpfi=indirect(pass 1) -Mpfo=indirect(pass 2)
-Mipa=fast(pass 2) -Mipa=inline(pass 2) -fastsse

481.wrf: -fastsse -Mvect=noaltcode -Msartalloc=huge
-Mprefetch=distance:8 -Mfprelaxed -tp shanghai-64
-Bstatic_pgi

Peak Other Flags

C benchmarks:
- -Mipa=jobs:4(pass 2)

C++ benchmarks:

444.namd: -Mipa=jobs:4(pass 2)

Fortran benchmarks:

410.bwaves: -Mipa=jobs:4

434.zeusmp: -Mipa=jobs:4

437.leslie3d: -Mipa=jobs:4(pass 2)

Benchmarks using both Fortran and C:

436.cactusADM: -Mipa=jobs:4

454.calculix: -Mipa=jobs:4(pass 2)

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/x86-open64-4.2.2-flags-revE.html
http://www.spec.org/cpu2006/flags/pgi80_linux_flags.20090710.html
http://www.spec.org/cpu2006/flags/amd-platform.20090710.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/x86-open64-4.2.2-flags-revE.xml
http://www.spec.org/cpu2006/flags/pgi80_linux_flags.20090710.xml
http://www.spec.org/cpu2006/flags/amd-platform.20090710.xml
Sun Microsystems

Sun Blade X6440 (AMD Opteron 8435 2.6GHz)

| SPECfp_rate2006 | 247 |
| SPECfp_rate_base2006 | 224 |

| CPU2006 license: | 6 |
| Test sponsor: | Sun Microsystems |
| Tested by: | Sun Microsystems |
| Test date: | Aug-2009 |
| Hardware Availability: | Jul-2009 |
| Software Availability: | Apr-2009 |

SPEC and SPECfp are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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

Tested with SPEC CPU2006 v1.1.
Originally published on 1 September 2009.