# SPEC® CINT2006 Result

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## Sun Microsystems

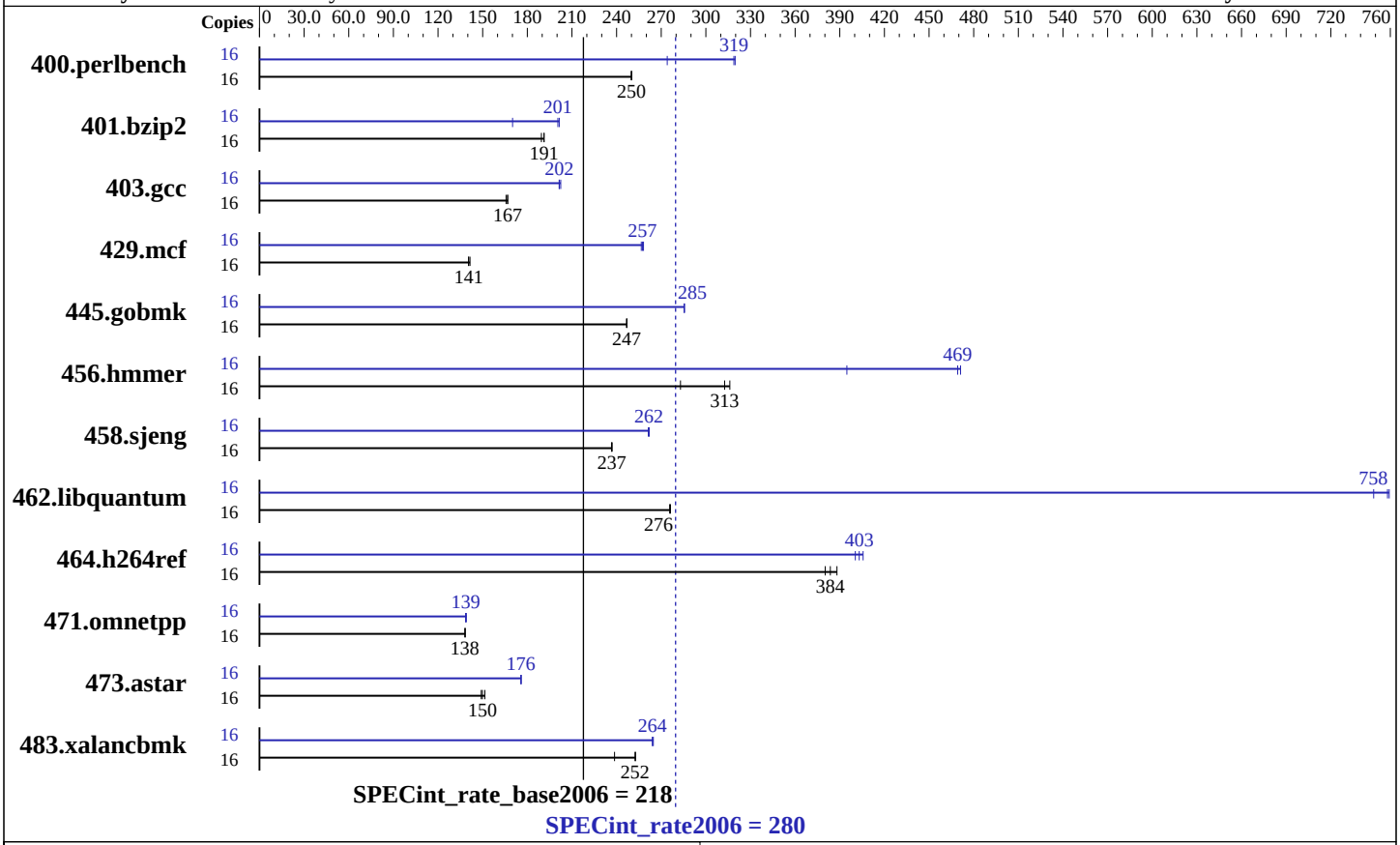
## Sun Blade X6440 (AMD Opteron 8384 2.7GHz)

SPECint®_rate2006 = 280

SPECint_rate_base2006 = 218

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

**Test date:** Aug-2009
**Hardware Availability:** Jan-2009
**Software Availability:** Jun-2009




### Hardware

| | |
|---|---|
| CPU Name: | AMD Opteron 8384 |
| CPU Characteristics: | |
| CPU MHz: | 2700 |
| FPU: | Integrated |
| CPU(s) enabled: | 16 cores, 4 chips, 4 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 |
| 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: | 1 x 80 GB 10 K RPM SATA via NFS |
| Other Hardware: | See additional details below |

### Software

| | |
|---|---|
| Operating System: | Red Hat Enterprise Linux Server release 5.3, Kernel 2.6.18-128.el5 for x86_64 |
| Compiler: | PGI Server Complete Version 8.0 x86 Open64 4.2.2 Compiler Suite (from AMD) |
| Auto Parallel: | No |
| File System: | NFSv3 |
| System State: | Run level 3 (Full multiuser with network) |
| Base Pointers: | 32/64-bit |
| Peak Pointers: | 32/64-bit |
| Other Software: | binutils 2.18 SmartHeap 8.1 32-bit Library for Linux |

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## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 400.perlbench | 16 | 625 | 250 | 626 | 250 | **625** | **250** | 16 | 570 | 274 | **490** | **319** | 489 | 320 |
| 401.bzip2 | 16 | **807** | **191** | 807 | 191 | 815 | 189 | 16 | 908 | 170 | 766 | 201 | **770** | **201** |
| 403.gcc | 16 | 772 | 167 | 777 | 166 | **772** | **167** | 16 | 640 | 201 | 636 | 202 | **639** | **202** |
| 429.mcf | 16 | **1038** | **141** | 1038 | 141 | 1031 | 141 | 16 | 569 | 257 | **567** | **257** | 565 | 258 |
| 445.gobmk | 16 | 680 | 247 | **680** | **247** | 680 | 247 | 16 | **588** | **285** | 588 | 286 | 588 | 285 |
| 456.hmmer | 16 | 528 | 283 | **478** | **313** | 472 | 316 | 16 | 378 | 395 | **318** | **469** | 317 | 471 |
| 458.sjeng | 16 | **817** | **237** | 817 | 237 | 818 | 237 | 16 | **740** | **262** | 741 | 261 | 739 | 262 |
| 462.libquantum | 16 | **1202** | **276** | 1202 | 276 | 1200 | 276 | 16 | 443 | 749 | 437 | 759 | **437** | **758** |
| 464.h264ref | 16 | 931 | 380 | 912 | 388 | **923** | **384** | 16 | 884 | 400 | **878** | **403** | 873 | 406 |
| 471.omnetpp | 16 | **724** | **138** | 723 | 138 | 724 | 138 | 16 | 719 | 139 | **721** | **139** | 722 | 139 |
| 473.astar | 16 | **750** | **150** | 742 | 151 | 754 | 149 | 16 | 639 | 176 | 639 | 176 | **639** | **176** |
| 483.xalancbmk | 16 | 463 | 239 | **437** | **252** | 437 | 253 | 16 | 418 | 264 | 417 | 265 | **418** | **264** |

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=14336 in /etc/sysctl.conf
mount -t hugetlbfs nodev /mnt/hugepages
```

## Platform Notes

```
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 = "896"
LD_LIBRARY_PATH = "/data1/SPECcpu2006v1.1-pegasus215/amd0905is-libs/64:/data1/SPECcpu2006v1.1-pegasus215/amd0905is-libs/32"
PGI_HUGE_PAGES = "896"

The NFS server used was a Sun Fire X2100 M2 containing 1 x 80 GB 10 K RPM SATA disks.
Connections to the clients were via gigabit ethernet.
The x86 Open64 Compiler Suite is only available from (and supported by) AMD at
```

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## General Notes (Continued)

<a href="http://developer.amd.com/cpu/open64">http://developer.amd.com/cpu/open64</a>.

## Base Compiler Invocation

C benchmarks:
opencc

C++ benchmarks:
openCC

## Base Portability Flags

400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
401.bzip2: -DSPEC_CPU_LP64
403.gcc: -DSPEC_CPU_LP64
429.mcf: -DSPEC_CPU_LP64
445.gobmk: -DSPEC_CPU_LP64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
464.h264ref: -DSPEC_CPU_LP64
483.xalancbmk: -DSPEC_CPU_LINUX

## Base Optimization Flags

C benchmarks:
-march=barcelona -Ofast -CG:local_sched_alg=1 -HP:bdt=2m:heap=2m

C++ benchmarks:
-march=barcelona -Ofast -m32 -INLINE:aggressive=on
-L/root/work/libraries/SmartHeap-8.1/lib -lsmartheap

## Peak Compiler Invocation

C benchmarks (except as noted below):
opencc

456.hmmer: pgcc

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

473.astar: pgcpp

## Peak Portability Flags

400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
401.bzip2: -DSPEC_CPU_LP64
445.gobmk: -DSPEC_CPU_LP64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
464.h264ref: -DSPEC_CPU_LP64
483.xalancbmk: -DSPEC_CPU_LINUX

## Peak Optimization Flags

C benchmarks:

400.perlbench: -march=barcelona -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -IPA:plimit=20000 -LNO:opt=0
-OPT:unroll_times_max=8 -OPT:unroll_size=256
-OPT:unroll_level=2 -OPT:keep_ext=on -WOPT:if_conv=0
-CG:local_sched_alg=1 -CG:unroll_fb_req=on
-HP:bdt=2m:heap=2m

401.bzip2: -march=barcelona -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -O3 -OPT:alias=disjoint
-OPT:unroll_size=0 -OPT:Ofast -OPT:goto=off
-INLINE:aggressive=on -CG:local_sched_alg=1 -m3dnow
-HP:bdt=2m:heap=2m

403.gcc: -march=barcelona -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -LNO:trip_count=256
-LNO:prefetch_ahead=10 -CG:cmp_peep=on -m32
-HP:bdt=2m:heap=2m -GRA:unspill=on

429.mcf: -march=barcelona -O3 -ipa -INLINE:aggressive=on
-CG:gcm=off -GRA:prioritize_by_density=on -m32
-HP:bdt=2m:heap=2m

445.gobmk: -march=barcelona -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -O3 -OPT:alias=restrict
-OPT:unroll_times_max=8 -OPT:unroll_size=256
-OPT:unroll_level=2 -OPT:keep_ext=on -ipa -IPA:plimit=750
-IPA:min_hotness=300 -IPA:pu_reorder=1 -LNO:prefetch=1
-LNO:ignore_feedback=off -CG:p2align=on
-CG:unroll_fb_req=on -HP:bdt=2m:heap=2m

456.hmmer: -fastsse -Mvect=partial -Munroll=n:8 -Msmartalloc=huge
-Msafeptr -Mprefetch=t0 -Mfprelaxed -Mipa=const -Mipa=ptr
-Mipa=arg -Mipa=inline -tp shanghai-64 -Bstatic_pgi

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## Peak Optimization Flags (Continued)

458.sjeng: `-march=barcelona -fb_create fbdata`(pass 1)
`-fb_opt fbdata`(pass 2) `-O3 -ipa -LNO:ignore_feedback=off`
`-LNO:full_unroll=10 -LNO:fusion=0 -LNO:fission=2`
`-IPA:pu_reorder=2 -CG:ptr_load_use=0`
`-OPT:unroll_times_max=8 -INLINE:aggressive=on`
`-HP:bdt=2m:heap=2m`

462.libquantum: `-march=barcelona -Ofast -LNO:pf2=0 -CG:gcm=off`
`-CG:use_prefetchnta=on -CG:cmp_peep=on -WOPT:aggstr=0`
`-HP:bdt=2m:heap=2m -OPT:alias=disjoint`
`-INLINE:aggressive=on -IPA:space=1000 -IPA:plimit=20000`

464.h264ref: `-march=barcelona -fb_create fbdata`(pass 1)
`-fb_opt fbdata`(pass 2) `-O3 -IPA:plimit=20000`
`-OPT:alias=disjoint -LNO:prefetch=0 -CG:ptr_load_use=0`
`-CG:push_pop_int_saved_regs=off -HP:bdt=2m:heap=2m`

C++ benchmarks:

471.omnetpp: `-march=barcelona -Ofast -CG:gcm=off -INLINE:aggressive=on`
`-OPT:alias=disjoint -WOPT:if_conv=0 -m32`
`-L/root/work/libraries/SmartHeap-8.1/lib -lsmartheap`

473.astar: `-Mpfi`(pass 1) `-Mpfo`(pass 2) `-Mipa=fast`(pass 2)
`-Mipa=inline:6`(pass 2) `-fastsse -O4 -Msmartalloc=huge`
`-Msafeptr=global -Mfprelaxed --zc_eh -tp shanghai-32`
`-Bstatic_pgi`

483.xalancbmk: `-march=barcelona -Ofast -INLINE:aggressive=on -m32`
`-CG:cmp_peep=on -GRA:unspill=on -TENV:frame_pointer=off`
`-L/root/work/libraries/SmartHeap-8.1/lib -lsmartheap`

## Peak Other Flags

C benchmarks:

456.hmmer: `-Mipa=jobs:4`

C++ benchmarks:

473.astar: `-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/amd-platform.20090710.html`
`http://www.spec.org/cpu2006/flags/x86-open64-4.2.2-flags-revE.20090915.html`
`http://www.spec.org/cpu2006/flags/pgi80_linux_flags.20090915.html`

You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2006/flags/amd-platform.20090710.xml
http://www.spec.org/cpu2006/flags/x86-open64-4.2.2-flags-revE.20090915.xml
http://www.spec.org/cpu2006/flags/pgi80_linux_flags.20090915.xml


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