IBM Corporation

IBM BladeCenter LS42 (AMD Opteron 8374 HE)

**SPECint**$_{rate2006} = 209$

**SPECint**$_{rate\_base2006} = 174$

<table>
<thead>
<tr>
<th>Test date:</th>
<th>Feb-2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Mar-2009</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Jun-2008</td>
</tr>
</tbody>
</table>

**CPU2006 license:** 11

**Test sponsor:** IBM Corporation

**Tested by:** IBM Corporation

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**Hardware**

- **CPU Name:** AMD Opteron 8374 HE
- **CPU Characteristics:**
  - CPU MHz: 2200
  - FPU: Integrated
  - CPU(s) enabled: 16 cores, 4 chips, 4 cores/chip
  - CPU(s) orderable: 1,2,3,4 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 (16 x 4 GB DDR2-6400 ECC)
  - Disk Subsystem: 1 x 73 GB SAS, 10000 RPM
  - Other Hardware: None

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**Software**

- **Operating System:** SuSE Linux Enterprise Server 10 (x86_64) SP2, Kernel 2.6.16.60-0.21-smp
- **Compiler:**
  - PGI Server Complete Version 7.2
  - PathScale Compiler Suite Version 3.2
- **Auto Parallel:** No
- **File System:** ReiserFS
- **System State:** Run level 3 (Full multiuser with network)
- **Base Pointers:** 32/64-bit
- **Peak Pointers:** 32/64-bit
- **Other Software:**
  - binutils 2.18
  - 32-bit and 64-bit libhugetlbfs libraries
  - SmartHeap 8.1 32-bit Library for Linux
### SPEC CINT2006 Result

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#### Results Table

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<thead>
<tr>
<th>Benchmark</th>
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</tbody>
</table>

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

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### Submit Notes

The config file option 'submit' was used.

'numactl' was used to bind copies to the cores

---

### Operating System Notes

The libhugetlbfs libraries were installed using the installation rpms that came with the distribution.

'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

Environment variables set by runspec before the start of the run:

HUGETLB_MORECORE = "yes"

LD_LIBRARY_PATH = "/cpu2006/amd909gh-libs/64:/cpu2006/amd909gh-libs/32"

Processor Performance States Disabled in BIOS

Memory ChipKill Disabled in BIOS
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**Base Compiler Invocation**

- C benchmarks:
  - pgcc
- C++ benchmarks:
  - pgcpp

---

**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:
  - -Mvect=cachesize:6291456
  - -fastsse
  - -Msmartalloc=huge
  - -Mfprelaxed
  - -Mipa=fast
  - -Mipa=inline
  - -tp barcelona-64
  - -Bstatic_pgi

- C++ benchmarks:
  - -Mvect=cachesize:6291456
  - -fastsse
  - -Msmartalloc=huge
  - -Mfprelaxed
  - --zc_eh
  - -Mipa=fast
  - -Mipa=inline:10
  - -tp barcelona-32
  - -Bstatic_pgi

---

**Base Other Flags**

- C benchmarks:
  - -Mipa=jobs:4
- C++ benchmarks:
  - -Mipa=jobs:4

---

**Peak Compiler Invocation**

C benchmarks (except as noted below):
- pathcc

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Peak Compiler Invocation (Continued)

456.hmmer: pgcc
462.libquantum: pgcc

C++ benchmarks (except as noted below):
pgcc
483.xalancbmk: pathCC

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)
-Wl,-T/usr/share/libhugetlbfs/ldscripts/elf_x86_64.xBDT(pass 2)
-L/usr/lib64 -lhugetlbfs(pass 2) -Ofast -IPA:plimit=20000
-IPA:field_reorder=on -LNO:opt=0 -WOPT:if_conv=0
-CG:local_sched_alg=1

401.bzip2: -march=barcelona -O3 -OPT:alias=disjoint -OPT:Ofast
-OPT:goto=off -INLINE:aggressive=on -CG:local_sched_alg=1
-m3dnow
-Wl,-T/usr/share/libhugetlbfs/ldscripts/elf_x86_64.xBDT
-L/usr/lib64 -lhugetlbfs

403.gcc: -march=barcelona -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -OPT:malloc_alg=1
-LNO:trip_count=256 -LNO:prefetch_ahead=10
-CG:prefer_lru_reg=off -m32

429.mcf: -march=barcelona -O3 -ipa -INLINE:aggressive=on
-CG:gc=off -GRA:prioritize_by_density=on -m32
-L/usr/lib -lhugetlbfs

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**Peak Optimization Flags (Continued)**

445.gobmk: 
- -march=barcelona -fb_create fbdata(pass 1)
  - -fb_opt fbdata(pass 2)
  - -Wl,-T/usr/share/libhugetlbfs/ldscripts/elf_x86_64_xBDT(pass 2)
  - -L/usr/lib64 -hugetlbfs(pass 2) -O3 -OPT:alias=restrict
  - -LNO:ignore_feedback=off -CG:p2align=on

456.hmmer: 
- -Mvect=cachesize:6291456 -fastsse -Mvect=partial
  - -Munroll=n:8 -Msmartralloc=huge -Msafeptr -Mprefetch=t0
  - -Mfprelaxed -Mipa=const -Mipa=ptr -Mipa=arg -Mipa=inline
  - tp barcelona-64 -Bstatic_pgi

458.sjeng: 
- -march=barcelona -fb_create fbdata(pass 1)
  - -fb_opt fbdata(pass 2)
  - -Wl,-T/usr/share/libhugetlbfs/ldscripts/elf_x86_64_xBDT(pass 2)
  - -L/usr/lib64 -hugetlbfs(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

462.libquantum: 
- -Mvect=cachesize:6291456 -fastsse -Munroll=m:8
  - -Msmartralloc=huge -Mprefetch=distance:4 -Mfprelaxed
  - -Mipa=fast -Mipa=inline -Mipa=noarg -tp barcelona-64
  - -Bstatic_pgi

464.h264ref: 
- -march=barcelona -fb_create fbdata(pass 1)
  - -fb_opt fbdata(pass 2)
  - -Wl,-T/usr/share/libhugetlbfs/ldscripts/elf_x86_64_xBDT(pass 2)
  - -L/usr/lib64 -hugetlbfs(pass 2) -O3 -ipa
  - -LNO:p2align=on -CG:p2align=on

**C++ benchmarks:**

471.omnetpp: basepeak = yes

473.astar: 
- -Mpfi(pass 1) -Mpfo(pass 2) -Mipa=fast(pass 2)
  - -Mipa=inline:6(pass 2) -Mvect=cachesize:6291456 -fastsse
  - -O4 -Msmartralloc=huge -Msafeptr=global -Mfprelaxed
  - --zc_eh -tp barcelona-32 -Bstatic_pgi

**Peak Other Flags**

**C benchmarks:**

483.xalancbmk: 
- -march=barcelona -Ofast -INLINE:aggressive=on -m32
  - -L/root/work/libraries/SmartHeap_8.1/lib -lsmartheap

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Peak Other Flags (Continued)

456.hmmer: -Mipa=jobs:4
462.libquantum: -Mipa=jobs:4

C++ benchmarks (except as noted below):
-Mipa=jobs:4(pass 2)
483.xalancbmk: No flags used

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/pgi72_linux_flags.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/amd-platform-amd909gh.20090713.xml
http://www.spec.org/cpu2006/flags/pgi72_linux_flags.xml
http://www.spec.org/cpu2006/flags/CPU2006_flags.20090710.xml

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