**Bull SAS**

NovaScale R450 F2 (Intel Xeon E5645, 2.40 Ghz)

**SPECint**2006 = 35.0

**SPECint_base**2006 = 33.7

- **CPU2006 license:** 20
- **Test date:** Jun-2011
- **Test sponsor:** Bull SAS
- **Hardware Availability:** Feb-2011
- **Tested by:** Dell Inc.
- **Software Availability:** Apr-2011

### Hardware

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon E5645</td>
</tr>
<tr>
<td>CPU Characteristics</td>
<td>Intel Turbo Boost Technology up to 2.80 GHz</td>
</tr>
<tr>
<td>CPU MHz</td>
<td>2400</td>
</tr>
<tr>
<td>FPU</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled</td>
<td>12 cores, 2 chips, 6 cores/chip</td>
</tr>
<tr>
<td>CPU(s) orderable</td>
<td>1.2 chips</td>
</tr>
<tr>
<td>Primary Cache</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Secondary Cache</td>
<td>256 KB I+D on chip per core</td>
</tr>
<tr>
<td>L3 Cache</td>
<td>12 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other Cache</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>48 GB (6 x 8 GB 2Rx4 PC3-10600R-9, ECC)</td>
</tr>
<tr>
<td>Disk Subsystem</td>
<td>2 x 146 GB 15000 RPM SAS</td>
</tr>
<tr>
<td>Other Hardware</td>
<td>none</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>Operating System</th>
<th>SUSE Linux Enterprise Server 11 SP1 (x86_64), Kernel 2.6.32.12-0.7-default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler</td>
<td>Intel C++ Intel 64 Compiler XE for applications running on Intel 64</td>
</tr>
<tr>
<td>Version</td>
<td>Version 12.0.1.116 Build 20101116</td>
</tr>
<tr>
<td>Auto Parallel</td>
<td>Yes</td>
</tr>
<tr>
<td>File System</td>
<td>ext3</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Peak Pointers</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other Software</td>
<td>Microquill SmartHeap V9.01</td>
</tr>
</tbody>
</table>
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</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>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.perlbench</td>
<td>439</td>
<td>22.3</td>
<td>439</td>
<td>22.2</td>
<td>439</td>
<td>22.2</td>
<td>388</td>
<td>25.2</td>
<td>388</td>
<td>25.2</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>592</td>
<td>16.3</td>
<td>592</td>
<td>16.3</td>
<td>592</td>
<td>16.3</td>
<td>564</td>
<td>17.1</td>
<td>564</td>
<td>17.1</td>
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<tr>
<td>403.gcc</td>
<td>353</td>
<td>22.8</td>
<td>356</td>
<td>22.6</td>
<td>354</td>
<td>22.7</td>
<td>337</td>
<td>23.9</td>
<td>337</td>
<td>23.9</td>
</tr>
<tr>
<td>429.mcf</td>
<td>222</td>
<td>41.0</td>
<td>223</td>
<td>40.9</td>
<td>222</td>
<td>41.0</td>
<td>208</td>
<td>43.8</td>
<td>209</td>
<td>43.6</td>
</tr>
<tr>
<td>445.gobmk</td>
<td>536</td>
<td>19.6</td>
<td>529</td>
<td>19.8</td>
<td>529</td>
<td>19.8</td>
<td>494</td>
<td>21.3</td>
<td>493</td>
<td>21.3</td>
</tr>
<tr>
<td>456.hmmer</td>
<td>233</td>
<td>40.0</td>
<td>233</td>
<td>40.1</td>
<td>233</td>
<td>40.0</td>
<td>229</td>
<td>40.7</td>
<td>230</td>
<td>40.6</td>
</tr>
<tr>
<td>458.sjeng</td>
<td>541</td>
<td>22.3</td>
<td>542</td>
<td>22.3</td>
<td>542</td>
<td>22.3</td>
<td>527</td>
<td>23.0</td>
<td>527</td>
<td>23.0</td>
</tr>
<tr>
<td>462.libquantum</td>
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<td>875</td>
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<td>23.7</td>
<td>875</td>
<td>23.7</td>
<td>875</td>
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<tr>
<td>464.h264ref</td>
<td>731</td>
<td>30.3</td>
<td>734</td>
<td>30.1</td>
<td>732</td>
<td>30.2</td>
<td>623</td>
<td>35.5</td>
<td>622</td>
<td>35.6</td>
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<tr>
<td>471.omnetpp</td>
<td>306</td>
<td>20.4</td>
<td>307</td>
<td>20.4</td>
<td>306</td>
<td>20.4</td>
<td>269</td>
<td>23.2</td>
<td>270</td>
<td>23.1</td>
</tr>
<tr>
<td>473.astar</td>
<td>343</td>
<td>20.4</td>
<td>343</td>
<td>20.5</td>
<td>343</td>
<td>20.5</td>
<td>404</td>
<td>17.4</td>
<td>405</td>
<td>17.3</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>209</td>
<td>33.1</td>
<td>210</td>
<td>32.8</td>
<td>210</td>
<td>32.9</td>
<td>229</td>
<td>30.1</td>
<td>230</td>
<td>30.1</td>
</tr>
</tbody>
</table>

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

Operating System Notes

'ulimit -s unlimited' was used to set the stack size to unlimited prior to run
'mount -t hugetlbfs nodev /mnt/hugepages' was used to enable large pages
echo 900 > /proc/sys/vm/nr_hugepages
export HUGETLB_MORECORE=yes
export LD_PRELOAD=/usr/lib64/libhugetlbfs.so

Platform Notes

BIOS Settings:
Power Management = Maximum Performance (Default = Active Power Controller)
Data Reuse = Disabled (Default = Enabled)
Logical Processor = Disabled (Default = Enabled)

General Notes

OMP_NUM_THREADS set to number of cores
Binaries were compiled on RHEL5.5
The Dell PowerEdge R510 and
the Bull NovaScale R450 F2 models are electronically equivalent.
The results have been measured on a Dell PowerEdge R510 model.
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Base Compiler Invocation

C benchmarks:
icc -m64

C++ benchmarks:
icpc -m64

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
471.omnetpp: -DSPEC_CPU_LP64
473.astar: -DSPEC_CPU_LP64
483.xalancbmk: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX

Base Optimization Flags

C benchmarks:
-xSSE4.2 -ipo -O3 -no-prec-div -parallel -opt-prefetch -auto-p32
-B /usr/share/libhugetlbfs/ -Wl,-melf_x86_64 -Wl,-hugetlbfs-link=BDT

C++ benchmarks:
-xSSE4.2 -ipo -O3 -no-prec-div -opt-prefetch -Wl,-z,muldefs
-L/smartheap -Lsmartheap64
-B /usr/share/libhugetlbfs/ -Wl,-melf_x86_64 -Wl,-hugetlbfs-link=BDT

Base Other Flags

C benchmarks:
403.gcc: -Dalloca=_alloca

Peak Compiler Invocation

C benchmarks (except as noted below):
icc -m64

Continued on next page
Bull SAS
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Peak Compiler Invocation (Continued)

400.perlbench: icc -m32
429.mcf: icc -m32
445.gobmk: icc -m32
464.h264ref: icc -m32

C++ benchmarks (except as noted below):
icc -m32

473.astar: icpc -m32

Peak Portability Flags

400.perlbench: -DSPEC_CPU_LINUX_IA32
401.bzip2: -DSPEC_CPU_LP64
403.gcc: -DSPEC_CPU_LP64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
473.astar: -DSPEC_CPU_LP64
483.xalancbmk: -DSPEC_CPU_LINUX

Peak Optimization Flags

C benchmarks:

400.perlbench: -xSSE4.2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-03(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-opt-prefetch -ansi-alias
-B /usr/share/libhugetlbfs/ -Wl,-hugetlbfs-link=BDT

401.bzip2: -xSSE4.2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-03(pass 2) -no-prec-div -prof-use(pass 2) -auto-1lp32
-opt-prefetch -ansi-alias

403.gcc: -xSSE4.2 -ipo -03 -no-prec-div -inline-calloc
-opt-malloc-options=3 -auto-1lp32
-B /usr/share/libhugetlbfs/ -Wl,-melf_x86_64 -Wl,-hugetlbfs-link=BDT

429.mcf: -xSSE4.2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-03(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-auto-1lp32 -ansi-alias
-B /usr/share/libhugetlbfs/ -Wl,-hugetlbfs-link=BDT

Continued on next page
Bull SAS
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**SPECint2006 = 35.0**

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<tr>
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</table>

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**Peak Optimization Flags (Continued)**

445.gobmk: `--xSSE4.2 (pass 2) -prof-gen (pass 1) -prof-use (pass 2) -auto-ilp32 -ansi-alias -B /usr/share/libhugetlbfs/ -Wl,-hugetlbfs-link=BDT`

456.hmmer: `--xSSE4.2 -ipo -O3 -no-prec-div -unroll2 -auto-ilp32 -ansi-alias -B /usr/share/libhugetlbfs/ -Wl,-melf_x86_64 -Wl,-hugetlbfs-link=BDT`

458.sjeng: `--xSSE4.2 (pass 2) -prof-gen (pass 1) -ipo (pass 2) -O3 (pass 2) -no-prec-div (pass 2) -prof-use (pass 2) -unroll4`

462.libquantum: `--basepeak = yes`

464.h264ref: `--xSSE4.2 (pass 2) -prof-gen (pass 1) -ipo (pass 2) -O3 (pass 2) -no-prec-div (pass 2) -prof-use (pass 2) -unroll2 -ansi-alias -B /usr/share/libhugetlbfs/ -Wl,-hugetlbfs-link=BDT`

**C++ benchmarks:**

471.omnetpp: `--xSSE4.2 (pass 2) -prof-gen (pass 1) -ipo (pass 2) -O3 (pass 2) -no-prec-div (pass 2) -prof-use (pass 2) -opt-ra-region-strategy=block -ansi-alias -Wl,-z,muldefs -L/smartheap -lsmartheap -B /usr/share/libhugetlbfs/ -Wl,-hugetlbfs-link=BDT`

473.astar: `--xSSE4.2 (pass 2) -prof-gen (pass 1) -ipo (pass 2) -O3 (pass 2) -no-prec-div (pass 2) -prof-use (pass 2) -opt-ra-region-strategy=routine -Wl,-z,muldefs -L/smartheap -lsmartheap64`

483.xalancbmk: `--xSSE4.2 -ipo -O3 -no-prec-div -opt-prefetch -ansi-alias -Wl,-z,muldefs -L/smartheap -lsmartheap -B /usr/share/libhugetlbfs/ -Wl,-hugetlbfs-link=BDT`

---

**Peak Other Flags**

C benchmarks:

403.gcc: `--Dalloca=_alloca`

---

The flags files that were used to format this result can be browsed at:


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You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic12.0-linux64-revB.xml
http://www.spec.org/cpu2006/flags/Intel-Linux64-Platform.20110524.00.xml

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For other inquiries, please contact webmaster@spec.org.

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