## Bull SAS

**NovoScale R460 F2 (Intel Xeon E5620, 2.40 GHz)**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECfp2006</th>
<th>SPECfp_base2006</th>
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<tbody>
<tr>
<td>410.bwaves</td>
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<td>416.gamess</td>
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<tr>
<td>433.milc</td>
<td>45.1</td>
<td>44.4</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>82.7</td>
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</tr>
<tr>
<td>435.gromacs</td>
<td>17.5</td>
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<td>436.cactusADM</td>
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<td>171</td>
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<tr>
<td>437.leslie3d</td>
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<td>98.3</td>
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<td>444.namd</td>
<td>15.6</td>
<td>15.8</td>
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<tr>
<td>447.dealII</td>
<td>32.7</td>
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<tr>
<td>450.soplex</td>
<td>28.0</td>
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</tr>
<tr>
<td>453.povray</td>
<td>27.0</td>
<td>31.2</td>
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<td>454.calculix</td>
<td>24.0</td>
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<tr>
<td>459.GemsFDTD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>465.tonto</td>
<td>20.1</td>
<td>26.8</td>
</tr>
<tr>
<td>470.lbm</td>
<td></td>
<td>42.1</td>
</tr>
<tr>
<td>481.wrf</td>
<td></td>
<td>48.0</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>41.8</td>
<td></td>
</tr>
</tbody>
</table>

**Hardware**
- **CPU Name**: Intel Xeon E5620
- **CPU Characteristics**: Intel Turbo Boost Technology up to 2.66 GHz
- **CPU MHz**: 2400
- **FPU**: Integrated
- **CPU(s) enabled**: 8 cores, 2 chips, 4 cores/chip
- **CPU(s) orderable**: 1, 2 chips
- **Primary Cache**: 32 KB I + 32 KB D on chip per core
- **Secondary Cache**: 256 KB I+D on chip per core

**Software**
- **Operating System**: SUSE Linux Enterprise Server 11 SP1 (x86_64), Kernel 2.6.32.12-0.7-default
- **Compiler**: Intel C++ and Fortran Intel 64 Compiler XE for applications running on Intel 64 Version 12.0 Update 3
- **Auto Parallel**: Yes
- **File System**: ext3
- **System State**: Run level 3 (multi-user)
- **Base Pointers**: 64-bit

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**Test date**: May-2011  
**Hardware Availability**: Mar-2010  
**Software Availability**: Apr-2011
Bull SAS
NovaScale R460 F2 (Intel Xeon E5620, 2.40 GHz)

CPU2006 license: 20
Test sponsor: Bull SAS
Tested by: Dell Inc.
L3 Cache: 12 MB I+D on chip per chip
Other Cache: None
Memory: 48 GB (12 x 4 GB 2Rx4 PC3-10600R-9, ECC, running at 1066 MHz)
Disk Subsystem: 1 x 146 GB 15000 RPM SAS
Other Hardware: None

SPECfp2006 = 48.6
SPECfp_base2006 = 45.6

Test date: May-2011
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Seconds</td>
<td>Ratio</td>
</tr>
<tr>
<td>410.bwaves</td>
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<td>343</td>
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<td>170</td>
<td>62.5</td>
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<td>465.tonto</td>
<td>489</td>
<td>20.1</td>
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<td>470.lbm</td>
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<tr>
<td>481.wrf</td>
<td>265</td>
<td>42.1</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>466</td>
<td>41.8</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 stacksize 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)
Logical Processor = Disabled (Default = Enabled)
Bull SAS
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General Notes
OMP_NUM_THREADS set to number of cores
The Dell PowerEdge R710 and
the Bull NovaScale R460 F2 models are electronically equivalent.
The results have been measured on a Dell PowerEdge R710 model
Binaries were compiled on RHEL5.5

Base Compiler Invocation

C benchmarks:
  icc  -m64

C++ benchmarks:
  icpc  -m64

Fortran benchmarks:
  ifort  -m64

Benchmarks using both Fortran and C:
  icc  -m64 ifort  -m64

Base 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 -nofor_main
436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
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 -nofor_main
454.calculix: -DSPEC_CPU_LP64
459.GemsFDTD: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
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:
  -xSSE4.2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
  -ansi-alias

Continued on next page
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Base Optimization Flags (Continued)

C++ benchmarks:
-xSSE4.2 -ipo -O3 -no-prec-div -static -opt-prefetch -ansi-alias

Fortran benchmarks:
-xSSE4.2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch

Benchmarks using both Fortran and C:
-xSSE4.2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
-ansi-alias

Peak Compiler Invocation

C benchmarks:
icc  -m64

C++ benchmarks:
icpc  -m64

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
icc  -m64 ifort -m64

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
433.milc: -xSSE4.2(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -prof-use(pass 2) -static -auto-ilp32
-ansi-alias

470.lbm: basepeak = yes

482.sphinx3: -xSSE4.2 -ipo -O3 -no-prec-div -unroll2 -ansi-alias
-parallel

C++ benchmarks:

Continued on next page
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Peak Optimization Flags (Continued)

444.namd: basepeak = yes
-\texttt{-xsSE4.2} (pass 2) \texttt{-prof-gen} (pass 1) \texttt{-ipo} (pass 2) \texttt{-\textup{-}03} (pass 2)
-\texttt{-no-prec-div} (pass 2) \texttt{-prof-use} (pass 2) \texttt{-fno-alias}
-\texttt{-auto-\textup{ilp32}}

447.dealII: basepeak = yes

450.soplex: basepeak = yes
-\texttt{-xsSE4.2} (pass 2) \texttt{-prof-gen} (pass 1) \texttt{-ipo} (pass 2) \texttt{-\textup{-}03} (pass 2)
-\texttt{-no-prec-div} (pass 2) \texttt{-prof-use} (pass 2) \texttt{-unroll4} \texttt{-ansi-alias}
-\texttt{-B /usr/share/libhugetlbfs/ -Wl,-melf_x86_64 -Wl,-hugetlbfs-link=BDT}

Fortran benchmarks:

410.bwaves: basepeak = yes

416.gamess: basepeak = yes
-\texttt{-xsSE4.2} (pass 2) \texttt{-prof-gen} (pass 1) \texttt{-ipo} (pass 2) \texttt{-\textup{-}03} (pass 2)
-\texttt{-no-prec-div} (pass 2) \texttt{-prof-use} (pass 2) \texttt{-unroll2}
-\texttt{-inline-level=0 -scalar-rep- -static}

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

459.GemsFDTD: basepeak = yes
-\texttt{-xsSE4.2} (pass 2) \texttt{-prof-gen} (pass 1) \texttt{-ipo} (pass 2) \texttt{-\textup{-}03} (pass 2)
-\texttt{-no-prec-div} (pass 2) \texttt{-prof-use} (pass 2) \texttt{-unroll12}
-\texttt{-inline-level=0 -opt-prefetch -parallel}
-\texttt{-B /usr/share/libhugetlbfs/ -Wl,-melf_x86_64 -Wl,-hugetlbfs-link=BDT}

465.tonto: basepeak = yes
-\texttt{-xsSE4.2} (pass 2) \texttt{-prof-gen} (pass 1) \texttt{-ipo} (pass 2) \texttt{-\textup{-}03} (pass 2)
-\texttt{-no-prec-div} (pass 2) \texttt{-prof-use} (pass 2) \texttt{-inline-call}
-\texttt{-opt-malloc-options=3 \textup{-auto-unroll4}}
-\texttt{-B /usr/share/libhugetlbfs/ -Wl,-melf_x86_64 -Wl,-hugetlbfs-link=BDT}

Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes
-\texttt{-xsSE4.2} (pass 2) \texttt{-prof-gen} (pass 1) \texttt{-ipo} (pass 2) \texttt{-\textup{-}03} (pass 2)
-\texttt{-no-prec-div} (pass 2) \texttt{-prof-use} (pass 2) \texttt{-static -auto-\textup{ilp32}}
-\texttt{-ansi-alias}

454.calculix: basepeak = yes
-\texttt{-xsSE4.2 -ipo -\textup{-}03 -no-prec-div -auto-\textup{ilp32} -ansi-alias}

481.wrf: basepeak = yes

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/Intel-ic12.0-linux64-revB.html
http://www.spec.org/cpu2006/flags/Intel-Linux64-Platform.20110524.00.html
<table>
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<th>Bull SAS</th>
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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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