# SPEC® CFP2006 Result
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## Bull SAS

NovaScale R450 F2 (Intel Xeon E5645, 2.40 GHz)

$SPECfp^®\_rate2006 =$ 211

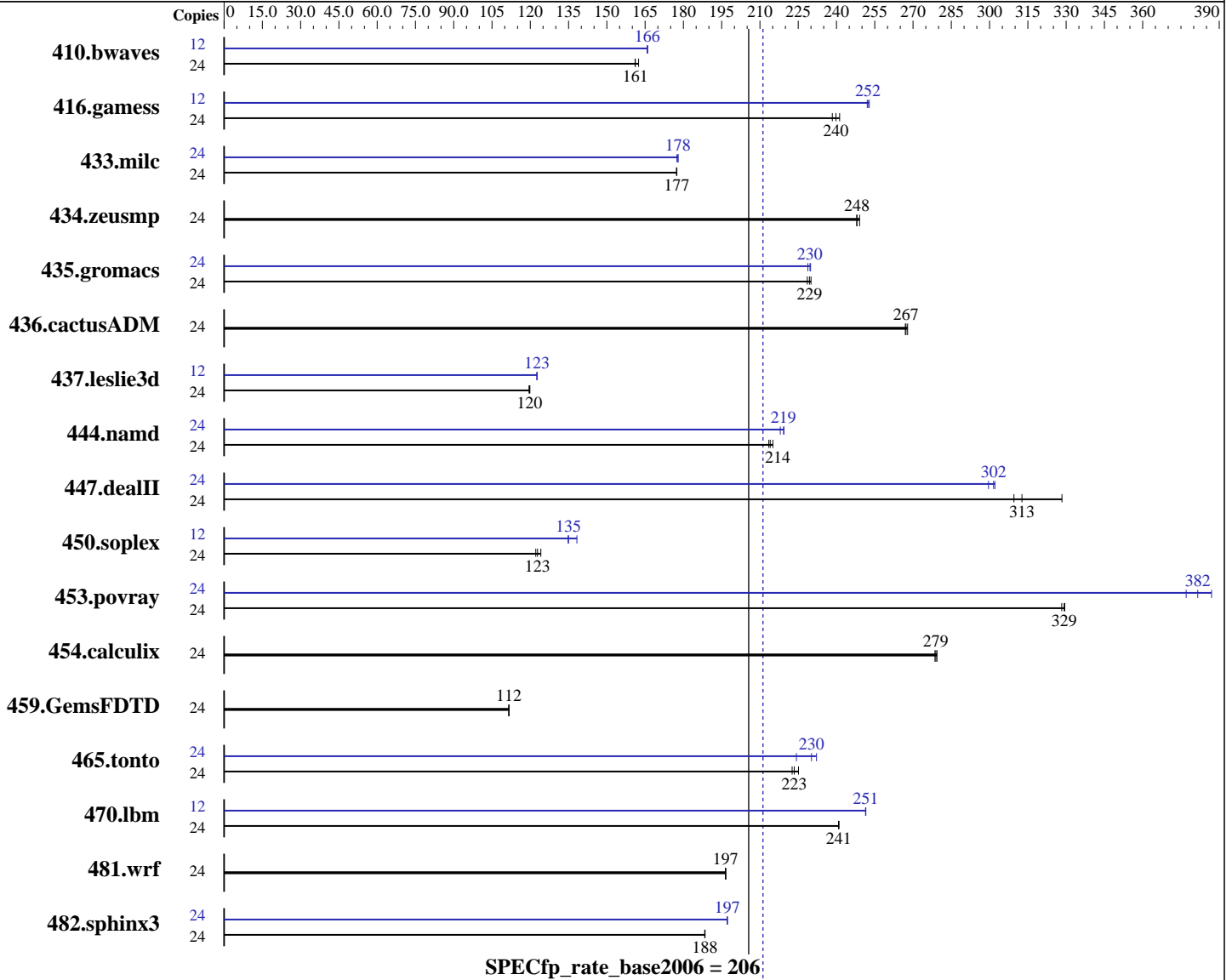$SPECfp\_rate\_base2006 =$ 206

**CPU2006 license:** 20
**Test sponsor:** Bull SAS
**Tested by:** Dell Inc.

**Test date:** Apr-2011
**Hardware Availability:** Feb-2011
**Software Availability:** Jan-2011



SPECfp_rate_base2006 = 206

SPECfp_rate2006 = 211

| | **Hardware** | |
|---|---|---|
| CPU Name: | Intel Xeon E5645 | |
| CPU Characteristics: | Intel Turbo Boost Technology up to 2.80 GHz | |
| CPU MHz: | 2400 | |
| FPU: | Integrated | |
| CPU(s) enabled: | 12 cores, 2 chips, 6 cores/chip, 2 threads/core | |
| 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 | |

*Continued on next page*

| | **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 12.0.1.116 Build 20101116 | |
| Auto Parallel: | No | |
| File System: | ext3 | |
| System State: | Run level 3 (multi-user) | |
| Base Pointers: | 64-bit | |

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| | |
|---|---|
| L3 Cache: | 12 MB I+D on chip per chip |
| Other Cache: | None |
| Memory: | 48 GB (6 x 8 GB 2Rx4 PC3-10600R-9, ECC) |
| Disk Subsystem: | 2 x 146 GB 15000 RPM SAS |
| Other Hardware: | None |

| | |
|---|---|
| Peak Pointers: | 32/64-bit |
| Other Software: | None |

## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 410.bwaves | 24 | 2025 | 161 | 2008 | 162 | **2024** | **161** | 12 | **983** | **166** | 984 | 166 | 983 | 166 |
| 416.gamess | 24 | 1971 | 238 | 1948 | 241 | **1960** | **240** | 12 | 932 | 252 | **931** | **252** | 929 | 253 |
| 433.milc | 24 | **1242** | **177** | 1243 | 177 | 1242 | 177 | 24 | 1241 | 177 | 1238 | 178 | **1238** | **178** |
| 434.zeusmp | 24 | 877 | 249 | 881 | 248 | **881** | **248** | 24 | 877 | 249 | 881 | 248 | **881** | **248** |
| 435.gromacs | 24 | 745 | 230 | **747** | **229** | 750 | 229 | 24 | **746** | **230** | 749 | 229 | 746 | 230 |
| 436.cactusADM | 24 | 1071 | 268 | 1074 | 267 | **1073** | **267** | 24 | 1071 | 268 | 1074 | 267 | **1073** | **267** |
| 437.leslie3d | 24 | 1888 | 120 | 1882 | 120 | **1885** | **120** | 12 | 920 | 123 | **920** | **123** | 920 | 123 |
| 444.namd | 24 | 895 | 215 | **899** | **214** | 902 | 213 | 24 | 877 | 219 | **878** | **219** | 883 | 218 |
| 447.dealII | 24 | 836 | 328 | 887 | 310 | **878** | **313** | 24 | 917 | 300 | **911** | **302** | 909 | 302 |
| 450.soplex | 24 | **1630** | **123** | 1639 | 122 | 1612 | 124 | 12 | **741** | **135** | 724 | 138 | 742 | 135 |
| 453.povray | 24 | 388 | 329 | 389 | 328 | **388** | **329** | 24 | 330 | 387 | **335** | **382** | 339 | 377 |
| 454.calculix | 24 | 711 | 279 | 709 | 279 | **710** | **279** | 24 | 711 | 279 | 709 | 279 | **710** | **279** |
| 459.GemsFDTD | 24 | **2282** | **112** | 2280 | 112 | 2282 | 112 | 24 | **2282** | **112** | 2280 | 112 | 2282 | 112 |
| 465.tonto | 24 | **1057** | **223** | 1049 | 225 | 1061 | 223 | 24 | **1026** | **230** | 1053 | 224 | 1017 | 232 |
| 470.lbm | 24 | 1369 | 241 | 1369 | 241 | **1369** | **241** | 12 | 656 | 251 | 656 | 251 | **656** | **251** |
| 481.wrf | 24 | 1363 | 197 | **1364** | **197** | 1364 | 196 | 24 | 1363 | 197 | **1364** | **197** | 1364 | 196 |
| 482.sphinx3 | 24 | 2483 | 188 | **2482** | **188** | 2481 | 189 | 24 | **2372** | **197** | 2371 | 197 | 2373 | 197 |

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
```

## 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 10800 > /proc/sys/vm/nr_hugepages
    export HUGETLB_MORECORE=yes
    export LD_PRELOAD=/usr/lib64/libhugetlbfs.so
```

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**CPU2006 license:** 20
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**Tested by:** Dell Inc.

**Test date:**          Apr-2011
**Hardware Availability:** Feb-2011
**Software Availability:**  Jan-2011

## Platform Notes

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

## General Notes

```
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.
```

## 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
  454.calculix: -DSPEC_CPU_LP64 -nofor_main
  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
```

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# Base Optimization Flags

C benchmarks:
```
-xSSE4.2 -ipo -O3 -no-prec-div -static -ansi-alias
```

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

Fortran benchmarks:
```
-xSSE4.2 -ipo -O3 -no-prec-div -static
```

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

# Peak Compiler Invocation

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

```
482.sphinx3: icc -m32
```

C++ benchmarks (except as noted below):
```
icpc   -m64
```

```
450.soplex: icpc -m32
```

Fortran benchmarks:
```
ifort -m64
```

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

# 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 -nofor_main
 436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
   437.leslie3d: -DSPEC_CPU_LP64
      444.namd: -DSPEC_CPU_LP64
     447.dealII: -DSPEC_CPU_LP64
    453.povray: -DSPEC_CPU_LP64
   454.calculix: -DSPEC_CPU_LP64 -nofor_main
  459.GemsFDTD: -DSPEC_CPU_LP64
      465.tonto: -DSPEC_CPU_LP64
```

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# Peak Portability Flags (Continued)

```
470.lbm: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
```

# 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

470.lbm: -xSSE4.2(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
         -no-prec-div(pass 2) -prof-use(pass 2) -opt-malloc-options=3
         -ansi-alias -opt-prefetch -static -auto-ilp32

482.sphinx3: -xSSE4.2 -ipo -O3 -no-prec-div -unroll2
```

C++ benchmarks:

```
444.namd: -xSSE4.2(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
          -no-prec-div(pass 2) -prof-use(pass 2) -fno-alias
          -auto-ilp32

447.dealII: -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

450.soplex: -xSSE4.2(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
            -no-prec-div(pass 2) -prof-use(pass 2) -opt-malloc-options=3
            -B /usr/share/libhugetlbfs/ -Wl,-hugetlbfs-link=BDT

453.povray: -xSSE4.2(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
            -no-prec-div(pass 2) -prof-use(pass 2) -unroll4 -ansi-alias
            -B /usr/share/libhugetlbfs/ -Wl,-melf_x86_64 -Wl,-hugetlbfs-link=BDT
```

Fortran benchmarks:

```
410.bwaves: -xSSE4.2(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
            -no-prec-div(pass 2) -prof-use(pass 2) -static

416.gamess: -xSSE4.2(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
            -no-prec-div(pass 2) -prof-use(pass 2) -unroll2
            -inline-level=0 -scalar-rep- -static

434.zeusmp: basepeak = yes

437.leslie3d: -xSSE4.2 -ipo -O3 -no-prec-div
              -B /usr/share/libhugetlbfs/ -Wl,-melf_x86_64 -Wl,-hugetlbfs-link=BDT
```

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# Peak Optimization Flags (Continued)

459.GemsFDTD: basepeak = yes

465.tonto: -xSSE4.2(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -prof-use(pass 2) -unroll4 -auto
-inline-calloc -opt-malloc-options=3
-B /usr/share/libhugetlbfs/ -Wl,-melf_x86_64 -Wl,-hugetlbfs-link=BDT

Benchmarks using both Fortran and C:

435.gromacs: -xSSE4.2(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -prof-use(pass 2) -opt-prefetch
-static -auto-ilp32

436.cactusADM: basepeak = yes

454.calculix: basepeak = yes

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

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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