



# SPEC® CFP2006 Result

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## IBM Corporation

### SPECfp®\_rate2006 = 203

IBM System x3650 M4  
(Intel Xeon E5-2603 v2, 1.80 GHz)

### SPECfp\_rate\_base2006 = 199

CPU2006 license: 11

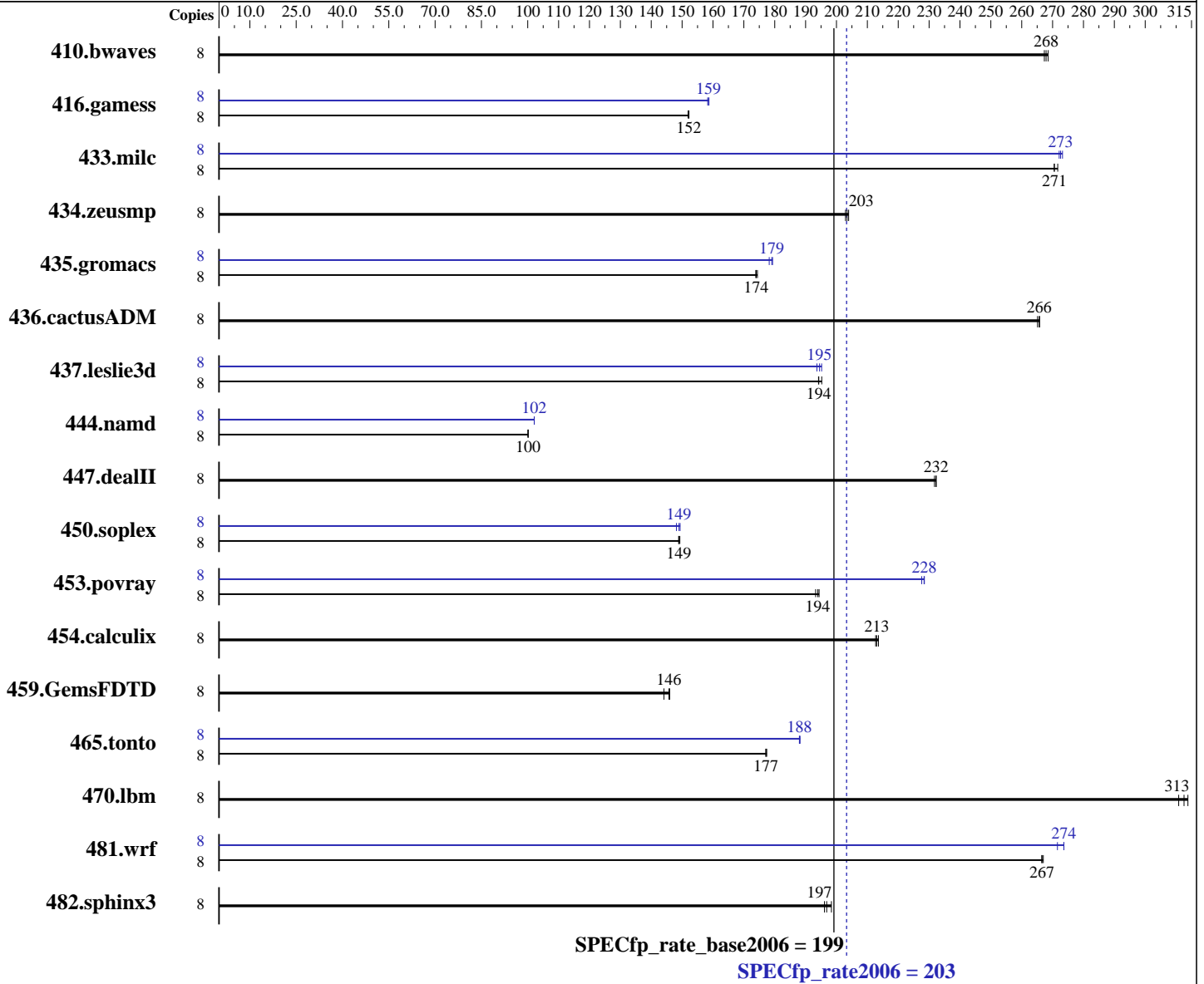
Test date: Nov-2013

Test sponsor: IBM Corporation

Hardware Availability: Dec-2013

Tested by: IBM Corporation

Software Availability: Sep-2013



### Hardware

CPU Name: Intel Xeon E5-2603 v2  
 CPU Characteristics:  
 CPU MHz: 1800  
 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

Continued on next page

### Software

Operating System: Red Hat Enterprise Linux Server release 6.4 (Santiago)  
 2.6.32-358.el6.x86\_64  
 Compiler: C/C++: Version 14.0.0.080 of Intel C++ Studio XE for Linux;  
 Fortran: Version 14.0.0.080 of Intel Fortran Studio XE for Linux  
 Auto Parallel: No  
 File System: ext4

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**L3 Cache:** 10 MB I+D on chip per chip  
**Other Cache:** None  
**Memory:** 256 GB (16 x 16 GB 2Rx4 PC3-14900R-13, ECC, running at 1333 MHz)  
**Disk Subsystem:** 1 x 400 GB SAS SSD, RAID 0  
**Other Hardware:** None

**System State:** Run level 3 (multi-user)  
**Base Pointers:** 32/64-bit  
**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    | 8      | 405         | 269        | <b>406</b> | <b>268</b> | 407        | 267        | 8      | 405        | 269        | <b>406</b> | <b>268</b> | 407        | 267        |  |  |
| 416.gamess    | 8      | <b>1029</b> | <b>152</b> | 1029       | 152        | 1031       | 152        | 8      | <b>988</b> | <b>159</b> | 987        | 159        | 990        | 158        |  |  |
| 433.milc      | 8      | 271         | 271        | <b>271</b> | <b>271</b> | 270        | 272        | 8      | 269        | 273        | <b>269</b> | <b>273</b> | 270        | 272        |  |  |
| 434.zeusmp    | 8      | <b>358</b>  | <b>203</b> | 359        | 203        | 357        | 204        | 8      | <b>358</b> | <b>203</b> | 359        | 203        | 357        | 204        |  |  |
| 435.gromacs   | 8      | 328         | 174        | <b>328</b> | <b>174</b> | 329        | 174        | 8      | 319        | 179        | <b>319</b> | <b>179</b> | 321        | 178        |  |  |
| 436.cactusADM | 8      | <b>360</b>  | <b>266</b> | 360        | 266        | 361        | 265        | 8      | <b>360</b> | <b>266</b> | 360        | 266        | 361        | 265        |  |  |
| 437.leslie3d  | 8      | <b>387</b>  | <b>194</b> | 387        | 194        | 385        | 195        | 8      | 385        | 195        | 388        | 194        | <b>387</b> | <b>195</b> |  |  |
| 444.namd      | 8      | <b>641</b>  | <b>100</b> | 641        | 100        | 641        | 100        | 8      | <b>628</b> | <b>102</b> | 628        | 102        | 628        | 102        |  |  |
| 447.dealII    | 8      | <b>394</b>  | <b>232</b> | 394        | 232        | 395        | 232        | 8      | <b>394</b> | <b>232</b> | 394        | 232        | 395        | 232        |  |  |
| 450.soplex    | 8      | 447         | 149        | 448        | 149        | <b>448</b> | <b>149</b> | 8      | 447        | 149        | 450        | 148        | <b>448</b> | <b>149</b> |  |  |
| 453.povray    | 8      | <b>219</b>  | <b>194</b> | 220        | 193        | 219        | 194        | 8      | 187        | 228        | 186        | 228        | <b>186</b> | <b>228</b> |  |  |
| 454.calculix  | 8      | 309         | 214        | 310        | 213        | <b>310</b> | <b>213</b> | 8      | 309        | 214        | 310        | 213        | <b>310</b> | <b>213</b> |  |  |
| 459.GemsFDTD  | 8      | 589         | 144        | 581        | 146        | <b>582</b> | <b>146</b> | 8      | 589        | 144        | 581        | 146        | <b>582</b> | <b>146</b> |  |  |
| 465.tonto     | 8      | 444         | 177        | 444        | 177        | <b>444</b> | <b>177</b> | 8      | 419        | 188        | 418        | 188        | <b>419</b> | <b>188</b> |  |  |
| 470.lbm       | 8      | <b>352</b>  | <b>313</b> | 354        | 311        | 350        | 314        | 8      | <b>352</b> | <b>313</b> | 354        | 311        | 350        | 314        |  |  |
| 481.wrf       | 8      | <b>335</b>  | <b>267</b> | 335        | 266        | 335        | 267        | 8      | 327        | 274        | 329        | 272        | <b>327</b> | <b>274</b> |  |  |
| 482.sphinx3   | 8      | 795         | 196        | <b>792</b> | <b>197</b> | 786        | 198        | 8      | 795        | 196        | <b>792</b> | <b>197</b> | 786        | 198        |  |  |

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

## Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

## Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"  
Zone reclaim mode enabled with:  
echo 1 > /proc/sys/vm/zone\_reclaim\_mode



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**Test date:** Nov-2013  
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### Platform Notes

BIOS setting:  
Operating Mode set to Maximum Performance  
Sysinfo program /home/SPECcpu-new/config/sysinfo.rev6818  
\$Rev: 6818 \$ \$Date:: 2012-07-17 #\$ e86d102572650a6e4d596a3cee98f191  
running on x3650M4 Fri Nov 29 01:40:51 2013

This section contains SUT (System Under Test) info as seen by some common utilities. To remove or add to this section, see: <http://www.spec.org/cpu2006/Docs/config.html#sysinfo>

```
From /proc/cpuinfo
model name : Intel(R) Xeon(R) CPU E5-2603 v2 @ 1.80GHz
 2 "physical id"s (chips)
 8 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The
following excerpts from /proc/cpuinfo might not be reliable. Use with
caution.)
  cpu cores : 4
  siblings  : 4
  physical 0: cores 0 1 2 3
  physical 1: cores 0 1 2 3
cache size : 10240 KB
```

```
From /proc/meminfo
MemTotal:      264343636 kB
HugePages_Total: 0
Hugepagesize:  2048 kB
```

```
/usr/bin/lsb_release -d
Red Hat Enterprise Linux Server release 6.4 (Santiago)
```

```
From /etc/*release* /etc/*version*
redhat-release: Red Hat Enterprise Linux Server release 6.4 (Santiago)
system-release: Red Hat Enterprise Linux Server release 6.4 (Santiago)
system-release-cpe: cpe:/o:redhat:enterprise_linux:6server:ga:server
```

```
uname -a:
Linux x3650M4 2.6.32-358.18.1.el6.x86_64 #1 SMP Fri Aug 2 17:04:38 EDT 2013
x86_64 x86_64 x86_64 GNU/Linux
```

```
run-level 3 Nov 28 14:28
```

```
SPEC is set to: /home/SPECcpu-new
Filesystem      Type      Size  Used Avail Use% Mounted on
/dev/mapper/vg_x3650m4-lv_home
ext4            313G    208G   90G   70% /home
```

```
Additional information from dmidecode:
BIOS IBM  -[TESTBUILD-1.50]- 08/09/2013
Memory:
 8x Not Specified Not Specified
16x Samsung M393B2G70QH0-CMA 16 GB 1333 MHz 2 rank
Continued on next page
```



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### Platform Notes (Continued)

(End of data from sysinfo program)  
"Not Specified" memory information from dmidecode indicates unused DIMM slots.  
The BIOS IBM -[TESTBUILD-1.50] is equivalent to production version [VVE134TUS-1.51]

### General Notes

Environment variables set by runspec before the start of the run:  
LD\_LIBRARY\_PATH = "/home/SPECcpu-new/libs/32:/home/SPECcpu-new/libs/64:/home/SPECcpu-new/sh"

Binaries compiled on a system with 1x Core i7-860 CPU + 8GB  
memory using RedHat EL 6.4  
Transparent Huge Pages enabled with:  
echo always > /sys/kernel/mm/redhat\_transparent\_hugepage/enabled  
Filesystem page cache cleared with:  
echo 1> /proc/sys/vm/drop\_caches  
runspec command invoked through numactl i.e.:  
numactl --interleave=all runspec <etc>

### 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

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## Base Portability Flags (Continued)

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

## Base Optimization Flags

C benchmarks:  
-xAVX -ipo -O3 -no-prec-div -opt-prefetch -auto-p32 -ansi-alias  
-opt-mem-layout-trans=3

C++ benchmarks:  
-xAVX -ipo -O3 -no-prec-div -opt-prefetch -auto-p32 -ansi-alias  
-opt-mem-layout-trans=3

Fortran benchmarks:  
-xAVX -ipo -O3 -no-prec-div -opt-prefetch

Benchmarks using both Fortran and C:  
-xAVX -ipo -O3 -no-prec-div -opt-prefetch -auto-p32 -ansi-alias  
-opt-mem-layout-trans=3

## Peak Compiler Invocation

C benchmarks:  
icc -m64

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

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## Peak Portability Flags (Continued)

```

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
470.lbm: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
482.sphinx3: -DSPEC_CPU_LP64

```

## Peak Optimization Flags

C benchmarks:

```

433.milc: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
         -no-prec-div(pass 2) -opt-mem-layout-trans=3(pass 2)
         -prof-use(pass 2) -auto-ilp32

```

470.lbm: basepeak = yes

482.sphinx3: basepeak = yes

C++ benchmarks:

```

444.namd: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
         -no-prec-div(pass 2) -opt-mem-layout-trans=3(pass 2)
         -prof-use(pass 2) -fno-alias -auto-ilp32

```

447.dealII: basepeak = yes

```

450.soplex: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
         -no-prec-div(pass 2) -opt-mem-layout-trans=3(pass 2)
         -prof-use(pass 2) -opt-malloc-options=3

```

```

453.povray: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
         -no-prec-div(pass 2) -opt-mem-layout-trans=3(pass 2)
         -prof-use(pass 2) -unroll4 -ansi-alias

```

Fortran benchmarks:

410.bwaves: basepeak = yes

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## Peak Optimization Flags (Continued)

416.gamess: -xAVX(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-

434.zeusmp: basepeak = yes

437.leslie3d: -xAVX -ipo -O3 -no-prec-div -opt-prefetch

459.GemsFDTD: basepeak = yes

465.tonto: -xAVX(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

Benchmarks using both Fortran and C:

435.gromacs: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)  
-no-prec-div(pass 2) -opt-mem-layout-trans=3(pass 2)  
-prof-use(pass 2) -opt-prefetch -auto-ilp32

436.cactusADM: basepeak = yes

454.calculix: basepeak = yes

481.wrf: -xAVX -ipo -O3 -no-prec-div -auto-ilp32

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

<http://www.spec.org/cpu2006/flags/Intel-ic14.0-official-linux64.20140128.html>  
<http://www.spec.org/cpu2006/flags/IBM-Platform-Flags-V1.2-IVB-A.html>

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

<http://www.spec.org/cpu2006/flags/Intel-ic14.0-official-linux64.20140128.xml>  
<http://www.spec.org/cpu2006/flags/IBM-Platform-Flags-V1.2-IVB-A.xml>

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For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

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