



# SPEC® CFP2006 Result

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## IBM Corporation

**SPECfp®2006 = 88.2**

IBM System x3650 M4 HD  
(Intel Xeon E5-2660 v2, 2.20 GHz)

**SPECfp\_base2006 = 83.9**

**CPU2006 license:** 11

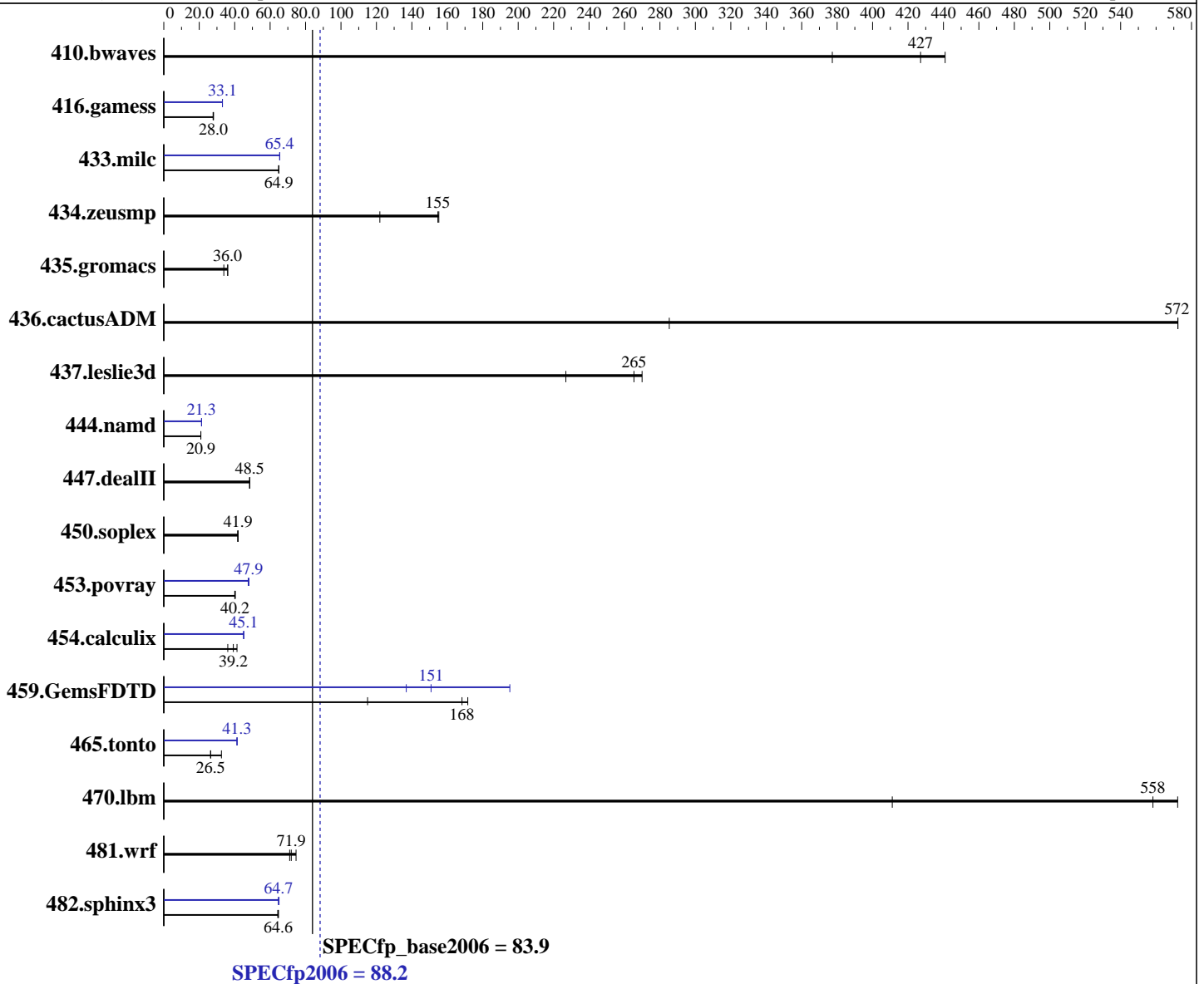
**Test date:** Nov-2013

**Test sponsor:** IBM Corporation

**Hardware Availability:** Dec-2013

**Tested by:** IBM Corporation

**Software Availability:** Sep-2013



### Hardware

CPU Name: Intel Xeon E5-2660 v2  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.00 GHz  
 CPU MHz: 2200  
 FPU: Integrated  
 CPU(s) enabled: 20 cores, 2 chips, 10 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

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### 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: Yes  
 File System: ext4

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L3 Cache: 25 MB I+D on chip per chip  
Other Cache: None  
Memory: 256 GB (16 x 16 GB 2Rx4 PC3-14900R-13, ECC)  
Disk Subsystem: 1 x 400 GB SAS SSD, RAID 0  
Other Hardware: None

System State: Run level 3 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: 32/64-bit  
Other Software: None

## Results Table

| Benchmark     | Base               |                    |                    |                    |                    |                    | Peak               |                    |                    |                    |                    |                    |
|---------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|               | Seconds            | Ratio              | Seconds            | Ratio              | Seconds            | Ratio              | Seconds            | Ratio              | Seconds            | Ratio              | Seconds            | Ratio              |
| 410.bwaves    | 36.0               | 377                | 30.8               | 441                | <b><u>31.8</u></b> | <b><u>427</u></b>  | 36.0               | 377                | 30.8               | 441                | <b><u>31.8</u></b> | <b><u>427</u></b>  |
| 416.gamess    | <b><u>700</u></b>  | <b><u>28.0</u></b> | 699                | 28.0               | 704                | 27.8               | 592                | 33.1               | <b><u>592</u></b>  | <b><u>33.1</u></b> | 591                | 33.1               |
| 433.milc      | 142                | 64.8               | 141                | 64.9               | <b><u>141</u></b>  | <b><u>64.9</u></b> | 140                | 65.4               | 140                | 65.4               | <b><u>140</u></b>  | <b><u>65.4</u></b> |
| 434.zeusmp    | <b><u>58.8</u></b> | <b><u>155</u></b>  | 74.6               | 122                | 58.6               | 155                | <b><u>58.8</u></b> | <b><u>155</u></b>  | 74.6               | 122                | 58.6               | 155                |
| 435.gromacs   | 211                | 33.9               | 198                | 36.1               | <b><u>198</u></b>  | <b><u>36.0</u></b> | 211                | 33.9               | 198                | 36.1               | <b><u>198</u></b>  | <b><u>36.0</u></b> |
| 436.cactusADM | 41.9               | 285                | <b><u>20.9</u></b> | <b><u>572</u></b>  | 20.9               | 572                | 41.9               | 285                | <b><u>20.9</u></b> | <b><u>572</u></b>  | 20.9               | 572                |
| 437.leslie3d  | 41.4               | 227                | 34.8               | 270                | <b><u>35.4</u></b> | <b><u>265</u></b>  | 41.4               | 227                | 34.8               | 270                | <b><u>35.4</u></b> | <b><u>265</u></b>  |
| 444.namd      | <b><u>384</u></b>  | <b><u>20.9</u></b> | 384                | 20.9               | 384                | 20.9               | 376                | 21.3               | 376                | 21.3               | <b><u>376</u></b>  | <b><u>21.3</u></b> |
| 447.dealII    | <b><u>236</u></b>  | <b><u>48.5</u></b> | 236                | 48.5               | 236                | 48.4               | <b><u>236</u></b>  | <b><u>48.5</u></b> | 236                | 48.5               | 236                | 48.4               |
| 450.soplex    | 199                | 41.9               | <b><u>199</u></b>  | <b><u>41.9</u></b> | 200                | 41.7               | 199                | 41.9               | <b><u>199</u></b>  | <b><u>41.9</u></b> | 200                | 41.7               |
| 453.povray    | 132                | 40.4               | 133                | 40.0               | <b><u>132</u></b>  | <b><u>40.2</u></b> | <b><u>111</u></b>  | <b><u>47.9</u></b> | 111                | 48.0               | 112                | 47.7               |
| 454.calculix  | <b><u>210</u></b>  | <b><u>39.2</u></b> | 228                | 36.1               | 200                | 41.3               | 183                | 45.1               | 183                | 45.1               | <b><u>183</u></b>  | <b><u>45.1</u></b> |
| 459.GemsFDTD  | 61.8               | 172                | <b><u>63.0</u></b> | <b><u>168</u></b>  | 92.3               | 115                | 77.5               | 137                | <b><u>70.3</u></b> | <b><u>151</u></b>  | 54.3               | 195                |
| 465.tonto     | 303                | 32.5               | <b><u>372</u></b>  | <b><u>26.5</u></b> | 373                | 26.4               | <b><u>238</u></b>  | <b><u>41.3</u></b> | 238                | 41.3               | 238                | 41.4               |
| 470.lbm       | 33.4               | 411                | 24.0               | 572                | <b><u>24.6</u></b> | <b><u>558</u></b>  | 33.4               | 411                | 24.0               | 572                | <b><u>24.6</u></b> | <b><u>558</u></b>  |
| 481.wrf       | 150                | 74.6               | 157                | 71.0               | <b><u>155</u></b>  | <b><u>71.9</u></b> | 150                | 74.6               | 157                | 71.0               | <b><u>155</u></b>  | <b><u>71.9</u></b> |
| 482.sphinx3   | 303                | 64.3               | 301                | 64.6               | <b><u>301</u></b>  | <b><u>64.6</u></b> | 301                | 64.7               | <b><u>301</u></b>  | <b><u>64.7</u></b> | 300                | 65.0               |

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

## 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

## Platform Notes

BIOS setting:  
Operating Mode set to Maximum Performance  
Hyper-Threading set to Disabled  
Sysinfo program /home/SPECcpu-new/config/sysinfo.rev6818  
\$Rev: 6818 \$ \$Date:: 2012-07-17 #\$ e86d102572650a6e4d596a3cee98f191  
running on x3650M4Plus Thu Nov 28 21:01:58 2013

This section contains SUT (System Under Test) info as seen by  
Continued on next page



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### Platform Notes (Continued)

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 E5-2660 v2 @ 2.20GHz
 2 "physical id"s (chips)
 20 "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 : 10
siblings : 10
physical 0: cores 0 1 2 3 4 8 9 10 11 12
physical 1: cores 0 1 2 3 4 8 9 10 11 12
cache size : 25600 KB
```

```
From /proc/meminfo
MemTotal:      264654328 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 x3650M4Plus 2.6.32-358.el6.x86_64 #1 SMP Tue Jan 29 11:47:41 EST 2013
x86_64 x86_64 x86_64 GNU/Linux
```

```
run-level 3 Nov 28 14:32
```

```
SPEC is set to: /home/SPECcpu-new
Filesystem      Type      Size Used Avail Use% Mounted on
/dev/mapper/vg_x3650m4plus-lv_home
                ext4      309G 199G  94G  68% /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 1867 MHz 2 rank
```

(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]



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### 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"  
OMP\_NUM\_THREADS = "20"

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  
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  
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:  
-xAVX -ipo -O3 -no-prec-div -parallel -opt-prefetch -ansi-alias

C++ benchmarks:  
-xAVX -ipo -O3 -no-prec-div -opt-prefetch -ansi-alias

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

Benchmarks using both Fortran and C:  
-xAVX -ipo -O3 -no-prec-div -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: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)  
-no-prec-div(pass 2) -prof-use(pass 2) -auto-ilp32  
-ansi-alias

470.lbm: basepeak = yes

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

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## Peak Optimization Flags (Continued)

C++ benchmarks:

444.namd: -xAVX(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.dealIII: basepeak = yes

450.soplex: basepeak = yes

453.povray: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)  
-no-prec-div(pass 2) -prof-use(pass 2) -unroll4 -ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes

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: basepeak = yes

459.GemsFDTD: -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 -opt-prefetch -parallel

465.tonto: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)  
-no-prec-div(pass 2) -prof-use(pass 2) -inline-calloc  
-opt-malloc-options=3 -auto -unroll4

Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes

436.cactusADM: basepeak = yes

454.calculix: -xAVX -ipo -O3 -no-prec-div -auto-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-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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