



# SPEC<sup>®</sup> CFP2006 Result

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## IBM Corporation

### SPECfp<sup>®</sup>\_rate2006 = 586

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

### SPECfp\_rate\_base2006 = 571

CPU2006 license: 11

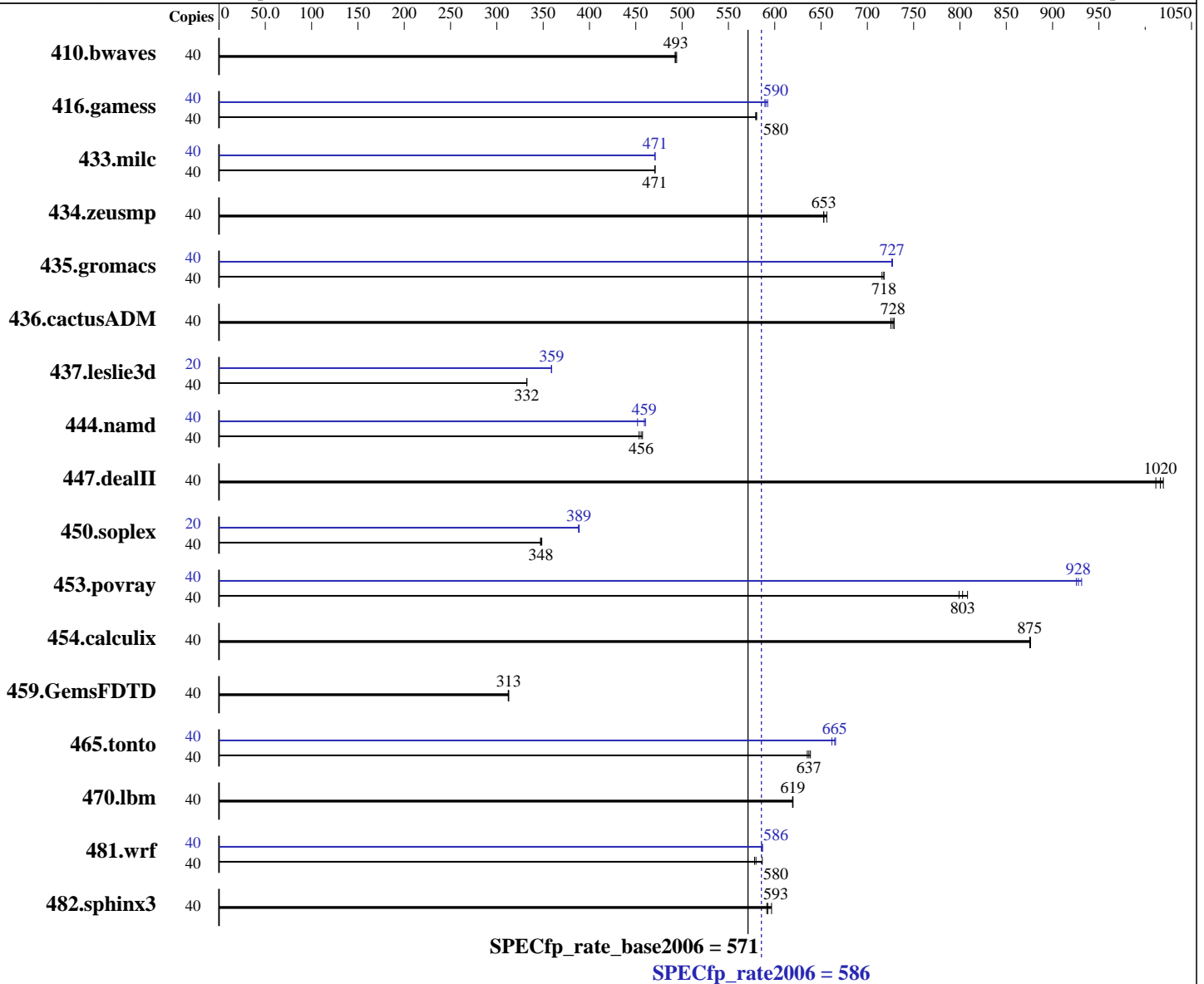
Test date: Nov-2013

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, 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: 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: 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: 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    | 40     | 1100               | 494                | <b><u>1102</u></b> | <b><u>493</u></b> | 1104              | 492               | 40     | 1100               | 494                | <b><u>1102</u></b> | <b><u>493</u></b> | 1104               | 492               |
| 416.gamess    | 40     | <b><u>1350</u></b> | <b><u>580</u></b>  | 1349               | 580               | 1352              | 579               | 40     | 1322               | 592                | 1329               | 589               | <b><u>1327</u></b> | <b><u>590</u></b> |
| 433.milc      | 40     | 781                | 470                | 780                | 471               | <b><u>780</u></b> | <b><u>471</u></b> | 40     | 780                | 471                | 780                | 471               | <b><u>780</u></b>  | <b><u>471</u></b> |
| 434.zeusmp    | 40     | <b><u>557</u></b>  | <b><u>653</u></b>  | 558                | 653               | 555               | 656               | 40     | <b><u>557</u></b>  | <b><u>653</u></b>  | 558                | 653               | 555                | 656               |
| 435.gromacs   | 40     | 398                | 718                | 399                | 716               | <b><u>398</u></b> | <b><u>718</u></b> | 40     | <b><u>393</u></b>  | <b><u>727</u></b>  | 393                | 726               | 393                | 727               |
| 436.cactusADM | 40     | <b><u>657</u></b>  | <b><u>728</u></b>  | 656                | 729               | 659               | 725               | 40     | <b><u>657</u></b>  | <b><u>728</u></b>  | 656                | 729               | 659                | 725               |
| 437.leslie3d  | 40     | <b><u>1131</u></b> | <b><u>332</u></b>  | 1132               | 332               | 1131              | 332               | 20     | 523                | 359                | <b><u>524</u></b>  | <b><u>359</u></b> | 524                | 359               |
| 444.namd      | 40     | <b><u>704</u></b>  | <b><u>456</u></b>  | 707                | 454               | 702               | 457               | 40     | <b><u>698</u></b>  | <b><u>459</u></b>  | 697                | 460               | 710                | 452               |
| 447.dealII    | 40     | <b><u>450</u></b>  | <b><u>1020</u></b> | 449                | 1020              | 452               | 1010              | 40     | <b><u>450</u></b>  | <b><u>1020</u></b> | 449                | 1020              | 452                | 1010              |
| 450.soplex    | 40     | 957                | 349                | 961                | 347               | <b><u>960</u></b> | <b><u>348</u></b> | 20     | 430                | 388                | <b><u>429</u></b>  | <b><u>389</u></b> | 429                | 389               |
| 453.povray    | 40     | 266                | 799                | 263                | 808               | <b><u>265</u></b> | <b><u>803</u></b> | 40     | <b><u>229</u></b>  | <b><u>928</u></b>  | 230                | 926               | 228                | 931               |
| 454.calculix  | 40     | 377                | 876                | 377                | 875               | <b><u>377</u></b> | <b><u>875</u></b> | 40     | 377                | 876                | 377                | 875               | <b><u>377</u></b>  | <b><u>875</u></b> |
| 459.GemsFDTD  | 40     | <b><u>1357</u></b> | <b><u>313</u></b>  | 1357               | 313               | 1359              | 312               | 40     | <b><u>1357</u></b> | <b><u>313</u></b>  | 1357               | 313               | 1359               | 312               |
| 465.tonto     | 40     | 616                | 639                | <b><u>618</u></b>  | <b><u>637</u></b> | 620               | 635               | 40     | <b><u>592</u></b>  | <b><u>665</u></b>  | 591                | 666               | 595                | 662               |
| 470.lbm       | 40     | 887                | 619                | <b><u>887</u></b>  | <b><u>619</u></b> | 887               | 620               | 40     | 887                | 619                | <b><u>887</u></b>  | <b><u>619</u></b> | 887                | 620               |
| 481.wrf       | 40     | 762                | 587                | <b><u>771</u></b>  | <b><u>580</u></b> | 773               | 578               | 40     | <b><u>762</u></b>  | <b><u>586</u></b>  | 761                | 587               | 762                | 586               |
| 482.sphinx3   | 40     | <b><u>1316</u></b> | <b><u>593</u></b>  | 1307               | 597               | 1318              | 591               | 40     | <b><u>1316</u></b> | <b><u>593</u></b>  | 1307               | 597               | 1318               | 591               |

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  
**Hardware Availability:** Dec-2013  
**Software Availability:** Sep-2013

### 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 x3650M4Plus Fri Nov 22 04:25:13 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 E5-2660 v2 @ 2.20GHz
 2 "physical id"s (chips)
 40 "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     : 20
  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:      264651844 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 21 14:55
```

```
SPEC is set to: /home/SPECcpu-new
Filesystem      Type      Size Used Avail Use% Mounted on
/dev/mapper/vg_x3650m4plus-lv_home
  ext4          309G 232G  62G  80% /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
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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