



# SPEC® CFP2006 Result

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## IBM Corporation

IBM Flex System x480 X6  
(Intel Xeon E7-4860 v2, 2.60 GHz)

SPECfp®\_rate2006 = 1430

SPECfp\_rate\_base2006 = 1390

CPU2006 license: 11

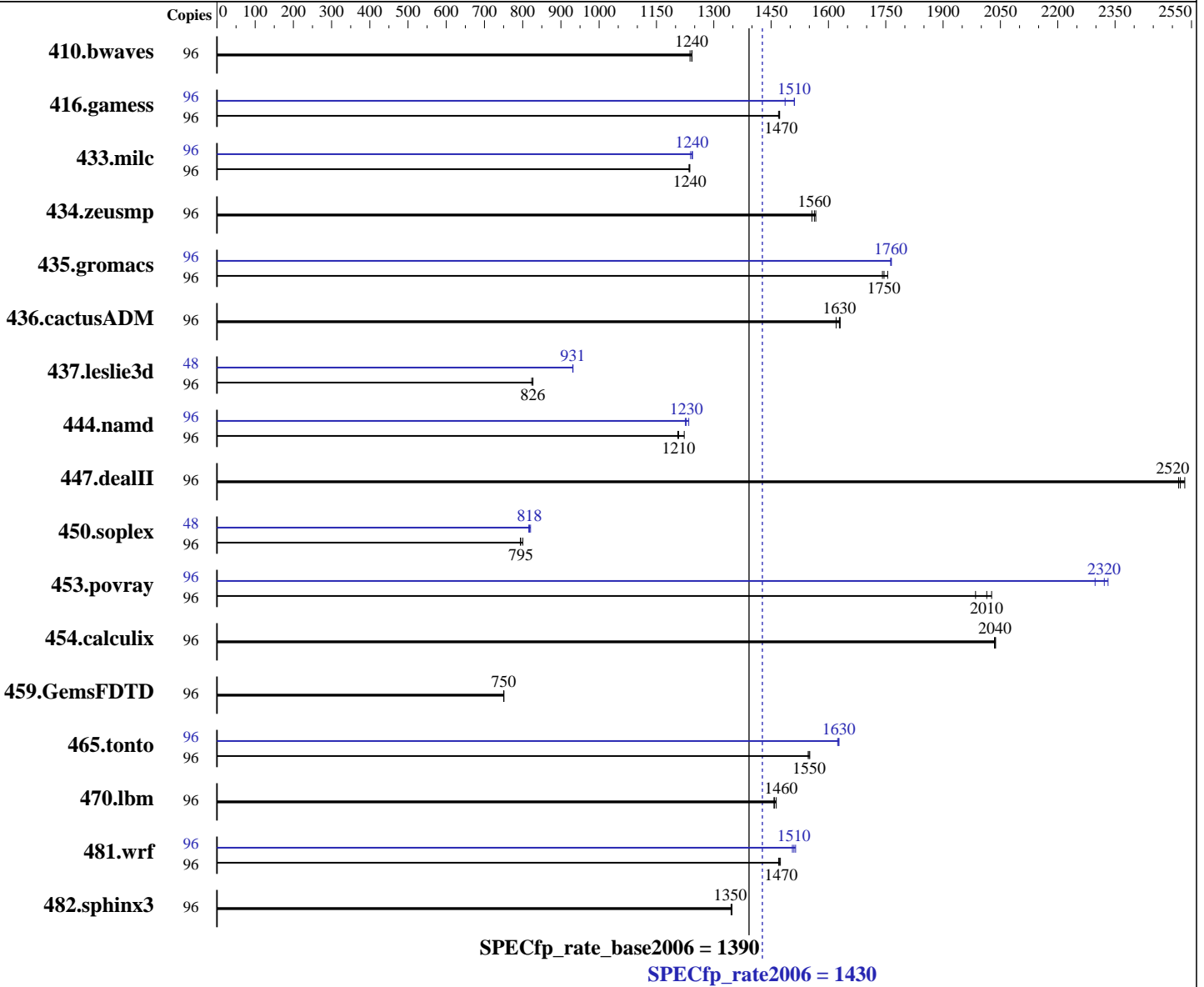
Test sponsor: IBM Corporation

Tested by: IBM Corporation

Test date: Aug-2014

Hardware Availability: Jun-2014

Software Availability: Nov-2013



### Hardware

CPU Name: Intel Xeon E7-4860 v2  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.20 GHz  
 CPU MHz: 2600  
 FPU: Integrated  
 CPU(s) enabled: 48 cores, 4 chips, 12 cores/chip, 2 threads/core  
 CPU(s) orderable: 2,4 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 6.5 (Santiago)  
 2.6.32-431.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: 30 MB I+D on chip per chip  
Other Cache: None  
Memory: 1 TB (64 x 16 GB 2Rx4 PC3L-12800R-11, ECC, running at 1333 MHz)  
Disk Subsystem: 1 x 300 GB SAS, 10000 RPM  
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    | 96     | 1054        | 1240        | <b>1050</b> | <b>1240</b> | 1049       | 1240        | 96     | 1054        | 1240        | <b>1050</b> | <b>1240</b> | 1049       | 1240        |
| 416.gamess    | 96     | 1277        | 1470        | <b>1277</b> | <b>1470</b> | 1279       | 1470        | 96     | <b>1244</b> | <b>1510</b> | 1264        | 1490        | 1244       | 1510        |
| 433.milc      | 96     | 712         | 1240        | <b>713</b>  | <b>1240</b> | 714        | 1240        | 96     | 711         | 1240        | <b>709</b>  | <b>1240</b> | 708        | 1240        |
| 434.zeusmp    | 96     | 558         | 1570        | <b>559</b>  | <b>1560</b> | 561        | 1560        | 96     | 558         | 1570        | <b>559</b>  | <b>1560</b> | 561        | 1560        |
| 435.gromacs   | 96     | 391         | 1760        | 394         | 1740        | <b>393</b> | <b>1750</b> | 96     | <b>389</b>  | <b>1760</b> | 389         | 1760        | 388        | 1760        |
| 436.cactusADM | 96     | 703         | 1630        | <b>704</b>  | <b>1630</b> | 708        | 1620        | 96     | 703         | 1630        | <b>704</b>  | <b>1630</b> | 708        | 1620        |
| 437.leslie3d  | 96     | 1096        | 824         | <b>1092</b> | <b>826</b>  | 1091       | 827         | 48     | <b>484</b>  | <b>931</b>  | 485         | 931         | 484        | 932         |
| 444.namd      | 96     | 630         | 1220        | <b>637</b>  | <b>1210</b> | 639        | 1210        | 96     | 628         | 1230        | 624         | 1230        | <b>627</b> | <b>1230</b> |
| 447.dealII    | 96     | 434         | 2530        | 436         | 2520        | <b>436</b> | <b>2520</b> | 96     | 434         | 2530        | 436         | 2520        | <b>436</b> | <b>2520</b> |
| 450.soplex    | 96     | 1000        | 800         | <b>1007</b> | <b>795</b>  | 1008       | 794         | 48     | <b>490</b>  | <b>818</b>  | 488         | 821         | 491        | 816         |
| 453.povray    | 96     | 257         | 1980        | <b>254</b>  | <b>2010</b> | 252        | 2030        | 96     | 222         | 2300        | 219         | 2330        | <b>220</b> | <b>2320</b> |
| 454.calculix  | 96     | 389         | 2030        | 389         | 2040        | <b>389</b> | <b>2040</b> | 96     | 389         | 2030        | 389         | 2040        | <b>389</b> | <b>2040</b> |
| 459.GemsFDTD  | 96     | <b>1357</b> | <b>750</b>  | 1357        | 751         | 1358       | 750         | 96     | <b>1357</b> | <b>750</b>  | 1357        | 751         | 1358       | 750         |
| 465.tonto     | 96     | <b>610</b>  | <b>1550</b> | 611         | 1550        | 609        | 1550        | 96     | <b>581</b>  | <b>1630</b> | 582         | 1620        | 580        | 1630        |
| 470.lbm       | 96     | 905         | 1460        | <b>904</b>  | <b>1460</b> | 901        | 1460        | 96     | 905         | 1460        | <b>904</b>  | <b>1460</b> | 901        | 1460        |
| 481.wrf       | 96     | <b>729</b>  | <b>1470</b> | 730         | 1470        | 727        | 1470        | 96     | 708         | 1510        | <b>710</b>  | <b>1510</b> | 712        | 1510        |
| 482.sphinx3   | 96     | <b>1390</b> | <b>1350</b> | 1391        | 1350        | 1388       | 1350        | 96     | <b>1390</b> | <b>1350</b> | 1391        | 1350        | 1388       | 1350        |

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"



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**Test date:** Aug-2014  
**Hardware Availability:** Jun-2014  
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### Platform Notes

Operating Mode set to Maximum Performance in BIOS  
Memory Data Scrambling Disabled  
Patrol Scrub Disabled  
Sysinfo program /cpu2006.1.2\_14.0\_aug2013/config/sysinfo.rev6818  
\$Rev: 6818 \$ \$Date:: 2012-07-17 #\$ e86d102572650a6e4d596a3cee98f191  
running on newport-rhel6.5 Fri Aug 15 09:06:54 2014

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 E7-4860 v2 @ 2.60GHz
 4 "physical id"s (chips)
 96 "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      : 12
  siblings       : 24
  physical 0:    cores 0 1 2 3 4 5 8 9 10 11 12 13
  physical 1:    cores 0 1 2 3 4 5 8 9 10 11 12 13
  physical 2:    cores 0 1 2 3 4 5 8 9 10 11 12 13
  physical 3:    cores 0 1 2 3 4 5 8 9 10 11 12 13
cache size      : 30720 KB
```

```
From /proc/meminfo
MemTotal:      1058506284 kB
HugePages_Total:      0
Hugepagesize:    2048 kB
```

```
/usr/bin/lsb_release -d
Red Hat Enterprise Linux Server release 6.5 (Santiago)
```

```
From /etc/*release* /etc/*version*
redhat-release: Red Hat Enterprise Linux Server release 6.5 (Santiago)
system-release: Red Hat Enterprise Linux Server release 6.5 (Santiago)
system-release-cpe: cpe:/o:redhat:enterprise_linux:6server:ga:server
```

```
uname -a:
Linux newport-rhel6.5 2.6.32-431.el6.x86_64 #1 SMP Sun Nov 10 22:19:54 EST 2013 x86_64 x86_64 x86_64 GNU/Linux
```

```
run-level 3 Aug 14 20:23 last=5
```

```
SPEC is set to: /cpu2006.1.2_14.0_aug2013
Filesystem                Type      Size  Used Avail Use% Mounted on
/dev/mapper/vg_newportrhel6-lv_root ext4      265G   29G  223G  12% /
```

```
Additional information from dmidecode:
BIOS IBM  -[N2E107JUS-1.00]- 05/03/2014
Memory:
```

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## Platform Notes (Continued)

32x Hynix HMT42GR7AFR4A-PB 16 GB 1333 MHz 2 rank  
32x NO DIMM Unknown  
32x Samsung M393B2G70QH0-YK0 16 GB 1333 MHz 2 rank

(End of data from sysinfo program)

## General Notes

Environment variables set by runspec before the start of the run:

LD\_LIBRARY\_PATH = "/cpu2006.1.2\_14.0\_aug2013/libs/32:/cpu2006.1.2\_14.0\_aug2013/libs/64:/cpu2006.1.2\_14.0\_aug2013/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

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## Base Portability Flags (Continued)

```

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

```

## 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

```



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## 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
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) -unroll14 -ansi-alias

```

Fortran benchmarks:

Continued on next page



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## Peak Optimization Flags (Continued)

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: -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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