



# SPEC<sup>®</sup> CFP2006 Result

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## IBM Corporation

IBM Flex System x440  
(Intel Xeon E5-4607, 2.20 GHz)

SPECfp<sup>®</sup>\_rate2006 = 569

SPECfp\_rate\_base2006 = 556

CPU2006 license: 11

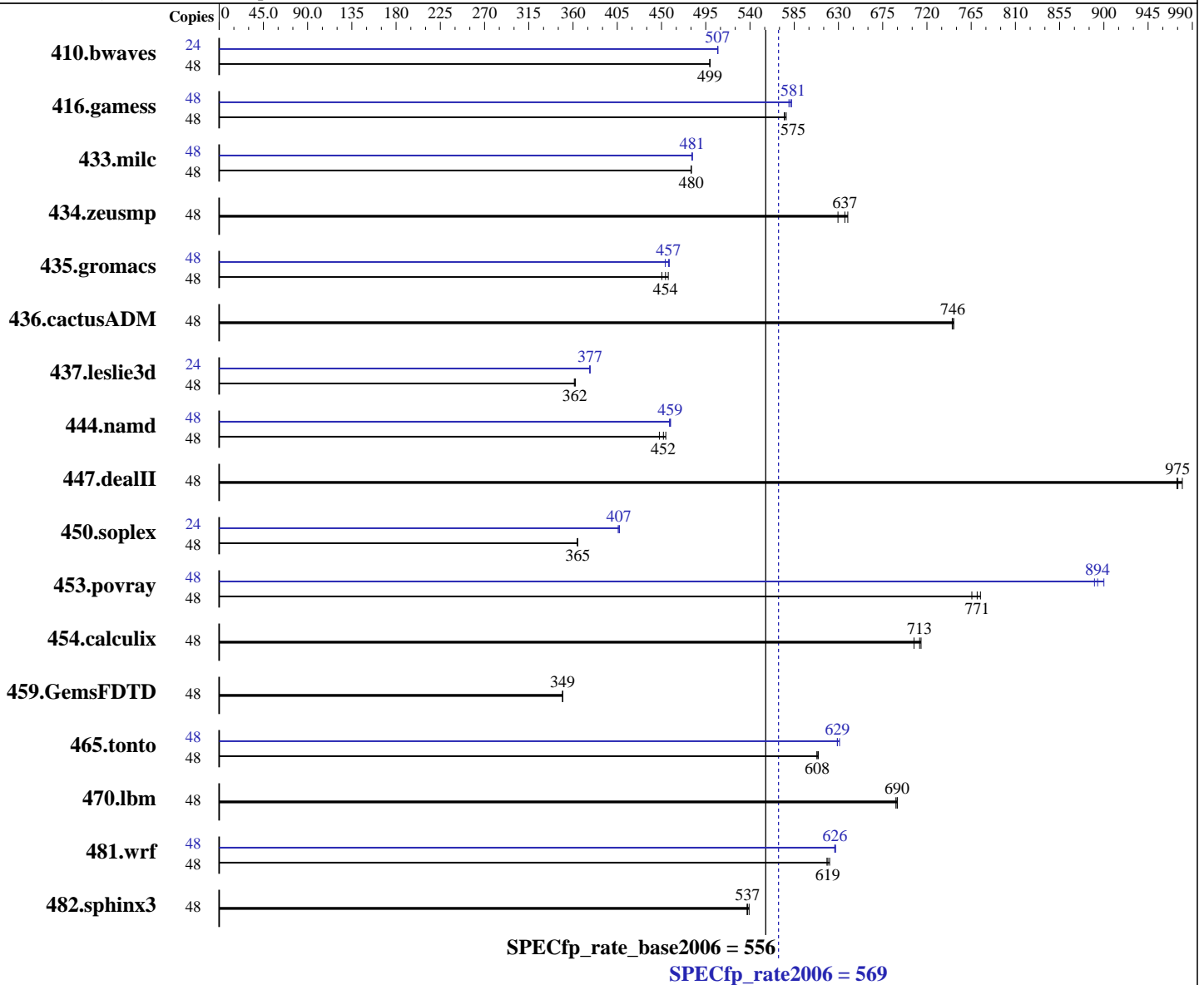
Test sponsor: IBM Corporation

Tested by: IBM Corporation

Test date: Aug-2012

Hardware Availability: Aug-2012

Software Availability: Dec-2011



### Hardware

CPU Name: Intel Xeon E5-4607  
 CPU Characteristics:  
 CPU MHz: 2200  
 FPU: Integrated  
 CPU(s) enabled: 24 cores, 4 chips, 6 cores/chip, 2 threads/core  
 CPU(s) orderable: 1,2,3,4 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 6.2 (Santiago)  
 2.6.32-220.el6.x86\_64  
 Compiler: C/C++: Version 12.1.0.225 of Intel C++ Studio XE for Linux;  
 Fortran: Version 12.1.0.225 of Intel Fortran Studio XE for Linux  
 Auto Parallel: No  
 File System: ext4

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L3 Cache: 12 MB I+D on chip per chip  
Other Cache: None  
Memory: 256 GB (32 x 8 GB 2Rx4 PC3-12800R-11, ECC, running at 1066 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    | 48     | 1307       | 499        | 1306       | 499        | <b>1307</b> | <b>499</b> | 24     | <b>643</b>  | <b>507</b> | 643        | 507        | 643         | 507        |  |  |
| 416.gamess    | 48     | 1629       | 577        | 1635       | 575        | <b>1634</b> | <b>575</b> | 48     | <b>1617</b> | <b>581</b> | 1614       | 582        | 1621        | 580        |  |  |
| 433.milc      | 48     | <b>918</b> | <b>480</b> | 917        | 480        | 918         | 480        | 48     | 916         | 481        | <b>916</b> | <b>481</b> | 915         | 481        |  |  |
| 434.zeusmp    | 48     | 683        | 640        | 694        | 630        | <b>686</b>  | <b>637</b> | 48     | 683         | 640        | 694        | 630        | <b>686</b>  | <b>637</b> |  |  |
| 435.gromacs   | 48     | 750        | 457        | <b>755</b> | <b>454</b> | 761         | 450        | 48     | <b>750</b>  | <b>457</b> | 748        | 458        | 755         | 454        |  |  |
| 436.cactusADM | 48     | <b>769</b> | <b>746</b> | 768        | 747        | 769         | 746        | 48     | <b>769</b>  | <b>746</b> | 768        | 747        | 769         | 746        |  |  |
| 437.leslie3d  | 48     | 1245       | 362        | 1249       | 361        | <b>1247</b> | <b>362</b> | 24     | <b>598</b>  | <b>377</b> | 598        | 377        | 598         | 377        |  |  |
| 444.namd      | 48     | 847        | 454        | 860        | 448        | <b>852</b>  | <b>452</b> | 48     | <b>839</b>  | <b>459</b> | 838        | 459        | 840         | 458        |  |  |
| 447.dealII    | 48     | <b>563</b> | <b>975</b> | 564        | 974        | 560         | 980        | 48     | <b>563</b>  | <b>975</b> | 564        | 974        | 560         | 980        |  |  |
| 450.soplex    | 48     | 1099       | 364        | 1097       | 365        | <b>1097</b> | <b>365</b> | 24     | 493         | 406        | <b>492</b> | <b>407</b> | 492         | 407        |  |  |
| 453.povray    | 48     | 333        | 766        | 330        | 774        | <b>331</b>  | <b>771</b> | 48     | 284         | 900        | <b>286</b> | <b>894</b> | 287         | 890        |  |  |
| 454.calculix  | 48     | 555        | 714        | 560        | 707        | <b>556</b>  | <b>713</b> | 48     | 555         | 714        | 560        | 707        | <b>556</b>  | <b>713</b> |  |  |
| 459.GemsFDTD  | 48     | 1457       | 350        | 1458       | 349        | <b>1457</b> | <b>349</b> | 48     | 1457        | 350        | 1458       | 349        | <b>1457</b> | <b>349</b> |  |  |
| 465.tonto     | 48     | <b>776</b> | <b>608</b> | 777        | 608        | 775         | 610        | 48     | 748         | 631        | 751        | 629        | <b>751</b>  | <b>629</b> |  |  |
| 470.lbm       | 48     | <b>956</b> | <b>690</b> | 956        | 690        | 958         | 688        | 48     | <b>956</b>  | <b>690</b> | 956        | 690        | 958         | 688        |  |  |
| 481.wrf       | 48     | 863        | 621        | <b>866</b> | <b>619</b> | 867         | 618        | 48     | 855         | 627        | 856        | 626        | <b>856</b>  | <b>626</b> |  |  |
| 482.sphinx3   | 48     | 1735       | 539        | 1742       | 537        | <b>1741</b> | <b>537</b> | 48     | 1735        | 539        | 1742       | 537        | <b>1741</b> | <b>537</b> |  |  |

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-2012  
**Hardware Availability:** Aug-2012  
**Software Availability:** Dec-2011

### Platform Notes

Operating Mode set to Maximum Performance in BIOS  
Sysinfo program /cpu2006.1.2/config/sysinfo.rev6800  
\$Rev: 6800 \$ \$Date:: 2011-10-11 # \$ 6f2ebdff5032aaa42e583f96b07f99d3  
running on congo-pete Fri Aug 10 09:30:34 2012

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 E5-4607 0 @ 2.20GHz
 4 "physical id"s (chips)
 48 "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 : 6
siblings : 12
physical 0: cores 0 1 2 3 4 5
physical 1: cores 0 1 2 3 4 5
physical 2: cores 0 1 2 3 4 5
physical 3: cores 0 1 2 3 4 5
cache size : 12288 KB
```

```
From /proc/meminfo
MemTotal: 264503712 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
```

```
/usr/bin/lsb_release -d
Red Hat Enterprise Linux Server release 6.2 (Santiago)
```

```
From /etc/*release* /etc/*version*
redhat-release: Red Hat Enterprise Linux Server release 6.2 (Santiago)
system-release: Red Hat Enterprise Linux Server release 6.2 (Santiago)
system-release-cpe: cpe:/o:redhat:enterprise_linux:6server:ga:server
```

```
uname -a:
Linux congo-pete 2.6.32-220.el6.x86_64 #1 SMP Wed Nov 9 08:03:13 EST 2011
x86_64 x86_64 x86_64 GNU/Linux
```

```
run-level 3 Aug 9 17:25
```

```
SPEC is set to: /cpu2006.1.2
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/vg_congopete-lv_root
ext4 264G 5.9G 245G 3% /
```

Additional information from dmidecode:  
Memory:  
32x Micron 36JSF1G72PZ-1G6M1 8 GB 1600 MHz 2 rank

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## Platform Notes (Continued)

(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/libs/32:/cpu2006.1.2/libs/64"

Binaries compiled on a system with 1x Core i7-860 CPU + 8GB memory using RHEL5.5

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
454.calculix: -DSPEC_CPU_LP64 -nofor_main
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64

```

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## Base Portability Flags (Continued)

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 -static -opt-prefetch -auto-p32  
-ansi-alias -opt-mem-layout-trans=3

C++ benchmarks:

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

Fortran benchmarks:

-xAVX -ipo -O3 -no-prec-div -static -opt-prefetch

Benchmarks using both Fortran and C:

-xAVX -ipo -O3 -no-prec-div -static -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  
416.gamess: -DSPEC\_CPU\_LP64  
433.milc: -DSPEC\_CPU\_LP64  
434.zeusmp: -DSPEC\_CPU\_LP64

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## Peak Portability Flags (Continued)

```

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) -prof-use(pass 2) -static -auto-ilp32
         -opt-mem-layout-trans=3

```

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) -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) -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) -prof-use(pass 2) -unroll4 -ansi-alias

```

Fortran benchmarks:

```

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

```

```

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- -static

```

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## Peak Optimization Flags (Continued)

434.zeusmp: basepeak = yes

437.leslie3d: -xAVX -ipo -O3 -no-prec-div -static -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) -prof-use(pass 2) -opt-prefetch  
-static -auto-ilp32 -opt-mem-layout-trans=3

436.cactusADM: basepeak = yes

454.calculix: basepeak = yes

481.wrf: -xAVX -ipo -O3 -no-prec-div -static -auto-ilp32  
-opt-mem-layout-trans=3

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

<http://www.spec.org/cpu2006/flags/Intel-ic12.1-official-linux64.20120425.html>

<http://www.spec.org/cpu2006/flags/IBM-Platform-Flags-V1.2-SNB-C.html>

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

<http://www.spec.org/cpu2006/flags/Intel-ic12.1-official-linux64.20120425.xml>

<http://www.spec.org/cpu2006/flags/IBM-Platform-Flags-V1.2-SNB-C.xml>

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For questions about this result, please contact the tester.  
For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

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