



# SPEC® CFP2006 Result

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## IBM Corporation

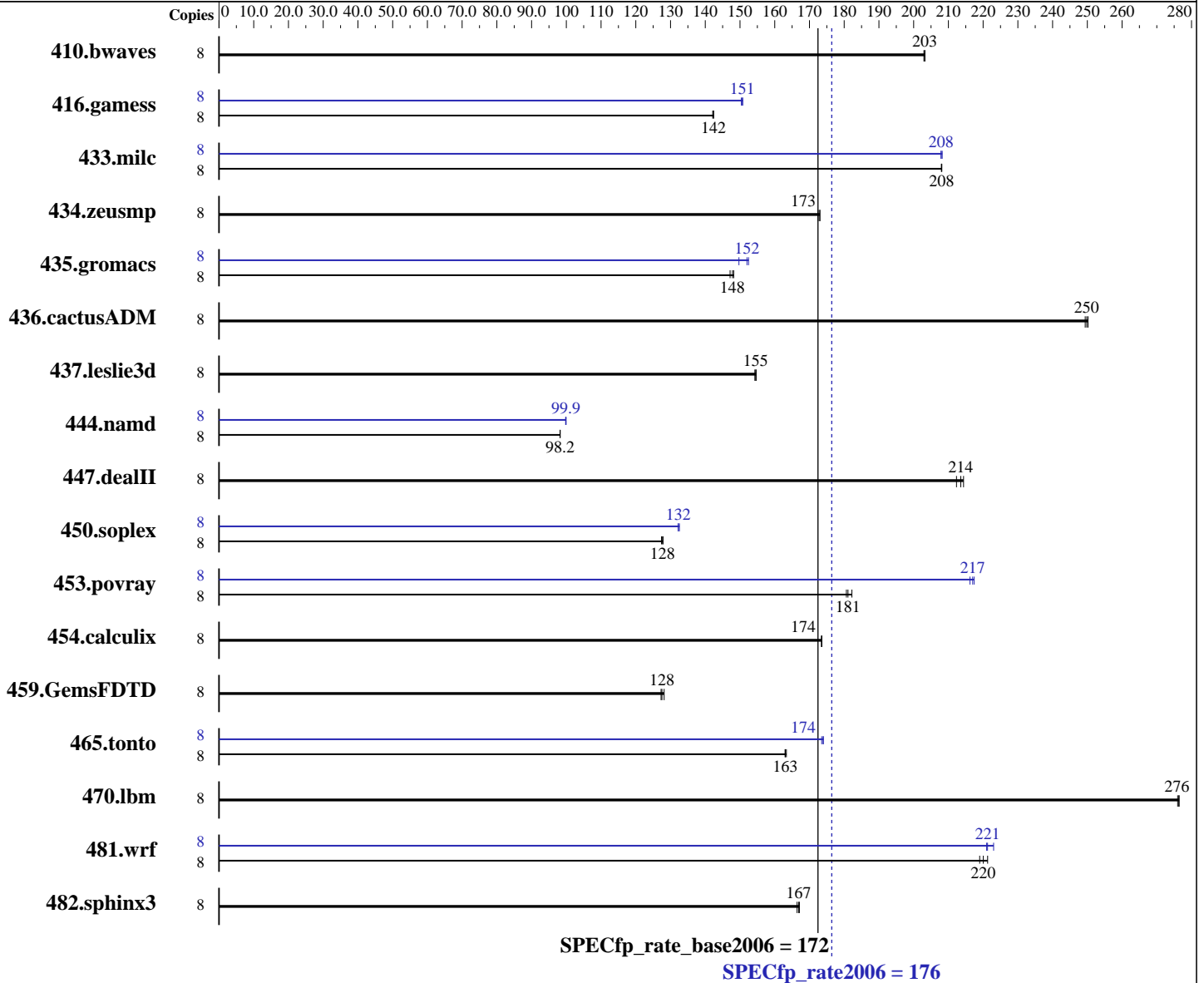
IBM Flex System x222  
(Intel Xeon E5-2403, 1.80 GHz)

SPECfp®\_rate2006 = 176

SPECfp\_rate\_base2006 = 172

CPU2006 license: 11  
Test sponsor: IBM Corporation  
Tested by: IBM Corporation

Test date: Jun-2013  
Hardware Availability: Sep-2013  
Software Availability: Oct-2012



### Hardware

CPU Name: Intel Xeon E5-2403  
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 6.2 (Santiago)  
2.6.32-220.el6.x86\_64  
Compiler: C/C++: Version 13.0.0.133 of Intel C++ Studio XE for Linux;  
Fortran: Version 13.0.0.133 of Intel Fortran Studio XE for Linux  
Auto Parallel: No  
File System: ext4

Continued on next page



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L3 Cache: 10 MB I+D on chip per chip  
Other Cache: None  
Memory: 96 GB (12 x 8 GB 2Rx4 PC3-12800R-11, ECC, running at 1066 MHz)  
Disk Subsystem: 1 x 100 GB SATA, SSD  
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	536	203	535	203	<b>535</b>	<b>203</b>	8	536	203	535	203	<b>535</b>	<b>203</b>		
416.gamess	8	1100	142	1102	142	<b>1100</b>	<b>142</b>	8	1039	151	1042	150	<b>1040</b>	<b>151</b>		
433.milc	8	353	208	<b>353</b>	<b>208</b>	353	208	8	<b>353</b>	<b>208</b>	353	208	353	208		
434.zeusmp	8	<b>421</b>	<b>173</b>	422	172	421	173	8	<b>421</b>	<b>173</b>	422	172	421	173		
435.gromacs	8	388	147	<b>386</b>	<b>148</b>	385	148	8	375	152	<b>376</b>	<b>152</b>	382	150		
436.cactusADM	8	383	249	<b>383</b>	<b>250</b>	382	250	8	383	249	<b>383</b>	<b>250</b>	382	250		
437.leslie3d	8	<b>487</b>	<b>155</b>	486	155	487	154	8	<b>487</b>	<b>155</b>	486	155	487	154		
444.namd	8	653	98.2	<b>653</b>	<b>98.2</b>	653	98.2	8	<b>642</b>	<b>99.9</b>	643	99.8	642	99.9		
447.dealII	8	427	214	431	212	<b>429</b>	<b>214</b>	8	427	214	431	212	<b>429</b>	<b>214</b>		
450.soplex	8	524	127	522	128	<b>523</b>	<b>128</b>	8	503	133	<b>505</b>	<b>132</b>	505	132		
453.povray	8	236	181	234	182	<b>235</b>	<b>181</b>	8	197	216	<b>196</b>	<b>217</b>	196	217		
454.calculix	8	380	174	380	173	<b>380</b>	<b>174</b>	8	380	174	380	173	<b>380</b>	<b>174</b>		
459.GemsFDTD	8	<b>666</b>	<b>128</b>	662	128	667	127	8	<b>666</b>	<b>128</b>	662	128	667	127		
465.tonto	8	482	163	483	163	<b>483</b>	<b>163</b>	8	452	174	454	174	<b>453</b>	<b>174</b>		
470.lbm	8	<b>398</b>	<b>276</b>	398	276	398	276	8	<b>398</b>	<b>276</b>	398	276	398	276		
481.wrf	8	408	219	404	221	<b>406</b>	<b>220</b>	8	<b>404</b>	<b>221</b>	401	223	404	221		
482.sphinx3	8	937	166	933	167	<b>934</b>	<b>167</b>	8	937	166	933	167	<b>934</b>	<b>167</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"

## Platform Notes

Operating Mode set to Maximum Performance in BIOS  
Sysinfo program /cpu2006.1.2/config/sysinfo.rev6818  
\$Rev: 6818 \$ \$Date:: 2012-07-17 # \$ e86d102572650a6e4d596a3cee98f191  
Continued on next page



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### Platform Notes (Continued)

running on Cara-speccpul Tue Jun 4 02:12:52 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 E5-2403 0 @ 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:      99039568 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 Cara-speccpul 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 May 31 11:07
```

```
SPEC is set to: /cpu2006.1.2
Filesystem      Type      Size  Used Avail Use% Mounted on
/dev/mapper/vg_caraspeccpul-lv_root
                ext4      82G   7.9G   70G   11% /
```

```
Additional information from dmidecode:
BIOS IBM  -[CCE123MUS-1.00]- 04/18/2013
Memory:
12x Samsung M393B1K70DH0-CK0 8 GB 1066 MHz 2 rank
```

(End of data from sysinfo program)



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## 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:/cpu2006.1.2/sh"

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.deallI: -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 -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`  
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`

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## Peak Portability Flags (Continued)

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) -static -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.dealIII: 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

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

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

459.GemsFDTD: basepeak = yes

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## Peak Optimization Flags (Continued)

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 -static -auto-ilp32

436.cactusADM: basepeak = yes

454.calculix: basepeak = yes

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

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

<http://www.spec.org/cpu2006/flags/Intel-ic13-official-linux64.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-ic13-official-linux64.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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