



# SPEC<sup>®</sup> CFP2006 Result

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## IBM Corporation

**SPECfp<sup>®</sup>2006 = 50.6**

### IBM System x3500 M3 (Intel Xeon E5645)

**SPECfp\_base2006 = 47.0**

CPU2006 license: 11

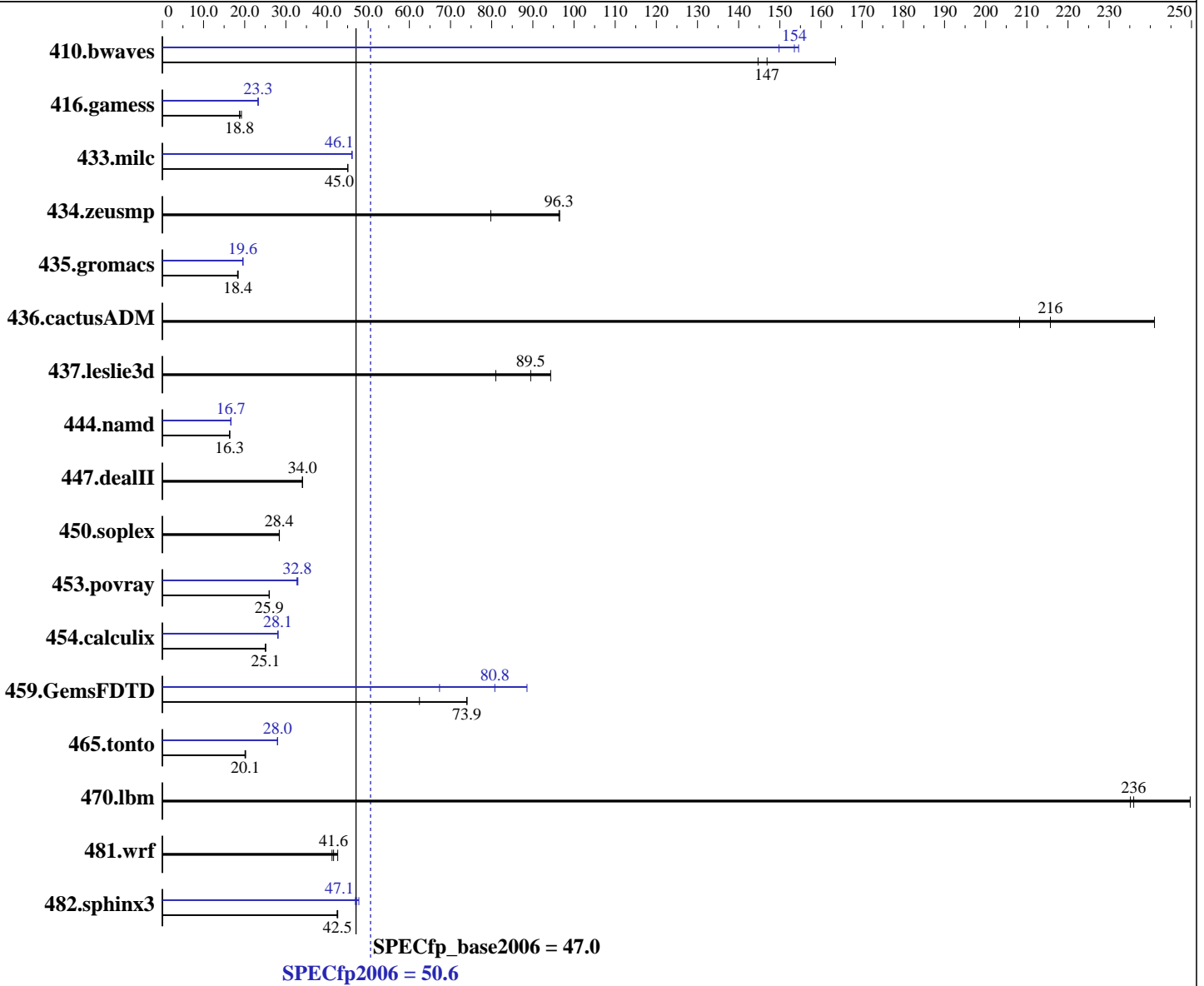
Test date: Mar-2011

Test sponsor: IBM Corporation

Hardware Availability: Feb-2011

Tested by: IBM Corporation

Software Availability: Jan-2011



### Hardware

CPU Name: Intel Xeon E5645  
 CPU Characteristics: Intel Turbo Boost Technology up to 2.80 GHz  
 CPU MHz: 2400  
 FPU: Integrated  
 CPU(s) enabled: 12 cores, 2 chips, 6 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

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### Software

Operating System: SUSE Linux Enterprise Server 11 SP1 (x86\_64), Kernel 2.6.32.12-0.7-default  
 Compiler: Intel C++ and Fortran Intel 64 Compiler XE for applications running on Intel 64 Version 12.0 Update 3  
 Auto Parallel: Yes  
 File System: ext3  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit

Continued on next page



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L3 Cache: 12 MB I+D on chip per chip  
Other Cache: None  
Memory: 96 GB (12 x 8 GB 2Rx4 PC3-10600R-9, ECC)  
Disk Subsystem: 1 x 146 GB SAS, 15000 RPM  
Other Hardware: None

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	93.9	145	83.1	164	<b><u>92.5</u></b>	<b><u>147</u></b>	90.7	150	<b><u>88.5</u></b>	<b><u>154</u></b>	87.9	155
416.gamess	<b><u>1043</u></b>	<b><u>18.8</u></b>	1043	18.8	1019	19.2	842	23.3	841	23.3	<b><u>842</u></b>	<b><u>23.3</u></b>
433.milc	204	45.0	<b><u>204</u></b>	<b><u>45.0</u></b>	204	45.1	199	46.1	199	46.1	<b><u>199</u></b>	<b><u>46.1</u></b>
434.zeusmp	<b><u>94.5</u></b>	<b><u>96.3</u></b>	94.3	96.5	114	79.8	<b><u>94.5</u></b>	<b><u>96.3</u></b>	94.3	96.5	114	79.8
435.gromacs	<b><u>389</u></b>	<b><u>18.4</u></b>	391	18.3	388	18.4	<b><u>365</u></b>	<b><u>19.6</u></b>	365	19.6	365	19.6
436.cactusADM	49.6	241	<b><u>55.4</u></b>	<b><u>216</u></b>	57.4	208	49.6	241	<b><u>55.4</u></b>	<b><u>216</u></b>	57.4	208
437.leslie3d	<b><u>105</u></b>	<b><u>89.5</u></b>	99.7	94.3	116	81.0	<b><u>105</u></b>	<b><u>89.5</u></b>	99.7	94.3	116	81.0
444.namd	490	16.4	<b><u>491</u></b>	<b><u>16.3</u></b>	491	16.3	<b><u>481</u></b>	<b><u>16.7</u></b>	482	16.6	481	16.7
447.dealII	336	34.1	336	34.0	<b><u>336</u></b>	<b><u>34.0</u></b>	336	34.1	336	34.0	<b><u>336</u></b>	<b><u>34.0</u></b>
450.soplex	293	28.4	294	28.4	<b><u>294</u></b>	<b><u>28.4</u></b>	293	28.4	294	28.4	<b><u>294</u></b>	<b><u>28.4</u></b>
453.povray	205	26.0	<b><u>205</u></b>	<b><u>25.9</u></b>	205	25.9	<b><u>162</u></b>	<b><u>32.8</u></b>	162	32.9	163	32.7
454.calculix	<b><u>329</u></b>	<b><u>25.1</u></b>	329	25.1	330	25.0	294	28.1	294	28.1	<b><u>294</u></b>	<b><u>28.1</u></b>
459.GemsFDTD	<b><u>144</u></b>	<b><u>73.9</u></b>	143	74.0	170	62.4	120	88.6	<b><u>131</u></b>	<b><u>80.8</u></b>	158	67.3
465.tonto	486	20.2	490	20.1	<b><u>489</u></b>	<b><u>20.1</u></b>	351	28.0	<b><u>352</u></b>	<b><u>28.0</u></b>	352	28.0
470.lbm	<b><u>58.2</u></b>	<b><u>236</u></b>	58.4	235	55.0	250	<b><u>58.2</u></b>	<b><u>236</u></b>	58.4	235	55.0	250
481.wrf	<b><u>269</u></b>	<b><u>41.6</u></b>	271	41.2	262	42.6	<b><u>269</u></b>	<b><u>41.6</u></b>	271	41.2	262	42.6
482.sphinx3	459	42.5	457	42.6	<b><u>458</u></b>	<b><u>42.5</u></b>	416	46.9	<b><u>413</u></b>	<b><u>47.1</u></b>	408	47.7

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

## Operating System Notes

```
'ulimit -s unlimited' was used to set the stacksize to unlimited prior to run
'mount -t hugetlbfs nodev /mnt/hugepages' was used to enable large pages
echo 900 > /proc/sys/vm/nr_hugepages
export HUGETLB_MORECORE=yes
export LD_PRELOAD=/usr/lib64/libhugetlbfs.so
```

## Platform Notes

Turbo Mode enabled in BIOS  
Turbo Boost set to Traditional in BIOS  
CPU C-State enabled in BIOS  
Data Reuse disabled in BIOS  
Demand Scrub disabled in BIOS



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## General Notes

OMP\_NUM\_THREADS set to number of cores  
Binaries compiled on RHEL5.5

## 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

## Base Optimization Flags

C benchmarks:

-xSSE4.2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch  
-ansi-alias

C++ benchmarks:

-xSSE4.2 -ipo -O3 -no-prec-div -static -opt-prefetch -ansi-alias

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## Base Optimization Flags (Continued)

Fortran benchmarks:

-xSSE4.2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch

Benchmarks using both Fortran and C:

-xSSE4.2 -ipo -O3 -no-prec-div -static -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: -xSSE4.2(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)  
-no-prec-div(pass 2) -prof-use(pass 2) -static -auto-ilp32  
-ansi-alias

470.lbm: basepeak = yes

482.sphinx3: -xSSE4.2 -ipo -O3 -no-prec-div -unroll2 -ansi-alias  
-parallel

C++ benchmarks:

444.namd: -xSSE4.2(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

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## Peak Optimization Flags (Continued)

447.deallI: basepeak = yes

450.soplex: basepeak = yes

453.povray: -xSSE4.2(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)  
-no-prec-div(pass 2) -prof-use(pass 2) -unroll4 -ansi-alias  
-B /usr/share/libhugetlbfs/ -Wl,-melf\_x86\_64 -Wl,-hugetlbfs-link=BDT

### Fortran benchmarks:

410.bwaves: -xSSE4.2 -ipo -O3 -no-prec-div -opt-prefetch -parallel  
-static

416.gamess: -xSSE4.2(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: -xSSE4.2(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  
-B /usr/share/libhugetlbfs/ -Wl,-melf\_x86\_64 -Wl,-hugetlbfs-link=BDT

465.tonto: -xSSE4.2(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  
-B /usr/share/libhugetlbfs/ -Wl,-melf\_x86\_64 -Wl,-hugetlbfs-link=BDT

### Benchmarks using both Fortran and C:

435.gromacs: -xSSE4.2(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)  
-no-prec-div(pass 2) -prof-use(pass 2) -static -auto-ilp32  
-ansi-alias

436.cactusADM: basepeak = yes

454.calculix: -xSSE4.2 -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-ic12.0-linux64-revB.html>

<http://www.spec.org/cpu2006/flags/IBM-platform-linux64-revA.20110420.html>

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

<http://www.spec.org/cpu2006/flags/Intel-ic12.0-linux64-revB.xml>

<http://www.spec.org/cpu2006/flags/IBM-platform-linux64-revA.20110420.xml>



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