



# SPEC® CFP2006 Result

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## IBM Corporation

SPECfp®\_rate2006 = 575

IBM Power 730 Express (4.2 GHz, 16 core, SLES)

SPECfp\_rate\_base2006 = 509

CPU2006 license: 11

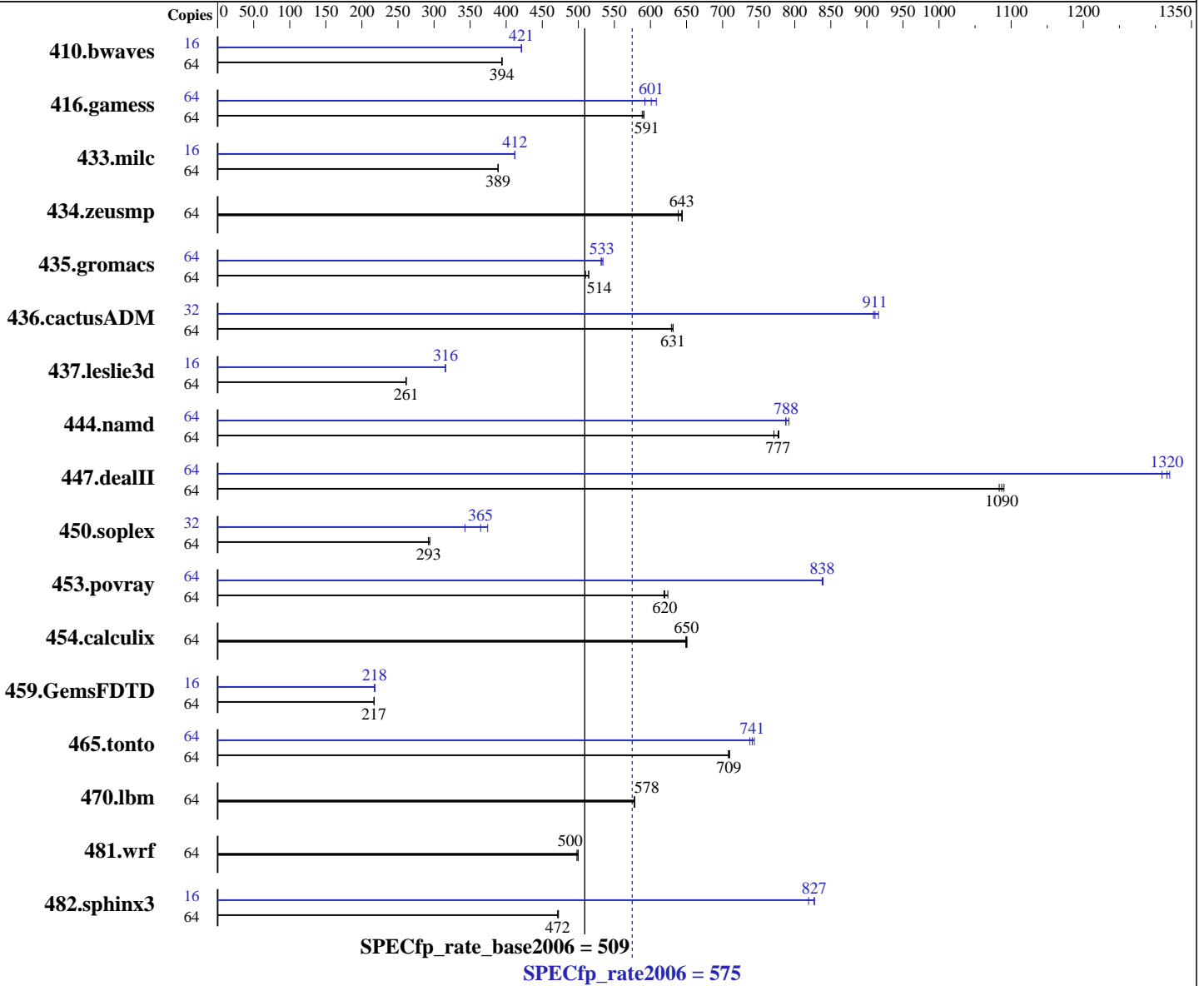
Test sponsor: IBM Corporation

Tested by: IBM Corporation

Test date: Jan-2013

Hardware Availability: Feb-2013

Software Availability: Dec-2012



### Hardware

CPU Name: POWER7+  
 CPU Characteristics: Intelligent Energy Optimization enabled, up to 4.540 GHz  
 CPU MHz: 4228  
 FPU: Integrated  
 CPU(s) enabled: 16 cores, 2 chips, 8 cores/chip, 4 threads/core  
 CPU(s) orderable: 8, 16 cores  
 Primary Cache: 32 KB I + 32 KB D on chip per core

Continued on next page

### Software

Operating System: SUSE Linux Enterprise Server 11 SP2 (ppc64) kernel 3.0.42-0.7-ppc64  
 Compiler: C/C++: Version 12.1 of IBM XL C/C++ for Linux; Fortran: Version 14.1 of IBM XL Fortran for Linux  
 Auto Parallel: No  
 File System: ext3  
 System State: Run level 3 (multi-user)  
 Base Pointers: 32-bit  
 Peak Pointers: 32/64-bit

Continued on next page



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Secondary Cache: 256 KB I+D on chip per core  
 L3 Cache: 10 MB I+D on chip per core  
 Other Cache: None  
 Memory: 128 GB (16 x 8 GB) DDR3 1066 MHz  
 Disk Subsystem: 1 x 146.8 GB SAS SFF 15K RPM  
 Other Hardware: None

Other Software: -Post-Link Optimization for Linux on POWER, version 5.6.1-7  
 -MicroQuill SmartHeap 9  
 -Apache C++ Standard Library V4.2.1

## Results Table

Benchmark	Base								Peak							
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio		
410.bwaves	64	2208	394	2206	394	<b>2206</b>	<b>394</b>	16	516	421	<b>516</b>	<b>421</b>	516	421		
416.gamess	64	2129	589	2121	591	<b>2122</b>	<b>591</b>	64	2061	608	2116	592	<b>2085</b>	<b>601</b>		
433.milc	64	1511	389	<b>1511</b>	<b>389</b>	1511	389	16	<b>356</b>	<b>412</b>	356	412	357	412		
434.zeusmp	64	904	644	<b>905</b>	<b>643</b>	912	639	64	904	644	<b>905</b>	<b>643</b>	912	639		
435.gromacs	64	888	514	896	510	<b>889</b>	<b>514</b>	64	855	534	860	531	<b>858</b>	<b>533</b>		
436.cactusADM	64	<b>1212</b>	<b>631</b>	1211	631	1216	629	32	<b>420</b>	<b>911</b>	417	916	421	909		
437.leslie3d	64	2303	261	2301	261	<b>2302</b>	<b>261</b>	16	476	316	476	316	<b>476</b>	<b>316</b>		
444.namd	64	<b>661</b>	<b>777</b>	660	778	666	771	64	652	787	<b>651</b>	<b>788</b>	648	792		
447.dealII	64	676	1080	<b>674</b>	<b>1090</b>	672	1090	64	559	1310	555	1320	<b>556</b>	<b>1320</b>		
450.soplex	64	1828	292	<b>1825</b>	<b>293</b>	1814	294	32	779	343	<b>732</b>	<b>365</b>	713	374		
453.povray	64	<b>549</b>	<b>620</b>	546	624	550	619	64	<b>406</b>	<b>838</b>	406	838	406	839		
454.calculix	64	<b>812</b>	<b>650</b>	814	649	811	651	64	<b>812</b>	<b>650</b>	814	649	811	651		
459.GemsFDTD	64	3131	217	3130	217	<b>3131</b>	<b>217</b>	16	781	217	<b>780</b>	<b>218</b>	779	218		
465.tonto	64	887	710	<b>888</b>	<b>709</b>	890	708	64	<b>850</b>	<b>741</b>	854	738	847	744		
470.lbm	64	1521	578	1522	578	<b>1522</b>	<b>578</b>	64	1521	578	1522	578	<b>1522</b>	<b>578</b>		
481.wrf	64	1431	500	<b>1431</b>	<b>500</b>	1435	498	64	1431	500	<b>1431</b>	<b>500</b>	1435	498		
482.sphinx3	64	2646	471	2640	472	<b>2645</b>	<b>472</b>	16	381	819	<b>377</b>	<b>827</b>	377	828		

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

## Compiler Invocation Notes

C/C++ compiler updated to December 2012 PTF  
 Version: 12.01.0000.0002  
 Fortran compiler updated to December 2012 PTF  
 Version: 14.01.0000.0002

## Peak Tuning Notes

Post-Link optimization tool used for:  
 433.milc 435.gromacs 450.soplex 482.sphinx3  
 with options -O4 -nodp  
 434.zeusmp  
 with options -O4 -vrox -nodp  
 437.leslie3d

Continued on next page



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## Peak Tuning Notes (Continued)

```
with options -O3 -lu -1 -nodp -sdp 9
444.namd
with options -O3 -lu -1 -nodp -sdp 9
450.soplex
with options -O4 -nodp
465.tonto
with options -O4
482.sphinx3
with options -O4 -nodp
```

## Submit Notes

The config file option 'submit' was used to assign benchmark copy to specific kernel thread using the "numactl" command (see flags file for details).

## Operating System Notes

ulimit -s (stack) set to 1048576.

Large pages reserved as follows by root user:  
echo 4224 > /proc/sys/vm/nr\_hugepages

The Apache C++ Standard Library V4.2.1 was installed from <http://stdcxx.apache.org/download.html> using:  
gmake BUILDTYPE=8d CONFIG=gcc.config

The following environment variables were set before the runspec command:  
export HUGETLB\_VERBOSE=0  
export HUGETLB\_MORECORE=yes  
export HUGETLB\_ELFMAP=RW  
export XLFRTEOPTS=intrinthds=1

## Base Compiler Invocation

C benchmarks:

```
xlc -qlanglvl=extc99
```

C++ benchmarks:

```
xlC
```

Fortran benchmarks:

```
xlF95
```

Benchmarks using both Fortran and C:

```
xlc -qlanglvl=extc99 xlf95
```



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## Base Portability Flags

```

410.bwaves: -qfixed
416.gamess: -qfixed
434.zeusmp: -qfixed
435.gromacs: -qfixed -qextname
436.cactusADM: -qfixed -qextname
437.leslie3d: -qfixed
454.calculix: -qfixed -qextname
481.wrf: -DNOUNDERSCORE
482.sphinx3: -qchars=signed

```

## Base Optimization Flags

C benchmarks:

```

-O5 -qarch=pwr7 -qtune=pwr7 -q32 -qipa=threads
-B/usr/share/libhugetlbfs/ -tl -Wl,--hugetlbfs-align

```

C++ benchmarks:

```

-O5 -qarch=pwr7 -qtune=pwr7 -q32 -qipa=threads -qrtti
-B/usr/share/libhugetlbfs/ -tl -Wl,--hugetlbfs-align

```

Fortran benchmarks:

```

-O5 -qarch=pwr7 -qtune=pwr7 -q32 -qipa=threads -qalias=nostd
-B/usr/share/libhugetlbfs/ -tl -Wl,--hugetlbfs-align

```

Benchmarks using both Fortran and C:

```

-O5 -qarch=pwr7 -qtune=pwr7 -q32 -qipa=threads
-B/usr/share/libhugetlbfs/ -tl -Wl,--hugetlbfs-align -qalias=nostd

```

## Base Other Flags

C benchmarks:

C++ benchmarks:

Fortran benchmarks:

Benchmarks using both Fortran and C:

## Peak Compiler Invocation

C benchmarks:

```

xlc -qlanglvl=extc99

```

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## Peak Compiler Invocation (Continued)

C++ benchmarks:  
x1c

Fortran benchmarks:  
x1f95

Benchmarks using both Fortran and C:  
x1c -qlanglvl=extc99 x1f95

## Peak Portability Flags

410.bwaves: -qfixed  
416.gamess: -qfixed  
434.zeusmp: -qfixed  
435.gromacs: -qfixed -qextname  
436.cactusADM: -DSPEC\_CPU\_LP64 -qfixed -qextname  
437.leslie3d: -qfixed  
453.povray: -DSPEC\_CPU\_LP64  
454.calculix: -qfixed -qextname  
481.wrf: -DNOUNDERSCORE  
482.sphinx3: -qchars=signed

## Peak Optimization Flags

C benchmarks:

433.milc: -Wl,-q -O5 -qarch=pwr7 -qtune=pwr7 -qipa=threads  
-lhugetlbfs

470.lbm: basepeak = yes

482.sphinx3: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O4 -qarch=pwr7  
-qtune=pwr7 -qipa=threads -lhugetlbfs

C++ benchmarks:

444.namd: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O5 -qarch=pwr7  
-qtune=pwr7 -qipa=threads -lhugetlbfs

447.dealII: -O4 -qarch=pwr7 -qtune=pwr7 -qipa=threads -qrtti  
-qcopp\_stdinc=/opt/stdcxx421/include/ansi:/opt/stdcxx421/include:/opt/ibmcmp/vacpp/12.1/i  
-lsmartheap -L/opt/stdcxx421/lib -R/opt/stdcxx421/lib  
-lstd8d

450.soplex: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O3 -qarch=pwr7  
-qtune=pwr7 -q64 -lhugetlbfs

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## Peak Optimization Flags (Continued)

453.povray: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O4 -qarch=pwr7  
-qtune=pwr7 -qipa=threads -qsimd -q64 -lsmartheap64

Fortran benchmarks:

410.bwaves: -qpdf1(pass 1) -qpdf2(pass 2) -O4 -qarch=pwr7 -qtune=pwr7  
-qipa=threads -qsmallstack=dynlenonheap -q64 -lhugetlbfs

416.gamess: -qpdf1(pass 1) -qpdf2(pass 2) -O5 -qarch=pwr7 -qtune=pwr7  
-qipa=threads -qalias=nostd -lhugetlbfs

434.zeusmp: basepeak = yes

437.leslie3d: -Wl,-q -O5 -qarch=pwr7 -qtune=pwr7 -qipa=threads -q64  
-B/usr/share/libhugetlbfs/ -tl -Wl,--hugetlbfs-align

459.GemsFDTD: -O4 -qarch=pwr7 -qtune=pwr7 -qipa=threads -qsimd  
-B/usr/share/libhugetlbfs/ -tl -Wl,--hugetlbfs-align

465.tonto: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O5 -qarch=pwr7  
-qtune=pwr7 -qipa=threads -qsimd -lhugetlbfs

Benchmarks using both Fortran and C:

435.gromacs: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O4 -qarch=pwr7  
-qtune=pwr7 -qipa=threads -qsimd -lhugetlbfs

436.cactusADM: -O4 -qarch=pwr7 -qtune=pwr7 -qipa=threads -qsimd  
-qnostrict -q64 -lhugetlbfs

454.calculix: basepeak = yes

481.wrf: basepeak = yes

## Peak Other Flags

C benchmarks:

C++ benchmarks:

Fortran benchmarks:

Benchmarks using both Fortran and C:

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

<http://www.spec.org/cpu2006/flags/IBM-Power.html>

<http://www.spec.org/cpu2006/flags/IBM-Linux-XL.20121024.html>



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

<http://www.spec.org/cpu2006/flags/IBM-Power.xml>

<http://www.spec.org/cpu2006/flags/IBM-Linux-XL.20121024.xml>

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For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

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