



# SPEC® CFP2006 Result

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## IBM Corporation

SPECfp®\_rate2006 = 428

IBM System p 570 (4.7 GHz, 16 core, SLES)

SPECfp\_rate\_base2006 = 364

CPU2006 license: 11

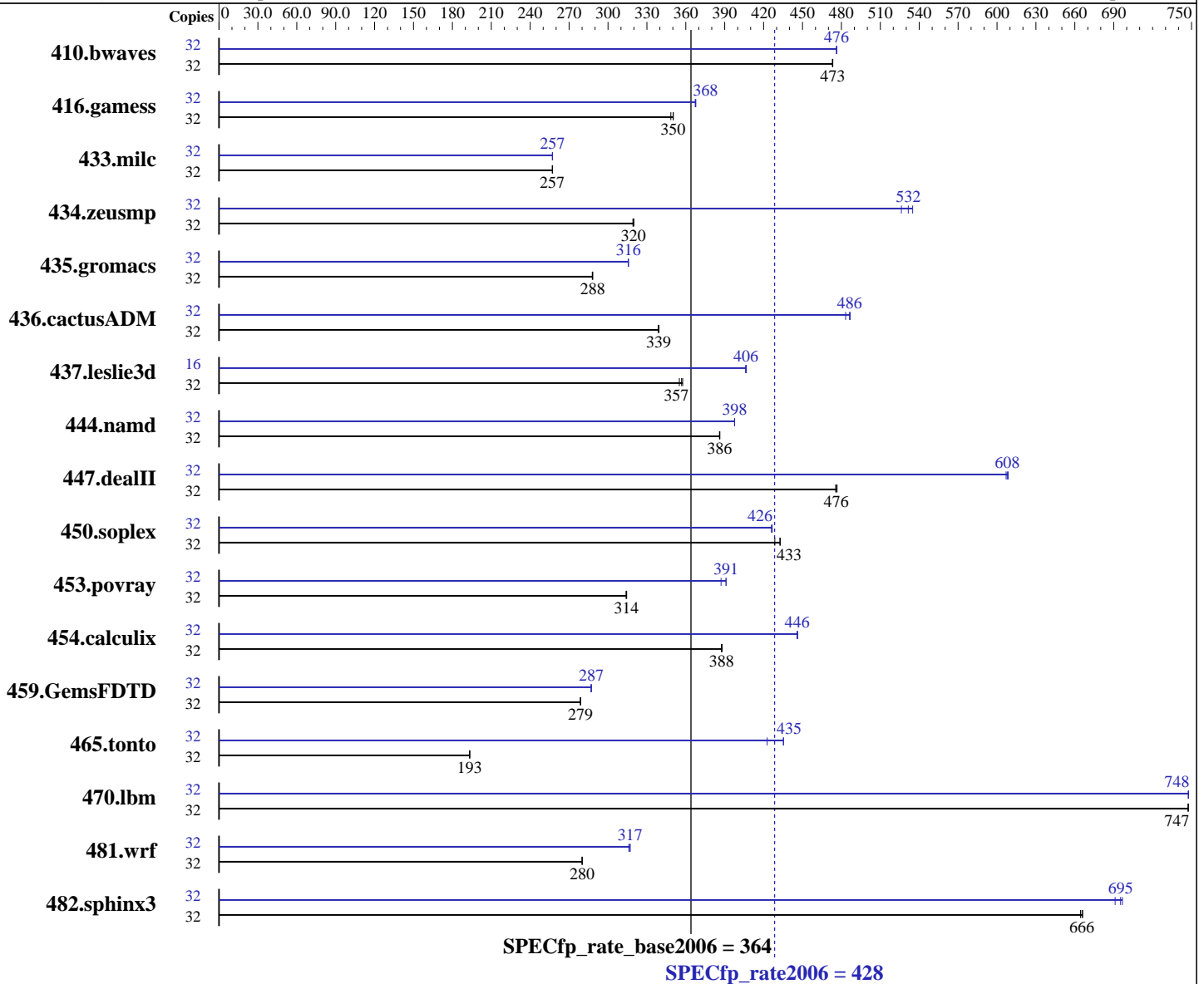
Test date: Jun-2007

Test sponsor: IBM Corporation

Hardware Availability: Jun-2007

Tested by: IBM Corporation

Software Availability: Sep-2007



### Hardware

CPU Name: POWER6  
 CPU Characteristics:  
 CPU MHz: 4700  
 FPU: Integrated  
 CPU(s) enabled: 16 cores, 8 chips, 2 cores/chip, 2 threads/core  
 CPU(s) orderable: 2,4,8,12,16 cores  
 Primary Cache: 64 KB I + 64 KB D on chip per core  
 Secondary Cache: 4 MB I+D on chip per core

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### Software

Operating System: SUSE Linux Enterprise 10 SP1  
 Compiler: IBM XL C/C++ Advanced Edition for Linux, V9.0  
 IBM XL Fortran Advanced Edition for Linux, V11.1  
 Auto Parallel: No  
 File System: ReiserFS  
 System State: Multi-User  
 Base Pointers: 32-bit  
 Peak Pointers: 32/64-bit

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L3 Cache: 32 MB I+D off chip per chip  
Other Cache: None  
Memory: 128 GB (64x2 GB) DDR2 667 MHz  
Disk Subsystem: 2x73 GB SAS 15K RPM  
Other Hardware: None

Other Software: -Post-Link Optimization for Linux on POWER, Version 5.4.0  
-MicroQuill SmartHeap 7.3  
-Engineering and Scientific Subroutine Library for Linux on POWER, Version 4.3

## Results Table

| Benchmark     | Base   |             |            |             |            |            |            | Peak   |            |            |             |            |             |            |
|---------------|--------|-------------|------------|-------------|------------|------------|------------|--------|------------|------------|-------------|------------|-------------|------------|
|               | Copies | Seconds     | Ratio      | Seconds     | Ratio      | Seconds    | Ratio      | Copies | Seconds    | Ratio      | Seconds     | Ratio      | Seconds     | Ratio      |
| 410.bwaves    | 32     | 919         | 473        | <u>919</u>  | <u>473</u> | 919        | 473        | 32     | 913        | 476        | <u>913</u>  | <u>476</u> | 913         | 476        |
| 416.gamess    | 32     | <u>1789</u> | <u>350</u> | 1789        | 350        | 1798       | 348        | 32     | 1704       | 368        | <u>1705</u> | <u>368</u> | 1706        | 367        |
| 433.milc      | 32     | 1142        | 257        | <u>1143</u> | <u>257</u> | 1143       | 257        | 32     | 1143       | 257        | 1142        | 257        | <u>1142</u> | <u>257</u> |
| 434.zeusmp    | 32     | 910         | 320        | 912         | 319        | <u>911</u> | <u>320</u> | 32     | 544        | 535        | 553         | 526        | <u>548</u>  | <u>532</u> |
| 435.gromacs   | 32     | 794         | 288        | <u>793</u>  | <u>288</u> | 793        | 288        | 32     | <u>724</u> | <u>316</u> | 724         | 316        | 724         | 316        |
| 436.cactusADM | 32     | 1127        | 339        | <u>1128</u> | <u>339</u> | 1129       | 339        | 32     | 786        | 487        | <u>786</u>  | <u>486</u> | 791         | 483        |
| 437.leslie3d  | 32     | 841         | 358        | 847         | 355        | <u>843</u> | <u>357</u> | 16     | 370        | 407        | 370         | 406        | <u>370</u>  | <u>406</u> |
| 444.namd      | 32     | <u>665</u>  | <u>386</u> | 664         | 386        | 665        | 386        | 32     | 646        | 398        | 645         | 398        | <u>645</u>  | <u>398</u> |
| 447.dealII    | 32     | <u>769</u>  | <u>476</u> | 770         | 476        | 768        | 477        | 32     | 602        | 609        | <u>602</u>  | <u>608</u> | 603         | 607        |
| 450.soplex    | 32     | 623         | 429        | <u>617</u>  | <u>433</u> | 617        | 433        | 32     | <u>626</u> | <u>426</u> | 626         | 427        | 626         | 426        |
| 453.povray    | 32     | 542         | 314        | <u>542</u>  | <u>314</u> | 541        | 314        | 32     | 435        | 391        | 440         | 387        | <u>435</u>  | <u>391</u> |
| 454.calculix  | 32     | 681         | 387        | 680         | 388        | <u>681</u> | <u>388</u> | 32     | <u>592</u> | <u>446</u> | 592         | 446        | 592         | 446        |
| 459.GemsFDTD  | 32     | 1218        | 279        | <u>1218</u> | <u>279</u> | 1218       | 279        | 32     | 1182       | 287        | <u>1183</u> | <u>287</u> | 1183        | 287        |
| 465.tonto     | 32     | 1629        | 193        | <u>1629</u> | <u>193</u> | 1629       | 193        | 32     | 723        | 435        | 745         | 423        | <u>723</u>  | <u>435</u> |
| 470.lbm       | 32     | <u>588</u>  | <u>747</u> | 588         | 747        | 588        | 747        | 32     | <u>588</u> | <u>748</u> | 588         | 748        | 588         | 748        |
| 481.wrf       | 32     | <u>1276</u> | <u>280</u> | 1276        | 280        | 1277       | 280        | 32     | 1131       | 316        | <u>1128</u> | <u>317</u> | 1127        | 317        |
| 482.sphinx3   | 32     | 939         | 664        | 936         | 666        | <u>937</u> | <u>666</u> | 32     | <u>897</u> | <u>695</u> | 902         | 691        | 895         | 697        |

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

## General Notes

kernel release 2.6.16.46-0.12-ppc64.

See flags file for details on following settings.

ulimit -s (stack) set to unlimited.

System set to Enhanced mode when defining partition on HMC

Large pages reserved as follows by root user:

```
echo 3200 > /proc/sys/vm/nr_hugepages
```

System configured with libhugetlbfs library for application access to large pages

Environment variables set before executing benchmarks.

```
export HUGETLB_VERBOSE=0
```

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## General Notes (Continued)

```
export HUGETLB_MORECORE=yes
export HUGETLB_MORECORE_HEAPBASE=0x50000000
export XLFRTOPTIONS=intrinthds=1
```

fdpr binary optimization tool used for  
435.gromacs 436.cactusADM 482.sphinx3

Benchmarks bound to a processor using taskset on the submit command.

## Base Compiler Invocation

C benchmarks:

```
xlc -qlanglvl=extc99
```

C++ benchmarks:

```
xlC
```

Fortran benchmarks:

```
xlf95
```

Benchmarks using both Fortran and C:

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

## 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 -qnoenablevmx -B/usr/share/libhugetlbfs/ -t1
-Wl,--hugetlbfs-link=BDT
```

C++ benchmarks:

```
-O5 -qrtti -qnoenablevmx -lhugetlbfs
```

Fortran benchmarks:

```
-O5 -qsmallstack=dynlenonheap -qalias=nostd -qnoenablevmx
-B/usr/share/libhugetlbfs/ -t1 -Wl,--hugetlbfs-link=BDT
```

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## Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:

-O5 -qnoenablevmx -B/usr/share/libhugetlbfs/ -t1  
-Wl,--hugetlbfs-link=BDT -qsmallstack=dynlenonheap -qalias=nostd

## Base Other Flags

C benchmarks:

-qipa=noobject -qipa=threads

C++ benchmarks:

-qipa=noobject -qipa=threads

Fortran benchmarks:

-qipa=noobject -qipa=threads

Benchmarks using both Fortran and C:

-qipa=noobject -qipa=threads

## Peak Compiler Invocation

C benchmarks:

xlc -qlanglvl=extc99

C++ benchmarks:

xlC

Fortran benchmarks:

xlF95

Benchmarks using both Fortran and C:

xlc -qlanglvl=extc99 xlF95

## Peak 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

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## Peak Portability Flags (Continued)

481.wrf: -DNOUNDERSCORE  
482.sphinx3: -qchars=signed

## Peak Optimization Flags

C benchmarks:

433.milc: -qpdf1(pass 1) -qpdf2(pass 2) -O5 -qnoenablevmx  
-B/usr/share/libhugetlbfs/ -tl -Wl,--hugetlbfs-link=BDT

470.lbm: -O3 -qarch=pwr6e -qtune=pwr6 -B/usr/share/libhugetlbfs/  
-tl -Wl,--hugetlbfs-link=BDT -q64

482.sphinx3: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O4 -lhugetlbfs

C++ benchmarks:

444.namd: -qpdf1(pass 1) -qpdf2(pass 2) -O3 -qarch=pwr6e -qtune=pwr6

447.dealIII: -O5 -qrtti -qnoenablevmx -qstaticlink  
-Wl,--whole-archive /usr/lib/libhugetlbfs.a  
-Wl,--no-whole-archive

450.soplex: -qpdf1(pass 1) -qpdf2(pass 2) -O4 -qstrict  
-B/usr/share/libhugetlbfs/ -tl -Wl,--hugetlbfs-link=BDT

453.povray: -qpdf1(pass 1) -qpdf2(pass 2) -O5 -lsmartheap

Fortran benchmarks:

410.bwaves: -O5 -qsmallstack=dynlenonheap -lhugetlbfs

416.gamess: -qpdf1(pass 1) -qpdf2(pass 2) -O5 -qalias=nostd  
-qnoenablevmx

434.zeusmp: -qpdf1(pass 1) -qpdf2(pass 2) -O3 -qarch=pwr6e -qtune=pwr6  
-qxlf90=nosignedzero -B/usr/share/libhugetlbfs/ -tl  
-Wl,--hugetlbfs-link=BDT

437.leslie3d: -O3 -qarch=pwr6e -qtune=pwr6 -B/usr/share/libhugetlbfs/  
-tl -Wl,--hugetlbfs-link=BDT -q64

459.GemsFDTD: -qpdf1(pass 1) -qpdf2(pass 2) -O5  
-B/usr/share/libhugetlbfs/ -tl -Wl,--hugetlbfs-link=BDT  
-q64

465.tonto: -qpdf1(pass 1) -qpdf2(pass 2) -O5 -lessl -lhugetlbfs  
-lxlf90\_r

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## Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

435.gromacs: -Wl, -q -O2 -qarch=pwr6e -qtune=pwr6 -lhugetlbfs

436.cactusADM: -Wl, -q -qpdf1(pass 1) -qpdf2(pass 2) -O2 -qarch=pwr6e  
-qtune=pwr6 -lhugetlbfs

454.calculix: -qpdf1(pass 1) -qpdf2(pass 2) -O4  
-B/usr/share/libhugetlbfs/ -tl -Wl, --hugetlbfs-link=BDT

481.wrf: -O5 -qnoenablevmx -qalias=nostd -lhugetlbfs

## Peak Other Flags

C benchmarks:

-qipa=noobject -qipa=threads

C++ benchmarks:

-qipa=noobject -qipa=threads

Fortran benchmarks:

-qipa=noobject -qipa=threads

Benchmarks using both Fortran and C:

-qipa=noobject -qipa=threads

The flags file that was used to format this result can be browsed at

<http://www.spec.org/cpu2006/flags/lop-xl-flags.20090714.01.html>

You can also download the XML flags source by saving the following link:

<http://www.spec.org/cpu2006/flags/lop-xl-flags.20090714.01.xml>

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

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