# SPEC® CFP2006 Result
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## IBM Corporation

## IBM Power 780 (3.86 GHz, 16 core)

$SPECfp®\_rate2006 = $  586

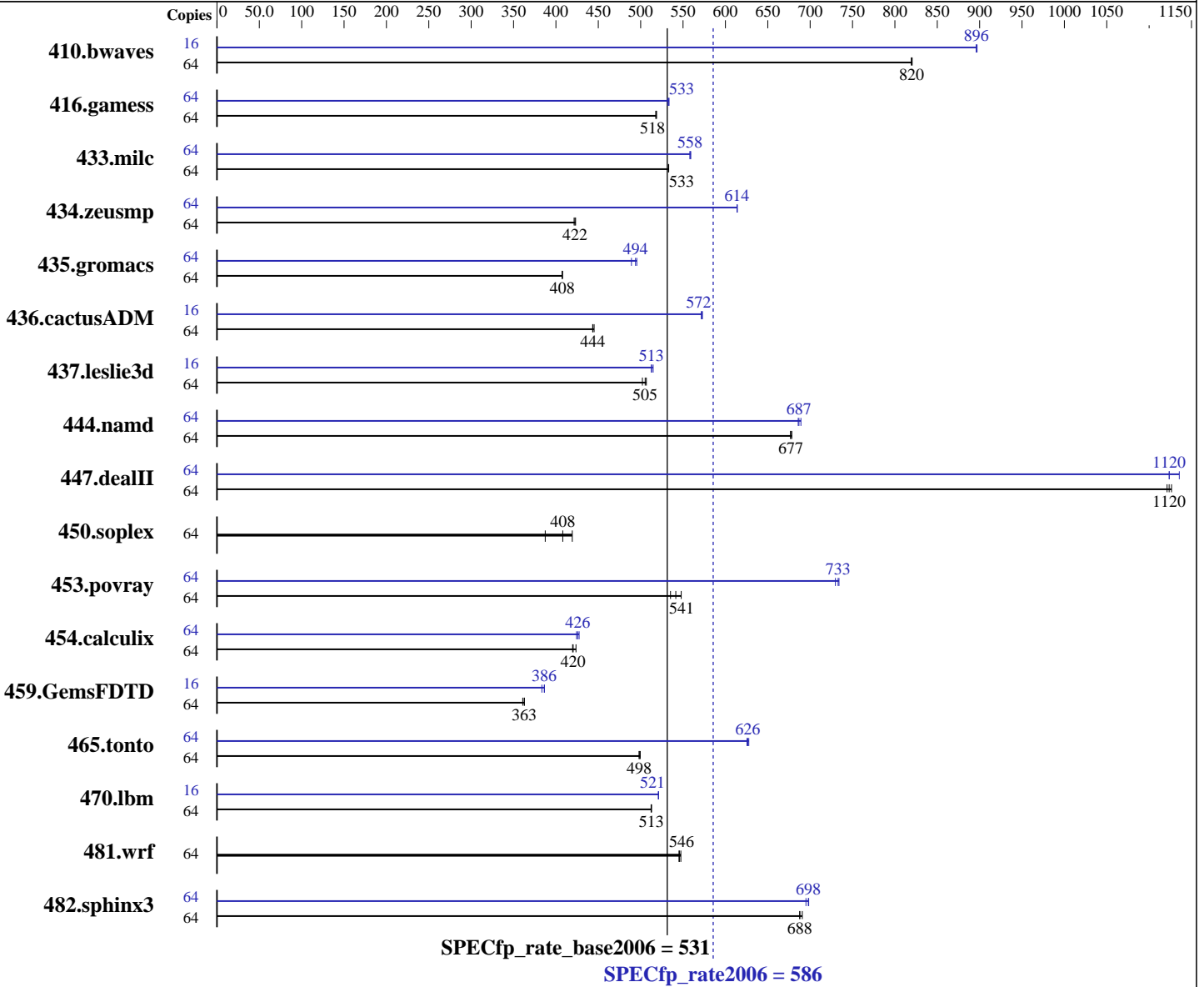$SPECfp\_rate\_base2006 = $  531

**CPU2006 license:** 11

**Test sponsor:** IBM Corporation

**Tested by:** IBM Corporation

**Test date:** Jan-2010

**Hardware Availability:** Mar-2010

**Software Availability:** Mar-2010



Results bar chart (Copies):

| Benchmark | Copies | Value |
|---|---|---|
| 410.bwaves | 16 | 896 |
| 410.bwaves | 64 | 820 |
| 416.gamess | 64 | 533 |
| 416.gamess | 64 | 518 |
| 433.milc | 64 | 558 |
| 433.milc | 64 | 533 |
| 434.zeusmp | 64 | 614 |
| 434.zeusmp | 64 | 422 |
| 435.gromacs | 64 | 494 |
| 435.gromacs | 64 | 408 |
| 436.cactusADM | 16 | 572 |
| 436.cactusADM | 64 | 444 |
| 437.leslie3d | 16 | 513 |
| 437.leslie3d | 64 | 505 |
| 444.namd | 64 | 687 |
| 444.namd | 64 | 677 |
| 447.dealII | 64 | 1120 |
| 447.dealII | 64 | 1120 |
| 450.soplex | 64 | 408 |
| 453.povray | 64 | 733 |
| 453.povray | 64 | 541 |
| 454.calculix | 64 | 426 |
| 454.calculix | 64 | 420 |
| 459.GemsFDTD | 16 | 386 |
| 459.GemsFDTD | 64 | 363 |
| 465.tonto | 64 | 626 |
| 465.tonto | 64 | 498 |
| 470.lbm | 16 | 521 |
| 470.lbm | 64 | 513 |
| 481.wrf | 64 | 546 |
| 482.sphinx3 | 64 | 698 |
| 482.sphinx3 | 64 | 688 |

**SPECfp_rate_base2006 = 531**

**SPECfp_rate2006 = 586**

## Hardware

CPU Name: POWER7

CPU Characteristics: Intelligent Energy Optimization enabled, up to 3.94 GHz

CPU MHz: 3860

FPU: Integrated

CPU(s) enabled: 16 cores, 2 chips, 8 cores/chip, 4 threads/core

CPU(s) orderable: 8,16,24,32,48,64 cores

Primary Cache: 32 KB I + 32 KB D on chip per core

*Continued on next page*

## Software

Operating System: IBM AIX V6.1 with the 6100-04 Technology Level and Service Pack 3

Compiler: XL C/C++ Enterprise Edition V10.1.0.5 for AIX
XL Fortran Enterprise Edition V12.1.0.6 for AIX

Auto Parallel: No

File System: AIX/JFS2

System State: 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: | 4 MB I+D on chip per core |
| Other Cache: | None |
| Memory: | 128 GB (16x8 GB) DDR3 1066 MHz |
| Disk Subsystem: | 6x146.8 GB SAS SFF 15K RPM |
| Other Hardware: | None |

Other Software: None

## Results Table

| Benchmark | Base Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Peak Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 410.bwaves | 64 | **1061** | **820** | 1060 | 820 | 1062 | 819 | 16 | 242 | 897 | 243 | 896 | **243** | **896** |
| 416.gamess | 64 | 2419 | 518 | **2419** | **518** | 2415 | 519 | 64 | 2357 | 532 | **2352** | **533** | 2349 | 534 |
| 433.milc | 64 | **1102** | **533** | 1103 | 533 | 1102 | 533 | 64 | 1053 | 558 | 1051 | 559 | **1052** | **558** |
| 434.zeusmp | 64 | 1382 | 421 | **1379** | **422** | 1376 | 423 | 64 | **949** | **614** | 949 | 614 | 948 | 614 |
| 435.gromacs | 64 | 1122 | 407 | **1121** | **408** | 1121 | 408 | 64 | 922 | 495 | **925** | **494** | 934 | 489 |
| 436.cactusADM | 64 | **1724** | **444** | 1725 | 443 | 1718 | 445 | 16 | 335 | 572 | **334** | **572** | 334 | 573 |
| 437.leslie3d | 64 | **1191** | **505** | 1187 | 507 | 1198 | 502 | 16 | 292 | 515 | **293** | **513** | 293 | 513 |
| 444.namd | 64 | 757 | 678 | **758** | **677** | 758 | 677 | 64 | **747** | **687** | 748 | 686 | 745 | 689 |
| 447.dealII | 64 | 653 | 1120 | **652** | **1120** | 650 | 1130 | 64 | 645 | 1140 | **652** | **1120** | 652 | 1120 |
| 450.soplex | 64 | 1273 | 419 | **1308** | **408** | 1378 | 387 | 64 | 1273 | 419 | **1308** | **408** | 1378 | 387 |
| 453.povray | 64 | 621 | 548 | 636 | 535 | **629** | **541** | 64 | 467 | 730 | 464 | 734 | **465** | **733** |
| 454.calculix | 64 | **1256** | **420** | 1246 | 424 | 1258 | 420 | 64 | 1244 | 424 | 1235 | 427 | **1240** | **426** |
| 459.GemsFDTD | 64 | 1882 | 361 | 1872 | 363 | **1872** | **363** | 16 | 439 | 386 | 443 | 383 | **439** | **386** |
| 465.tonto | 64 | 1264 | 498 | 1261 | 500 | **1264** | **498** | 64 | 1003 | 628 | **1005** | **626** | 1007 | 625 |
| 470.lbm | 64 | 1716 | 512 | 1715 | 513 | **1715** | **513** | 16 | **422** | **521** | 422 | 521 | 422 | 521 |
| 481.wrf | 64 | 1311 | 545 | 1306 | 547 | **1310** | **546** | 64 | 1311 | 545 | 1306 | 547 | **1310** | **546** |
| 482.sphinx3 | 64 | 1806 | 691 | 1814 | 688 | **1813** | **688** | 64 | 1795 | 695 | 1786 | 698 | **1788** | **698** |

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

## Peak Tuning Notes

```
fdpr binary optimization tool used for 410.bwaves
 with options -O3 -vrox -pbsi -A 64
fdpr binary optimization tool used for 433.milc
 with options -O4 -vrox -pbsi
fdpr binary optimization tool used for 434.zeusmp
 with options -O3 -vrox -sdp 9
fdpr binary optimization tool used for 435.gromacs
 with options -O4 -vrox -pbsi
fdpr binary optimization tool used for 437.leslie3d
 with options -O4 -vrox -pbsi
fdpr binary optimization tool used for 450.soplex
 with options -O3 -vrox -sdp 9
fdpr binary optimization tool used for 453.povray
```

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## Peak Tuning Notes (Continued)

```
  with options -O4 -vrox -pbsi
fdpr binary optimization tool used for 454.calculix
 with options -O4 -vrox -pbsi
fdpr binary optimization tool used for 459.GemsFDTD
 with options -O4 -vrox -pbsi
fdpr binary optimization tool used for 470.lbm
 with options -O3 -vrox -sdp 9
fdpr binary optimization tool used for 481.wrf
 with options -O4 -vrox -pbsi
fdpr binary optimization tool used for 482.sphinx3
 with options -O4 -vrox -pbsi
```

## Submit Notes

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

## Operating System Notes

```
all ulimits set to unlimited.
6400 16M large pages defined with vmo command
```

## General Notes

```
Environment variables set by runspec before the start of the run:
MALLOCOPTIONS = "pool"
MEMORY_AFFINITY = "MCM"
XLFRTEOPTS = "intrinthds=1"

 See the flags file for details on settings.
```

## Base Compiler Invocation

C benchmarks:
```
/usr/vac/bin/xlc -qlanglvl=extc99
```

C++ benchmarks:
```
/usr/vacpp/bin/xlC
```

Fortran benchmarks:
```
/usr/bin/xlf95
```

Benchmarks using both Fortran and C:
```
/usr/vac/bin/xlc -qlanglvl=extc99 /usr/bin/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: -DSPEC_CPU_AIX -DNOUNDERSCORE
   482.sphinx3: -qchars=signed
```

## Base Optimization Flags

C benchmarks:
```
    -bmaxdata:0x40000000 -O5 -qlargepage -D_ILS_MACROS -blpdata
```

C++ benchmarks:
```
    -bmaxdata:0x50000000 -O5 -qlargepage -D_ILS_MACROS -qrtti=all
    -D__IBM_FAST_VECTOR -D__IBM_FAST_SET_MAP_ITERATOR -blpdata
```

Fortran benchmarks:
```
    -bmaxdata:0x60000000 -O5 -qlargepage -qsmallstack=dynlenonheap
    -qalias=nostd -blpdata
```

Benchmarks using both Fortran and C:
```
    -bmaxdata:0x60000000 -O5 -qlargepage -D_ILS_MACROS
    -qsmallstack=dynlenonheap -qalias=nostd -blpdata
```

## Base Other Flags

C benchmarks:
```
    -qipa=threads -qipa=noobject -qsuppress=1500-036
```

C++ benchmarks:
```
    -qipa=threads -qipa=noobject -qsuppress=1500-036
```

Fortran benchmarks:
```
    -qipa=threads -qipa=noobject -qsuppress=1500-010 -qsuppress=cmpmsg
    -qsuppress=1500-036
```

Benchmarks using both Fortran and C:
```
    -qipa=threads -qipa=noobject -qsuppress=1500-010 -qsuppress=cmpmsg
    -qsuppress=1500-036
```

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## Peak Compiler Invocation

C benchmarks:
        /usr/vac/bin/xlc -qlanglvl=extc99

C++ benchmarks:
        /usr/vacpp/bin/xlC

Fortran benchmarks:
        /usr/bin/xlf95

Benchmarks using both Fortran and C:
        /usr/vac/bin/xlc -qlanglvl=extc99 /usr/bin/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
            481.wrf: -DSPEC_CPU_AIX -DNOUNDERSCORE
        482.sphinx3: -qchars=signed

## Peak Optimization Flags

C benchmarks:

        433.milc: -bmaxdata:0x40000000 -O5 -qlargepage -D_ILS_MACROS
                -qalign=natural -qfdpr -blpdata

        470.lbm: -qpdf1(pass 1) -qpdf2(pass 2) -O3 -qarch=auto -qtune=auto
                -qlargepage -q64 -D_ILS_MACROS -qfdpr -blpdata

        482.sphinx3: -qpdf1(pass 1) -qpdf2(pass 2) -O4 -qlargepage
                -D_ILS_MACROS -qfdpr -blpdata

C++ benchmarks:

        444.namd: -qpdf1(pass 1) -qpdf2(pass 2) -O5 -qlargepage
                -D_ILS_MACROS -blpdata

        447.dealII: -bmaxdata:0x50000000 -O5 -D_ILS_MACROS -qrtti=all
                -D__IBM_FAST_VECTOR -D__IBM_FAST_SET_MAP_ITERATOR -blpdata
                -btextpsize:64K

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# Peak Optimization Flags (Continued)

450.soplex: basepeak = yes

453.povray: -qpdf1(pass 1) -qpdf2(pass 2) -O5 -D_ILS_MACROS
             -qalign=natural -qfdpr -btextpsize:64K

Fortran benchmarks:

410.bwaves: -bmaxdata:0x50000000 -O5 -qlargepage -qenablevmx -qvecnvol
             -qfdpr -qsmallstack=dynlenonheap -blpdata

416.gamess: -bmaxdata:0x40000000 -qpdf1(pass 1) -qpdf2(pass 2) -O5
             -qlargepage -qalias=nostd -blpdata

434.zeusmp: -bmaxdata:0x40000000 -qpdf1(pass 1) -qpdf2(pass 2) -O3
             -qarch=auto -qtune=auto -qlargepage -qenablevmx -qvecnvol
             -qxlf90=nosignedzero -qfdpr -blpdata

437.leslie3d: -O5 -qlargepage -qenablevmx -qvecnvol -qfdpr -blpdata

459.GemsFDTD: -O4 -qlargepage -q64 -qfdpr -blpdata

465.tonto: -bmaxdata:0x50000000 -qpdf1(pass 1) -qpdf2(pass 2) -O5
             -blpdata -btextpsize:64K

Benchmarks using both Fortran and C:

435.gromacs: -qpdf1(pass 1) -qpdf2(pass 2) -O5 -D_ILS_MACROS -qfdpr

436.cactusADM: -bmaxdata:0x60000000 -qpdf1(pass 1) -qpdf2(pass 2) -O2
             -qarch=auto -qtune=auto -qenablevmx -qvecnvol
             -D_ILS_MACROS -qfdpr -qnostrict -blpdata -btextpsize:64K

454.calculix: -O4 -qlargepage -q64 -D_ILS_MACROS -qfdpr -blpdata

481.wrf: basepeak = yes

# Peak Other Flags

C benchmarks:
    -qipa=threads -qipa=noobject -qsuppress=1500-036

C++ benchmarks:
    -qipa=threads -qipa=noobject -qsuppress=1500-036

Fortran benchmarks:
    -qipa=threads -qipa=noobject -qsuppress=1500-010 -qsuppress=cmpmsg
    -qsuppress=1500-036

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## Peak Other Flags (Continued)

Benchmarks using both Fortran and C:
```
-qipa=threads -qipa=noobject -qsuppress=1500-010 -qsuppress=cmpmsg
-qsuppress=1500-036
```

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/IBM-XL.20100303.html
http://www.spec.org/cpu2006/flags/IBM-AIX.20100303.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/IBM-XL.20100303.xml
http://www.spec.org/cpu2006/flags/IBM-AIX.20100303.xml

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