# SPEC® CFP2006 Result

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## NEC Corporation

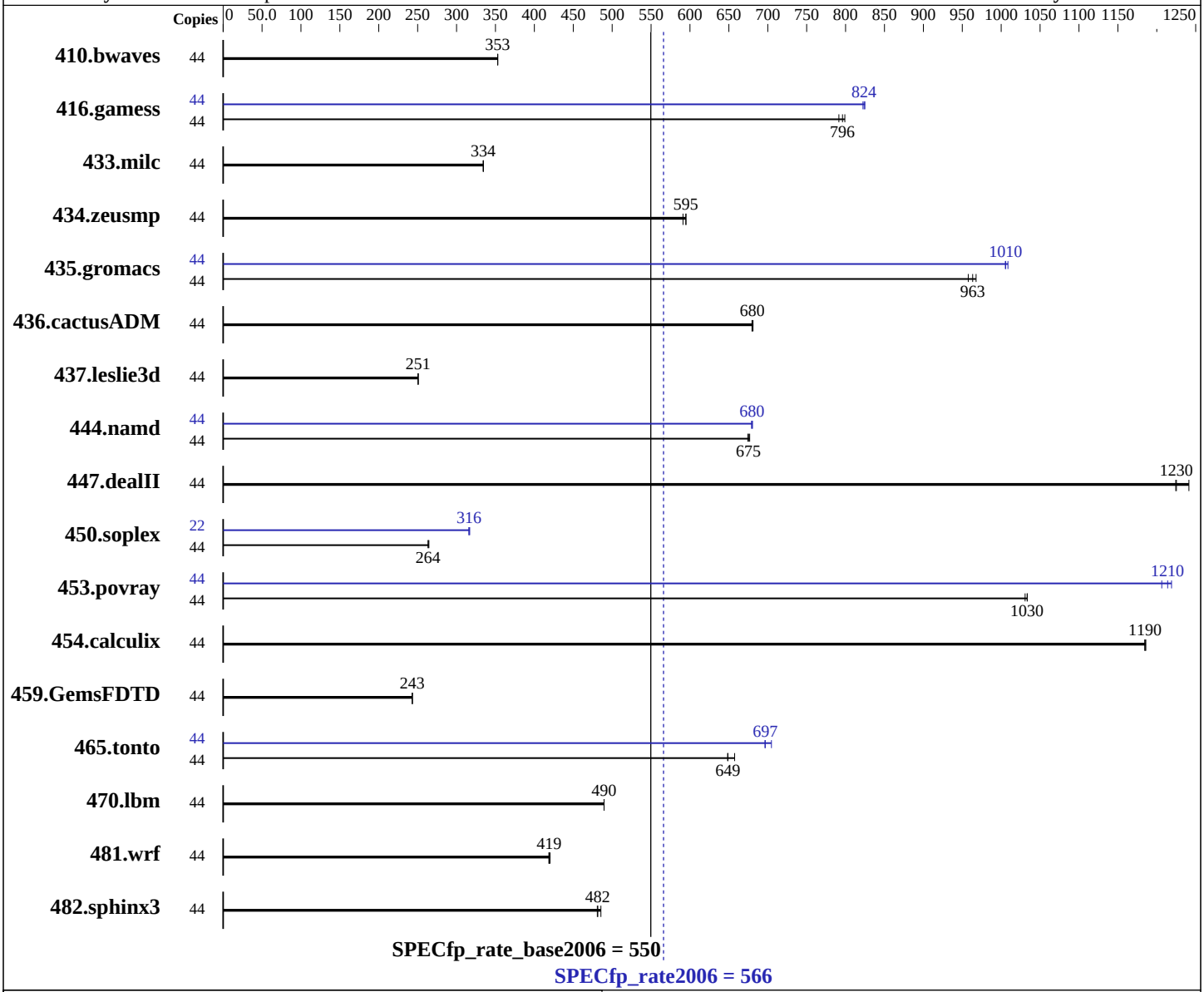
Express5800/R120g-2M (Intel Xeon E5-2699 v4)

SPECfp®_rate2006 = 566

SPECfp_rate_base2006 = 550

**CPU2006 license:** 9006
**Test sponsor:** NEC Corporation
**Tested by:** NEC Corporation

**Test date:** Feb-2016
**Hardware Availability:** Apr-2016
**Software Availability:** Jan-2016




### Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon E5-2699 v4 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.60 GHz |
| CPU MHz: | 2200 |
| FPU: | Integrated |
| CPU(s) enabled: | 22 cores, 1 chip, 22 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: | Red Hat Enterprise Linux Server release 7.2 (Maipo)<br>Kernel 3.10.0-327.4.5.el7.x86_64 |
| Compiler: | C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux;<br>Fortran: Version 16.0.0.101 of Intel Fortran Studio XE for Linux |
| Auto Parallel: | No |
| File System: | ext4 |

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L3 Cache: 55 MB I+D on chip per chip
Other Cache: None
Memory: 128 GB (8 x 16 GB 2Rx4 PC4-2400T-R)
Disk Subsystem: 1 x 1 TB SATA, 7200 RPM
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 | 44 | **1694** | **353** | 1695 | 353 | 1694 | 353 | 44 | **1694** | **353** | 1695 | 353 | 1694 | 353 |
| 416.gamess | 44 | 1089 | 791 | **1082** | **796** | 1078 | 799 | 44 | **1046** | **824** | 1044 | 825 | 1048 | 822 |
| 433.milc | 44 | 1208 | 335 | 1208 | 334 | **1208** | **334** | 44 | 1208 | 335 | 1208 | 334 | **1208** | **334** |
| 434.zeusmp | 44 | **673** | **595** | 677 | 591 | 673 | 595 | 44 | **673** | **595** | 677 | 591 | 673 | 595 |
| 435.gromacs | 44 | 325 | 968 | 328 | 958 | **326** | **963** | 44 | 311 | 1010 | 312 | 1010 | **312** | **1010** |
| 436.cactusADM | 44 | 774 | 680 | 772 | 681 | **773** | **680** | 44 | 774 | 680 | 772 | 681 | **773** | **680** |
| 437.leslie3d | 44 | 1651 | 251 | 1650 | 251 | **1651** | **251** | 44 | 1651 | 251 | 1650 | 251 | **1651** | **251** |
| 444.namd | 44 | 521 | 677 | 523 | 674 | **522** | **675** | 44 | **519** | **680** | 519 | 680 | 520 | 679 |
| 447.dealII | 44 | 411 | 1220 | 406 | 1240 | **411** | **1230** | 44 | 411 | 1220 | 406 | 1240 | **411** | **1230** |
| 450.soplex | 44 | 1393 | 263 | **1392** | **264** | 1388 | 264 | 22 | 579 | 317 | **580** | **316** | 581 | 316 |
| 453.povray | 44 | 227 | 1030 | 226 | 1030 | **227** | **1030** | 44 | **193** | **1210** | 192 | 1220 | 194 | 1210 |
| 454.calculix | 44 | 306 | 1190 | 306 | 1180 | **306** | **1190** | 44 | 306 | 1190 | 306 | 1180 | **306** | **1190** |
| 459.GemsFDTD | 44 | 1920 | 243 | **1921** | **243** | 1921 | 243 | 44 | 1920 | 243 | **1921** | **243** | 1921 | 243 |
| 465.tonto | 44 | **667** | **649** | 659 | 657 | 668 | 648 | 44 | **621** | **697** | 614 | 705 | 622 | 696 |
| 470.lbm | 44 | 1235 | 490 | **1235** | **490** | 1235 | 490 | 44 | 1235 | 490 | **1235** | **490** | 1235 | 490 |
| 481.wrf | 44 | 1170 | 420 | **1173** | **419** | 1174 | 419 | 44 | 1170 | 420 | **1173** | **419** | 1174 | 419 |
| 482.sphinx3 | 44 | **1781** | **482** | 1783 | 481 | 1766 | 486 | 44 | **1781** | **482** | 1783 | 481 | 1766 | 486 |

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

```
BIOS Settings:
 Power Management Policy: Custom
 Energy Performance: Performance
```

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## Platform Notes (Continued)

```
Patrol Scrub: Disabled
Cluster on Die: Enabled
```

## General Notes

```
Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2006/libs/32:/home/cpu2006/libs/64:/home/cpu2006/sh"

 Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB
 memory using RedHat EL 7.1

 The Express5800/R120g-1M (Intel Xeon E5-2699 v4) and
 the Express5800/R120g-2M (Intel Xeon E5-2699 v4) models are electronically equivalent.
 The results have been measured on the Express5800/R120g-2M (Intel Xeon E5-2699 v4) model.

 Transparent Huge Pages enabled with:
 echo always > /sys/kernel/mm/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
```

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## Base Portability Flags (Continued)

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:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -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 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin

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
450.soplex: -D_FILE_OFFSET_BITS=64
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

## Peak Optimization Flags

C benchmarks:

433.milc: basepeak = yes

470.lbm: basepeak = yes

482.sphinx3: basepeak = yes

C++ benchmarks:

444.namd: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
-ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
-par-num-threads=1(pass 1) -opt-mem-layout-trans=3(pass 2)
-prof-use(pass 2) -fno-alias -auto-ilp32

447.dealII: basepeak = yes

450.soplex: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
-ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
-par-num-threads=1(pass 1) -opt-mem-layout-trans=3(pass 2)
-prof-use(pass 2) -opt-malloc-options=3

453.povray: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
-ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
-par-num-threads=1(pass 1) -opt-mem-layout-trans=3(pass 2)
-prof-use(pass 2) -unroll4 -ansi-alias

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# Peak Optimization Flags (Continued)

Fortran benchmarks:

410.bwaves: basepeak = yes

416.gamess: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll2 -inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

459.GemsFDTD: basepeak = yes

465.tonto: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll4 -auto -inline-calloc -opt-malloc-options=3

Benchmarks using both Fortran and C:

435.gromacs: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -opt-mem-layout-trans=3(pass 2) -prof-use(pass 2) -opt-prefetch -auto-ilp32

436.cactusADM: basepeak = yes

454.calculix: basepeak = yes

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-ic16.0-official-linux64.html
http://www.spec.org/cpu2006/flags/NEC-Platform-Settings-V1.2-120g-RevC.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/NEC-Platform-Settings-V1.2-120g-RevC.xml

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Tested with SPEC CPU2006 v1.2.
Report generated on Wed Jun 1 19:09:16 2016 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 1 June 2016.