



# SPEC<sup>®</sup> CFP2006 Result

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## NEC Corporation

SPECfp<sup>®</sup>2006 = **118**

Express5800/E120g-M (Intel Xeon E5-2640 v4)

SPECfp\_base2006 = **112**

CPU2006 license: 9006

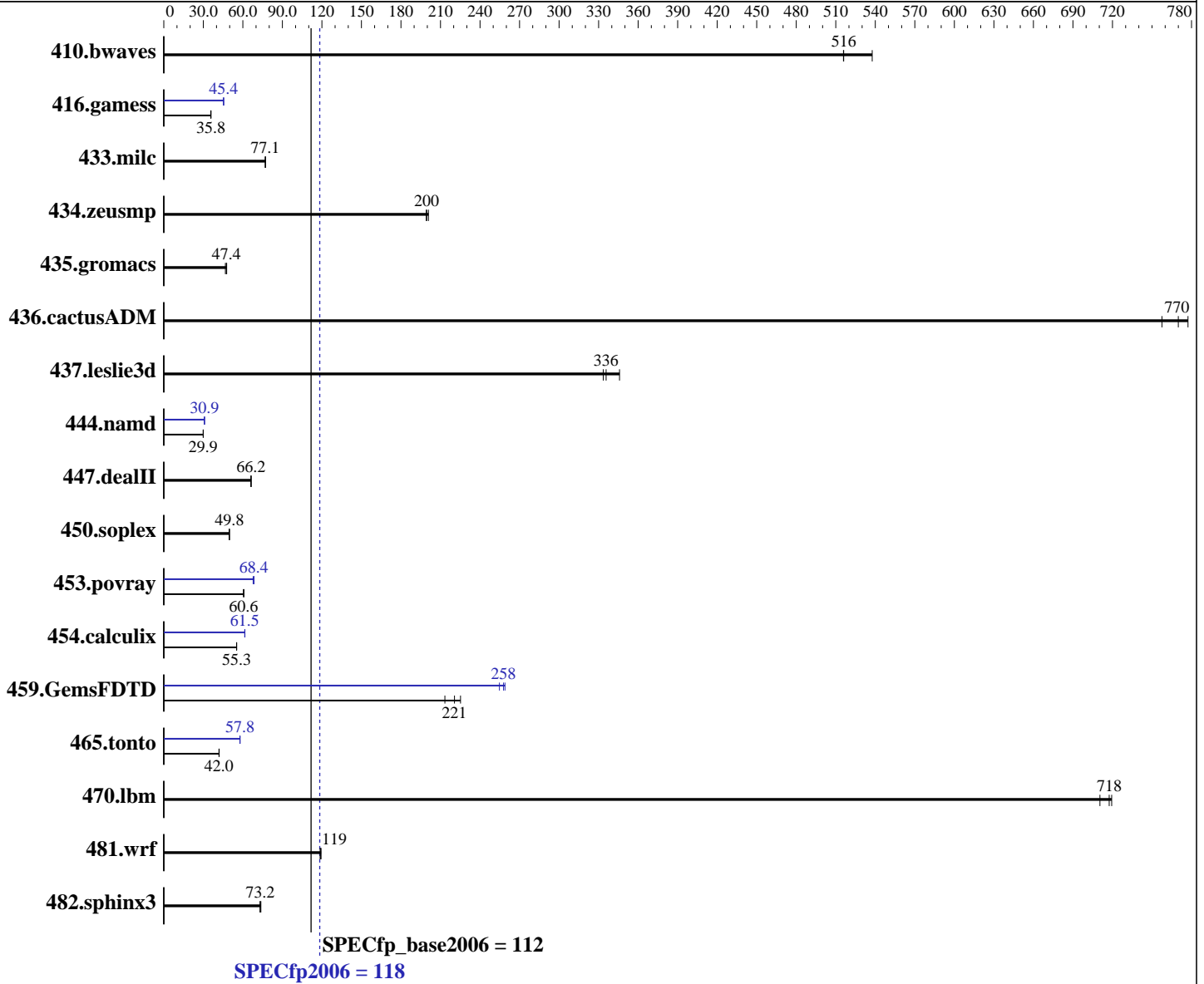
Test date: Mar-2016

Test sponsor: NEC Corporation

Hardware Availability: Apr-2016

Tested by: NEC Corporation

Software Availability: Nov-2015



**Hardware**

CPU Name: Intel Xeon E5-2640 v4  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.40 GHz  
 CPU MHz: 2400  
 FPU: Integrated  
 CPU(s) enabled: 20 cores, 2 chips, 10 cores/chip  
 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)  
 Kernel 3.10.0-327.el7.x86\_64  
 Compiler: C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux;  
 Fortran: Version 16.0.0.101 of Intel Fortran Studio XE for Linux  
 Auto Parallel: Yes  
 File System: ext4

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L3 Cache: 25 MB I+D on chip per chip  
 Other Cache: None  
 Memory: 256 GB (16 x 16 GB 2Rx4 PC4-2400T-R, running at 2133 MHz)  
 Disk Subsystem: 1 x 1 TB SATA, 7200 RPM  
 Other Hardware: None

System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 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    | 25.3        | 538         | 26.3        | 516         | <b>26.3</b> | <b>516</b>  | 25.3        | 538         | 26.3        | 516         | <b>26.3</b> | <b>516</b>  |
| 416.gamess    | 547         | 35.8        | <b>547</b>  | <b>35.8</b> | 550         | 35.6        | 431         | 45.4        | <b>431</b>  | <b>45.4</b> | 432         | 45.3        |
| 433.milc      | 119         | 77.2        | 119         | 77.0        | <b>119</b>  | <b>77.1</b> | 119         | 77.2        | 119         | 77.0        | <b>119</b>  | <b>77.1</b> |
| 434.zeusmp    | 45.7        | 199         | <b>45.6</b> | <b>200</b>  | 45.3        | 201         | 45.7        | 199         | <b>45.6</b> | <b>200</b>  | 45.3        | 201         |
| 435.gromacs   | 153         | 46.7        | <b>151</b>  | <b>47.4</b> | 150         | 47.7        | 153         | 46.7        | <b>151</b>  | <b>47.4</b> | 150         | 47.7        |
| 436.cactusADM | 15.8        | 758         | 15.4        | 777         | <b>15.5</b> | <b>770</b>  | 15.8        | 758         | 15.4        | 777         | <b>15.5</b> | <b>770</b>  |
| 437.leslie3d  | <b>28.0</b> | <b>336</b>  | 28.2        | 334         | 27.2        | 346         | <b>28.0</b> | <b>336</b>  | 28.2        | 334         | 27.2        | 346         |
| 444.namd      | <b>268</b>  | <b>29.9</b> | 268         | 29.9        | 268         | 29.9        | 260         | 30.9        | <b>260</b>  | <b>30.9</b> | 260         | 30.8        |
| 447.dealII    | 173         | 66.1        | <b>173</b>  | <b>66.2</b> | 173         | 66.3        | 173         | 66.1        | <b>173</b>  | <b>66.2</b> | 173         | 66.3        |
| 450.soplex    | 168         | 49.8        | 168         | 49.7        | <b>168</b>  | <b>49.8</b> | 168         | 49.8        | 168         | 49.7        | <b>168</b>  | <b>49.8</b> |
| 453.povray    | 87.5        | 60.8        | <b>87.8</b> | <b>60.6</b> | 87.9        | 60.5        | 77.7        | 68.5        | <b>77.8</b> | <b>68.4</b> | 78.5        | 67.8        |
| 454.calculix  | <b>149</b>  | <b>55.3</b> | 149         | 55.2        | 149         | 55.3        | 134         | 61.6        | 134         | 61.4        | <b>134</b>  | <b>61.5</b> |
| 459.GemsFDTD  | 49.7        | 213         | <b>48.1</b> | <b>221</b>  | 47.1        | 225         | <b>41.2</b> | <b>258</b>  | 41.7        | 255         | 41.0        | 259         |
| 465.tonto     | 234         | 42.0        | <b>234</b>  | <b>42.0</b> | 235         | 41.9        | 170         | 57.9        | 170         | 57.7        | <b>170</b>  | <b>57.8</b> |
| 470.lbm       | <b>19.1</b> | <b>718</b>  | 19.1        | 719         | 19.3        | 710         | <b>19.1</b> | <b>718</b>  | 19.1        | 719         | 19.3        | 710         |
| 481.wrf       | 94.1        | 119         | <b>94.0</b> | <b>119</b>  | 93.6        | 119         | 94.1        | 119         | <b>94.0</b> | <b>119</b>  | 93.6        | 119         |
| 482.sphinx3   | <b>266</b>  | <b>73.2</b> | 265         | 73.7        | 267         | 73.1        | <b>266</b>  | <b>73.2</b> | 265         | 73.7        | 267         | 73.1        |

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

## Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

## Platform Notes

BIOS Settings:  
 Power Management Policy: Custom  
 Energy Performance: Performance  
 Patrol Scrub: Disabled  
 Snoop Mode: Home Snoop with Directory  
 Hyper-Threading: Disabled



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## General Notes

Environment variables set by runspec before the start of the run:

KMP\_AFFINITY = "granularity=fine,compact"

LD\_LIBRARY\_PATH = "/home/cpu2006/libs/32:/home/cpu2006/libs/64:/home/cpu2006/sh"

OMP\_NUM\_THREADS = "20"

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

Transparent Huge Pages enabled with:

echo always > /sys/kernel/mm/transparent\_hugepage/enabled

## 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



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## Base Optimization Flags

C benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch  
-ansi-alias

C++ benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -ansi-alias

Fortran benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch

Benchmarks using both Fortran and C:

-xCORE-AVX2 -ipo -O3 -no-prec-div -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: basepeak = yes

470.lbm: basepeak = yes

482.sphinx3: basepeak = yes

C++ benchmarks:

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## Peak Optimization Flags (Continued)

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) -prof-use(pass 2) -fno-alias  
-auto-ilp32

447.dealII: basepeak = yes

450.soplex: basepeak = yes

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) -prof-use(pass 2) -unroll4  
-ansi-alias

### 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: -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 -opt-prefetch -parallel

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) -inline-calloc  
-opt-malloc-options=3 -auto -unroll4

### Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes

436.cactusADM: basepeak = yes

454.calculix: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32 -ansi-alias

481.wrf: basepeak = yes



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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-RevB.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-RevB.xml>

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