



# SPEC® CFP2006 Result

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## Lenovo Group Limited

### SPECfp®\_rate2006 = 409

IBM Flex System x240 M5  
(Intel Xeon E5-2637 v3, 3.50 GHz)

### SPECfp\_rate\_base2006 = 397

CPU2006 license: 9017

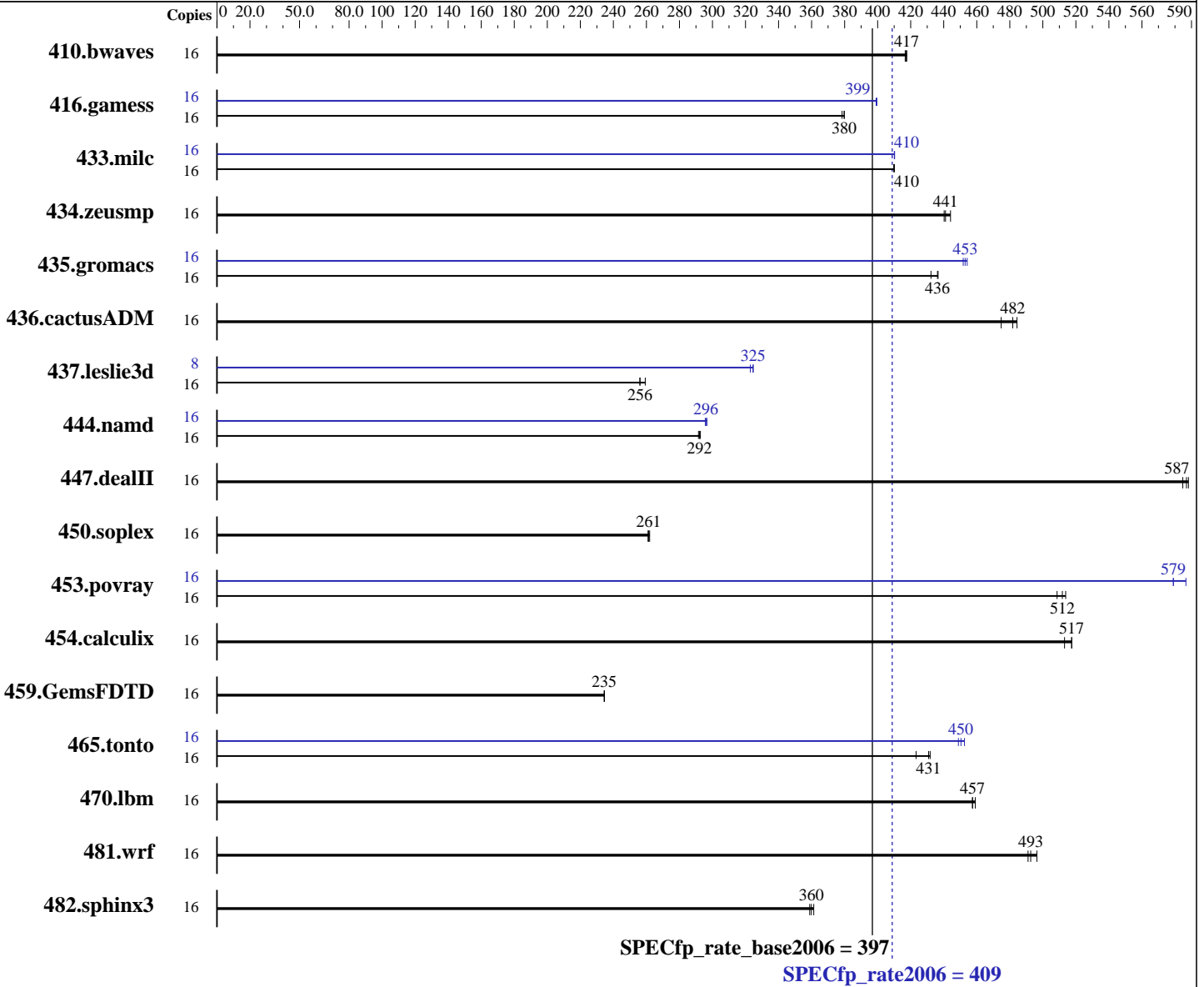
Test date: Jan-2015

Test sponsor: Lenovo Group Limited

Hardware Availability: Dec-2014

Tested by: Lenovo Group Limited

Software Availability: Nov-2013



### Hardware

CPU Name: Intel Xeon E5-2637 v3  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.70 GHz  
 CPU MHz: 3500  
 FPU: Integrated  
 CPU(s) enabled: 8 cores, 2 chips, 4 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 6.5 (Santiago)  
 2.6.32-431.el6.x86\_64  
 Compiler: C/C++: Version 14.0.0.080 of Intel C++ Studio XE for Linux;  
 Fortran: Version 14.0.0.080 of Intel Fortran Studio XE for Linux  
 Auto Parallel: No  
 File System: ext4

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L3 Cache: 15 MB I+D on chip per chip  
Other Cache: None  
Memory: 256 GB (16 x 16 GB 2Rx4 PC4-2133P-R)  
Disk Subsystem: 1 x 400 GB SSD  
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    | 16     | <u>521</u> | <u>417</u> | 522        | 417        | 521        | 418        | 16     | <u>521</u> | <u>417</u> | 522        | 417        | 521        | 418        |
| 416.gamess    | 16     | 828        | 378        | 825        | 380        | <u>825</u> | <u>380</u> | 16     | 784        | 400        | <u>785</u> | <u>399</u> | 785        | 399        |
| 433.milc      | 16     | 358        | 410        | 358        | 410        | <u>358</u> | <u>410</u> | 16     | 358        | 410        | <u>358</u> | <u>410</u> | 358        | 410        |
| 434.zeusmp    | 16     | <u>330</u> | <u>441</u> | 331        | 440        | 328        | 444        | 16     | <u>330</u> | <u>441</u> | 331        | 440        | 328        | 444        |
| 435.gromacs   | 16     | 262        | 437        | 264        | 432        | <u>262</u> | <u>436</u> | 16     | 253        | 452        | <u>252</u> | <u>453</u> | 252        | 454        |
| 436.cactusADM | 16     | 395        | 484        | <u>397</u> | <u>482</u> | 403        | 475        | 16     | 395        | 484        | <u>397</u> | <u>482</u> | 403        | 475        |
| 437.leslie3d  | 16     | <u>587</u> | <u>256</u> | 587        | 256        | 580        | 259        | 8      | <u>232</u> | <u>325</u> | 233        | 323        | 232        | 325        |
| 444.namd      | 16     | 440        | 292        | <u>439</u> | <u>292</u> | 438        | 293        | 16     | <u>433</u> | <u>296</u> | 433        | 297        | 434        | 296        |
| 447.dealII    | 16     | 311        | 588        | <u>312</u> | <u>587</u> | 313        | 585        | 16     | 311        | 588        | <u>312</u> | <u>587</u> | 313        | 585        |
| 450.soplex    | 16     | 511        | 261        | <u>511</u> | <u>261</u> | 509        | 262        | 16     | 511        | 261        | <u>511</u> | <u>261</u> | 509        | 262        |
| 453.povray    | 16     | <u>166</u> | <u>512</u> | 167        | 509        | 166        | 514        | 16     | 147        | 579        | <u>147</u> | <u>579</u> | 145        | 587        |
| 454.calculix  | 16     | 257        | 513        | <u>255</u> | <u>517</u> | 255        | 517        | 16     | 257        | 513        | <u>255</u> | <u>517</u> | 255        | 517        |
| 459.GemsFDTD  | 16     | 724        | 234        | <u>724</u> | <u>235</u> | 724        | 235        | 16     | 724        | 234        | <u>724</u> | <u>235</u> | 724        | 235        |
| 465.tonto     | 16     | 372        | 423        | 365        | 432        | <u>365</u> | <u>431</u> | 16     | 348        | 453        | <u>350</u> | <u>450</u> | 351        | 449        |
| 470.lbm       | 16     | 481        | 457        | 479        | 459        | <u>481</u> | <u>457</u> | 16     | 481        | 457        | 479        | 459        | <u>481</u> | <u>457</u> |
| 481.wrf       | 16     | 364        | 491        | 360        | 496        | <u>363</u> | <u>493</u> | 16     | 364        | 491        | 360        | 496        | <u>363</u> | <u>493</u> |
| 482.sphinx3   | 16     | 863        | 361        | <u>867</u> | <u>360</u> | 869        | 359        | 16     | 863        | 361        | <u>867</u> | <u>360</u> | 869        | 359        |

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

Operating Mode set to Maximum Performance in BIOS  
Fan speed set to 100%  
Enabled COD Preference in BIOS

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### Platform Notes (Continued)

Disable Early Snoop Preference in BIOS  
Sysinfo program /cpu2006.1.2/config/sysinfo.rev6818  
\$Rev: 6818 \$ \$Date:: 2012-07-17 #\$ e86d102572650a6e4d596a3cee98f191  
running on Bonneville-SPECcpu Fri Jan 30 05:15:22 2015

This section contains SUT (System Under Test) info as seen by some common utilities. To remove or add to this section, see: <http://www.spec.org/cpu2006/Docs/config.html#sysinfo>

```
From /proc/cpuinfo
model name : Intel(R) Xeon(R) CPU E5-2637 v3 @ 3.50GHz
 2 "physical id"s (chips)
 16 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The
following excerpts from /proc/cpuinfo might not be reliable. Use with
caution.)
  cpu cores : 4
  siblings  : 8
  physical 0: cores 0 1 4 5
  physical 1: cores 0 1 4 5
cache size : 15360 KB
```

```
From /proc/meminfo
MemTotal:      231028212 kB
HugePages_Total:    0
Hugepagesize:    2048 kB
```

```
/usr/bin/lsb_release -d
Red Hat Enterprise Linux Server release 6.5 (Santiago)
```

```
From /etc/*release* /etc/*version*
redhat-release: Red Hat Enterprise Linux Server release 6.5 (Santiago)
system-release: Red Hat Enterprise Linux Server release 6.5 (Santiago)
system-release-cpe: cpe:/o:redhat:enterprise_linux:6server:ga:server
```

```
uname -a:
Linux Bonneville-SPECcpu 2.6.32-431.el6.x86_64 #1 SMP Sun Nov 10 22:19:54 EST
2013 x86_64 x86_64 x86_64 GNU/Linux
```

```
run-level 3 Jan 29 20:43 last=5
```

SPEC is set to: /cpu2006.1.2

| Filesystem                           | Type | Size | Used | Avail | Use% | Mounted on |
|--------------------------------------|------|------|------|-------|------|------------|
| /dev/mapper/vg_bonnevillespe-lv_root | ext4 | 356G | 14G  | 324G  | 4%   | /          |

Additional information from dmidecode:

```
BIOS IBM -[C4E103EUS-1.00]- 11/25/2014
Memory:
 8x NO DIMM Unknown
16x Samsung M393A2G40DB0-CPB 16 GB 2133 MHz 2 rank
```

(End of data from sysinfo program)



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## General Notes

Environment variables set by runspec before the start of the run:  
LD\_LIBRARY\_PATH = "/cpu2006.1.2/libs/32:/cpu2006.1.2/libs/64:/cpu2006.1.2/sh"

Binaries compiled on a system with 1x Core i7-860 CPU + 8GB  
memory using RedHat EL 6.4  
Transparent Huge Pages enabled with:  
echo always > /sys/kernel/mm/redhat\_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  
447.deallI: -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 -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:

`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: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)  
-O3(pass 2) -no-prec-div(pass 2)  
-opt-mem-layout-trans=3(pass 2) -prof-use(pass 2)  
-auto-ilp32`

`470.lbm: basepeak = yes`

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## Peak Optimization Flags (Continued)

482.sphinx3: basepeak = yes

### C++ benchmarks:

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

447.dealII: basepeak = yes

450.soplex: basepeak = yes

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

### Fortran benchmarks:

410.bwaves: basepeak = yes

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

434.zeusmp: basepeak = yes

437.leslie3d: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch

459.GemsFDTD: basepeak = yes

465.tonto: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)  
-O3(pass 2) -no-prec-div(pass 2) -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(pass 1) -ipo(pass 2)  
-O3(pass 2) -no-prec-div(pass 2)  
-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



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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-ic14.0-official-linux64.20140128.html>

<http://www.spec.org/cpu2006/flags/IBM-Platform-Flags-V1.2-HSW-B.20141021.html>

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

<http://www.spec.org/cpu2006/flags/Intel-ic14.0-official-linux64.20140128.xml>

<http://www.spec.org/cpu2006/flags/IBM-Platform-Flags-V1.2-HSW-B.20141021.xml>

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