# SPEC® CFP2006 Result

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## Lenovo Group Limited

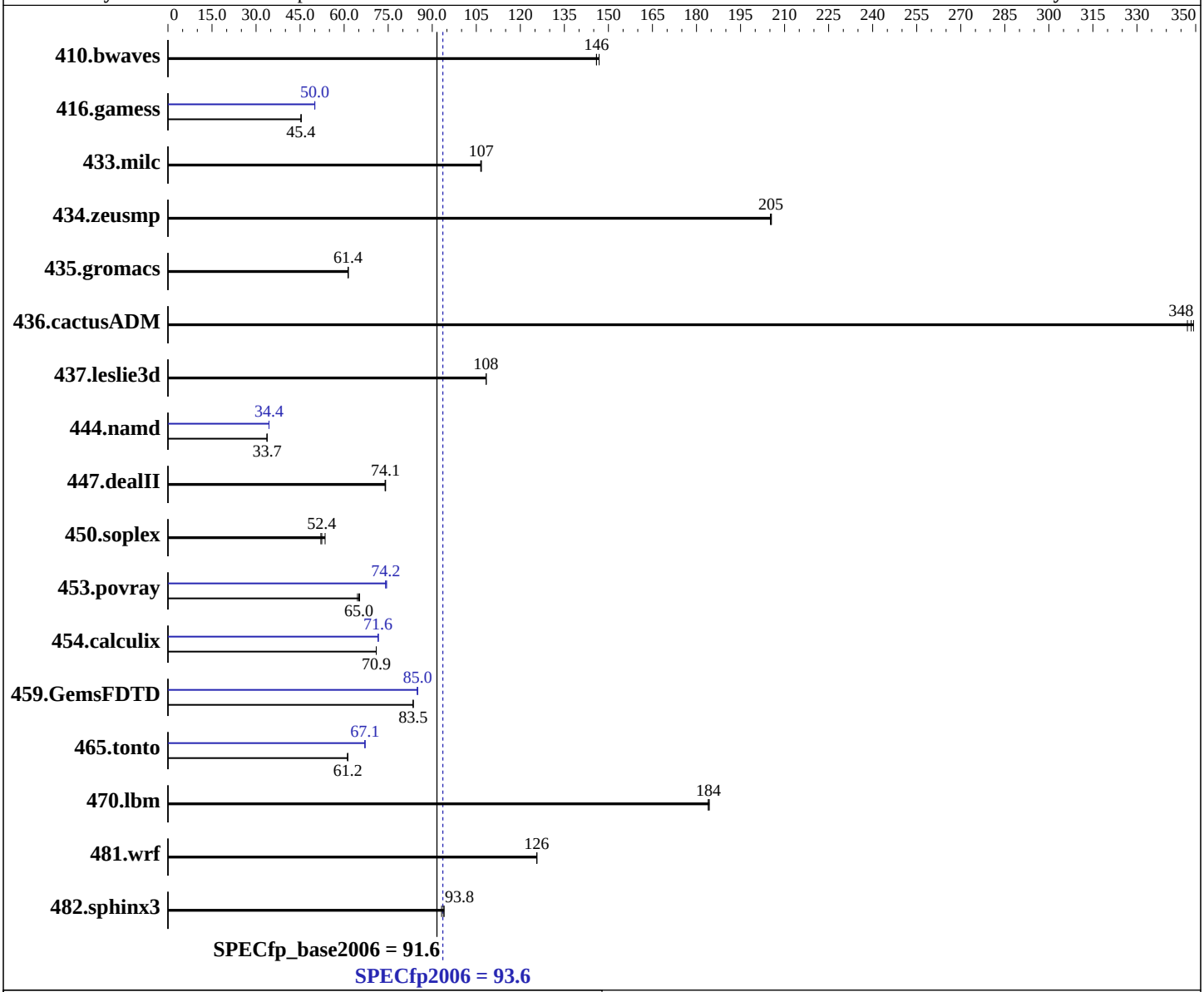
Lenovo ThinkServer RS160
(3.00 GHz, Intel Xeon E3-1220 v5)

SPECfp®2006 = 93.6

SPECfp_base2006 = 91.6

**CPU2006 license:** 9017
**Test sponsor:** Lenovo Group Limited
**Tested by:** Lenovo Group Limited

**Test date:** Nov-2016
**Hardware Availability:** Sep-2016
**Software Availability:** Mar-2016




### Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon E3-1220 v5 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.50 GHz |
| CPU MHz: | 3000 |
| FPU: | Integrated |
| CPU(s) enabled: | 4 cores, 1 chip, 4 cores/chip |
| CPU(s) orderable: | 1 chip |
| 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<br>Kernel 3.10.0-327.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: | Yes |
| File System: | xfs |
| System State: | Run level 3 (multi-user) |

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L3 Cache: 8 MB I+D on chip per chip
Other Cache: None
Memory: 16 GB (2 x 8 GB 2Rx8 PC4-2133P-E)
Disk Subsystem: 1 x 800 GB SATA SSD
Other Hardware: None

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 | 92.6 | 147 | **93.1** | **146** | 93.1 | 146 | 92.6 | 147 | **93.1** | **146** | 93.1 | 146 |
| 416.gamess | 432 | 45.4 | 432 | 45.3 | **432** | **45.4** | 392 | 50.0 | **392** | **50.0** | 391 | 50.0 |
| 433.milc | 86.0 | 107 | **86.0** | **107** | 86.2 | 107 | 86.0 | 107 | **86.0** | **107** | 86.2 | 107 |
| 434.zeusmp | 44.4 | 205 | 44.3 | 206 | **44.3** | **205** | 44.4 | 205 | 44.3 | 206 | **44.3** | **205** |
| 435.gromacs | 116 | 61.4 | **116** | **61.4** | 116 | 61.4 | 116 | 61.4 | **116** | **61.4** | 116 | 61.4 |
| 436.cactusADM | 34.2 | 349 | **34.3** | **348** | 34.4 | 347 | 34.2 | 349 | **34.3** | **348** | 34.4 | 347 |
| 437.leslie3d | 86.8 | 108 | **86.8** | **108** | 86.7 | 108 | 86.8 | 108 | **86.8** | **108** | 86.7 | 108 |
| 444.namd | **238** | **33.7** | 238 | 33.7 | 237 | 33.8 | 233 | 34.4 | 233 | 34.4 | **233** | **34.4** |
| 447.dealII | **154** | **74.1** | 154 | 74.1 | 155 | 73.9 | **154** | **74.1** | 154 | 74.1 | 155 | 73.9 |
| 450.soplex | **159** | **52.4** | 160 | 52.1 | 156 | 53.5 | **159** | **52.4** | 160 | 52.1 | 156 | 53.5 |
| 453.povray | 81.5 | 65.3 | **81.8** | **65.0** | 82.4 | 64.5 | **71.7** | **74.2** | 71.4 | 74.5 | 71.8 | 74.1 |
| 454.calculix | **116** | **70.9** | 116 | 70.9 | 116 | 70.9 | 115 | 71.6 | 115 | 71.6 | **115** | **71.6** |
| 459.GemsFDTD | **127** | **83.5** | 127 | 83.5 | 127 | 83.5 | 125 | 85.0 | 125 | 84.9 | **125** | **85.0** |
| 465.tonto | **161** | **61.2** | 161 | 61.1 | 161 | 61.3 | 147 | 67.1 | 147 | 67.1 | **147** | **67.1** |
| 470.lbm | 74.5 | 184 | **74.6** | **184** | 74.7 | 184 | 74.5 | 184 | **74.6** | **184** | 74.7 | 184 |
| 481.wrf | **88.9** | **126** | 89.0 | 126 | 88.9 | 126 | **88.9** | **126** | 89.0 | 126 | 88.9 | 126 |
| 482.sphinx3 | 209 | 93.2 | 207 | 94.1 | **208** | **93.8** | 209 | 93.2 | 207 | 94.1 | **208** | **93.8** |

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

## Platform Notes

```
BIOS configuration:
Boot performance mode set to Turbo Performance
 Sysinfo program /home/cpu2006-1.2-ic16.0/config/sysinfo.rev6914
 $Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
 running on RS160-01 Sat Nov  5 21:49:07 2016

 This section contains SUT (System Under Test) info as seen by
 some common utilities.  To remove or add to this section, see:
```

Continued on next page

## Platform Notes (Continued)

```
      http://www.spec.org/cpu2006/Docs/config.html#sysinfo

    From /proc/cpuinfo
       model name : Intel(R) Xeon(R) CPU E3-1220 v5 @ 3.00GHz
          1 "physical id"s (chips)
          4 "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  : 4
          physical 0: cores 0 1 2 3
       cache size : 8192 KB

    From /proc/meminfo
       MemTotal:       16376276 kB
       HugePages_Total:       0
       Hugepagesize:       2048 kB

    From /etc/*release* /etc/*version*
       os-release:
          NAME="Red Hat Enterprise Linux Server"
          VERSION="7.2 (Maipo)"
          ID="rhel"
          ID_LIKE="fedora"
          VERSION_ID="7.2"
          PRETTY_NAME="Red Hat Enterprise Linux Server 7.2 (Maipo)"
          ANSI_COLOR="0;31"
          CPE_NAME="cpe:/o:redhat:enterprise_linux:7.2:GA:server"
       redhat-release: Red Hat Enterprise Linux Server release 7.2 (Maipo)
       system-release: Red Hat Enterprise Linux Server release 7.2 (Maipo)
       system-release-cpe: cpe:/o:redhat:enterprise_linux:7.2:ga:server

    uname -a:
       Linux RS160-01 3.10.0-327.el7.x86_64 #1 SMP Thu Oct 29 17:29:29 EDT 2015
       x86_64 x86_64 x86_64 GNU/Linux

    run-level 3 Nov 5 17:17

    SPEC is set to: /home/cpu2006-1.2-ic16.0
       Filesystem     Type  Size  Used Avail Use% Mounted on
       /dev/sda3      xfs   703G  4.0G  699G   1% /home
    Additional information from dmidecode:

       Warning: Use caution when you interpret this section. The 'dmidecode' program
       reads system data which is "intended to allow hardware to be accurately
       determined", but the intent may not be met, as there are frequent changes to
       hardware, firmware, and the "DMTF SMBIOS" standard.

      BIOS LENOVO VB1TS152 09/29/2016
      Memory:
       2x Not Specified Not Specified
```

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## Platform Notes (Continued)

```
      2x Samsung M391A1G43EB1-CPB 8 GB 2 rank 2133 MHz

   (End of data from sysinfo program)
```

## General Notes

```
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,1,0"
LD_LIBRARY_PATH = "/home/cpu2006-1.2-ic16.0/libs/32:/home/cpu2006-1.2-ic16.0/libs/64:/home/cpu2006-1.2-ic16.0/sh"
OMP_NUM_THREADS = "4"

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

## 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

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## Base Portability Flags (Continued)

482.sphinx3: `-DSPEC_CPU_LP64`

## 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`

Continued on next page

## Peak Optimization Flags (Continued)

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) -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

Continued on next page

## Peak Optimization Flags (Continued)

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

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/Lenovo-Platform-Settings-V1.2-BDW-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/Lenovo-Platform-Settings-V1.2-BDW-revC.xml`


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