



# SPEC<sup>®</sup> CFP2006 Result

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## Lenovo Group Limited

Lenovo ThinkServer TD350 (Intel Xeon E5-2650 v3, 2.30 GHz)

SPECfp<sup>®</sup>2006 = 103

SPECfp\_base2006 = 98.9

CPU2006 license: 9017

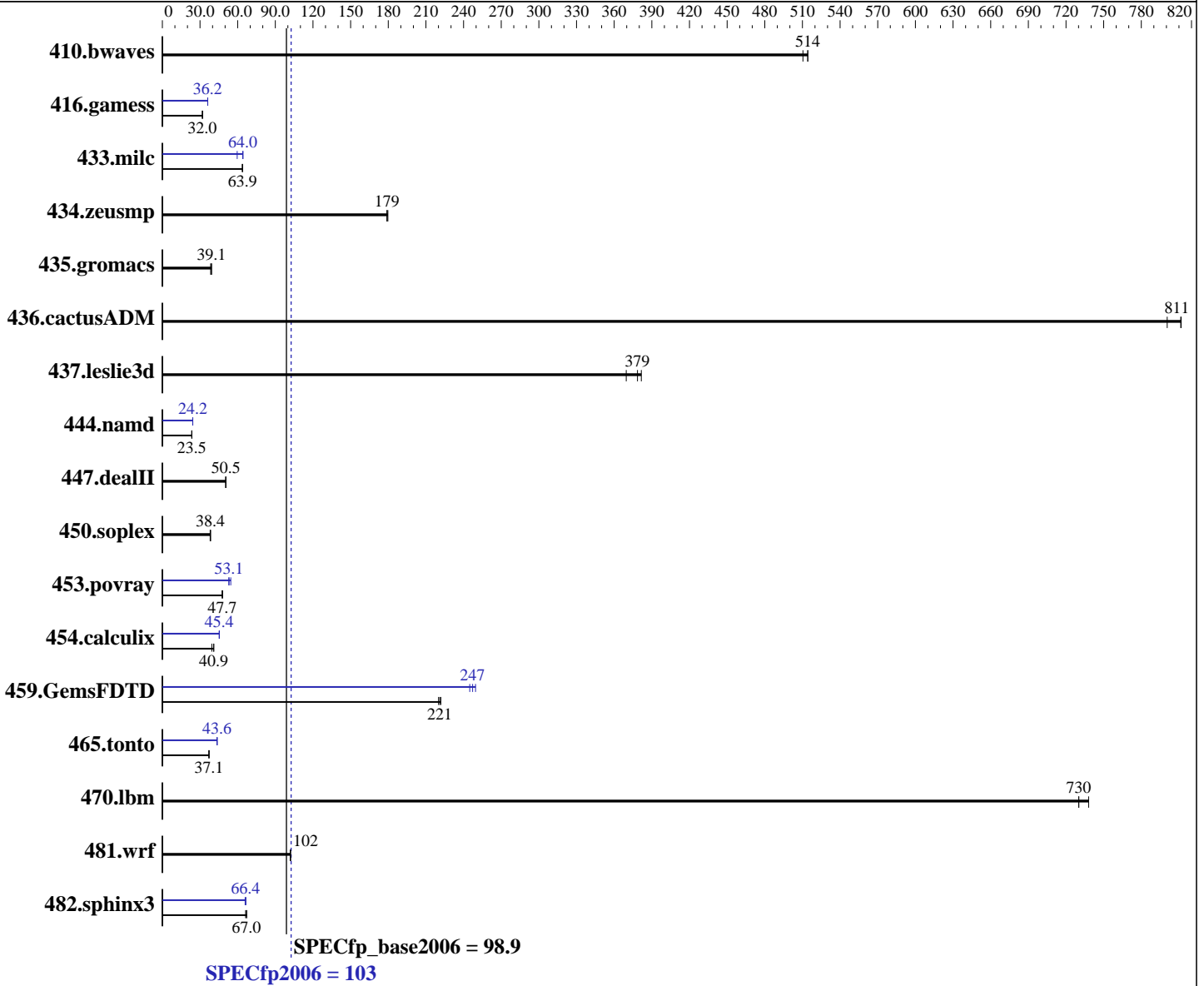
Test sponsor: Lenovo Group Limited

Tested by: Lenovo Group Limited

Test date: Nov-2014

Hardware Availability: Sep-2014

Software Availability: Jan-2014



### Hardware

CPU Name: Intel Xeon E5-2650 v3  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.00 GHz  
 CPU MHz: 2300  
 FPU: Integrated  
 CPU(s) enabled: 20 cores, 2 chips, 10 cores/chip, 2 threads/core  
 CPU(s) orderable: 1,2 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 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: 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 PC4-2133P-R)  
 Disk Subsystem: 1 x 800 GB SATA SSD  
 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    | 26.4        | 514         | <b>26.4</b> | <b>514</b>  | 26.6        | 510         | 26.4        | 514         | <b>26.4</b> | <b>514</b>  | 26.6        | 510         |
| 416.gamess    | 612         | 32.0        | 614         | 31.9        | <b>613</b>  | <b>32.0</b> | <b>542</b>  | <b>36.2</b> | 542         | 36.1        | 541         | 36.2        |
| 433.milc      | 144         | 63.9        | <b>144</b>  | <b>63.9</b> | 144         | 63.7        | 154         | 59.6        | 143         | 64.3        | <b>143</b>  | <b>64.0</b> |
| 434.zeusmp    | <b>50.8</b> | <b>179</b>  | 50.8        | 179         | 50.6        | 180         | <b>50.8</b> | <b>179</b>  | 50.8        | 179         | 50.6        | 180         |
| 435.gromacs   | 186         | 38.5        | 182         | 39.2        | <b>183</b>  | <b>39.1</b> | 186         | 38.5        | 182         | 39.2        | <b>183</b>  | <b>39.1</b> |
| 436.cactusADM | 14.7        | 812         | <b>14.7</b> | <b>811</b>  | 14.9        | 801         | 14.7        | 812         | <b>14.7</b> | <b>811</b>  | 14.9        | 801         |
| 437.leslie3d  | 25.4        | 370         | 24.6        | 382         | <b>24.8</b> | <b>379</b>  | 25.4        | 370         | 24.6        | 382         | <b>24.8</b> | <b>379</b>  |
| 444.namd      | <b>342</b>  | <b>23.5</b> | 342         | 23.5        | 342         | 23.5        | 331         | 24.2        | 331         | 24.2        | <b>331</b>  | <b>24.2</b> |
| 447.dealII    | 226         | 50.6        | 226         | 50.5        | <b>226</b>  | <b>50.5</b> | 226         | 50.6        | 226         | 50.5        | <b>226</b>  | <b>50.5</b> |
| 450.soplex    | <b>217</b>  | <b>38.4</b> | 219         | 38.1        | 217         | 38.4        | <b>217</b>  | <b>38.4</b> | 219         | 38.1        | 217         | 38.4        |
| 453.povray    | 112         | 47.7        | <b>111</b>  | <b>47.7</b> | 111         | 48.0        | 97.6        | 54.5        | <b>100</b>  | <b>53.1</b> | 100         | 53.0        |
| 454.calculix  | 201         | 41.0        | <b>202</b>  | <b>40.9</b> | 209         | 39.5        | 182         | 45.4        | 182         | 45.4        | <b>182</b>  | <b>45.4</b> |
| 459.GemsFDTD  | <b>48.0</b> | <b>221</b>  | 47.8        | 222         | 48.2        | 220         | 42.5        | 250         | 43.3        | 245         | <b>42.9</b> | <b>247</b>  |
| 465.tonto     | 265         | 37.2        | <b>265</b>  | <b>37.1</b> | 265         | 37.1        | <b>226</b>  | <b>43.6</b> | 225         | 43.6        | 226         | 43.5        |
| 470.lbm       | <b>18.8</b> | <b>730</b>  | 18.8        | 730         | 18.6        | 738         | <b>18.8</b> | <b>730</b>  | 18.8        | 730         | 18.6        | 738         |
| 481.wrf       | <b>109</b>  | <b>102</b>  | 109         | 102         | 109         | 102         | <b>109</b>  | <b>102</b>  | 109         | 102         | 109         | 102         |
| 482.sphinx3   | <b>291</b>  | <b>67.0</b> | 294         | 66.3        | 290         | 67.2        | <b>293</b>  | <b>66.4</b> | 293         | 66.5        | 296         | 66.0        |

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 configuration:  
 Cluster On Die set to Disabled  
 Early Snoop set to Disabled  
 Performance Profile set to Custom  
 ClE Support set to Disabled  
 Core C3 set to Disabled  
 Core C6 set to Disabled  
 Thermal Profile set to Max Performance  
 Memory Power Savings set to Disabled  
 Sysinfo program /usr/cpu2006/config/sysinfo.rev6818

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### Platform Notes (Continued)

\$Rev: 6818 \$ \$Date:: 2012-07-17 #\$ e86d102572650a6e4d596a3cee98f191  
running on TD350 Tue Nov 11 19:10:50 2014

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 E5-2650 v3 @ 2.30GHz
 2 "physical id"s (chips)
 40 "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 : 10
  siblings  : 20
  physical 0: cores 0 1 2 3 4 8 9 10 11 12
  physical 1: cores 0 1 2 3 4 8 9 10 11 12
cache size : 25600 KB
```

```
From /proc/meminfo
MemTotal:      264412688 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 TD350 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 Nov 11 19:10
```

```
SPEC is set to: /usr/cpu2006
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda2        ext4  730G  48G   646G   7% /
```

Additional information from dmidecode:

BIOS LENOVO TB5TS110 10/06/2014

Memory:

16x 16 GB

2x Hynix Semiconductor HMA42GR7MFR4N-TF 16 GB 2133 MHz 2 rank

14x Hynix Semiconductor HMA42GR7MFR4N-TFTD 16 GB 2133 MHz 2 rank

(End of data from sysinfo program)

TD350 support 4 channels and 8 DIMMs per processor, total 8 channels and  
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## Platform Notes (Continued)

16 DIMMs. All 16 DIMM slots installed with 16 GB DIMM for this run.

## General Notes

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

KMP\_AFFINITY = "granularity=fine,compact,1,0"

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

OMP\_NUM\_THREADS = "20"

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

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.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

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## Base Portability Flags (Continued)

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 -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:

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## Peak Optimization Flags (Continued)

433.milc: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)  
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)  
-auto-ilp32 -ansi-alias

470.lbm: basepeak = yes

482.sphinx3: -xCORE-AVX2 -ipo -O3 -no-prec-div -unroll2 -ansi-alias  
-parallel

### C++ benchmarks:

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

447.dealIII: 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) -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: basepeak = yes

459.GemsFDTD: -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 -opt-prefetch -parallel

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

### Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes

436.cactusADM: basepeak = yes

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

<http://www.spec.org/cpu2006/flags/Lenovo-Platform-Settings-V1.2-TD350-revA.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/Lenovo-Platform-Settings-V1.2-TD350-revA.xml>

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