



# SPEC<sup>®</sup> CFP2006 Result

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## Lenovo Group Limited

Lenovo ThinkServer TD350 (Intel Xeon E5-2620 v3, 2.40 GHz)

SPECfp<sup>®</sup>2006 = 94.8

SPECfp\_base2006 = 90.8

CPU2006 license: 9017

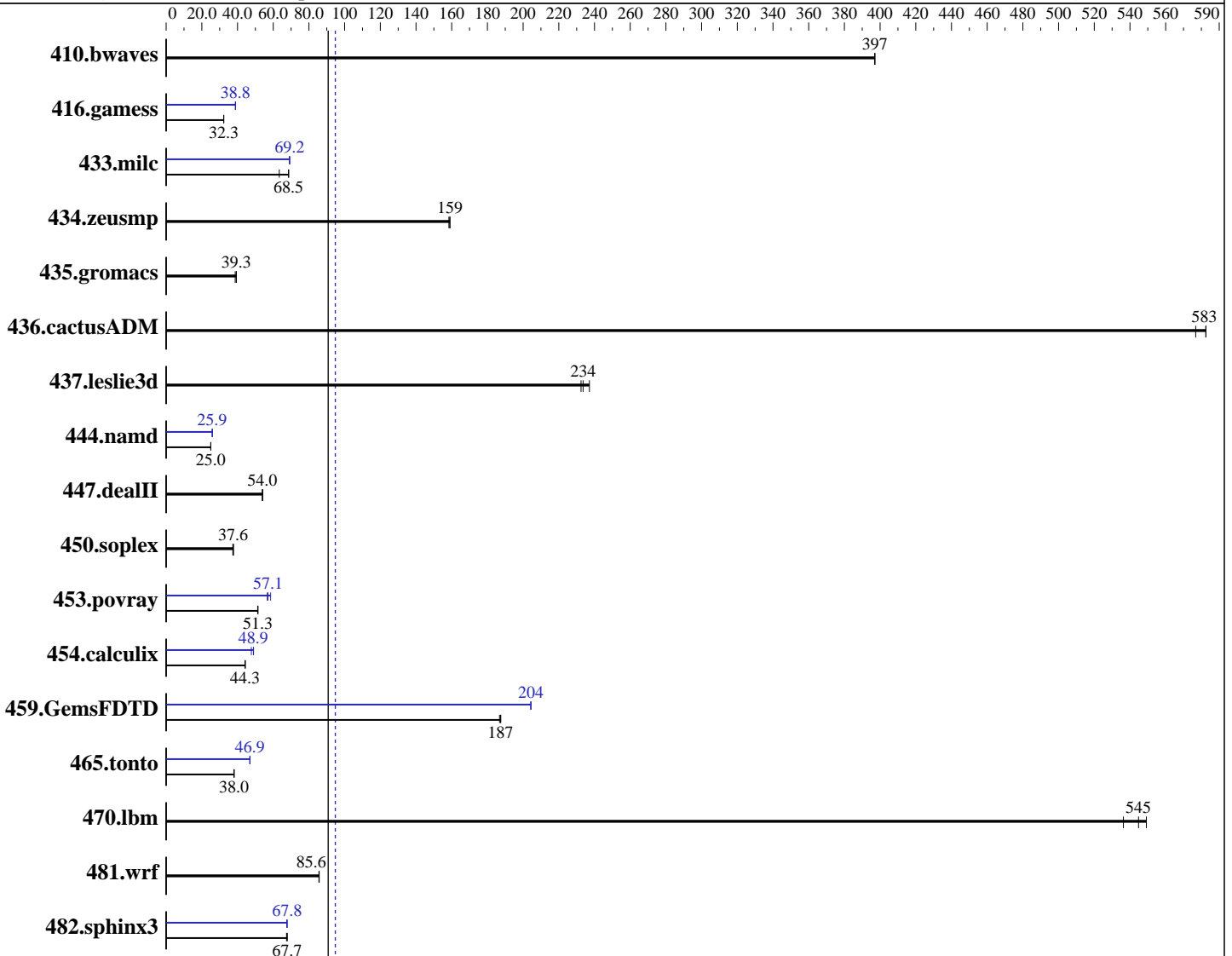
Test sponsor: Lenovo Group Limited

Tested by: Lenovo Group Limited

Test date: Nov-2014

Hardware Availability: Sep-2014

Software Availability: Jan-2014



SPECfp\_base2006 = 90.8  
SPECfp2006 = 94.8

### Hardware

CPU Name: Intel Xeon E5-2620 v3  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.20 GHz  
 CPU MHz: 2400  
 FPU: Integrated  
 CPU(s) enabled: 12 cores, 2 chips, 6 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: 15 MB I+D on chip per chip  
 Other Cache: None  
 Memory: 256 GB (16 x 16 GB 2Rx4 PC4-2133P-R, running at 1866 MHz)  
 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	<b>34.2</b>	<b>397</b>	34.2	397	34.2	397	<b>34.2</b>	<b>397</b>	34.2	397	34.2	397
416.gamess	607	32.2	<b>607</b>	<b>32.3</b>	606	32.3	504	38.8	<b>504</b>	<b>38.8</b>	504	38.8
433.milc	145	63.4	134	68.7	<b>134</b>	<b>68.5</b>	133	69.2	133	69.0	<b>133</b>	<b>69.2</b>
434.zeusmp	57.4	158	<b>57.2</b>	<b>159</b>	57.2	159	57.4	158	<b>57.2</b>	<b>159</b>	57.2	159
435.gromacs	185	38.7	<b>182</b>	<b>39.3</b>	181	39.4	185	38.7	<b>182</b>	<b>39.3</b>	181	39.4
436.cactusADM	<b>20.5</b>	<b>583</b>	20.5	583	20.7	577	<b>20.5</b>	<b>583</b>	20.5	583	20.7	577
437.leslie3d	39.6	237	<b>40.2</b>	<b>234</b>	40.4	232	39.6	237	<b>40.2</b>	<b>234</b>	40.4	232
444.namd	321	25.0	320	25.0	<b>320</b>	<b>25.0</b>	310	25.8	310	25.9	<b>310</b>	<b>25.9</b>
447.dealII	212	54.0	<b>212</b>	<b>54.0</b>	212	53.9	212	54.0	<b>212</b>	<b>54.0</b>	212	53.9
450.soplex	223	37.4	<b>222</b>	<b>37.6</b>	221	37.7	223	37.4	<b>222</b>	<b>37.6</b>	221	37.7
453.povray	<b>104</b>	<b>51.3</b>	103	51.5	104	51.3	<b>93.2</b>	<b>57.1</b>	90.9	58.5	93.9	56.7
454.calculix	<b>186</b>	<b>44.3</b>	186	44.3	187	44.2	173	47.8	168	49.0	<b>169</b>	<b>48.9</b>
459.GemsFDTD	56.8	187	56.6	187	<b>56.6</b>	<b>187</b>	51.9	204	<b>51.9</b>	<b>204</b>	51.9	204
465.tonto	<b>259</b>	<b>38.0</b>	259	38.0	258	38.1	210	46.9	<b>210</b>	<b>46.9</b>	209	47.0
470.lbm	25.0	549	<b>25.2</b>	<b>545</b>	25.6	536	25.0	549	<b>25.2</b>	<b>545</b>	25.6	536
481.wrf	<b>130</b>	<b>85.6</b>	130	85.8	130	85.6	<b>130</b>	<b>85.6</b>	130	85.8	130	85.6
482.sphinx3	287	67.9	<b>288</b>	<b>67.7</b>	289	67.5	287	67.8	288	67.6	<b>287</b>	<b>67.8</b>

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  
 C1E Support set to Disabled  
 Core C3 set to Disabled  
 Core C6 set to Disabled  
 Thermal Profile set to High Fan Speed  
 Memory Power Savings set to Disabled

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### Platform Notes (Continued)

Sysinfo program /usr/cpu2006/config/sysinfo.rev6818  
\$Rev: 6818 \$ \$Date:: 2012-07-17 # \$ e86d102572650a6e4d596a3cee98f191  
running on TD350 Fri Nov 21 17:24:01 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 E5-2620 v3 @ 2.40GHz  
2 "physical id"s (chips)  
24 "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 : 6  
siblings : 12  
physical 0: cores 0 1 2 3 4 5  
physical 1: cores 0 1 2 3 4 5  
cache size : 15360 KB

From /proc/meminfo  
MemTotal: 264414652 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 21 17:23

SPEC is set to: /usr/cpu2006  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/sda2 ext4 730G 11G 682G 2% /

Additional information from dmidecode:  
BIOS LENOVO TB5TS110 10/06/2014  
Memory:  
16x 16 GB  
16x Samsung M393A2G40DB0-CPB 16 GB 1866 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 = "12"

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-alloc -opt-malloc-options=3 -auto -unroll4

### Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes

436.cactusADM: basepeak = yes

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**Software Availability:** Jan-2014

## 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-HSW-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-HSW-revA.xml>

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