Lenovo Group Limited

Lenovo ThinkServer RD350
(1.70 GHz, Intel Xeon E5-2650L v4)

**SPECfp®2006 = 94.0**

**SPECfp_base2006 = 88.4**

<table>
<thead>
<tr>
<th>Test sponsor:</th>
<th>Lenovo Group Limited</th>
</tr>
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<tbody>
<tr>
<td>Tested by:</td>
<td>Lenovo Group Limited</td>
</tr>
<tr>
<td>CPU2006 license:</td>
<td>9017</td>
</tr>
<tr>
<td>Test date:</td>
<td>Apr-2016</td>
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<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Result</th>
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<tr>
<td>410.bwaves</td>
<td>810</td>
</tr>
<tr>
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<td>30.1</td>
</tr>
<tr>
<td>433.milc</td>
<td>57.3</td>
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<tr>
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<td>170</td>
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<tr>
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<td>31.4</td>
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<tr>
<td>437.leslie3d</td>
<td>299</td>
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<tr>
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<td>22.7</td>
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<tr>
<td>447.dealII</td>
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<td>83.7</td>
</tr>
<tr>
<td>481.wrf</td>
<td>49.3</td>
</tr>
</tbody>
</table>

**SPECfp_base2006 = 88.4**

### Hardware

- **CPU Name:** Intel Xeon E5-2650L v4
- **CPU Characteristics:** Intel Turbo Boost Technology up to 2.50 GHz
- **CPU MHz:** 1700
- **FPU:** Integrated
- **CPU(s) enabled:** 28 cores, 2 chips, 14 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

### Software

- **Operating System:** SUSE Linux Enterprise Server 12 SP1 (x86_64) Kernel 3.12.49-11-default
- **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:** xfs
- **System State:** Run level 3 (multi-user)

Continued on next page

Standards Performance Evaluation Corporation
info@spec.org
http://www.spec.org/
### Lenovo Group Limited

**Lenovo ThinkServer RD350**  
(1.70 GHz, Intel Xeon E5-2650L v4)  

**SPEC CFP2006 Result**

**SPECfp2006 =**  
94.0

**SPECfp_base2006 =**  
88.4

---

**CPU2006 license:** 9017  
**Test date:** Apr-2016

**Test sponsor:** Lenovo Group Limited  
**Hardware Availability:** Mar-2016

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**Software Availability:** Dec-2015

---

**L3 Cache:** 35 MB I+D on chip per chip  
**Base Pointers:** 64-bit  
**Peak Pointers:** 32/64-bit

**Other Cache:** None  
**Other Software:** None

**Memory:** 256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)  
**Test date:** Apr-2016

**Disk Subsystem:** 1 x 800 GB SATA SSD  
**Hardware Availability:** Mar-2016

**Other Hardware:** None  
**Software Availability:** Dec-2015

---

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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<th>Ratio</th>
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</tr>
</tbody>
</table>

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:**  
  - Hyper-Threading set to Disabled  
  - Cluster On Die set to Disabled  
  - Early Snoop set to Enabled  
  - 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

Continued on next page
Lenovo Group Limited
Lenovo ThinkServer RD350
(1.70 GHz, Intel Xeon E5-2650L v4)

SPEC CFP2006 Result

SPECfp2006 =  94.0
SPECfp_base2006 =  88.4

CPU2006 license: 9017
Test date: Apr-2016
Test sponsor: Lenovo Group Limited
Hardware Availability: Mar-2016
Tested by: Lenovo Group Limited
Software Availability: Dec-2015

Platform Notes (Continued)

Sysinfo program /home/cpu2006-1.2-ic16.0/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceeb81e28219e1
running on ip10-245-48-204 Sun Apr 17 22:25:09 2016

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 E5-2650L v4@ 1.70GHz
 2 "physical id"s (chips)
 28 "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 : 14
siblings : 14
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
cache size : 35840 KB

From /proc/meminfo
MemTotal:       264559484 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
SuSE-release:
  SUSE Linux Enterprise Server 12 (x86_64)
  VERSION = 12
  PATCHLEVEL = 1
  # This file is deprecated and will be removed in a future service pack or
  release.
  # Please check /etc/os-release for details about this release.
  os-release:
  NAME="SLES"
  VERSION="12-SP1"
  VERSION_ID="12.1"
  PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"
  ID="sles"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:12:sp1"

uname -a:
  (8d714a0) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Apr 17 15:56

SPEC is set to: /home/cpu2006-1.2-ic16.0
Filesystem  Type Size  Used  Avail Use% Mounted on
/dev/sda4    xfs  689G  3.9G  685G   1%  /home

Continued on next page
Lenovo Group Limited
Lenovo ThinkServer RD350
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**Platform Notes (Continued)**

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 VB3TS362 03/24/2016
Memory:
16x Hynix Semiconductor HMA42GR7AFR4N-UH 16 GB 2 rank 2400 MHz, configured at 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"
- 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 = "28"

Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB memory using RedHat EL 7.1
Transparent Huge Pages disabled with:
edo never > /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
Lenovo Group Limited

Lenovo ThinkServer RD350  
(1.70 GHz, Intel Xeon E5-2650L v4)

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Hardware Availability: Mar-2016
Tested by: Lenovo Group Limited  
Software Availability: Dec-2015

Base Portability Flags (Continued)

435.gromacs: -DSPEC_CPU_LP64 -nofor_main  
436.cactusADM: -DSPEC_CPU_LP64 -nofor_main  
437.leslie3d: -DSPEC_CPU_LP64  
444.namd: -DSPEC_CPU_LP64 -nofor_main  
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

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
Lenovo Group Limited

Lenovo ThinkServer RD350
(1.70 GHz, Intel Xeon E5-2650L v4)

SPECfp2006 = 94.0
SPECfp_base2006 = 88.4

CPU2006 license: 9017
Test date: Apr-2016
Test sponsor: Lenovo Group Limited
Hardware Availability: Mar-2016
Tested by: Lenovo Group Limited
Software Availability: Dec-2015

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:

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

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Lenovo Group Limited

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SPECfp2006 = 94.0
SPECfp_base2006 = 88.4

Peak Optimization Flags (Continued)

465.tonto (continued):
   -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

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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