## Lenovo Group Limited

### Lenovo ThinkServer RD550
(2.20 GHz, Intel Xeon E5-2699 v4)

| SPECfp®2006 | 126 |
| SPECfp_base2006 | 118 |

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

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**Hardware**

- **CPU Name:** Intel Xeon E5-2699 v4  
- **CPU Characteristics:** Intel Turbo Boost Technology up to 3.60 GHz  
- **CPU MHz:** 2200  
- **FPU:** Integrated  
- **CPU(s) enabled:** 44 cores, 2 chips, 22 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)

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**Test date:** Feb-2016  
**Hardware Availability:** Mar-2016  
**Software Availability:** Dec-2015

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<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Result</th>
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<tbody>
<tr>
<td>410.bwaves</td>
<td>562</td>
</tr>
<tr>
<td>416.gamsse</td>
<td>46.5</td>
</tr>
<tr>
<td>433.milc</td>
<td>71.2</td>
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<tr>
<td>434.zeusmp</td>
<td>210</td>
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<tr>
<td>435.gromacs</td>
<td>45.0</td>
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<tr>
<td>436.cactusADM</td>
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<tr>
<td>437.leslie3d</td>
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<tr>
<td>444.namd</td>
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**SPECfp_base2006** = 118  
**SPECfp2006** = 126
Lenovo Group Limited
Lenovo ThinkServer RD550
(2.20 GHz, Intel Xeon E5-2699 v4)

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SPECfp_base2006 = 118

CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
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L3 Cache: 55 MB I+D on chip per chip
Other Cache: None
Memory: 256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)
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

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</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-Threadin set to Disabled
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

Continued on next page
## Lenovo Group Limited

### Lenovo ThinkServer RD550 (2.20 GHz, Intel Xeon E5-2699 v4)

| SPECfp2006 = | 126 |
| SPECfp_base2006 = | 118 |

**CPU2006 license:** 9017  
**Test date:** Feb-2016  
**Test sponsor:** Lenovo Group Limited  
**Tested by:** Lenovo Group Limited

**Software Availability:** Dec-2015  
**Hardware Availability:** Mar-2016

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### Platform Notes (Continued)

Sysinfo program /home/cpu2006-1.2-ic16.0/config/sysinfo.rev6914

$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1

running on rd550-mlk-rackA02 Sun Feb 14 16:59:33 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 E5-2699 v4 @ 2.20GHz
- 2 "physical id"s (chips)
- 44 "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 : 22
  - siblings : 22
  - physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
  - physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
- cache size : 56320 KB

From /proc/meminfo

- MemTotal: 264554512 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:
  - Linux rd550-mlk-rackA02 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015 (8d714a0) x86_64 x86_64 x86_64 GNU/Linux

- run-level 3 Feb 14 11:42

- SPEC is set to: /home/cpu2006-1.2-ic16.0

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Lenovo Group Limited
Lenovo ThinkServer RD550
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SPECfp2006 = 126
SPECfp_base2006 = 118

Platform Notes (Continued)

Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda4      xfs   690G  7.7G  683G   2% /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 PB2TS335 01/09/2016
Memory:
16x Hynix Semiconductor HMA42GR7AFR4N-UH 16 GB 2 rank 2400 MHz
8x NO DIMM NO DIMM

(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 = "44"

Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB
memory using RedHat EL 7.1
Transparent Huge Pages disabled with:
echo 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

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Base Portability Flags (Continued)

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 -nofor_main
447.dealII: -DSPEC_CPU_LP64
450.soplex: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64 -nofor_main
454.cacculix: -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
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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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### Tested by: Lenovo Group Limited

## 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:

- [Intel ic16.0-official-linux64.html](http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.html)
- [Lenovo-Platform-Settings-V1.2-BDW-revC.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:

- [Intel ic16.0-official-linux64.xml](http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.xml)
- [Lenovo-Platform-Settings-V1.2-BDW-revC.xml](http://www.spec.org/cpu2006/flags/Lenovo-Platform-Settings-V1.2-BDW-revC.xml)

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For other inquiries, please contact webmaster@spec.org.

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