**Lenovo Group Limited**

Lenovo ThinkServer SD350
(2.40 GHz, Intel Xeon E5-2640 v4)

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

**Software**

- **Operating System:** SUSE Linux Enterprise Server 12 SP1 (x86_64)  
  Kernel 3.12.49-11-default
- **Compiler:** C/C++: Version 17.0.0.098 of Intel C/C++ Compiler for Linux;
  Fortran: Version 17.0.0.098 of Intel Fortran Compiler for Linux
- **Auto Parallel:** Yes
- **File System:** btrfs
- **System State:** Run level 3 (multi-user)

**Hardware**

- **CPU Name:** Intel Xeon E5-2640 v4  
- **CPU Characteristics:** Intel Turbo Boost Technology up to 3.40 GHz  
- **CPU MHz:** 2400  
- **FPU:** Integrated  
- **CPU(s) enabled:** 20 cores, 2 chips, 10 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

**SPECfp®2006 = 119**

**SPECfp_base2006 = 114**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
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Continued on next page
Lenovo Group Limited

Lenovo ThinkServer SD350
(2.40 GHz, Intel Xeon E5-2640 v4)

SPECfp2006 = 119
SPECfp_base2006 = 114

CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
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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 PC4-2400T-R, running at 2133 MHz)
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>
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<th>Base Ratio</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
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<td>271</td>
<td>72.0</td>
</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"
Transparent Huge Pages disabled with:
echo never > /sys/kernel/mm/transparent_hugepage/enabled

Platform Notes

BIOS configuration:
Hyper-Threading set to Disabled
Sysinfo program /home/cpu2006-1.2-ic17.0/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on Kent-SUT1 Thu Jan 14 18:44:18 2016

This section contains SUT (System Under Test) info as seen by
Platform Notes (Continued)

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 E5-2640 v4 @ 2.40GHz
  2 "physical id"s (chips)
  20 "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 : 10
  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:       264571652 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
  Suse-release:
    NAME="SLES"
    VERSION="12-SP1"
    VERSION_ID="12.1"
    # 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 Jan 14 13:49

SPEC is set to: /home/cpu2006-1.2-ic17.0
  Filesystem     Type   Size  Used Avail Use% Mounted on
  /dev/md126p2   btrfs  745G  7.8G  736G   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 
Continued on next page
Lenovo Group Limited
Lenovo ThinkServer SD350
(2.40 GHz, Intel Xeon E5-2640 v4)

SPECfp2006 = 119
SPECfp_base2006 = 114

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

Test date: Jan-2017
Hardware Availability: Sep-2016
Software Availability: Sep-2016

Platform Notes (Continued)

- BIOS American Megatrends Inc. 3.57 08/12/2016
- Memory: 16x Samsung M393A2G40DB1-CRC 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-ic17.0/libs/32:/home/cpu2006-1.2-ic17.0/libs/64:/home/cpu2006-1.2-ic17.0/sh10.2"
OMP_NUM_THREADS = "20"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.2

Base Compiler Invocation

C benchmarks:
icc -m64

C++ benchmarks:
icc -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

Continued on next page
## Lenovo Group Limited

**Lenovo ThinkServer SD350**  
(2.40 GHz, Intel Xeon E5-2640 v4)

<table>
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| CPU2006 license: | 9017 |
| Test sponsor: | Lenovo Group Limited |
| Tested by: | Lenovo Group Limited |

### Base Portability Flags (Continued)

- 459.GemsFD: `−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 -qopt-prefetch` |
| C++ benchmarks: | `-xCORE-AVX2`  
  `-ipo -O3 -no-prec-div -qopt-prefetch` |
| Fortran benchmarks: | `-xCORE-AVX2`  
  `-ipo -O3 -no-prec-div -parallel -qopt-prefetch` |
| Benchmarks using both Fortran and C: | `-xCORE-AVX2`  
  `-ipo -O3 -no-prec-div -parallel -qopt-prefetch` |

### 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: | |

Continued on next page
Lenovo Group Limited
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Test date: Jan-2017
Hardware Availability: Sep-2016
Software Availability: Sep-2016

Peak Optimization Flags (Continued)

433.milc: basepeak = yes
470.lbm: basepeak = yes
482.sphinx3: basepeak = yes

C++ benchmarks:
444.namd: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -fno-alias -auto-ilp32
447.dealII: basepeak = yes
450.soplex: basepeak = yes
453.povray: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -unroll14 -ansi-alias

Fortran benchmarks:
410.bwaves: basepeak = yes
416.gamess: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -unroll12 -inline-level=0 -scalar-rep-
434.zeusmp: basepeak = yes
437.leslie3d: basepeak = yes
459.GemsFDTD: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -unroll12 -inline-level=0 -qopt-prefetch -parallel
465.tonto: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -inline-callloc -qopt-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

Continued on next page
Lenovo Group Limited
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| SPECfp2006 | 119 |
| SPECfp_base2006 | 114 |

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

Test date: Jan-2017
Hardware Availability: Sep-2016
Software Availability: Sep-2016

Peak Optimization Flags (Continued)

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-ic17.0-official-linux64.html
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Settings-V1.2-BDW-revE.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Settings-V1.2-BDW-revE.xml

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

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