Lenovo Group Limited
Lenovo ThinkServer SD350
(1.70 GHz, Intel Xeon E5-2603 v4)

**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

<table>
<thead>
<tr>
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</tr>
<tr>
<td>482.sphinx3</td>
<td>48.8</td>
<td>48.8</td>
</tr>
</tbody>
</table>

**Hardware**
- **CPU Name:** Intel Xeon E5-2603 v4
- **CPU Characteristics:**
  - **CPU MHz:** 1700
  - **FPU:** Integrated
  - **CPU(s) enabled:** 12 cores, 2 chips, 6 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 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)

**SPECfp2006 = 71.8**
**SPECfp_base2006 = 70.3**

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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 PC4-2400T-R, running at 1866 MHz)
Disk Subsystem: 1 x 800 GB SATA SSD
Other Hardware: None

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

SPECfp2006 = 71.8
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Seconds</td>
<td>Ratio</td>
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<td>399</td>
<td>48.9</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:
Sysinfo program /home/cpu2006-1.2-ic17.0/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on Kent-SUT1 Tue Jan 12 18:20:36 2016

This section contains SUT (System Under Test) info as seen by some common utilities. To remove or add to this section, see: Continued on next page
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Platform Notes (Continued)

http://www.spec.org/cpu2006/Docs/config.html#sysinfo

From /proc/cpuinfo
  model name : Intel(R) Xeon(R) CPU E5-2603 v4@ 1.70GHz
  2 "physical id"s (chips)
  12 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The
following excerpts from /proc/cpuinfo might not be reliable. Use with
cautions.)
cpu cores : 6
siblings  : 6
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: 264572516 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 Jan 12 09:15

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
hardware, firmware, and the "DMTF SMBIOS" standard.

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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 1866 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 = "12"

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:
  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 -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

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Standard Performance Evaluation Corporation
info@spec.org
http://www.spec.org/
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**Base Portability Flags (Continued)**

- 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 -03 -no-prec-div -parallel -qopt-prefetch

- C++ benchmarks:
  -xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch

- Fortran benchmarks:
  -xCORE-AVX2 -ipo -03 -no-prec-div -parallel -qopt-prefetch

- Benchmarks using both Fortran and C:
  -xCORE-AVX2 -ipo -03 -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
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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) -unroll4 -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) -unroll2 -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) -unroll2 -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

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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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