SPEC® CFP2006 Result
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Lenovo Global Technology

$SPECfp^{®}2006 =$ 141

ThinkSystem SR950
(3.60 GHz, Intel Xeon Platinum 8156)

$SPECfp\_base2006 =$ 137

CPU2006 license: 9017

Test sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test date: Aug-2017

Hardware Availability: Sep-2017

Software Availability: Apr-2017

Benchmark results chart:

Benchmark	Result
410.bwaves	1170
416.gamess	51.7 / 49.1
433.milc	70.6
434.zeusmp	213
435.gromacs	68.6
436.cactusADM	1090
437.leslie3d	496
444.namd	36.5 / 35.6
447.dealII	71.1
450.soplex	46.7
453.povray	79.1 / 69.9
454.calculix	76.1 / 75.5
459.GemsFDTD	240 / 202
465.tonto	66.3 / 57.4
470.lbm	1180
481.wrf	92.3
482.sphinx3	83.6

SPECfp_base2006 = 137

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Hardware

CPU Name: Intel Xeon Platinum 8156

CPU Characteristics: Intel Turbo Boost Technology up to 3.70 GHz

CPU MHz: 3600

FPU: Integrated

CPU(s) enabled: 16 cores, 4 chips, 4 cores/chip

CPU(s) orderable: 2,4 chips

Primary Cache: 32 KB I + 32 KB D on chip per core

Secondary Cache: 1 MB I+D on chip per core

Continued on next page

Software

Operating System: SUSE Linux Enterprise Server 12 SP2 (x86_64)
Kernel 4.4.21-69-default

Compiler: C/C++: Version 17.0.3.191 of Intel C/C++
Compiler for Linux;
Fortran: Version 17.0.3.191 of Intel Fortran
Compiler for Linux

Auto Parallel: Yes

File System: btrfs

System State: Run level 3 (multi-user)

Continued on next page

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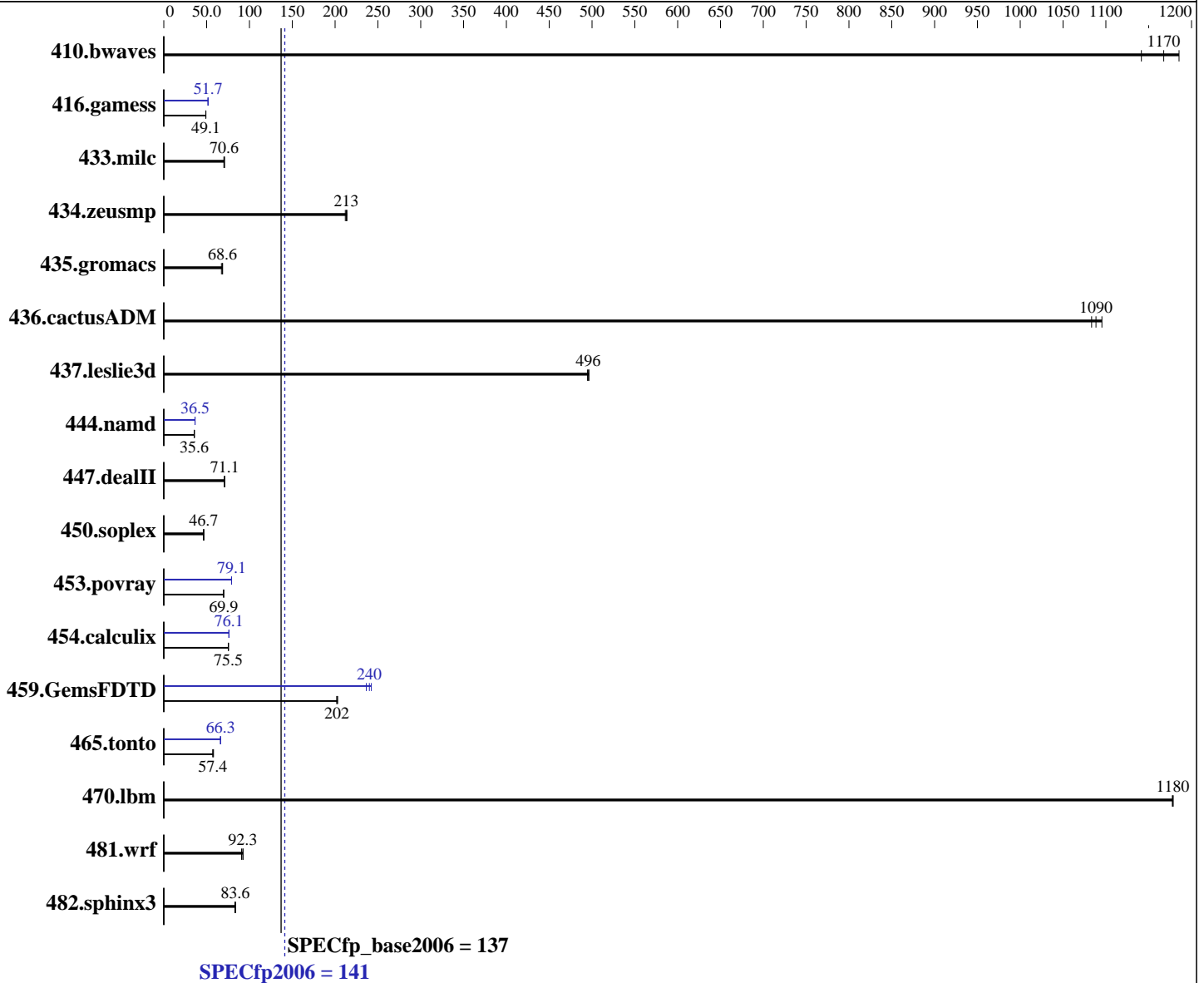SPECfp2006 = 141

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L3 Cache:	16.5 MB I+D on chip per chip
Other Cache:	None
Memory:	1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R)
Disk Subsystem:	1 x 800 GB SAS SSD
Other Hardware:	None

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	11.9	1140	**11.6**	**1170**	11.5	1190	11.9	1140	**11.6**	**1170**	11.5	1190
416.gamess	399	49.1	**399**	**49.1**	399	49.1	379	51.7	**379**	**51.7**	379	51.6
433.milc	129	70.9	131	70.2	**130**	**70.6**	129	70.9	131	70.2	**130**	**70.6**
434.zeusmp	42.9	212	42.6	214	**42.7**	**213**	42.9	212	42.6	214	**42.7**	**213**
435.gromacs	104	68.6	**104**	**68.6**	106	67.3	104	68.6	**104**	**68.6**	106	67.3
436.cactusADM	11.0	1080	**11.0**	**1090**	10.9	1100	11.0	1080	**11.0**	**1090**	10.9	1100
437.leslie3d	18.9	496	**19.0**	**496**	19.0	495	18.9	496	**19.0**	**496**	19.0	495
444.namd	**225**	**35.6**	225	35.6	225	35.6	**220**	**36.5**	220	36.5	220	36.5
447.dealII	**161**	**71.1**	161	71.1	162	70.7	**161**	**71.1**	161	71.1	162	70.7
450.soplex	**179**	**46.7**	179	46.7	180	46.3	**179**	**46.7**	179	46.7	180	46.3
453.povray	76.0	70.0	**76.1**	**69.9**	76.1	69.9	**67.2**	**79.1**	67.3	79.0	67.2	79.2
454.calculix	109	75.5	**109**	**75.5**	110	75.3	109	76.0	**108**	**76.1**	108	76.1
459.GemsFDTD	52.5	202	52.3	203	**52.5**	**202**	44.9	236	43.8	242	**44.2**	**240**
465.tonto	170	58.1	172	57.1	**171**	**57.4**	149	66.2	**149**	**66.3**	148	66.3
470.lbm	11.7	1180	**11.7**	**1180**	11.7	1180	11.7	1180	**11.7**	**1180**	11.7	1180
481.wrf	**121**	**92.3**	121	92.5	123	90.8	**121**	**92.3**	121	92.5	123	90.8
482.sphinx3	233	83.7	**233**	**83.6**	235	83.0	233	83.7	**233**	**83.6**	235	83.0

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:
Choose Operating Mode set to Maximum Performance
Hyper-Threading set to Disable
LLC dead line alloc set to Disable
 Sysinfo program /home/cpu2006-1.2-ic17.0u3/config/sysinfo.rev6993
 Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
 running on Proton4S-SUSE12SP2 Fri Aug 25 15:47:35 2017

 This section contains SUT (System Under Test) info as seen by
 some common utilities.  To remove or add to this section, see:
```

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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) Platinum 8156 CPU @ 3.60GHz
      4 "physical id"s (chips)
      16 "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 : 4
      siblings  : 4
      physical 0: cores 0 3 10 13
      physical 1: cores 1 5 9 13
      physical 2: cores 1 2 5 11
      physical 3: cores 1 5 9 13
   cache size : 16896 KB

From /proc/meminfo
   MemTotal:      1584767276 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

From /etc/*release* /etc/*version*
   SuSE-release:
      SUSE Linux Enterprise Server 12 (x86_64)
      VERSION = 12
      PATCHLEVEL = 2
      # 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-SP2"
      VERSION_ID="12.2"
      PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
      ID="sles"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
   Linux Proton4S-SUSE12SP2 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC
   2016 (9464f67) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Aug 25 15:46

SPEC is set to: /home/cpu2006-1.2-ic17.0u3
   Filesystem      Type    Size   Used Avail Use% Mounted on
   /dev/sda3       btrfs   743G   140G  603G  19% /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
```
Continued on next page

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Platform Notes (Continued)

```
   determined", but the intent may not be met, as there are frequent changes to
   hardware, firmware, and the "DMTF SMBIOS" standard.

   BIOS Lenovo -[PSE105I-1.00]- 06/12/2017
   Memory:
    48x NO DIMM NO DIMM
    48x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666 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-ic17.0u3/lib/ia32:/home/cpu2006-1.2-ic17.0u3/lib/intel64:/home/cpu2006-1.2-ic17.0u3/sh10.2"
OMP_NUM_THREADS = "16"

 Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.2
 Transparent Huge Pages disabled with:
  echo never > /sys/kernel/mm/transparent_hugepage/enabled
 Filesystem page cache cleared with:
 shell invocation of 'sync; echo 3 > /proc/sys/vm/drop_caches' prior to run
```

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

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Base Portability Flags (Continued)

```
   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
      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
```

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Peak Optimization Flags

C benchmarks:

     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-calloc -qopt-malloc-options=3`
         `-auto -unroll4`

Benchmarks using both Fortran and C:

     435.gromacs: `basepeak = yes`

     436.cactusADM: `basepeak = yes`

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Peak Optimization Flags (Continued)

454.calculix: `-xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32`

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-revF.html
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-C.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-revF.xml
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-C.xml

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