SPEC® CFP2006 Result
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Lenovo Global Technology

ThinkSystem SR950
(2.10 GHz, Intel Xeon Platinum 8160)

$SPECfp^{®}2006 = $ 150

$SPECfp_base2006 = $ 142

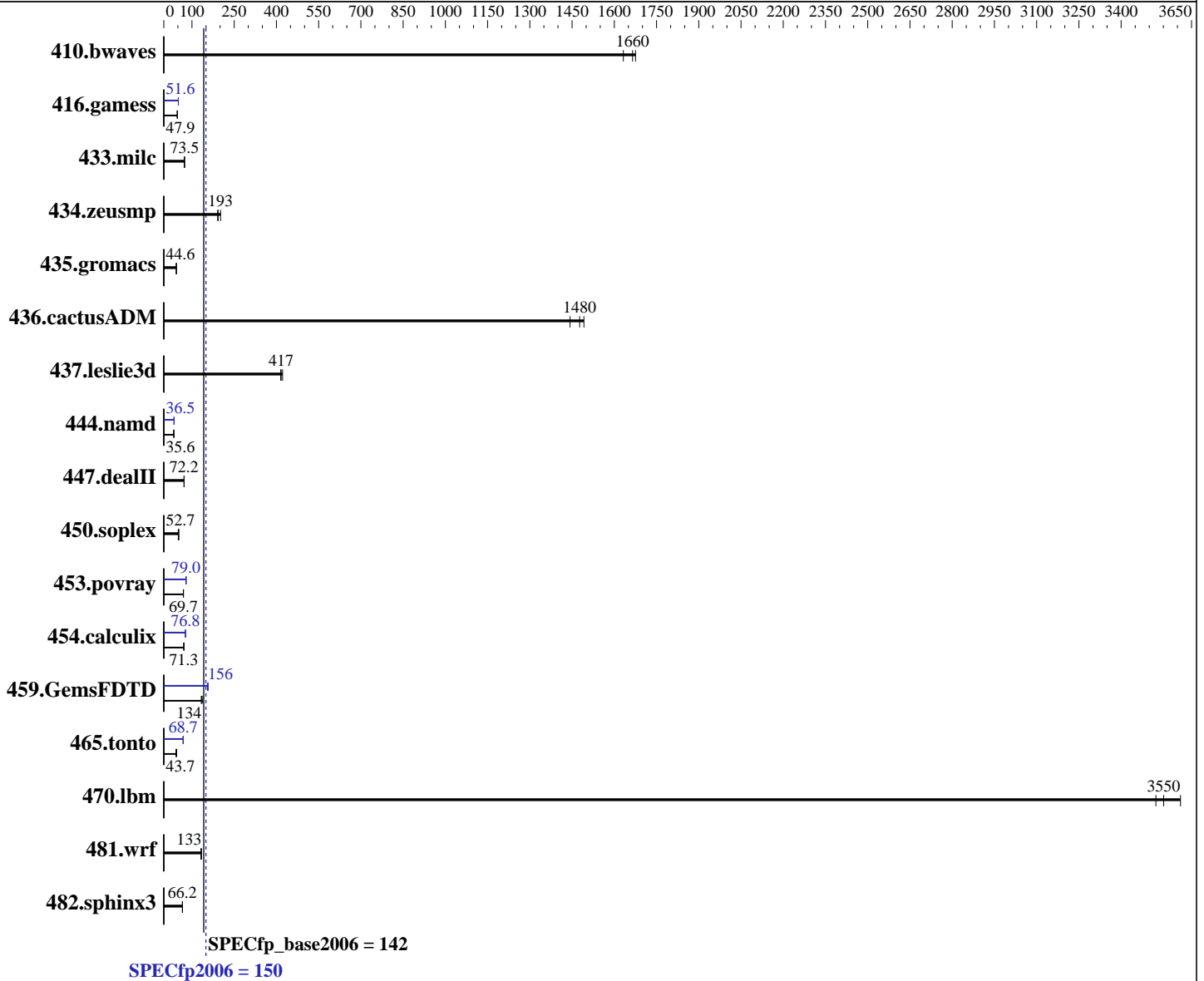|	
CPU2006 license: 9017	**Test date:** Nov-2017
Test sponsor: Lenovo Global Technology	**Hardware Availability:** Sep-2017
Tested by: Lenovo Global Technology	**Software Availability:** Apr-2017

410.bwaves	1660
416.gamess	51.6 / 47.9
433.milc	73.5
434.zeusmp	193
435.gromacs	44.6
436.cactusADM	1480
437.leslie3d	417
444.namd	36.5 / 35.6
447.dealII	72.2
450.soplex	52.7
453.povray	79.0 / 69.7
454.calculix	76.8 / 71.3
459.GemsFDTD	156 / 134
465.tonto	68.7 / 43.7
470.lbm	3550
481.wrf	133
482.sphinx3	66.2

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Hardware

CPU Name:	Intel Xeon Platinum 8160
CPU Characteristics:	Intel Turbo Boost Technology up to 3.70 GHz
CPU MHz:	2100
FPU:	Integrated
CPU(s) enabled:	96 cores, 4 chips, 24 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)

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L3 Cache:	33 MB I+D on chip per chip	Base Pointers:	64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R)	Other Software:	None
Disk Subsystem:	1 x 800 GB SAS SSD		
Other Hardware:	None		

Results Table

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	8.33	1630	**8.16**	**1660**	8.11	1680	8.33	1630	**8.16**	**1660**	8.11	1680
416.gamess	407	48.1	409	47.9	**409**	**47.9**	379	51.6	**379**	**51.6**	378	51.8
433.milc	126	72.9	**125**	**73.5**	124	73.9	126	72.9	**125**	**73.5**	124	73.9
434.zeusmp	45.1	202	**47.1**	**193**	47.6	191	45.1	202	**47.1**	**193**	47.6	191
435.gromacs	160	44.5	**160**	**44.6**	160	44.6	160	44.5	**160**	**44.6**	160	44.6
436.cactusADM	**8.09**	**1480**	8.01	1490	8.28	1440	**8.09**	**1480**	8.01	1490	8.28	1440
437.leslie3d	22.3	422	**22.6**	**417**	22.6	415	22.3	422	**22.6**	**417**	22.6	415
444.namd	225	35.6	**225**	**35.6**	225	35.6	220	36.5	**220**	**36.5**	220	36.5
447.dealII	160	71.7	158	72.3	**158**	**72.2**	160	71.7	158	72.3	**158**	**72.2**
450.soplex	157	53.2	**158**	**52.7**	162	51.5	157	53.2	**158**	**52.7**	162	51.5
453.povray	**76.4**	**69.7**	76.7	69.3	76.2	69.8	67.3	79.1	**67.4**	**79.0**	67.4	78.9
454.calculix	116	71.3	116	71.1	**116**	**71.3**	**107**	**76.8**	107	77.3	108	76.3
459.GemsFDTD	76.7	138	79.5	134	**79.4**	**134**	**68.0**	**156**	68.3	155	67.3	158
465.tonto	215	45.8	227	43.4	**225**	**43.7**	143	68.6	143	68.8	**143**	**68.7**
470.lbm	3.81	3610	3.90	3520	**3.87**	**3550**	3.81	3610	3.90	3520	**3.87**	**3550**
481.wrf	**84.1**	**133**	84.5	132	83.6	134	**84.1**	**133**	84.5	132	83.6	134
482.sphinx3	295	66.1	**295**	**66.2**	294	66.3	295	66.1	**295**	**66.2**	294	66.3

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 Tue Nov 28 02:54:25 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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Test date: Nov-2017
Hardware Availability: Sep-2017
Software Availability: Apr-2017

Platform Notes (Continued)

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

  From /proc/cpuinfo
     model name : Intel(R) Xeon(R) Platinum 8160 CPU @ 2.10GHz
        4 "physical id"s (chips)
        96 "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 : 24
        siblings  : 24
        physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
        27 28 29
        physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
        27 28 29
        physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
        27 28 29
        physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
        27 28 29
     cache size : 33792 KB

  From /proc/meminfo
     MemTotal:       1584766852 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 Nov 28 02:24

  SPEC is set to: /home/cpu2006-1.2-ic17.0u3
     Filesystem      Type   Size   Used Avail Use% Mounted on
     /dev/sda3       btrfs  743G   182G  561G  25% /home
```

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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 -[PSE105X-1.00]- 08/17/2017
   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 = "96"

 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`

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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
   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
```

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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: -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

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Peak Optimization Flags (Continued)

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

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-E.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-E.xml

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

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