SPEC® CFP2006 Result

Lenovo Global Technology

ThinkSystem SR530
(2.10 GHz, Intel Xeon Silver 4116)

$SPECfp®\_rate2006 = 915$

$SPECfp\_rate\_base2006 = 900$

CPU2006 license: 9017
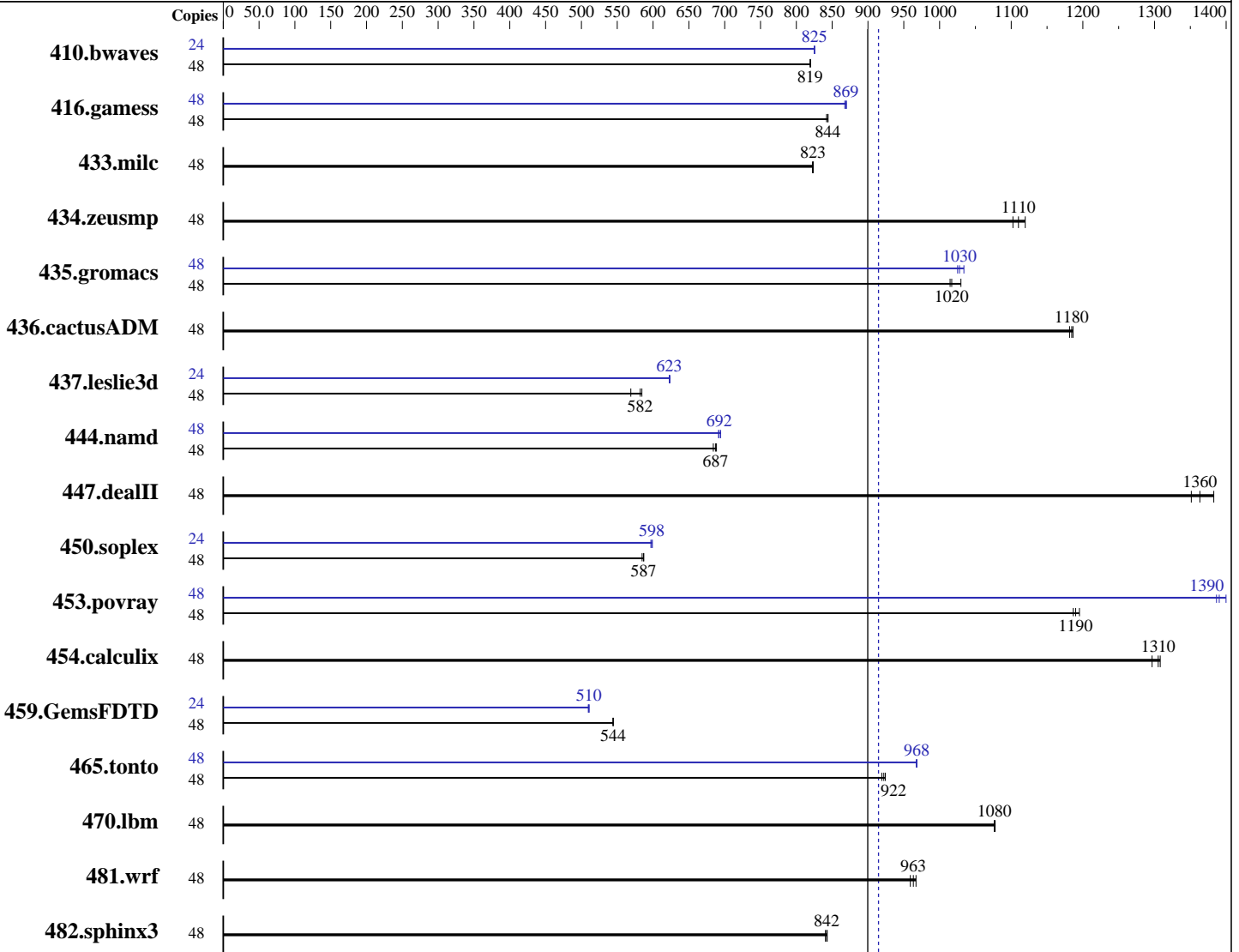
Test sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test date: Aug-2017

Hardware Availability: Aug-2017

Software Availability: Apr-2017

SPECfp_rate_base2006 = 900

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	Copies	
410.bwaves	24	825
	48	819
416.gamess	48	869
	48	844
433.milc	48	823
434.zeusmp	48	1110
435.gromacs	48	1030
	48	1020
436.cactusADM	48	1180
437.leslie3d	24	623
	48	582
444.namd	48	692
	48	687
447.dealII	48	1360
450.soplex	24	598
	48	587
453.povray	48	1390
	48	1190
454.calculix	48	1310
459.GemsFDTD	24	510
	48	544
465.tonto	48	968
	48	922
470.lbm	48	1080
481.wrf	48	963
482.sphinx3	48	842

Hardware

CPU Name:	Intel Xeon Silver 4116
CPU Characteristics:	Intel Turbo Boost Technology up to 3.00 GHz
CPU MHz:	2100
FPU:	Integrated
CPU(s) enabled:	24 cores, 2 chips, 12 cores/chip, 2 threads/core
CPU(s) orderable:	1,2 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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L3 Cache:	16.5 MB I+D on chip per chip	Base Pointers:	32/64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	384 GB (12 x 32 GB 2Rx4 PC4-2666V-R, running at 2400 MHz)	Other Software:	None
Disk Subsystem:	1 x 800 GB SATA SSD		
Other Hardware:	None		

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	48	**<u>796</u>**	**<u>819</u>**	796	819	796	820	24	395	826	395	825	**<u>395</u>**	**<u>825</u>**
416.gamess	48	1116	842	1113	844	**<u>1114</u>**	**<u>844</u>**	48	1083	868	**<u>1081</u>**	**<u>869</u>**	1080	870
433.milc	48	536	823	535	824	**<u>535</u>**	**<u>823</u>**	48	536	823	535	824	**<u>535</u>**	**<u>823</u>**
434.zeusmp	48	**<u>393</u>**	**<u>1110</u>**	396	1100	390	1120	48	**<u>393</u>**	**<u>1110</u>**	396	1100	390	1120
435.gromacs	48	**<u>337</u>**	**<u>1020</u>**	338	1010	333	1030	48	334	1030	331	1030	**<u>333</u>**	**<u>1030</u>**
436.cactusADM	48	485	1180	**<u>484</u>**	**<u>1180</u>**	484	1190	48	485	1180	**<u>484</u>**	**<u>1180</u>**	484	1190
437.leslie3d	48	772	584	793	569	**<u>775</u>**	**<u>582</u>**	24	**<u>362</u>**	**<u>623</u>**	362	623	362	624
444.namd	48	**<u>560</u>**	**<u>687</u>**	563	684	559	689	48	**<u>556</u>**	**<u>692</u>**	557	691	554	694
447.dealII	48	397	1380	406	1350	**<u>403</u>**	**<u>1360</u>**	48	397	1380	406	1350	**<u>403</u>**	**<u>1360</u>**
450.soplex	48	685	585	682	587	**<u>682</u>**	**<u>587</u>**	24	334	599	335	597	**<u>335</u>**	**<u>598</u>**
453.povray	48	**<u>215</u>**	**<u>1190</u>**	214	1200	215	1190	48	184	1390	182	1400	**<u>184</u>**	**<u>1390</u>**
454.calculix	48	303	1310	**<u>303</u>**	**<u>1310</u>**	305	1300	48	303	1310	**<u>303</u>**	**<u>1310</u>**	305	1300
459.GemsFDTD	48	936	544	936	544	**<u>936</u>**	**<u>544</u>**	24	**<u>499</u>**	**<u>510</u>**	499	511	500	510
465.tonto	48	514	919	511	924	**<u>512</u>**	**<u>922</u>**	48	488	968	488	967	**<u>488</u>**	**<u>968</u>**
470.lbm	48	612	1080	613	1080	**<u>613</u>**	**<u>1080</u>**	48	612	1080	613	1080	**<u>613</u>**	**<u>1080</u>**
481.wrf	48	554	967	**<u>557</u>**	**<u>963</u>**	559	959	48	554	967	**<u>557</u>**	**<u>963</u>**	559	959
482.sphinx3	48	**<u>1111</u>**	**<u>842</u>**	1110	843	1113	841	48	**<u>1111</u>**	**<u>842</u>**	1110	843	1113	841

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

Platform Notes

BIOS configuration:
Operating Mode set to Maximum Performance
SNC set to Enable

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Hardware Availability: Aug-2017
Software Availability: Apr-2017

Platform Notes (Continued)

```
DCU Streamer Prefetcher set to Disable
XPT Prefetcher set to Disable
LLC dead line alloc set to Disable
Stale AtoS set to Enable
 Sysinfo program /home/cpu2006-1.2-ic17.0u3/config/sysinfo.rev6993
 Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
 running on linux-dqoj Sun Aug  6 00:19:03 2017

 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) Silver 4116 CPU @ 2.10GHz
       2 "physical id"s (chips)
       48 "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 : 12
       siblings  : 24
       physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
       physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13
    cache size : 16896 KB

 From /proc/meminfo
    MemTotal:       395882112 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 linux-dqoj 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 6 00:17
```

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Platform Notes (Continued)

```
   SPEC is set to: /home/cpu2006-1.2-ic17.0u3
      Filesystem      Type    Size   Used Avail Use% Mounted on
      /dev/sdb2       btrfs   744G   155G  587G  21% /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 -[TEE105Z-1.00]- 04/27/2017
      Memory:
      12x Hynix HMA84GR7AFR4N-VK 32 GB 2 rank 2666 MHz, configured at 2400 MHz

   (End of data from sysinfo program)
```

General Notes

```
Environment variables set by runspec before the start of the run:
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"


 Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.2
 Transparent Huge Pages enabled by default
 Filesystem page cache cleared with:
 shell invocation of 'sync; echo 3 > /proc/sys/vm/drop_caches' prior to run
 runspec command invoked through numactl i.e.:
 numactl --interleave=all runspec <etc>
```

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
```

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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
     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 -qopt-prefetch -auto-p32
    -qopt-mem-layout-trans=3
```

C++ benchmarks:
```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
    -qopt-mem-layout-trans=3
```

Fortran benchmarks:
```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
```

Benchmarks using both Fortran and C:
```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
    -qopt-mem-layout-trans=3
```

Peak Compiler Invocation

C benchmarks:
```
    icc -m64
```

C++ benchmarks (except as noted below):
```
    icpc -m64
```

```
  450.soplex: icpc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32
```

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Peak Compiler Invocation (Continued)

Fortran benchmarks:
        ifort -m64

Benchmarks using both Fortran and C:
        icc -m64 ifort -m64

Peak 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: -D_FILE_OFFSET_BITS=64
         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

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
              -qopt-mem-layout-trans=3

        447.dealII: basepeak = yes

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Peak Optimization Flags (Continued)

450.soplex: -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) -qopt-malloc-options=3
-qopt-mem-layout-trans=3

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 -qopt-mem-layout-trans=3

Fortran benchmarks:

410.bwaves: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch

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: Same as 410.bwaves

459.GemsFDTD: Same as 410.bwaves

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) -unroll4 -auto -inline-calloc
-qopt-malloc-options=3

Benchmarks using both Fortran and C:

435.gromacs: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
-par-num-threads=1(pass 1) -qopt-prefetch -auto-ilp32
-qopt-mem-layout-trans=3

436.cactusADM: basepeak = yes

454.calculix: basepeak = yes

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

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