SPEC® CFP2006 Result
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Lenovo Global Technology

SPECfp®_rate2006 = 666

ThinkSystem SR630
(2.00 GHz, Intel Xeon Silver 4109T)

SPECfp_rate_base2006 = 660

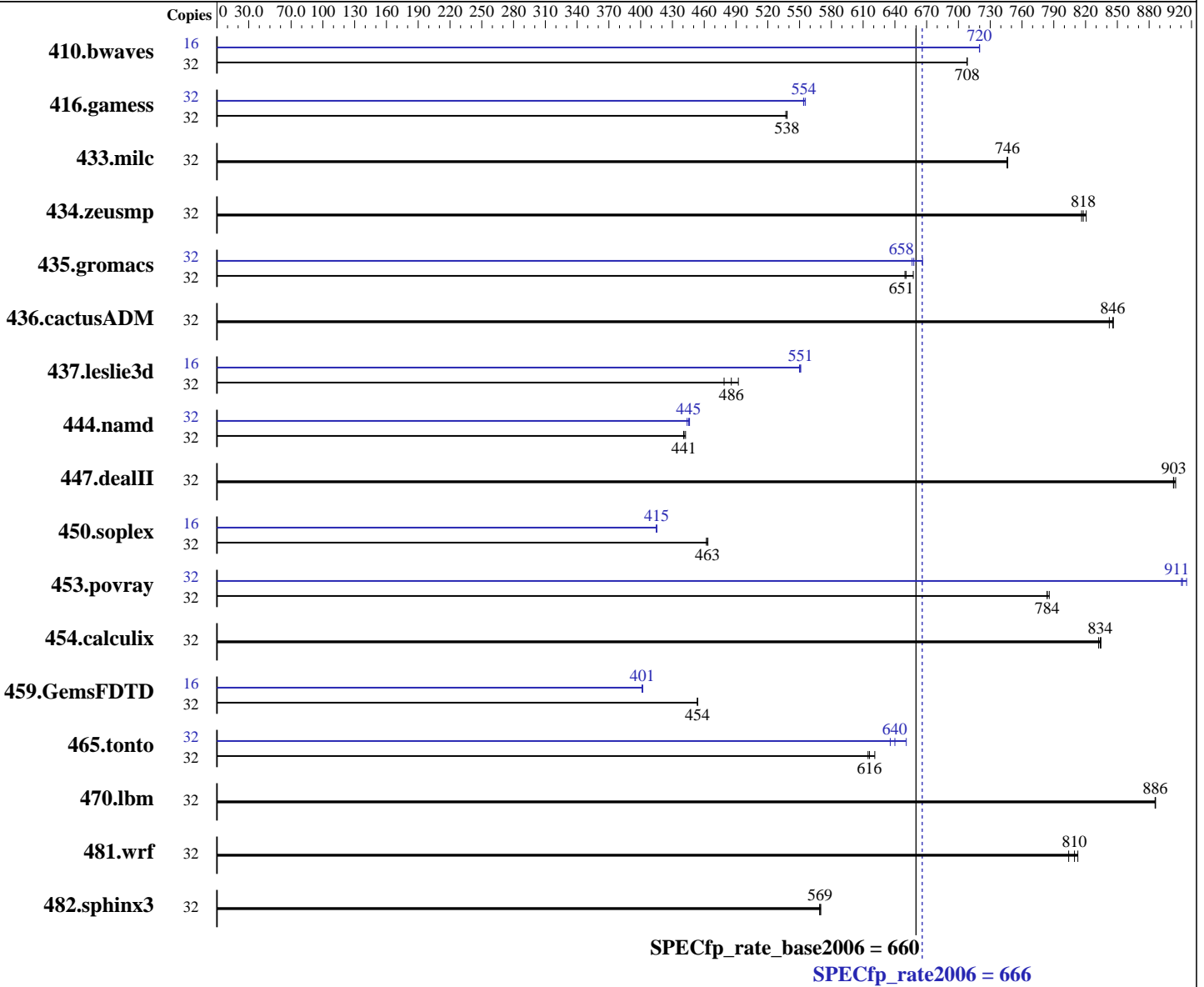**CPU2006 license:** 9017　　　　　　　　　　　　　　　　**Test date:** Aug-2017
Test sponsor: Lenovo Global Technology　　　　　　　**Hardware Availability:** Aug-2017
Tested by: Lenovo Global Technology　　　　　　　　**Software Availability:** Apr-2017

Copies		
410.bwaves	16	720
	32	708
416.gamess	32	554
	32	538
433.milc	32	746
434.zeusmp	32	818
435.gromacs	32	658
	32	651
436.cactusADM	32	846
437.leslie3d	16	551
	32	486
444.namd	32	445
	32	441
447.dealII	32	903
450.soplex	16	415
	32	463
453.povray	32	911
	32	784
454.calculix	32	834
459.GemsFDTD	16	401
	32	454
465.tonto	32	640
	32	616
470.lbm	32	886
481.wrf	32	810
482.sphinx3	32	569

SPECfp_rate_base2006 = 660

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<table>
<tr><th colspan="2">Hardware</th></tr>
<tr><td>CPU Name:</td><td>Intel Xeon Silver 4109T</td></tr>
<tr><td>CPU Characteristics:</td><td>Intel Turbo Boost Technology up to 3.00 GHz</td></tr>
<tr><td>CPU MHz:</td><td>2000</td></tr>
<tr><td>FPU:</td><td>Integrated</td></tr>
<tr><td>CPU(s) enabled:</td><td>16 cores, 2 chips, 8 cores/chip, 2 threads/core</td></tr>
<tr><td>CPU(s) orderable:</td><td>1,2 chips</td></tr>
<tr><td>Primary Cache:</td><td>32 KB I + 32 KB D on chip per core</td></tr>
<tr><td>Secondary Cache:</td><td>1 MB I+D on chip per core</td></tr>
</table>

Continued on next page

<table>
<tr><th colspan="2">Software</th></tr>
<tr><td>Operating System:</td><td>SUSE Linux Enterprise Server 12 SP2 (x86_64)
Kernel 4.4.21-69-default</td></tr>
<tr><td>Compiler:</td><td>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</td></tr>
<tr><td>Auto Parallel:</td><td>Yes</td></tr>
<tr><td>File System:</td><td>btrfs</td></tr>
<tr><td>System State:</td><td>Run level 3 (multi-user)</td></tr>
</table>

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L3 Cache:	11 MB I+D on chip per chip	Base Pointers:	32/64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	384 GB (24 x 16 GB 2Rx8 PC4-2666V-R, running at 2400 MHz)	Other Software:	None
Disk Subsystem:	1 x 800 GB SAS 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	32	614	708	**614**	**708**	614	708	16	**302**	**720**	302	720	302	720
416.gamess	32	1167	537	**1164**	**538**	1164	538	32	**1131**	**554**	1131	554	1128	556
433.milc	32	394	746	394	746	**394**	**746**	32	394	746	394	746	**394**	**746**
434.zeusmp	32	**356**	**818**	355	821	357	816	32	**356**	**818**	355	821	357	816
435.gromacs	32	**351**	**651**	348	657	352	649	32	**347**	**658**	343	666	348	656
436.cactusADM	32	454	842	452	846	**452**	**846**	32	454	842	452	846	**452**	**846**
437.leslie3d	32	**619**	**486**	611	492	628	479	16	**273**	**551**	274	550	273	551
444.namd	32	580	442	**582**	**441**	583	441	32	578	444	575	446	**576**	**445**
447.dealII	32	**405**	**903**	405	903	404	905	32	**405**	**903**	405	903	404	905
450.soplex	32	578	462	576	463	**576**	**463**	16	321	415	322	415	**322**	**415**
453.povray	32	**217**	**784**	217	784	217	786	32	**187**	**911**	187	911	186	915
454.calculix	32	**317**	**834**	316	835	317	832	32	**317**	**834**	316	835	317	832
459.GemsFDTD	32	**748**	**454**	748	454	749	454	16	423	401	422	402	**423**	**401**
465.tonto	32	512	615	**511**	**616**	507	621	32	**492**	**640**	484	651	495	636
470.lbm	32	496	886	496	886	**496**	**886**	32	496	886	496	886	**496**	**886**
481.wrf	32	**442**	**810**	445	804	440	813	32	**442**	**810**	445	804	440	813
482.sphinx3	32	**1095**	**569**	1096	569	1094	570	32	**1095**	**569**	1096	569	1094	570

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:
Choose Operating Mode set to Maximum Performance
DCU Streamer Prefetcher set to Disable

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Software Availability: Apr-2017

Platform Notes (Continued)

```
Stale AtoS set to Enable
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 Cable-SPECcpu2006-SUSE12SP2 Sat Aug 26 05:00:10 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 4109T CPU @ 2.00GHz
       2 "physical id"s (chips)
       32 "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 : 8
       siblings  : 16
       physical 0: cores 0 1 2 3 4 5 6 7
       physical 1: cores 0 1 2 3 4 5 6 7
    cache size : 11264 KB

 From /proc/meminfo
    MemTotal:       395893920 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 Cable-SPECcpu2006-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 17:34

 SPEC is set to: /home/cpu2006-1.2-ic17.0u3
```

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Platform Notes (Continued)

```
   Filesystem      Type    Size   Used  Avail  Use% Mounted on
   /dev/sda2       btrfs   744G   216G   526G   30% /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 -[IVE109Q-1.00]- 06/28/2017
    Memory:
     24x Samsung M393A2K43BB1-CTD 16 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

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 -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
```

Fortran benchmarks:
```
ifort -m64
```

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Peak Compiler Invocation (Continued)

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

     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
```

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Peak Optimization Flags (Continued)

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.20171004.html

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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.20171004.xml

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Tested with SPEC CPU2006 v1.2.
Report generated on Wed Oct 4 12:35:13 2017 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 3 October 2017.