SPEC® CFP2006 Result
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Lenovo Global Technology

ThinkSystem SR570
(2.00 GHz, Intel Xeon Platinum 8164)

$SPECfp^{®}\_rate2006 =$ 1570

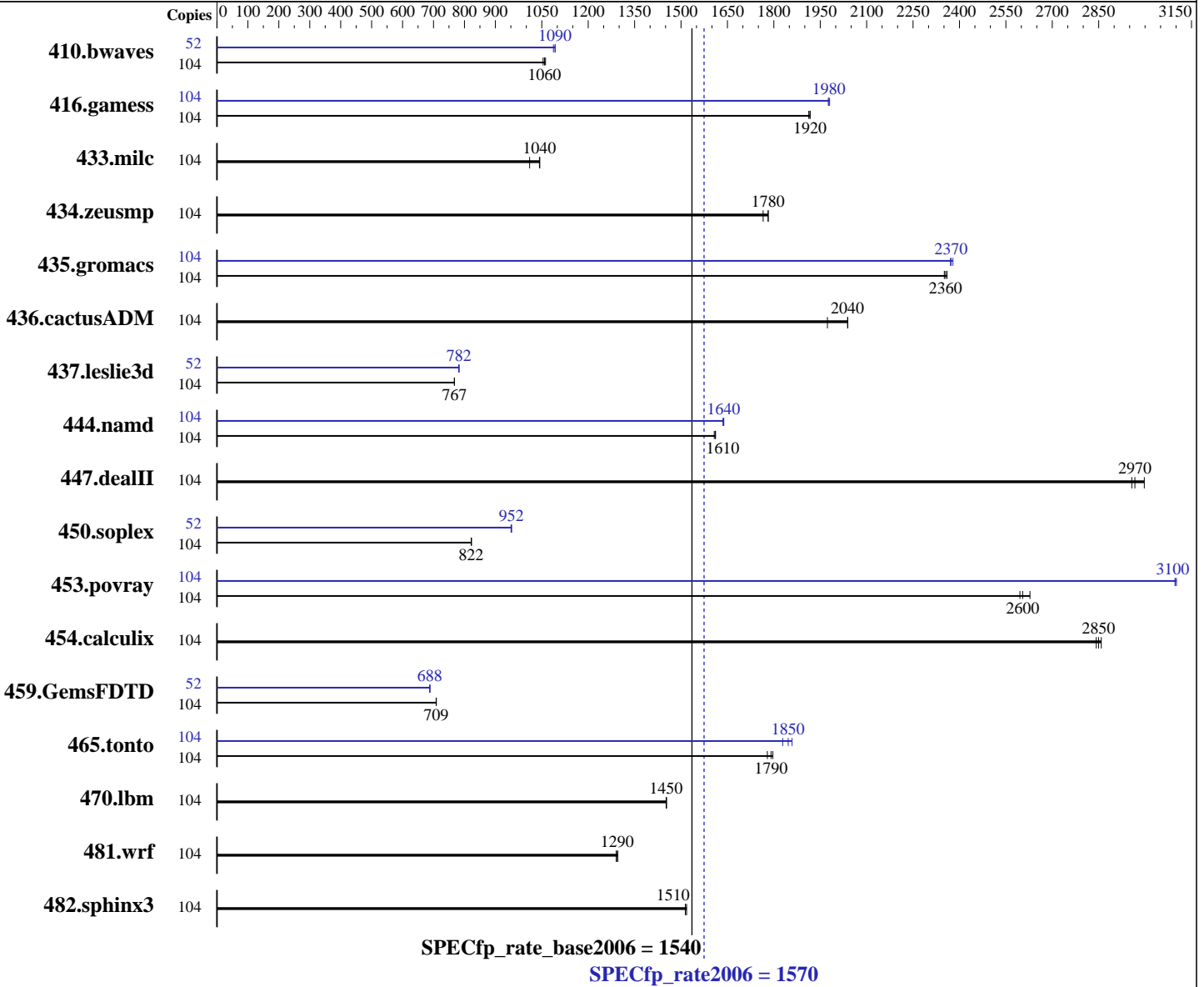SPECfp_rate_base2006 = 1540

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

Benchmark	Copies	Result (blue/base)
410.bwaves	52 / 104	1090 / 1060
416.gamess	104 / 104	1980 / 1920
433.milc	104	1040
434.zeusmp	104	1780
435.gromacs	104 / 104	2370 / 2360
436.cactusADM	104	2040
437.leslie3d	52 / 104	782 / 767
444.namd	104 / 104	1640 / 1610
447.dealII	104	2970
450.soplex	52 / 104	952 / 822
453.povray	104 / 104	3100 / 2600
454.calculix	104	2850
459.GemsFDTD	52 / 104	688 / 709
465.tonto	104 / 104	1850 / 1790
470.lbm	104	1450
481.wrf	104	1290
482.sphinx3	104	1510

SPECfp_rate_base2006 = 1540
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Hardware

CPU Name:	Intel Xeon Platinum 8164
CPU Characteristics:	Intel Turbo Boost Technology up to 3.70 GHz
CPU MHz:	2000
FPU:	Integrated
CPU(s) enabled:	52 cores, 2 chips, 26 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:	Red Hat Enterprise Linux Server release 7.4 (Maipo)
	Kernel 3.10.0-693.el7.x86_64
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

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L3 Cache:	35.75 MB I+D on chip per chip	System State:	Run level 3 (multi-user)
Other Cache:	None	Base Pointers:	32/64-bit
Memory:	192 GB (12 x 16 GB 2Rx8 PC4-2666V-R)	Peak Pointers:	32/64-bit
Disk Subsystem:	1 x 800 GB SAS SSD	Other Software:	None
Other Hardware:	None		

Results Table

	Base						Peak						
Benchmark	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	104	1341	1050	**_1335_**	**_1060_**	1331	1060	52	650	1090	**_647_**	**_1090_**	646	1090
416.gamess	104	1065	1910	1062	1920	**_1062_**	**_1920_**	104	1028	1980	**_1029_**	**_1980_**	1031	1980
433.milc	104	945	1010	**_916_**	**_1040_**	915	1040	104	945	1010	**_916_**	**_1040_**	915	1040
434.zeusmp	104	536	1770	531	1780	**_531_**	**_1780_**	104	536	1770	531	1780	**_531_**	**_1780_**
435.gromacs	104	**_315_**	**_2360_**	315	2360	316	2350	104	313	2370	**_313_**	**_2370_**	312	2380
436.cactusADM	104	630	1970	609	2040	**_610_**	**_2040_**	104	630	1970	609	2040	**_610_**	**_2040_**
437.leslie3d	104	1273	768	1274	767	**_1274_**	**_767_**	52	**_625_**	**_782_**	625	783	625	782
444.namd	104	**_518_**	**_1610_**	518	1610	519	1610	104	510	1640	**_509_**	**_1640_**	509	1640
447.dealII	104	397	3000	402	2960	**_401_**	**_2970_**	104	397	3000	402	2960	**_401_**	**_2970_**
450.soplex	104	1055	822	**_1055_**	**_822_**	1055	823	52	456	951	**_456_**	**_952_**	455	952
453.povray	104	**_212_**	**_2600_**	211	2630	213	2600	104	**_179_**	**_3100_**	179	3100	178	3100
454.calculix	104	302	2840	300	2860	**_301_**	**_2850_**	104	302	2840	300	2860	**_301_**	**_2850_**
459.GemsFDTD	104	1556	709	1557	709	**_1557_**	**_709_**	52	802	688	802	688	**_802_**	**_688_**
465.tonto	104	575	1780	570	1800	**_571_**	**_1790_**	104	560	1830	550	1860	**_554_**	**_1850_**
470.lbm	104	**_984_**	**_1450_**	983	1450	984	1450	104	**_984_**	**_1450_**	983	1450	984	1450
481.wrf	104	900	1290	897	1300	**_897_**	**_1290_**	104	900	1290	897	1300	**_897_**	**_1290_**
482.sphinx3	104	**_1338_**	**_1510_**	1339	1510	1335	1520	104	**_1338_**	**_1510_**	1339	1510	1335	1520

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"
echo 0 > /proc/sys/kernel/numa_balancing

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Test date: Nov-2017
Hardware Availability: Nov-2017
Software Availability: Aug-2017

Platform Notes

```
BIOS configuration:
Choose Operating Mode set to Maximum Performance
DCU Streamer Prefetcher set to Disable
MONITORMWAIT set to Enable
SNC set to Enable
LLC Deadline Alloc set to Disable
 Sysinfo program /home/cpu2006-1.2-ic17.0u3/config/sysinfo.rev6993
 Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
 running on localhost.localdomain Fri Nov  3 10:46:02 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) Platinum 8164 CPU @ 2.00GHz
       2 "physical id"s (chips)
       104 "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 : 26
       siblings  : 52
       physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25
       26 27 28 29
       physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25
       26 27 28 29
    cache size : 36608 KB

 From /proc/meminfo
    MemTotal:       197410280 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

 From /etc/*release* /etc/*version*
    os-release:
       NAME="Red Hat Enterprise Linux Server"
       VERSION="7.4 (Maipo)"
       ID="rhel"
       ID_LIKE="fedora"
       VARIANT="Server"
       VARIANT_ID="server"
       VERSION_ID="7.4"
       PRETTY_NAME="Red Hat Enterprise Linux Server 7.4 (Maipo)"
    redhat-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
    system-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
    system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server

 uname -a:
    Linux localhost.localdomain 3.10.0-693.el7.x86_64 #1 SMP Thu Jul 6 19:56:57
    EDT 2017 x86_64 x86_64 x86_64 GNU/Linux
```

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Platform Notes (Continued)

```
run-level 3 Nov 3 10:40

SPEC is set to: /home/cpu2006-1.2-ic17.0u3
   Filesystem     Type   Size  Used Avail Use% Mounted on
   /dev/sdb2      btrfs  740G  7.5G  730G   2% /
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 -[TEE119J-1.20]- 09/06/2017
  Memory:
   4x NO DIMM NO DIMM
   12x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666 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-F.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-F.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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