SPEC® CINT2006 Result

Lenovo Global Technology

$SPECint^{®}_rate2006 = $ 4560

ThinkSystem SR950
(2.10 GHz, Intel Xeon Platinum 8160)

$SPECint_rate_base2006 = $ 4360

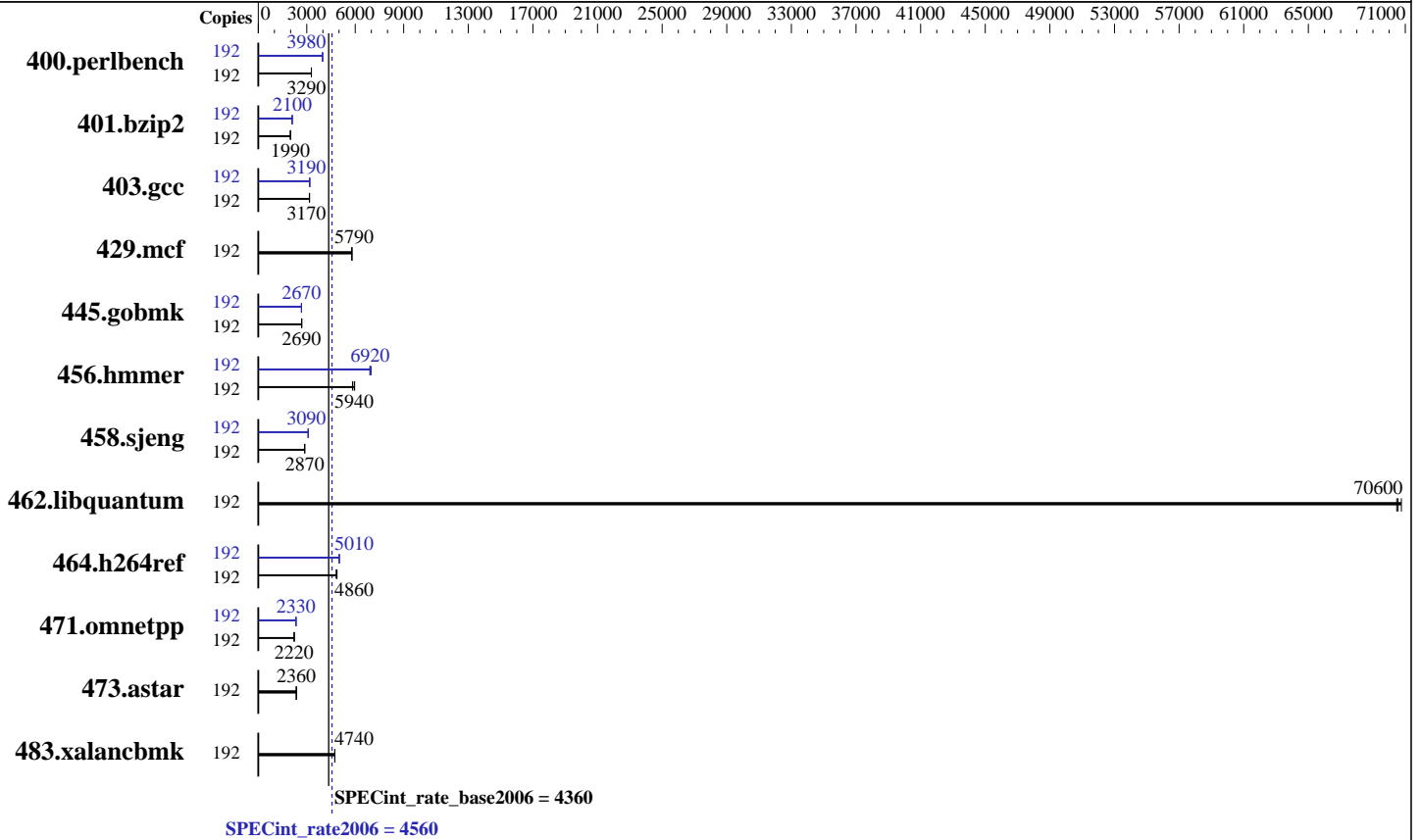|		
CPU2006 license: 9017	**Test date:**	Nov-2017
Test sponsor: Lenovo Global Technology	**Hardware Availability:**	Sep-2017
Tested by: Lenovo Global Technology	**Software Availability:**	Apr-2017

Copies 0 3000 6000 9000 13000 17000 21000 25000 29000 33000 37000 41000 45000 49000 53000 57000 61000 65000 71000

400.perlbench — 192 / 3980 ; 192 / 3290
401.bzip2 — 192 / 2100 ; 192 / 1990
403.gcc — 192 / 3190 ; 192 / 3170
429.mcf — 192 / 5790
445.gobmk — 192 / 2670 ; 192 / 2690
456.hmmer — 192 / 6920 ; 192 / 5940
458.sjeng — 192 / 3090 ; 192 / 2870
462.libquantum — 192 / 70600
464.h264ref — 192 / 5010 ; 192 / 4860
471.omnetpp — 192 / 2330 ; 192 / 2220
473.astar — 192 / 2360
483.xalancbmk — 192 / 4740

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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, 2 threads/core
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
L3 Cache:	33 MB I+D on chip per chip
Other Cache:	None
Memory:	1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R)
Disk Subsystem:	800 GB tmpfs
Other Hardware:	None

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
Auto Parallel:	Yes
File System:	tmpfs
System State:	Run level 3 (multi-user)
Base Pointers:	32-bit
Peak Pointers:	32/64-bit
Other Software:	Microquill SmartHeap V10.2

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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
400.perlbench	192	571	3280	**571**	**3290**	570	3290	192	**471**	**3980**	472	3980	471	3980
401.bzip2	192	933	1990	**930**	**1990**	928	2000	192	884	2100	881	2100	**881**	**2100**
403.gcc	192	489	3160	487	3170	**487**	**3170**	192	488	3170	484	3190	**485**	**3190**
429.mcf	192	**302**	**5790**	302	5800	303	5790	192	**302**	**5790**	302	5800	303	5790
445.gobmk	192	749	2690	750	2680	**750**	**2690**	192	753	2670	754	2670	**754**	**2670**
456.hmmer	192	307	5830	**302**	**5940**	300	5970	192	259	6910	256	6980	**259**	**6920**
458.sjeng	192	809	2870	808	2870	**809**	**2870**	192	752	3090	**752**	**3090**	753	3090
462.libquantum	192	**56.4**	**70600**	56.2	70800	56.5	70500	192	**56.4**	**70600**	56.2	70800	56.5	70500
464.h264ref	192	882	4820	872	4870	**874**	**4860**	192	847	5010	**848**	**5010**	848	5010
471.omnetpp	192	541	2220	**541**	**2220**	539	2220	192	514	2330	**514**	**2330**	514	2340
473.astar	192	**572**	**2360**	573	2350	572	2360	192	**572**	**2360**	573	2350	572	2360
483.xalancbmk	192	279	4740	**280**	**4740**	280	4740	192	279	4740	**280**	**4740**	280	4740

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"
    Tmpfs filesystem can be set with:
     mount -t tmpfs -o size=800g tmpfs /home
    Process tuning setting:
      echo 50000   > /proc/sys/kernel/sched_cfs_bandwidth_slice_us
      echo 240000000 > /proc/sys/kernel/sched_latency_ns
      echo 5000000   > /proc/sys/kernel/sched_migration_cost_ns
      echo 100000000 > /proc/sys/kernel/sched_min_granularity_ns
      echo 150000000 > /proc/sys/kernel/sched_wakeup_granularity_ns

Platform Notes

    BIOS configuration:
    Choose Operating Mode set to Maximum Performance
    SNC set to Enable
    DCU Streamer Prefetcher set to Disable
    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 Proton8S-SUSE12SP2 Sat Nov 4 20:09:29 2017

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Platform Notes (Continued)

```
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 8160 CPU @ 2.10GHz
      4 "physical id"s (chips)
      192 "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  : 48
      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:       1584622892 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 Proton8S-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 4 20:04
```

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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
    tmpfs          tmpfs  800G  5.0G  796G   1% /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 -[PSE109F-1.10]- 09/25/2017
  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:
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 -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32
```

C++ benchmarks:
```
    icpc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32
```

Base Portability Flags

```
    400.perlbench: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX_IA32
       401.bzip2: -D_FILE_OFFSET_BITS=64
        403.gcc: -D_FILE_OFFSET_BITS=64
        429.mcf: -D_FILE_OFFSET_BITS=64
      445.gobmk: -D_FILE_OFFSET_BITS=64
      456.hmmer: -D_FILE_OFFSET_BITS=64
```

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Base Portability Flags (Continued)

```
      458.sjeng: -D_FILE_OFFSET_BITS=64
 462.libquantum: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX
    464.h264ref: -D_FILE_OFFSET_BITS=64
    471.omnetpp: -D_FILE_OFFSET_BITS=64
      473.astar: -D_FILE_OFFSET_BITS=64
  483.xalancbmk: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX
```

Base Optimization Flags

C benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-qopt-mem-layout-trans=3
```

C++ benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-qopt-mem-layout-trans=3 -Wl,-z,muldefs -L/sh10.2 -lsmartheap
```

Base Other Flags

C benchmarks:

```
403.gcc: -Dalloca=_alloca
```

Peak Compiler Invocation

C benchmarks (except as noted below):
```
icc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32
```

```
400.perlbench: icc -m64
```

```
401.bzip2: icc -m64
```

```
456.hmmer: icc -m64
```

```
458.sjeng: icc -m64
```

C++ benchmarks:
```
icpc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32
```

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Peak Portability Flags

```
     400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
         401.bzip2: -DSPEC_CPU_LP64
           403.gcc: -D_FILE_OFFSET_BITS=64
           429.mcf: -D_FILE_OFFSET_BITS=64
         445.gobmk: -D_FILE_OFFSET_BITS=64
        456.hmmer: -DSPEC_CPU_LP64
         458.sjeng: -DSPEC_CPU_LP64
     462.libquantum: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX
        464.h264ref: -D_FILE_OFFSET_BITS=64
       471.omnetpp: -D_FILE_OFFSET_BITS=64
         473.astar: -D_FILE_OFFSET_BITS=64
     483.xalancbmk: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX
```

Peak Optimization Flags

C benchmarks:

```
     400.perlbench: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(pass 2)
                    -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
                    -no-prec-div(pass 2) -auto-ilp32 -qopt-mem-layout-trans=3

         401.bzip2: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(pass 2)
                    -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
                    -no-prec-div(pass 2) -qopt-prefetch -auto-ilp32
                    -qopt-mem-layout-trans=3

           403.gcc: -xCORE-AVX512 -ipo -O3 -no-prec-div
                    -qopt-mem-layout-trans=3

           429.mcf: basepeak = yes

         445.gobmk: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(pass 2)
                    -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
                    -no-prec-div(pass 2) -qopt-mem-layout-trans=3

        456.hmmer: -xCORE-AVX512 -ipo -O3 -no-prec-div -unroll2 -auto-ilp32
                    -qopt-mem-layout-trans=3

         458.sjeng: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(pass 2)
                    -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
                    -no-prec-div(pass 2) -unroll4 -auto-ilp32
                    -qopt-mem-layout-trans=3

     462.libquantum: basepeak = yes

        464.h264ref: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(pass 2)
                    -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
                    -no-prec-div(pass 2) -unroll2 -qopt-mem-layout-trans=3
```

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Peak Optimization Flags (Continued)

C++ benchmarks:

471.omnetpp: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(pass 2)
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2)
-qopt-ra-region-strategy=block
-qopt-mem-layout-trans=3 -Wl,-z,muldefs
-L/sh10.2 -lsmartheap

473.astar: basepeak = yes

483.xalancbmk: basepeak = yes

Peak Other Flags

C benchmarks:

403.gcc: -Dalloca=_alloca

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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