



# SPEC® CINT2006 Result

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## Lenovo Global Technology

SPECint®\_rate2006 = 8660

ThinkSystem SR950  
(2.10 GHz, Intel Xeon Platinum 8160T)

SPECint\_rate\_base2006 = 8540

CPU2006 license: 9017

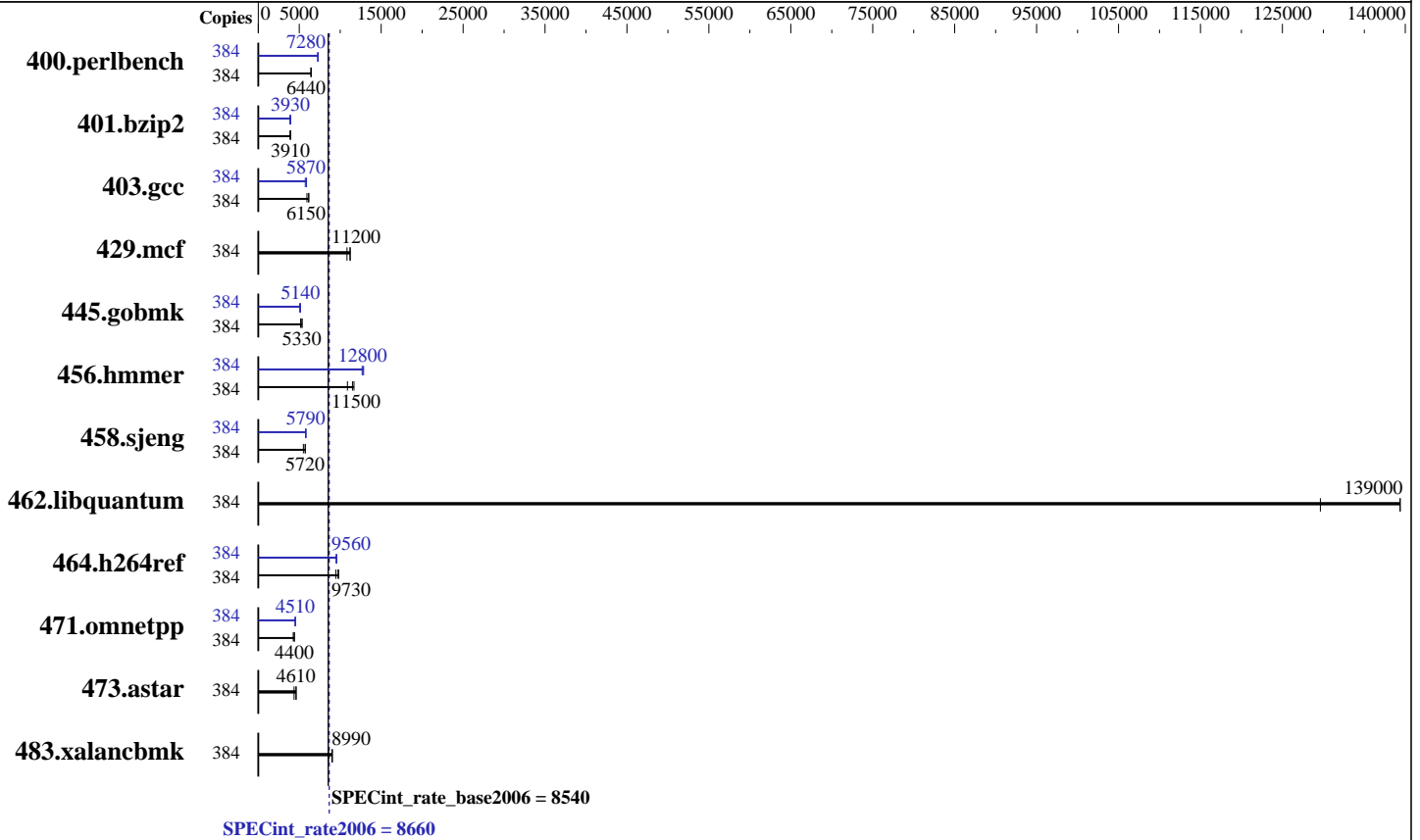
Test date: Aug-2017

Test sponsor: Lenovo Global Technology

Hardware Availability: Sep-2017

Tested by: Lenovo Global Technology

Software Availability: Apr-2017



### Hardware

CPU Name: Intel Xeon Platinum 8160T  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.70 GHz  
 CPU MHz: 2100  
 FPU: Integrated  
 CPU(s) enabled: 192 cores, 8 chips, 24 cores/chip, 2 threads/core  
 CPU(s) orderable: 2,4,8 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: 3 TB (96 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	384	582	6450	583	6440	<b>583</b>	<b>6440</b>	384	<b>515</b>	<b>7280</b>	518	7250	514	7300
401.bzip2	384	<b>947</b>	<b>3910</b>	945	3920	949	3910	384	960	3860	936	3960	<b>944</b>	<b>3930</b>
403.gcc	384	502	6160	<b>503</b>	<b>6150</b>	521	5940	384	525	5890	<b>527</b>	<b>5870</b>	539	5730
429.mcf	384	312	11200	<b>313</b>	<b>11200</b>	323	10800	384	312	11200	<b>313</b>	<b>11200</b>	323	10800
445.gobmk	384	754	5340	<b>755</b>	<b>5330</b>	780	5160	384	<b>783</b>	<b>5140</b>	797	5060	783	5150
456.hammer	384	<b>312</b>	<b>11500</b>	307	11700	329	10900	384	279	12900	283	12700	<b>281</b>	<b>12800</b>
458.sjeng	384	<b>812</b>	<b>5720</b>	811	5730	844	5500	384	806	5770	<b>802</b>	<b>5790</b>	797	5830
462.libquantum	384	57.1	139000	<b>57.1</b>	<b>139000</b>	61.4	130000	384	57.1	139000	<b>57.1</b>	<b>139000</b>	61.4	130000
464.h264ref	384	<b>873</b>	<b>9730</b>	867	9800	897	9470	384	889	9560	<b>889</b>	<b>9560</b>	895	9500
471.omnetpp	384	546	4400	<b>546</b>	<b>4400</b>	562	4270	384	<b>532</b>	<b>4510</b>	528	4540	534	4490
473.astar	384	<b>585</b>	<b>4610</b>	584	4610	617	4370	384	<b>585</b>	<b>4610</b>	584	4610	617	4370
483.xalancbmk	384	293	9050	<b>295</b>	<b>8990</b>	310	8560	384	293	9050	<b>295</b>	<b>8990</b>	310	8560

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 Mon Aug 21 04:02:37 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 8160T CPU @ 2.10GHz
 8 "physical id"s (chips)
 384 "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
physical 4:    : 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 5:    : 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 6:    : 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 7:    : 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:      3170207836 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"
```

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## Platform Notes (Continued)

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 Aug 21 03:59

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

```
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 800G 3.7G 797G 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 -[PSE105L-1.00]- 06/22/2017

Memory:

96x 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



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## 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
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/shl0.2 -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-C.20171004.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.20171004.xml>

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