# SPEC® CINT2006 Result

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## Lenovo Global Technology

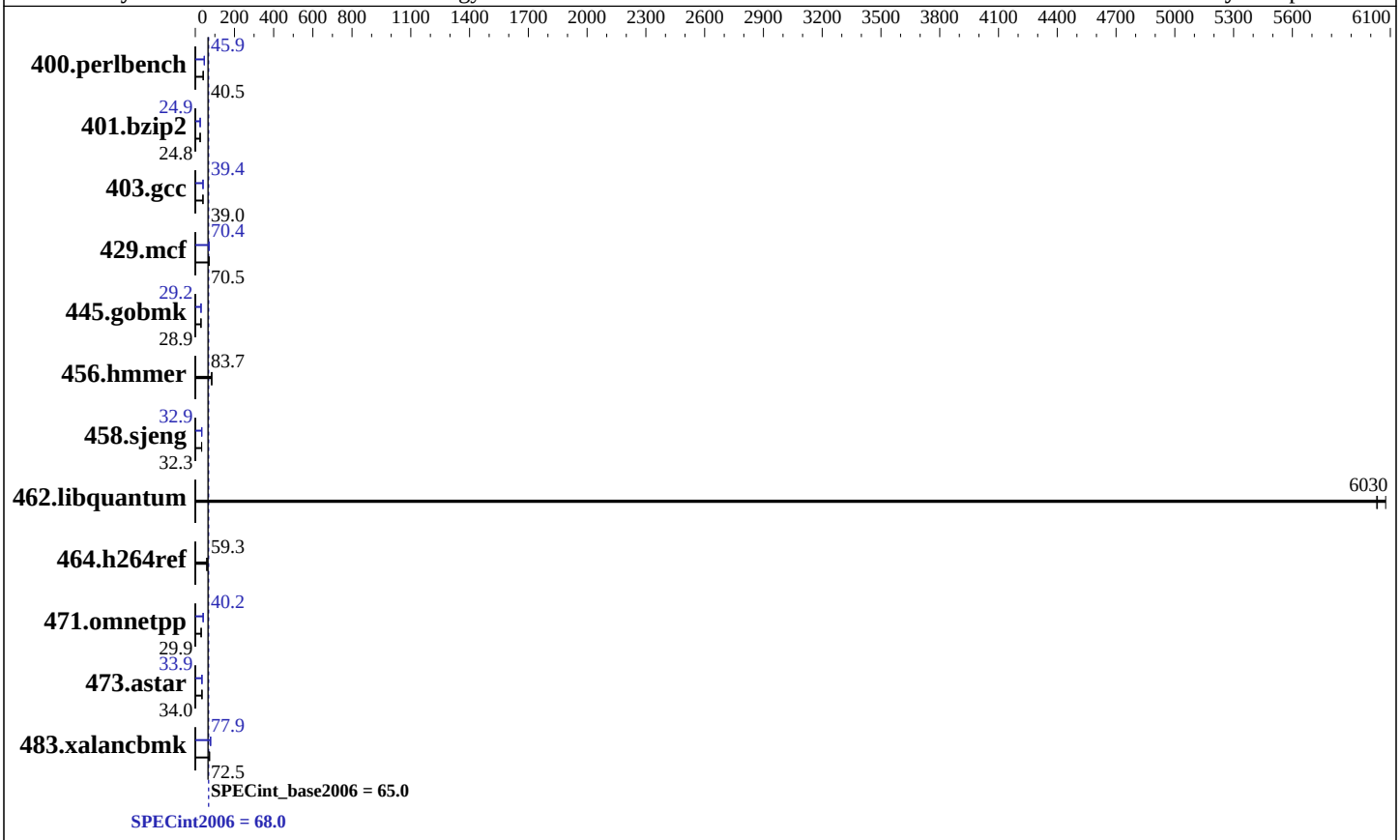
ThinkSystem SR950
(2.20 GHz, Intel Xeon Gold 5120)

SPECint®2006 = 68.0

SPECint_base2006 = 65.0

**CPU2006 license:** 9017
**Test sponsor:** Lenovo Global Technology
**Tested by:** Lenovo Global Technology

**Test date:** Dec-2017
**Hardware Availability:** Sep-2017
**Software Availability:** Apr-2017




### Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon Gold 5120 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.20 GHz |
| CPU MHz: | 2200 |
| FPU: | Integrated |
| CPU(s) enabled: | 56 cores, 4 chips, 14 cores/chip |
| 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: | 19.25 MB I+D on chip per chip |
| Other Cache: | None |
| Memory: | 1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R, running at 2400) |
| Disk Subsystem: | 1 x 800 GB SAS SSD |
| Other Hardware: | None |

### Software

| | |
|---|---|
| Operating System: | Red Hat Enterprise Linux Server release 7.3 (Maipo)<br>Kernel 3.10.0-514.el7.x86_64 |
| Compiler: | C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux |
| Auto Parallel: | Yes |
| File System: | xfs |
| System State: | Run level 3 (multi-user) |
| Base Pointers: | 32/64-bit |
| Peak Pointers: | 32/64-bit |
| Other Software: | Microquill SmartHeap V10.2 |

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## Results Table

| Benchmark | Base | | | | | | Peak | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 400.perlbench | 241 | 40.5 | **241** | **40.5** | 242 | 40.4 | 213 | 45.9 | **213** | **45.9** | 213 | 45.9 |
| 401.bzip2 | 390 | 24.7 | 390 | 24.8 | **390** | **24.8** | **388** | **24.9** | 388 | 24.9 | 388 | 24.9 |
| 403.gcc | 207 | 39.0 | **207** | **39.0** | 207 | 38.9 | **204** | **39.4** | 204 | 39.4 | 204 | 39.4 |
| 429.mcf | 131 | 69.4 | **129** | **70.5** | 129 | 70.5 | 132 | 69.2 | 129 | 70.4 | **129** | **70.4** |
| 445.gobmk | 364 | 28.8 | 363 | 28.9 | **364** | **28.9** | 359 | 29.2 | **359** | **29.2** | 359 | 29.3 |
| 456.hmmer | 111 | 83.7 | **111** | **83.7** | 111 | 83.8 | 111 | 83.7 | **111** | **83.7** | 111 | 83.8 |
| 458.sjeng | 374 | 32.3 | **374** | **32.3** | 374 | 32.3 | 367 | 32.9 | **367** | **32.9** | 367 | 32.9 |
| 462.libquantum | 3.44 | 6030 | 3.41 | 6080 | **3.43** | **6030** | 3.44 | 6030 | 3.41 | 6080 | **3.43** | **6030** |
| 464.h264ref | 371 | 59.6 | **373** | **59.3** | 373 | 59.3 | 371 | 59.6 | **373** | **59.3** | 373 | 59.3 |
| 471.omnetpp | **209** | **29.9** | 209 | 29.9 | 209 | 29.9 | 155 | 40.2 | **155** | **40.2** | 156 | 40.2 |
| 473.astar | **207** | **34.0** | 207 | 33.9 | 206 | 34.1 | 206 | 34.0 | **207** | **33.9** | 208 | 33.8 |
| 483.xalancbmk | 95.1 | 72.5 | **95.2** | **72.5** | 95.3 | 72.4 | **88.6** | **77.9** | 88.6 | 77.9 | 88.7 | 77.8 |

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

## Submit Notes

```
The config file option 'submit' was used.
```

## Operating System Notes

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

## Platform Notes

```
BIOS configuration:
Choose Operating Mode set to Maximum Performance
Hyper-Threading set to Disable
StaleAtoS 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-RHEL7.3 Sun Dec 24 20:19:54 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) Gold 5120 CPU @ 2.20GHz
       4 "physical id"s (chips)
       56 "processors"
    cores, siblings (Caution: counting these is hw and system dependent.  The
    following excerpts from /proc/cpuinfo might not be reliable.  Use with
```

Continued on next page

## Platform Notes (Continued)

```
      caution.)
         cpu cores : 14
         siblings  : 14
         physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
         physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
         physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
         physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
      cache size : 19712 KB

   From /proc/meminfo
      MemTotal:       1584772072 kB
      HugePages_Total:       0
      Hugepagesize:       2048 kB

   From /etc/*release* /etc/*version*
      os-release:
         NAME="Red Hat Enterprise Linux Server"
         VERSION="7.3 (Maipo)"
         ID="rhel"
         ID_LIKE="fedora"
         VERSION_ID="7.3"
         PRETTY_NAME="Red Hat Enterprise Linux Server 7.3 (Maipo)"
         ANSI_COLOR="0;31"
         CPE_NAME="cpe:/o:redhat:enterprise_linux:7.3:GA:server"
      redhat-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
      system-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
      system-release-cpe: cpe:/o:redhat:enterprise_linux:7.3:ga:server

   uname -a:
      Linux Proton8S-RHEL7.3 3.10.0-514.el7.x86_64 #1 SMP Wed Oct 19 11:24:13 EDT
      2016 x86_64 x86_64 x86_64 GNU/Linux

   run-level 3 Dec 24 20:19

   SPEC is set to: /home/cpu2006-1.2-ic17.0u3
      Filesystem     Type  Size  Used Avail Use% Mounted on
      /dev/sdb3      xfs   743G   22G  722G   3% /
   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 -[PSE105X-1.00]- 08/17/2017
     Memory:
      48x NO DIMM NO DIMM
      48x Samsung M393A4K40BB2-CTD 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:
KMP_AFFINITY = "granularity=fine,compact,0,3"
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"
OMP_NUM_THREADS = "56"

 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
```

## Base Compiler Invocation

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

C++ benchmarks:
```
icpc -m64
```

## Base Portability Flags

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

## Base Optimization Flags

C benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch
-auto-p32
```

C++ benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
-Wl,-z,muldefs -L/sh10.2 -lsmartheap64
```

## Base Other Flags

C benchmarks:

403.gcc: `-Dalloca=_alloca`

## Peak Compiler Invocation

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

400.perlbench: `icc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32`

445.gobmk: `icc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32`

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

473.astar: `icpc -m64`

## Peak Portability Flags

400.perlbench: `-D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX_IA32`
401.bzip2: `-DSPEC_CPU_LP64`
403.gcc: `-DSPEC_CPU_LP64`
429.mcf: `-DSPEC_CPU_LP64`
445.gobmk: `-D_FILE_OFFSET_BITS=64`
456.hmmer: `-DSPEC_CPU_LP64`
458.sjeng: `-DSPEC_CPU_LP64`
462.libquantum: `-DSPEC_CPU_LP64 -DSPEC_CPU_LINUX`
464.h264ref: `-DSPEC_CPU_LP64`
471.omnetpp: `-D_FILE_OFFSET_BITS=64`
473.astar: `-DSPEC_CPU_LP64`
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-AVX2`(pass 2)
`-par-num-threads=1`(pass 1) `-ipo`(pass 2) `-O3`(pass 2)
`-no-prec-div`(pass 2) `-qopt-prefetch`

401.bzip2: `-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 -auto-ilp32 -qopt-prefetch`

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# Peak Optimization Flags (Continued)

403.gcc: -xCORE-AVX2 -ipo -O3 -no-prec-div -inline-calloc
-qopt-malloc-options=3 -auto-ilp32

429.mcf: -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel
-qopt-prefetch -auto-p32

445.gobmk: -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)

456.hmmer: basepeak = yes

458.sjeng: -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

462.libquantum: basepeak = yes

464.h264ref: basepeak = yes

C++ benchmarks:

471.omnetpp: -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-ra-region-strategy=block
-Wl,-z,muldefs -L/sh10.2 -lsmartheap

473.astar: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-auto-p32 -Wl,-z,muldefs -L/sh10.2 -lsmartheap64

483.xalancbmk: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-Wl,-z,muldefs -L/sh10.2 -lsmartheap

# 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-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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