SPEC® CINT2006 Result

Lenovo Global Technology

ThinkSystem SR860
(2.10 GHz, Intel Xeon Platinum 8176)

SPECint®_rate2006 = 5040

SPECint_rate_base2006 = 4780

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

Copies 0 3000 7000 11000 15000 19000 23000 27000 31000 35000 39000 43000 47000 51000 55000 59000 63000 67000 71000 80000

- 400.perlbench — 224 / 4480, 224 / 3550
- 401.bzip2 — 224 / 2360, 224 / 2180
- 403.gcc — 224 / 3360, 224 / 3380
- 429.mcf — 224 / 6230
- 445.gobmk — 224 / 2940, 224 / 2950
- 456.hmmer — 224 / 8220, 224 / 6780
- 458.sjeng — 224 / 3430, 224 / 3230
- 462.libquantum — 224 / 79500
- 464.h264ref — 224 / 5610, 224 / 5460
- 471.omnetpp — 224 / 2490, 224 / 2400
- 473.astar — 224 / 2580
- 483.xalancbmk — 224 / 5060

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Hardware

CPU Name:	Intel Xeon Platinum 8176
CPU Characteristics:	Intel Turbo Boost Technology up to 3.80 GHz
CPU MHz:	2100
FPU:	Integrated
CPU(s) enabled:	112 cores, 4 chips, 28 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:	38.5 MB I+D on chip per chip
Other Cache:	None
Memory:	768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)
Disk Subsystem:	1 x 800 GB SAS SSD
Other Hardware:	None

Software

Operating System:	Red Hat Enterprise Linux Server release 7.4 (Maipo)
	Kernel 3.10.0-693.el7.x86_64
Compiler:	C/C++: Version 17.0.1.132 of Intel C/C++ Compiler for Linux
Auto Parallel:	No
File System:	xfs
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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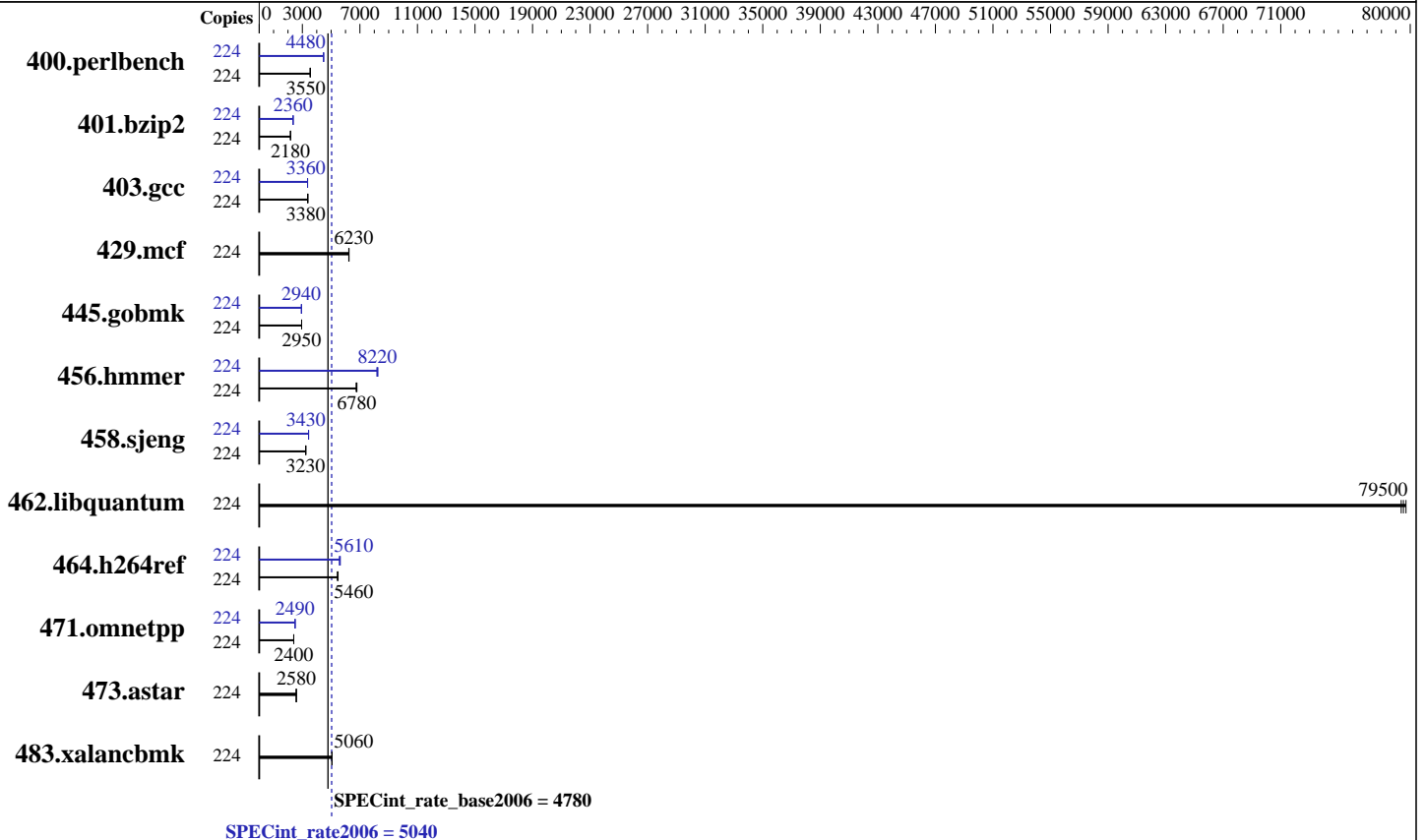**Test sponsor:** Lenovo Global Technology
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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
400.perlbench	224	617	3550	616	3550	**616**	**3550**	224	**489**	**4480**	488	4480	491	4460
401.bzip2	224	988	2190	996	2170	**993**	**2180**	224	918	2350	916	2360	**917**	**2360**
403.gcc	224	536	3360	**534**	**3380**	533	3380	224	537	3360	**536**	**3360**	536	3360
429.mcf	224	327	6250	328	6230	**328**	**6230**	224	327	6250	328	6230	**328**	**6230**
445.gobmk	224	**797**	**2950**	796	2950	797	2950	224	**800**	**2940**	800	2940	798	2940
456.hmmer	224	308	6790	310	6730	**308**	**6780**	224	**254**	**8220**	253	8250	256	8180
458.sjeng	224	838	3230	837	3240	**838**	**3230**	224	790	3430	**790**	**3430**	789	3430
462.libquantum	224	58.5	79400	58.2	79700	**58.4**	**79500**	224	58.5	79400	58.2	79700	**58.4**	**79500**
464.h264ref	224	**908**	**5460**	912	5430	904	5480	224	**883**	**5610**	890	5570	879	5640
471.omnetpp	224	583	2400	**583**	**2400**	582	2400	224	562	2490	**561**	**2490**	561	2500
473.astar	224	610	2580	609	2580	**610**	**2580**	224	610	2580	609	2580	**610**	**2580**
483.xalancbmk	224	**306**	**5060**	306	5060	305	5060	224	**306**	**5060**	306	5060	305	5060

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
    Intel Virtualization Technology set to Disable
    DCU Streamer Prefetcher set to Disable
    DCA set to Enable
    MONITORMWAIT set to Enable
    SNC set to Enable
    Per Core P-state set to Disable
    Stale AtoS set to Enable
    LLC Deadline Alloc set to Disable
     Sysinfo program /home/cpu2006-1.2-ic17.0u1/config/sysinfo.rev6993
     Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
     running on SR860 Sat Dec 9 22:45:34 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

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Platform Notes (Continued)

```
From /proc/cpuinfo
   model name : Intel(R) Xeon(R) Platinum 8176 CPU @ 2.10GHz
      4 "physical id"s (chips)
      224 "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 : 28
      siblings  : 56
      physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
      25 26 27 28 29 30
      physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
      25 26 27 28 29 30
      physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
      25 26 27 28 29 30
      physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
      25 26 27 28 29 30
   cache size : 39424 KB

From /proc/meminfo
   MemTotal:       792254220 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 SR860 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

run-level 3 Dec 9 22:26

SPEC is set to: /home/cpu2006-1.2-ic17.0u1
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda4      xfs   686G   15G  671G   3% /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
```

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Platform Notes (Continued)

        determined", but the intent may not be met, as there are frequent changes to
        hardware, firmware, and the "DMTF SMBIOS" standard.

      BIOS Lenovo -[TEE117I-1.10]- 10/19/2017
      Memory:
      48x 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-ic17.0u1/lib/ia32:/home/cpu2006-1.2-ic17.0u1/lib/intel64:/home/cpu2006-1.2-ic17.0u1/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:
     echo 1>   /proc/sys/vm/drop_caches
     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
            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

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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
```

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
```

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Peak Portability Flags (Continued)

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`

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`

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Peak Optimization Flags (Continued)

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-revD.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-revD.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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