SPEC® CINT2006 Result

Lenovo Global Technology

SPECint®_rate2006 =   1880

ThinkSystem ST550
(2.00 GHz, Intel Xeon Gold 6138)

SPECint_rate_base2006 = 1760

CPU2006 license: 9017
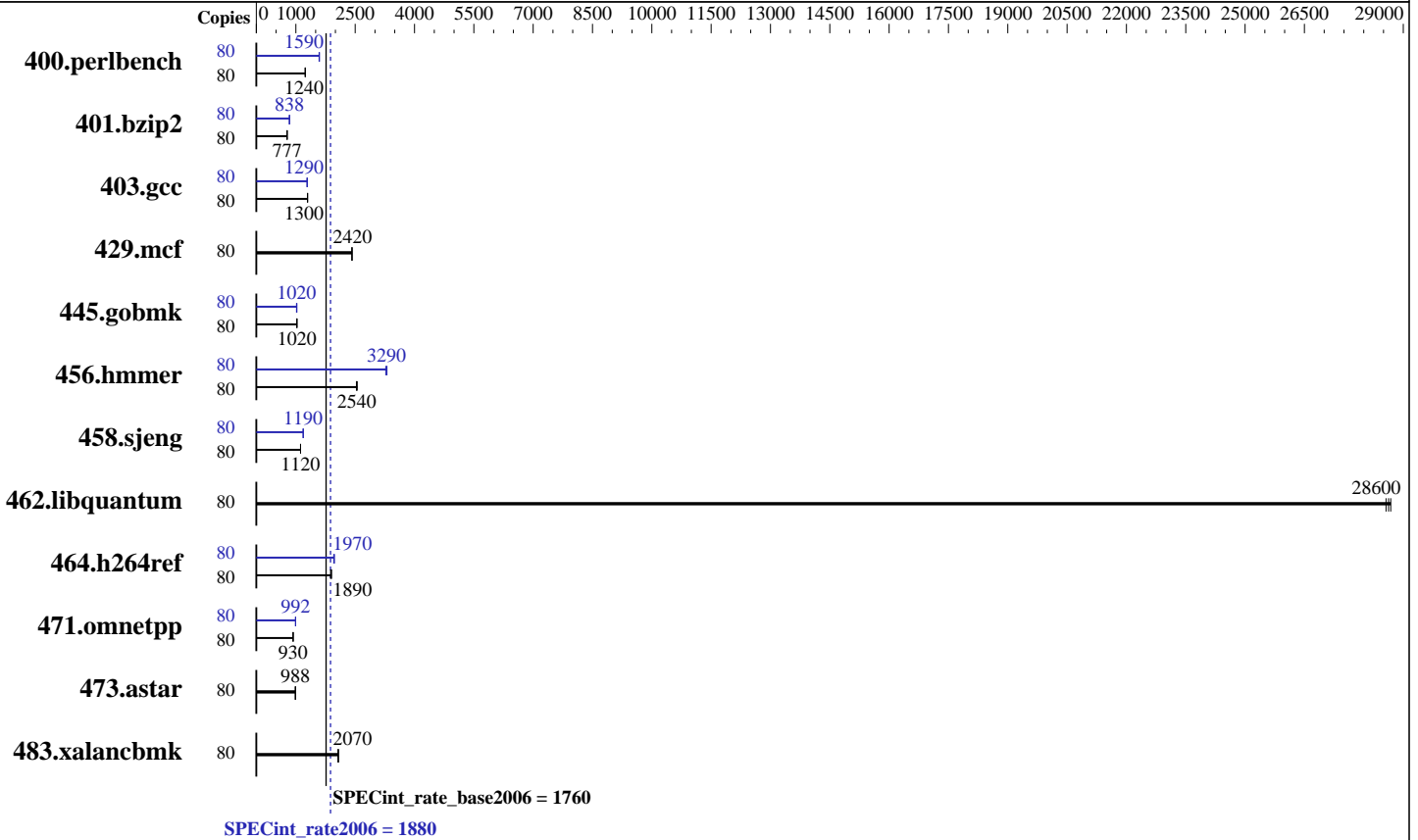
Test sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test date: Jun-2017

Hardware Availability: Aug-2017

Software Availability: Nov-2016

Copies 0 1000 2500 4000 5500 7000 8500 10000 11500 13000 14500 16000 17500 19000 20500 22000 23500 25000 26500 29000

- 400.perlbench — 80: 1590, 80: 1240
- 401.bzip2 — 80: 838, 80: 777
- 403.gcc — 80: 1290, 80: 1300
- 429.mcf — 80: 2420
- 445.gobmk — 80: 1020, 80: 1020
- 456.hmmer — 80: 3290, 80: 2540
- 458.sjeng — 80: 1190, 80: 1120
- 462.libquantum — 80: 28600
- 464.h264ref — 80: 1970, 80: 1890
- 471.omnetpp — 80: 992, 80: 930
- 473.astar — 80: 988
- 483.xalancbmk — 80: 2070

SPECint_rate_base2006 = 1760

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Hardware

CPU Name: Intel Xeon Gold 6138

CPU Characteristics: Intel Turbo Boost Technology up to 3.70 GHz

CPU MHz: 2000

FPU: Integrated

CPU(s) enabled: 40 cores, 2 chips, 20 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

L3 Cache: 27.5 MB I+D on chip per chip

Other Cache: None

Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R)

Disk Subsystem: 1 x 800 GB SATA SSD

Other Hardware: None

Software

Operating System: SUSE Linux Enterprise Server 12 SP2 (x86_64) Kernel 4.4.21-69-default

Compiler: C/C++: Version 17.0.1.132 of Intel C/C++ Compiler for Linux

Auto Parallel: No

File System: btrfs

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	80	631	1240	632	1240	**631**	**1240**	80	493	1590	**490**	**1590**	490	1590
401.bzip2	80	994	777	989	780	**993**	**777**	80	**921**	**838**	923	837	919	840
403.gcc	80	**497**	**1300**	497	1300	497	1300	80	502	1280	**501**	**1290**	499	1290
429.mcf	80	**302**	**2420**	301	2420	302	2420	80	**302**	**2420**	301	2420	302	2420
445.gobmk	80	815	1030	821	1020	**819**	**1020**	80	**821**	**1020**	819	1020	826	1020
456.hmmer	80	**294**	**2540**	293	2550	295	2530	80	228	3270	226	3300	**227**	**3290**
458.sjeng	80	866	1120	865	1120	**865**	**1120**	80	816	1190	**816**	**1190**	816	1190
462.libquantum	80	57.8	28700	**57.9**	**28600**	58.0	28600	80	57.8	28700	**57.9**	**28600**	58.0	28600
464.h264ref	80	943	1880	931	1900	**936**	**1890**	80	898	1970	**899**	**1970**	904	1960
471.omnetpp	80	**538**	**930**	538	930	537	931	80	503	994	504	991	**504**	**992**
473.astar	80	568	988	568	989	**568**	**988**	80	568	988	568	989	**568**	**988**
483.xalancbmk	80	**266**	**2070**	267	2070	266	2080	80	**266**	**2070**	267	2070	266	2080

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
     DCU Streamer Prefetcher set to Disable
     SNC set to Enable
     Per Core P-state set to Disable
     Stale AtoS set to Enable
     LLC dead line alloc set to Disable
    Sysinfo program /home/cpu2006-1.2-ic17.0u1/config/sysinfo.rev6993
    Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
    running on ST550 Wed Jun 14 08:53:32 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 6138 CPU @ 2.00GHz
```
Continued on next page

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Platform Notes (Continued)

```
    2 "physical id"s (chips)
    80 "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 : 20
    siblings  : 40
    physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
    physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
  cache size : 28160 KB

From /proc/meminfo
  MemTotal:       395881920 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 ST550 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 Jun 14 08:51

SPEC is set to: /home/cpu2006-1.2-ic17.0u1
  Filesystem      Type    Size  Used Avail Use% Mounted on
  /dev/sdb2       btrfs  744G  155G  586G  21% /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 -[O0E105R-1.00]- 04/27/2017
  Memory:
  12x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666 MHz
```

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Platform Notes (Continued)

```
(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
```

Base Optimization Flags

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

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Base Optimization Flags (Continued)

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`
483.xalancbmk: `-D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX`

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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`

    473.astar: `basepeak = yes`

    483.xalancbmk: `basepeak = yes`

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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-C.html

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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-C.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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