Lenovo Global Technology
ThinkSystem ST550
(2.40 GHz, Intel Xeon Gold 5115)

SPECint\_rate2006 = 1020
SPECint\_rate\_base2006 = 973

Hardware:
- CPU Name: Intel Xeon Gold 5115
- CPU Characteristics: Intel Turbo Boost Technology up to 3.20 GHz
- CPU MHz: 2400
- FPU: Integrated
- CPU(s) enabled: 20 cores, 2 chips, 10 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: 13.75 MB I+D on chip per chip
- Other Cache: None
- Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R, running at 2400 MHz)
- 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 17.0.0.098 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

Test sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology
CPU2006 license: 9017
Test date: Aug-2017
Hardware Availability: Aug-2017
Software Availability: Nov-2016
## Lenovo Global Technology

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<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Copies</td>
<td>Seconds</td>
</tr>
<tr>
<td>400.perlbench</td>
<td>40</td>
<td>535</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>40</td>
<td>893</td>
</tr>
<tr>
<td>403.gcc</td>
<td>40</td>
<td>466</td>
</tr>
<tr>
<td>429.mcf</td>
<td>40</td>
<td>263</td>
</tr>
<tr>
<td>445.gobmk</td>
<td>40</td>
<td>669</td>
</tr>
<tr>
<td>456.hmmer</td>
<td>40</td>
<td>255</td>
</tr>
<tr>
<td>458.sjeng</td>
<td>40</td>
<td>725</td>
</tr>
<tr>
<td>462.libquantum</td>
<td>40</td>
<td>82.9</td>
</tr>
<tr>
<td>464.h264ref</td>
<td>40</td>
<td>775</td>
</tr>
<tr>
<td>471.omnetpp</td>
<td>40</td>
<td>499</td>
</tr>
<tr>
<td>473.astar</td>
<td>40</td>
<td>497</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>40</td>
<td>232</td>
</tr>
</tbody>
</table>

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
- Per Core P-state set to Disable
- UPI Prefetcher set to Disable
- Stale AtoS set to Enable
- LLC dead line alloc set to Disable

**Sysinfo program** /home/cpu2006-1.2-ic17.0/config/sysinfo.rev6993  
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)  
running on ST550 Mon Aug 28 05:20:14 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

```plaintext
model name : Intel(R) Xeon(R) Gold 5115 CPU @ 2.40GHz
```

Continued on next page
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Platform Notes (Continued) 

2 "physical id"s (chips) 
40 "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 : 10 
siblings : 20 
physical 0: cores 0 1 2 3 4 8 9 10 11 12 
physical 1: cores 0 1 2 3 4 8 9 10 11 12 
cache size : 14080 KB 

From /proc/meminfo 
MemTotal: 395883500 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 Aug 28 05:16 

SPEC is set to: /home/cpu2006-1.2-ic17.0 
Filesystem Type Size Used Avail Use% Mounted on 
/dev/sdb2 btrfs 744G 132G 609G 18% /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 -[00E105R-1.00]- 04/27/2017 
Memory: 
12x Hynix HMA84GR7AFR4N-VK 32 GB 2 rank 2666 MHz, configured at 2400 MHz 

Continued on next page
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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-ic17.0/libs/32:/home/cpu2006-1.2-ic17.0/libs/64:/home/cpu2006-1.2-ic17.0/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:

```
<etc>
enodectl --interleave=all runspec
```

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:
-xxCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch
-qopt-mem-layout-trans=3
```

Continued on next page
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CPU2006 license: 9017
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### Base Optimization Flags (Continued)

C++ benchmarks:
- -xCORE-AVX2
  -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-AVX2(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-AVX2(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-AVX2 -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-AVX2(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-AVX2 -ipo -O3 -no-prec-div -unroll12 -auto-ilp32
-qopt-mem-layout-trans=3

462.libquantum: basepeak = yes

464.h264ref: -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) -unroll12 -qopt-mem-layout-trans=3

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
-qopt-mem-layout-trans=3 -Wl,-z,muldefs
-L/sh10.2 -lsmartheap

473.astar: basepeak = yes

483.xalancbmk: basepeak = yes
SPEC CINT2006 Result

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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.html
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-C.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.xml
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-C.xml

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