SPEC® CPU2017 Integer Speed Result

Lenovo Global Technology
ThinkSystem SR650
(2.10 GHz, Intel Xeon Silver 4110)

| SPECspeed2017_int_base | 6.89 |
| SPECspeed2017_int_peak | 7.10 |

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Threads

600.perlbench_s 16
602.gcc_s 16
605.mcf_s 16
620.omnetpp_s 16
623.xalancbmk_s 16
625.x264_s 16
631.deepsjeng_s 16
641.leela_s 16
648.exchange2_s 16
657.xz_s 16

Hardware
CPU Name: Intel Xeon Silver 4110
Max MHz.: 3000
Nominal: 2100
Enabled: 16 cores, 2 chips
Orderable: 1,2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 11 MB I+D on chip per chip
Other: None
Memory: 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)
Storage: 1 x 800 GB SAS SSD
Other: None

Software
OS: SUSE Linux Enterprise Server 12 SP2 (x86_64)
Kernel 4.4.21-69-default
Compiler: C/C++: Version 18.0.0.128 of Intel C/C++
Compiler for Linux:
Fortran: Version 18.0.0.128 of Intel Fortran
Compiler for Linux
Parallel: Yes
Firmware: Lenovo BIOS Version IVE111C 1.00 released Jul-2017
File System: btrfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other: jemalloc: jemalloc memory allocator library V5.0.1;
jemalloc: configured and built at default for 32bit (i686) and 64bit (x86_64) targets;
jemalloc: built with the RedHat Enterprise 7.4,
and the system compiler gcc 4.8.5;
jemalloc: sources available from jemalloc.net or releases

Test Date: Jan-2018
Hardware Availability: Aug-2017
Software Availability: Sep-2017
Operating System Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017.1.0.2.ic18.0/lib/ia32:/home/cpu2017.1.0.2.ic18.0/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017.1.0.2.ic18.0/je5.0.1-32:/home/cpu2017.1.0.2.ic18.0/je5.0.1-64"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.4
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
    sync; echo 3> /proc/sys/vm/drop_caches
No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
No: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.
No: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

This benchmark result is intended to provide perspective on past performance using the historical hardware and/or software described on this result page.

The system as described on this result page was formerly

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General Notes (Continued)

generally available. At the time of this publication, it may not be shipping, and/or may not be supported, and/or may fail to meet other tests of General Availability described in the SPEC OSG Policy document, http://www.spec.org/osg/policy.html

This measured result may not be representative of the result that would be measured were this benchmark run with hardware and software available as of the publication date.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Hyper-Threading set to Disable
MONITOR\MWAIT set to Enable
Adjacent Cache Prefetch set to Disable
XPT Prefetcher set to Enable
Stale AtoS set to Enable
DCA set to Enable
Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on Cyborg-SPECcpu2006-SUSE12SP2 Wed Jan 3 18:31:21 2018

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo
model name : Intel(R) Xeon(R) Silver 4110 CPU @ 2.10GHz
  2 "physical id"s (chips)
  16 "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 : 8
siblings : 8
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 1
Core(s) per socket: 8

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**Platform Notes (Continued)**

Socket(s): 2  
NUMA node(s): 2  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 85  
Model name: Intel(R) Xeon(R) Silver 4110 CPU @ 2.10GHz  
Stepping: 4  
CPU MHz: 2095.080  
BogoMIPS: 4190.16  
Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 1024K  
L3 cache: 11264K  
NUMA node0 CPU(s): 0-7  
NUMA node1 CPU(s): 8-15  
Flags:  
```
fpvme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
aperfmpref eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat pfn pt dtherm intel_pt
tpr_shadow vt xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc
```

```
/proc/cpuinfo cache data
   cache size : 11264 KB
```

```
From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
   available: 2 nodes (0-1)
   node 0 cpus: 0 1 2 3 4 5 6 7
   node 0 free: 192381 MB
   node 1 cpus: 8 9 10 11 12 13 14 15
   node 1 free: 192739 MB
   node distances:
   node 0 1
   0: 10 21
   1: 21 10
```

```
From /proc/meminfo
   MemTotal: 395894464 kB
   HugePages_Total: 0
   Hugepagesize: 2048 kB
```

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**Platform Notes (Continued)**

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 Cyborg-SPECcpu2006-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 Jan 3 18:29

SPEC is set to: /home/cpu2017.1.0.2.ic18.0

```
+-----------------+----------+----------+----------+----------+----------+----------+
<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sdb2</td>
<td>btrfs</td>
<td>744G</td>
<td>174G</td>
<td>570G</td>
<td>24%</td>
<td>/home</td>
</tr>
</tbody>
</table>
```

Additional information from dmidecode follows. 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 -[IVE111C-1.00]- 07/17/2017
Memory:
   24x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

**Compiler Version Notes**

```plaintext
==============================================================================
CC  600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base, peak) 657.xz_s(base)
==============================================================================
```

icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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SPECspeed2017_int_base = 6.89
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Compiler Version Notes (Continued)

CC 600.perlibench_s(peak) 602.gcc_s(peak) 605.mcf_s(peak) 657.xz_s(peak)
-------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
641.leela_s(base)
-------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

CXXC 620.omnetpp_s(peak) 623.xalancbmk_s(peak) 631.deepsjeng_s(peak)
641.leela_s(peak)
-------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

FC 648.exchange2_s(base, peak)
-------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

Base Compiler Invocation
C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort
Lenovo Global Technology
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<table>
<thead>
<tr>
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<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_int_base</td>
<td>6.89</td>
</tr>
<tr>
<td>SPECspeed2017_int_peak</td>
<td>7.10</td>
</tr>
</tbody>
</table>

**Base Portability Flags**

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

**Base Optimization Flags**

C benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc

Fortran benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
-L/usr/local/je5.0.1-64/lib -ljemalloc

**Base Other Flags**

C benchmarks:
-m64 -std=c11

C++ benchmarks:
-m64

Fortran benchmarks:
-m64
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### CPU2017 License
9017

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Lenovo Global Technology

### Tested by
Lenovo Global Technology

### Test Date
Jan-2018

### Hardware Availability
Aug-2017

### Software Availability
Sep-2017

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### Peak Compiler Invocation

- **C benchmarks:**  
  - icc

- **C++ benchmarks:**  
  - icpc

- **Fortran benchmarks:**  
  - ifort

---

### Peak Portability Flags

- 600.perlbench_s: 
  - DSPEC_LP64  
  - DSPEC_LINUX_X64

- 602.gcc_s:  
  - DSPEC_LP64

- 605.mcf_s:  
  - DSPEC_LP64

- 620.omnetpp_s:  
  - DSPEC_LP64

- 623.xalancbmk_s:  
  - D_FILE_OFFSET_BITS=64  
  - DSPEC_LINUX

- 625.x264_s:  
  - DSPEC_LP64

- 631.deepsjeng_s:  
  - DSPEC_LP64

- 641.leela_s:  
  - DSPEC_LP64

- 648.exchange2_s:  
  - DSPEC_LP64

- 657.xz_s:  
  - DSPEC_LP64

---

### Peak Optimization Flags

- **C benchmarks:**
  
  - 600.perlbench_s:  
    - -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2  
    - -xCORE-AVX512  
    - gopt-mem-layout-trans=3 -ipo -03  
    - -no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp  
    - -DSPEC_OPENMP -fno-strict-overflow  
    - -L/usr/local/je5.0.1-64/lib -ljemalloc

  - 602.gcc_s:  
    - -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2  
    - -xCORE-AVX512  
    - gopt-mem-layout-trans=3 -ipo -03  
    - -no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp  
    - -DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc

  - 605.mcf_s:  
    - -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
    - -xCORE-AVX512 -03 -no-prec-div -gopt-mem-layout-trans=3  
    - -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP  
    - -L/usr/local/je5.0.1-64/lib -ljemalloc

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### Peak Optimization Flags (Continued)

- 625.x264_s: `-Wl,-z, muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
  -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
  -L/usr/local/je5.0.1-64/lib -ljemalloc`

- 657.xz_s: Same as 602.gcc_s

### C++ benchmarks:

- 620.omnetpp_s: `-Wl,-z, muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
  -xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
  -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
  -L/usr/local/je5.0.1-64/lib -ljemalloc`

- 623.xalancbmk_s: `-L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32
  -Wl,-z, muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
  -xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
  -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
  -L/usr/local/je5.0.1-32/lib -ljemalloc`

- 631.deepsjeng_s: Same as 620.omnetpp_s

- 641.leela_s: Same as 620.omnetpp_s

### Fortran benchmarks:

- `-Wl,-z, muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
  -qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
  -L/usr/local/je5.0.1-64/lib -ljemalloc`

### Peak Other Flags

### C benchmarks:

- `-m64 -std=c11`

### C++ benchmarks (except as noted below):

- `-m64`

- 623.xalancbmk_s: `-m32`

### Fortran benchmarks:

- `-m64`
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**Test Date:** Jan-2018  
**Hardware Availability:** Aug-2017  
**Software Availability:** Sep-2017  

The flags files that were used to format this result can be browsed at:
- [http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.html](http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.html)  

You can also download the XML flags sources by saving the following links:
- [http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.xml](http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.xml)  

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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