# Lenovo Global Technology

## ThinkSystem SR570
(2.60 GHz, Intel Xeon Silver 4112)

### SPEC® CPU2017 Integer Rate Result

- **Test Sponsor:** Lenovo Global Technology
- **Test Date:** Jan-2018
- **Hardware Availability:** Nov-2017
- **Software Availability:** Sep-2017

<table>
<thead>
<tr>
<th>Copies</th>
<th>SPECrate2017_int_base</th>
<th>SPECrate2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>0</td>
<td>80.0</td>
</tr>
<tr>
<td>32</td>
<td>20.0</td>
<td>128.0</td>
</tr>
<tr>
<td>64</td>
<td>40.0</td>
<td>160.0</td>
</tr>
<tr>
<td>96</td>
<td>60.0</td>
<td>180.0</td>
</tr>
<tr>
<td>128</td>
<td>80.0</td>
<td>200.0</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Silver 4112
- **Max MHz.:** 3000
- **Nominal:** 2600
- **Enabled:** 8 cores, 2 chips, 2 threads/core
- **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:** 8.25 MB I+D on chip per chip
- **Other:** None
- **Memory:** 192 GB (12 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 SP3 (x86_64)
- **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
- **Firmware:** Lenovo BIOS Version TEE119J 1.20 released Sep-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
### Lenovo Global Technology
ThinkSystem SR570
(2.60 GHz, Intel Xeon Silver 4112)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>16</td>
<td>784</td>
<td>32.5</td>
<td>786</td>
<td>32.4</td>
<td>797</td>
<td>32.0</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>16</td>
<td>581</td>
<td>39.0</td>
<td>577</td>
<td>39.2</td>
<td>579</td>
<td>39.1</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>16</td>
<td>460</td>
<td>56.2</td>
<td>462</td>
<td>55.9</td>
<td>477</td>
<td>54.2</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>16</td>
<td>775</td>
<td>27.1</td>
<td>781</td>
<td>26.9</td>
<td>779</td>
<td>26.9</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>16</td>
<td>352</td>
<td>48.0</td>
<td>349</td>
<td>48.5</td>
<td>352</td>
<td>48.0</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>16</td>
<td>326</td>
<td>86.0</td>
<td>332</td>
<td>84.5</td>
<td>324</td>
<td>86.4</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>16</td>
<td>487</td>
<td>37.6</td>
<td>488</td>
<td>37.6</td>
<td>490</td>
<td>37.4</td>
</tr>
<tr>
<td>541.leea_r</td>
<td>16</td>
<td>763</td>
<td>34.7</td>
<td>761</td>
<td>34.8</td>
<td>764</td>
<td>34.7</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>16</td>
<td>512</td>
<td>81.8</td>
<td>513</td>
<td>81.8</td>
<td>511</td>
<td>82.0</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>16</td>
<td>547</td>
<td>31.6</td>
<td>547</td>
<td>31.6</td>
<td>544</td>
<td>31.8</td>
</tr>
</tbody>
</table>

**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>16</td>
<td>784</td>
<td>32.5</td>
<td>786</td>
<td>32.4</td>
<td>797</td>
<td>32.0</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>16</td>
<td>581</td>
<td>39.0</td>
<td>577</td>
<td>39.2</td>
<td>579</td>
<td>39.1</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>16</td>
<td>460</td>
<td>56.2</td>
<td>462</td>
<td>55.9</td>
<td>477</td>
<td>54.2</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>16</td>
<td>775</td>
<td>27.1</td>
<td>781</td>
<td>26.9</td>
<td>779</td>
<td>26.9</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>16</td>
<td>352</td>
<td>48.0</td>
<td>349</td>
<td>48.5</td>
<td>352</td>
<td>48.0</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>16</td>
<td>326</td>
<td>86.0</td>
<td>332</td>
<td>84.5</td>
<td>324</td>
<td>86.4</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>16</td>
<td>487</td>
<td>37.6</td>
<td>488</td>
<td>37.6</td>
<td>490</td>
<td>37.4</td>
</tr>
<tr>
<td>541.leea_r</td>
<td>16</td>
<td>763</td>
<td>34.7</td>
<td>761</td>
<td>34.8</td>
<td>764</td>
<td>34.7</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>16</td>
<td>512</td>
<td>81.8</td>
<td>513</td>
<td>81.8</td>
<td>511</td>
<td>82.0</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>16</td>
<td>547</td>
<td>31.6</td>
<td>547</td>
<td>31.6</td>
<td>544</td>
<td>31.8</td>
</tr>
</tbody>
</table>

**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"

**General 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"
```

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
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
```

jemalloc: configured and built at default for 32bit (i686) and 64bit (x86_64) targets;
nemalloc: built with the RedHat Enterprise 7.4, and the system compiler gcc 4.8.5;
nemalloc: sources available from jemalloc.net or

(Continued on next page)
General Notes (Continued)

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 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
DCU Streamer Prefetcher set to Enable
MONITOR/MWAIT set to Enable
SNC set to Enable
XPT Prefetcher set to Enable
Stale AtoS set to Enable
LLC Deadline Alloc set to Disable
Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bccc091cf0f
running on linux-uru4 Thu Jan 18 05:56:32 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 4112 CPU @ 2.60GHz
  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 : 4
  siblings : 8
  physical 0: cores 1 2 3 4

(Continued on next page)
**Platform Notes (Continued)**

```
physical 1: cores 1 2 4 5

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: 2
Core(s) per socket: 4
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4112 CPU @ 2.60GHz
Stepping: 4
CPU MHz: 2593.906
BogoMIPS: 5187.81
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 8448K
NUMA node0 CPU(s): 0-3,8-11
NUMA node1 CPU(s): 4-7,12-15
Flags: fpu vme de pse tsc msr pae mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc aperfmperf eagerfpu nni 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 epb pni pclmulqdq dtes64_64bit smap cx16 stp lse cpuid cmovxs3dnow pdcm sse turbo msr aarch64 smep bmi2 bmi1 aasimov vfpv13 dbrfs mrcp sahfp tsc_adjust bmi1 hle avx2 smep bmi2 smep avx512f avx512dq rseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc pku ospke
```

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 8 9 10 11
node 0 size: 96060 MB
node 0 free: 95652 MB
node 1 cpus: 4 5 6 7 12 13 14 15
node 1 size: 96749 MB
```
### Lenovo Global Technology

**ThinkSystem SR570**  
(2.60 GHz, Intel Xeon Silver 4112)

<table>
<thead>
<tr>
<th>SPEC CPU2017 Integer Rate Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td><strong>SPECrate2017_int_base</strong> = 43.9</td>
</tr>
<tr>
<td><strong>SPECrate2017_int_peak</strong> = 45.8</td>
</tr>
</tbody>
</table>

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

**Test Date:** Jan-2018  
**Hardware Availability:** Nov-2017  
**Software Availability:** Sep-2017

---

#### Platform Notes (Continued)

```
node 1 free: 96378 MB
node distances:
node  0  1  
 0: 10  21
 1: 21  10

From /proc/meminfo
MemTotal: 197437636 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
SuSE-release:
  SUSE Linux Enterprise Server 12 (x86_64)
  VERSION = 12
  PATCHLEVEL = 3
  # 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-SP3"
  VERSION_ID="12.3"
  PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
  ID="sles"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:12:sp3"

uname -a:
  Linux linux-uru4 4.4.73-5-default #1 SMP Tue Jul 4 15:33:39 UTC 2017 (b7ce4e4) x86_64
  x86_64 x86_64 GNU/Linux

run-level 3 Jan 18 05:55

SPEC is set to: /home/cpu2017.1.0.2.ic18.0
  Filesystem   Type  Size  Used Avail Use% Mounted on
  /dev/sdb2    btrfs  744G  32G  711G  5% /home

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 -[TEE119J-1.20]- 09/06/2017
  Memory:
    4x NO DIMM NO DIMM
    12x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666, configured at 2400
```

(End of data from sysinfo program)
Lenovo Global Technology
ThinkSystem SR570
(2.60 GHz, Intel Xeon Silver 4112)

<table>
<thead>
<tr>
<th>CPU2017 License</th>
<th>Lenovo Global Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Tested by</td>
<td>Lenovo Global Technology</td>
</tr>
</tbody>
</table>

**Specrate2017_int_base = 43.9**

**Specrate2017_int_peak = 45.8**

**Compiler Version Notes**

```
==============================================================================
CC  500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
    525.x264_r(base, peak) 557.xz_r(base, peak)
==============================================================================
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

```
==============================================================================
CC  500.perlbench_r(peak) 502.gcc_r(peak)
==============================================================================
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

```
==============================================================================
CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
    541.leela_r(base)
==============================================================================
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

```
==============================================================================
CXXC 520.omnetpp_r(peak) 523.xalancbmk_r(peak) 531.deepsjeng_r(peak)
    541.leela_r(peak)
==============================================================================
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

```
==============================================================================
FC  548.exchange2_r(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

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR570
(2.60 GHz, Intel Xeon Silver 4112)

SPECr2017_int_base = 43.9
SPECr2017_int_peak = 45.8

Test Date: Jan-2018
Hardware Availability: Nov-2017
Software Availability: Sep-2017

Base Compiler Invocation (Continued)

Fortran benchmarks:
ifort

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-W1, -z, muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:
-W1, -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:
-W1, -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

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR570
(2.60 GHz, Intel Xeon Silver 4112)

**SPECrate2017_int_base** = 43.9
**SPECrate2017_int_peak** = 45.8

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

**Test Date:** Jan-2018
**Hardware Availability:** Nov-2017
**Software Availability:** Sep-2017

### Base Other Flags (Continued)

Fortran benchmarks:

- `-m64`

### Peak Compiler Invocation

**C benchmarks:**

- `icc`

**C++ benchmarks:**

- `icpc`

Fortran benchmarks:

- `ifort`

### Peak Portability Flags

500.perlbench_r: `-DSPEC_LP64 -DSPEC_LINUX_X64`
502.gcc_r: `-D_FILE_OFFSET_BITS=64`
505.mcf_r: `-DSPEC_LP64`
520.omnetpp_r: `-DSPEC_LP64`
523.xalancbmk_r: `-D_FILE_OFFSET_BITS=64 -DSPEC_LINUX`
525.x264_r: `-DSPEC_LP64`
531.deepsjeng_r: `-DSPEC_LP64`
541.leela_r: `-DSPEC_LP64`
548.exchange2_r: `-DSPEC_LP64`
557.xz_r: `-DSPEC_LP64`

### Peak Optimization Flags

**C benchmarks:**

500.perlbench_r: `-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-fno-strict-overflow -L/usr/local/je5.0.1-64/lib
-ljemalloc`

502.gcc_r: `-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
-L/usr/local/je5.0.1-32/lib -ljemalloc`

(Continued on next page)
Peak Optimization Flags (Continued)

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

525.x264_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div 
-qopt-mem-layout-trans=3 -fno-alias 
-L/usr/local/je5.0.1-64/lib -ljemalloc

557.xz_r: Same as 505.mcf_r

C++ benchmarks:

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

523.xalancbmk_r: -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 
-L/usr/local/je5.0.1-32/lib -ljemalloc

531.deepsjeng_r: Same as 520.omnetpp_r

541.leela_r: Same as 520.omnetpp_r

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 (except as noted below):

-m64 -std=c11

502.gcc_r: -m32 -std=c11

C++ benchmarks (except as noted below):

-m64

523.xalancbmk_r: -m32
SPEC CPU2017 Integer Rate Result

Lenovo Global Technology
ThinkSystem SR570
(2.60 GHz, Intel Xeon Silver 4112)

SPECrate2017_int_base = 43.9
SPECrate2017_int_peak = 45.8

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

Test Date: Jan-2018
Hardware Availability: Nov-2017
Software Availability: Sep-2017

Peak Other Flags (Continued)

Fortran benchmarks:
- m64

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

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/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-A.xml

SPEC is a registered trademark of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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

Tested with SPEC CPU2017 v1.0.2 on 2018-01-17 16:56:32-0500.
Originally published on 2018-03-06.