### Lenovo Global Technology
ThinkSystem SR550
(2.10 GHz, Intel Xeon Silver 4116)

<table>
<thead>
<tr>
<th><strong>Threads</strong></th>
<th><strong>spec</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>603.bwaves_s</strong> 24</td>
<td>603.bwaves_s 24</td>
</tr>
<tr>
<td><strong>607.cactuBSSN_s</strong> 24</td>
<td>607.cactuBSSN_s 24</td>
</tr>
<tr>
<td><strong>619.lbm_s</strong> 24</td>
<td>619.lbm_s 24</td>
</tr>
<tr>
<td><strong>621.wrf_s</strong> 24</td>
<td>621.wrf_s 24</td>
</tr>
<tr>
<td><strong>627.cam4_s</strong> 24</td>
<td>627.cam4_s 24</td>
</tr>
<tr>
<td><strong>628.pop2_s</strong> 24</td>
<td>628.pop2_s 24</td>
</tr>
<tr>
<td><strong>638.imagick_s</strong> 24</td>
<td>638.imagick_s 24</td>
</tr>
<tr>
<td><strong>644.nab_s</strong> 24</td>
<td>644.nab_s 24</td>
</tr>
<tr>
<td><strong>649.fotonik3d_s</strong> 24</td>
<td>649.fotonik3d_s 24</td>
</tr>
<tr>
<td><strong>654.roms_s</strong> 24</td>
<td>654.roms_s 24</td>
</tr>
</tbody>
</table>

| **CPU2017 License:** | 9017  |
| **Test Sponsor:** | Lenovo Global Technology |
| **Tested by:** | Lenovo Global Technology |
| **Test Date:** | Dec-2017 |
| **Hardware Availability:** | Aug-2017 |
| **Software Availability:** | Sep-2017 |

<table>
<thead>
<tr>
<th><strong>Hardware</strong></th>
<th><strong>Software</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU Name:</strong> Intel Xeon Silver 4116</td>
<td><strong>OS:</strong> SUSE Linux Enterprise Server 12 SP2 (x86_64)</td>
</tr>
<tr>
<td><strong>Max MHz.:</strong> 3000</td>
<td><strong>Kernel:</strong> 4.4.21-69-default</td>
</tr>
<tr>
<td><strong>Nominal:</strong> 2100</td>
<td><strong>Compiler:</strong> C/C++: Version 18.0.0.128 of Intel C/C++</td>
</tr>
<tr>
<td><strong>Enabled:</strong> 24 cores, 2 chips</td>
<td><strong>Compiler for Linux:</strong> Fortran: Version 18.0.0.128 of Intel Fortran</td>
</tr>
<tr>
<td><strong>Orderable:</strong> 1.2 chips</td>
<td><strong>Compiler for Linux:</strong></td>
</tr>
<tr>
<td><strong>Cache L1:</strong> 32 KB I + 32 KB D on chip per core</td>
<td><strong>Parallel:</strong> Yes</td>
</tr>
<tr>
<td><strong>L2:</strong> 1 MB I+D on chip per core</td>
<td><strong>Firmware:</strong> Lenovo BIOS Version TEE19J 1.20 released Sep-2017</td>
</tr>
<tr>
<td><strong>L3:</strong> 16.5 MB I+D on chip per chip</td>
<td><strong>File System:</strong> btrfs</td>
</tr>
<tr>
<td><strong>Other:</strong> None</td>
<td><strong>System State:</strong> Run level 3 (multi-user)</td>
</tr>
<tr>
<td><strong>Memory:</strong> 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)</td>
<td><strong>Base Pointers:</strong> 64-bit</td>
</tr>
<tr>
<td><strong>Storage:</strong> 1 x 800 GB SAS SSD</td>
<td><strong>Peak Pointers:</strong> 64-bit</td>
</tr>
<tr>
<td><strong>Other:</strong> None</td>
<td><strong>Other:</strong> None</td>
</tr>
</tbody>
</table>

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**SPECspeed2017_fp_base = 76.0**

**SPECspeed2017_fp_peak = 77.3**
Lenovo Global Technology
ThinkSystem SR550
(2.10 GHz, Intel Xeon Silver 4116)

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

SPECspeed2017_fp_base = 76.0
SPECspeed2017_fp_peak = 77.3

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>24</td>
<td>157</td>
<td>375</td>
<td>158</td>
<td>373</td>
<td>190</td>
<td>310</td>
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<td>607.cactuBSSN_s</td>
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<td>95.7</td>
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<td>95.8</td>
<td>201</td>
<td>82.8</td>
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<td>619.lbm_s</td>
<td>24</td>
<td>151</td>
<td>34.8</td>
<td>151</td>
<td>34.8</td>
<td>151</td>
<td>34.7</td>
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<tr>
<td>621.wrf_s</td>
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<td>220</td>
<td>60.1</td>
<td>220</td>
<td>60.0</td>
<td>255</td>
<td>51.8</td>
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<tr>
<td>627.cam4_s</td>
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<td>186</td>
<td>47.6</td>
<td>186</td>
<td>47.6</td>
<td>186</td>
<td>47.6</td>
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<tr>
<td>628.pop2_s</td>
<td>24</td>
<td>238</td>
<td>49.9</td>
<td>238</td>
<td>49.9</td>
<td>238</td>
<td>49.8</td>
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<tr>
<td>638.imagick_s</td>
<td>24</td>
<td>234</td>
<td>61.6</td>
<td>236</td>
<td>61.1</td>
<td>234</td>
<td>61.6</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>24</td>
<td>187</td>
<td>78.6</td>
<td>187</td>
<td>78.6</td>
<td>187</td>
<td>78.6</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>135</td>
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<td>146</td>
<td>62.4</td>
<td>135</td>
<td>67.4</td>
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<td>654.roms_s</td>
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<td>200</td>
<td>78.6</td>
<td>233</td>
<td>67.6</td>
<td>200</td>
<td>78.7</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 76.0
SPECspeed2017_fp_peak = 77.3

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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"
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

(Continued on next page)
Lenovo Global Technology
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SPECspeed2017_fp_base = 76.0
SPECspeed2017_fp_peak = 77.3

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
MONITORMWAIT set to Enable
Adjacent Cache Prefetch set to Disable
LLC dead line alloc set to Disable
Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-yyst Mon Dec 4 21:01:34 2017

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 4116 CPU @ 2.10GHz
  2 "physical id"s (chips)
  24 "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 : 12
  siblings : 12
  physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
  physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 24
On-line CPU(s) list: 0-23
Thread(s) per core: 1
Core(s) per socket: 12
Socket(s): 2
NUMA node(s): 2

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR550
(2.10 GHz, Intel Xeon Silver 4116)

| SPECspeed2017_fp_base = 76.0 |
| SPECspeed2017_fp_peak = 77.3 |

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

| 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 8 9 10 11 |
| node 0 size: 193110 MB |
| node 0 free: 191752 MB |
| node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23 |
| node 1 size: 193504 MB |
| node 1 free: 192141 MB |
| node distances: |
| node 0 1 |
| 0: 10 21 |
| 1: 21 10 |

From /proc/meminfo
MemTotal: 395893764 KB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*

(Continued on next page)
Platform Notes (Continued)

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 linux-yyst 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 Dec 4 18:47

SPEC is set to: /home/cpu2017.1.0.2.ic18.0
   Filesystem     Type   Size  Used Avail Use% Mounted on
   /dev/sda2      btrfs  744G   13G  728G   2% /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:
      12x Hynix HMA84GR7AFR4N-VK 32 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
 CC  619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)
==============================================================================
 icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================

 CC  619.lbm_s(peak)
(Continued on next page)
Lenovo Global Technology
ThinkSystem SR550
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SPEC CPU2017 Floating Point Speed Result

SPECSpeed2017_fp_base = 76.0
SPECSpeed2017_fp_peak = 77.3

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

Test Date: Dec-2017
Hardware Availability: Aug-2017
Software Availability: Sep-2017

Compiler Version Notes (Continued)

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

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

icc (ICC) 18.0.0 20170811

(Continued on next page)
Lenovo Global Technology
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SPECspeed2017_fp_base = 76.0
SPECspeed2017_fp_peak = 77.3

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

Compiler Version Notes (Continued)
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

Base Compiler Invocation
C benchmarks:
icc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Base Portability Flags
603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
-assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64
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<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>76.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>77.3</td>
</tr>
</tbody>
</table>

**Base Optimization Flags**

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte

**Base Other Flags**

C benchmarks:
-m64 -std=c11

Fortran benchmarks:
-m64

Benchmarks using both Fortran and C:
-m64 -std=c11

Benchmarks using Fortran, C, and C++:
-m64 -std=c11

**Peak Compiler Invocation**

C benchmarks:
icc

Fortran benchmarks:
ifort

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Lenovo Global Technology
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SPECspeed2017_fp_base = 76.0
SPECspeed2017_fp_peak = 77.3

**Peak Compiler Invocation (Continued)**

Benchmarks using both Fortran and C:
- `ifort icc`

Benchmarks using Fortran, C, and C++:
- `icpc icc ifort`

**Peak Portability Flags**

Same as Base Portability Flags

**Peak Optimization Flags**

C benchmarks:

```
619.lbm_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP
```

```
638.imagick_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP
```

```
644.nab_s: Same as 638.imagick_s
```

Fortran benchmarks:

```
-prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
-DSPEC_OPENMP -O2 -xCORE-AVX2 -qopt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -align array32byte
```

Benchmarks using both Fortran and C:

```
621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte
```

```
627.cam4_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte
```

(Continued on next page)
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SPECspeed2017_fp_base = 76.0
SPECspeed2017_fp_peak = 77.3

CPU2017 License: 9017
Test Date: Dec-2017
Test Sponsor: Lenovo Global Technology
Hardware Availability: Aug-2017
Tested by: Lenovo Global Technology
Software Availability: Sep-2017

Peak Optimization Flags (Continued)

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:
-prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2 -qopt-prefetch
-ipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs
-align array32byte

Peak Other Flags

C benchmarks:
-m64 -std=c11

Fortran benchmarks:
-m64

Benchmarks using both Fortran and C:
-m64 -std=c11

Benchmarks using Fortran, C, and C++:
-m64 -std=c11

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

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