Lenovo Global Technology
ThinkSystem SR650
(1.90 GHz, Intel Xeon Bronze 3204)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>43.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

### Hardware

- **CPU Name:** Intel Xeon Bronze 3204
- **Max MHz.:** 1900
- **Nominal:** 1900
- **Enabled:** 12 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:** 8.25 MB I+D on chip per chip
- **Other:** None
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R, running at 2133)
- **Storage:** 1 x 800 GB SATA SSD
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux Server release 7.6 (Maipo)
- **Kernel:** 3.10.0-957.el7.x86_64
- **Compiler:** C/C++: Version 19.0.1.144 of Intel C/C++ Compiler Build 20181018 for Linux; Fortran: Version 19.0.1.144 of Intel Fortran Compiler Build 20181018 for Linux
- **Parallel:** Yes
- **Firmware:** Lenovo BIOS Version IVE135R 2.10 released Feb-2019
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Other:** None

---

### Throughput

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Notes</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>12</td>
<td>47.9</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>12</td>
<td>47.9</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>12</td>
<td>34.8</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>12</td>
<td>42.4</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>12</td>
<td>19.9</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>12</td>
<td>33.3</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>12</td>
<td>26.0</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>12</td>
<td>49.0</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>12</td>
<td>45.2</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>12</td>
<td>41.0</td>
</tr>
</tbody>
</table>
## Lenovo Global Technology

ThinkSystem SR650  
(1.90 GHz, Intel Xeon Bronze 3204)

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9017</th>
<th>Test Date:</th>
<th>May-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
<td>Hardware Availability:</td>
<td>Apr-2019</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
<td>Software Availability:</td>
<td>Nov-2018</td>
</tr>
</tbody>
</table>

### 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>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>12</td>
<td>257</td>
<td>229</td>
<td>258</td>
<td>229</td>
<td>257</td>
<td>229</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>12</td>
<td>348</td>
<td>47.9</td>
<td>349</td>
<td>47.8</td>
<td>348</td>
<td>47.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>12</td>
<td>151</td>
<td>34.8</td>
<td>150</td>
<td>34.8</td>
<td>150</td>
<td>34.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>12</td>
<td>312</td>
<td>42.4</td>
<td>310</td>
<td>42.6</td>
<td>314</td>
<td>42.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>12</td>
<td>445</td>
<td>19.9</td>
<td>447</td>
<td>19.8</td>
<td>446</td>
<td>19.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>12</td>
<td>357</td>
<td>33.3</td>
<td>353</td>
<td>33.6</td>
<td>357</td>
<td>33.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>12</td>
<td>556</td>
<td>26.0</td>
<td>555</td>
<td>26.0</td>
<td>555</td>
<td>26.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>644.nab_s</td>
<td>12</td>
<td>356</td>
<td>49.0</td>
<td>356</td>
<td>49.1</td>
<td>356</td>
<td>49.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>12</td>
<td>206</td>
<td>44.3</td>
<td>202</td>
<td>45.2</td>
<td>202</td>
<td>45.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>654.roms_s</td>
<td>12</td>
<td>384</td>
<td>41.0</td>
<td>384</td>
<td>41.0</td>
<td>385</td>
<td>40.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SPECspeed2017_fp_base = 43.7**  
**SPECspeed2017_fp_peak = Not Run**

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:  
  KMP_AFFINITY = "granularity=fine,compact"  
  LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u1/lib/intel64"  
  OMP_STACKSIZE = "192M"

- Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM  
  memory using Redhat Enterprise Linux 7.5  
  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

- NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
- Yes: 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.
- Yes: 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.
- Yes: The test sponsor attests, as of date of publication, that CVE-2018-3640 (Spectre variant 3a) is mitigated in the system as tested and documented.
- Yes: The test sponsor attests, as of date of publication, that CVE-2018-3639 (Spectre variant 4) is mitigated in the system as tested and documented.
Lenovo Global Technology
ThinkSystem SR650
(1.90 GHz, Intel Xeon Bronze 3204)

**SPECspeed2017_fp_base = 43.7**

**SPECspeed2017_fp_peak = Not Run**

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9017</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>
<tr>
<td>Test Date:</td>
<td>May-2019</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Apr-2019</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Nov-2018</td>
</tr>
</tbody>
</table>

**Platform Notes**

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Choose Operating Mode set to Custom Mode
C-states set to Legacy
Adjacent Cache Prefetch set to Disable
Stale AtoS set to Enable
Sysinfo program /home/cpu2017-1.0.5-ic19.0u1/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcd8f2999c33d61f64985e45859ea9
running on localhost.localdomain Sun May 12 10:15:29 2019

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) Bronze 3204 CPU @ 1.90GHz
          2 "physical id"s (chips)
          12 "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 : 6
siblings : 6
physical 0: cores 0 1 2 3 4 5
physical 1: cores 0 1 2 3 4 5
```

From lscpu:

```
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                12
On-line CPU(s) list:   0-11
Thread(s) per core:    1
Core(s) per socket:    6
Socket(s):             2
NUMA node(s):          2
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 85
Model name:            Intel(R) Xeon(R) Bronze 3204 CPU @ 1.90GHz
Stepping:              6
CPU MHz:               1900.000
BogoMIPS:              3800.00
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              8448K
```
Lenovo Global Technology
ThinkSystem SR650
(1.90 GHz, Intel Xeon Bronze 3204)

SPECspeed2017_fp_base = 43.7
SPECspeed2017_fp_peak = Not Run

Platform Notes (Continued)

NUMA node0 CPU(s): 0-5
NUMA node1 CPU(s): 6-11
Flags: fpu vme 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 ntopology 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 3nowprefetch epb cat_13 cdp_13 intel_pt ssbd mba
ibrs ibpb stibp ibrs_enhanced tpr_shadow vnumi flexpriority ept vpid fsgsbase
tsc_adjust bml1 hle avx2 smep bmi2 erm invpcid rtm cmn mpx rdt_a avx512f avx512dq
rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1
cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm arat pln pts pku ospke
avx512_vnni spec_ctrl intel_stibp flush_l1d arch_capabilities

/proc/cpuinfo cache data
 cache size : 8448 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
 node 0 size: 196281 MB
 node 0 free: 191571 MB
 node 1 cpus: 6 7 8 9 10 11
 node 1 size: 196608 MB
 node 1 free: 191966 MB
 node distances:
 node 0 1
 0: 10 21
 1: 21 10

From /proc/meminfo
MemTotal: 395880312 kB
 HugePages_Total: 0
 Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
 os-release:
  NAME="Red Hat Enterprise Linux Server"
  VERSION="7.6 (Maipo)"
  ID="rhel"
  ID_LIKE="fedora"
  VARIANT="Server"
  VARIANT_ID="server"
  VERSION_ID="7.6"
  PRETTY_NAME="Red Hat Enterprise Linux Server 7.6 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)
Lenovo Global Technology

ThinkSystem SR650
(1.90 GHz, Intel Xeon Bronze 3204)

SPECSpeed2017_fp_base = 43.7
SPECSpeed2017_fp_peak = Not Run

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

Test Date: May-2019
Hardware Availability: Apr-2019
Software Availability: Nov-2018

Platform Notes (Continued)

system-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)

uname -a:
Linux localhost.localdomain 3.10.0-957.el7.x86_64 #1 SMP Thu Oct 4 20:48:51 UTC 2018
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown): Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: Load fences, __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS

run-level 3 May 12 10:05

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1
  Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sdb2      xfs   689G   18G  671G   3% /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 -[IVE135R-2.10]- 02/27/2019
Memory:
  24x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933, configured at 2133

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
 CC  619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
==============================================================================
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================

==============================================================================
 FC  607.cactuBSSN_s(base)
==============================================================================
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Lenovo Global Technology
ThinkSystem SR650
(1.90 GHz, Intel Xeon Bronze 3204)

SPECspeed2017_fp_base = 43.7
SPECspeed2017_fp_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: May-2019
Tested by: Lenovo Global Technology
Hardware Availability: Apr-2019
Software Availability: Nov-2018

Compiler Version Notes (Continued)

Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R)
64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

FC  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
-----------------------------------------------
Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R)
64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

CC  621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
-----------------------------------------------
Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R)
64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel (R) C Intel (R) 64 Compiler for applications running on Intel (R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

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

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

Base Portability Flags

603.bwaves_s: -DSPEC_LP64

(Continued on next page)
<table>
<thead>
<tr>
<th>Base Portability Flags (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>607.cactuBSSN_s: -DSPEC_LP64</td>
</tr>
<tr>
<td>619.libm_s: -DSPEC_LP64</td>
</tr>
<tr>
<td>621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian</td>
</tr>
<tr>
<td>627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG</td>
</tr>
<tr>
<td>628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian -assume byterecl</td>
</tr>
<tr>
<td>638.imagick_s: -DSPEC_LP64</td>
</tr>
<tr>
<td>644.nab_s: -DSPEC_LP64</td>
</tr>
<tr>
<td>649.fotonik3d_s: -DSPEC_LP64</td>
</tr>
<tr>
<td>654.roms_s: -DSPEC_LP64</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Base Optimization Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>C benchmarks:</td>
</tr>
<tr>
<td>-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch</td>
</tr>
<tr>
<td>-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP</td>
</tr>
</tbody>
</table>

| Fortran benchmarks:    |
| -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch |
| -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp |
| -nostandard-realloc-lhs |

| Benchmarks using both Fortran and C: |
| -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch |
| -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP |
| -nostandard-realloc-lhs |

| Benchmarks using Fortran, C, and C++: |
| -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch |
| -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP |
| -nostandard-realloc-lhs |

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.xml
<table>
<thead>
<tr>
<th>Lenovo Global Technology</th>
<th>SPECsped2017_fp_base = 43.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>ThinkSystem SR650</td>
<td>SPECsped2017_fp_peak = Not Run</td>
</tr>
<tr>
<td>(1.90 GHz, Intel Xeon Bronze 3204)</td>
<td></td>
</tr>
</tbody>
</table>

**SPEC CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Test Date:** May-2019

**Hardware Availability:** Apr-2019

**Software Availability:** Nov-2018

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 v1.0.5 on 2019-05-11 22:15:28-0400.
Originally published on 2019-06-11.