## Lenovo Global Technology

**ThinkSystem ST50**  
(3.40 GHz, Intel Xeon E-2124G)

### Hardware

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon E-2124G</td>
</tr>
<tr>
<td>Max MHz.</td>
<td>4500</td>
</tr>
<tr>
<td>Nominal</td>
<td>3400</td>
</tr>
<tr>
<td>Enabled</td>
<td>4 cores, 1 chip</td>
</tr>
<tr>
<td>Orderable</td>
<td>1 chip</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2</td>
<td>256 KB I+D on chip per core</td>
</tr>
<tr>
<td>L3</td>
<td>8 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>64 GB (4 x 16 GB 2Rx8 PC4-2666V-E)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 x 480 GB SATA SSD</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>Red Hat Enterprise Linux Server release 7.5 (Maipo)</td>
</tr>
<tr>
<td>Compiler</td>
<td>C/C++: Version 18.0.2.199 of Intel C/C++ Compiler for Linux; Fortran: Version 18.0.2.199 of Intel Fortran Compiler for Linux</td>
</tr>
<tr>
<td>Parallel</td>
<td>No</td>
</tr>
<tr>
<td>Firmware</td>
<td>Lenovo BIOS Version ITE101U released Sep-2018</td>
</tr>
<tr>
<td>File System</td>
<td>xfs</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
</tbody>
</table>

---

**SPECrate2017_fp_base** = 30.4

**SPECrate2017_fp_peak** = Not Run

---

**Test Sponsor:** Lenovo Global Technology  
**Test Date:** Nov-2018  
**Hardware Availability:** Nov-2018  
**Software Availability:** Aug-2018  
**Tested by:** Lenovo Global Technology

### SPECrate2017_fp_base = 30.4

<table>
<thead>
<tr>
<th>Test</th>
<th>Copies</th>
<th>SPECrate2017_fp_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>bwaves_r</td>
<td>4</td>
<td>25.6</td>
</tr>
<tr>
<td>cactuBSSN_r</td>
<td>4</td>
<td>21.0</td>
</tr>
<tr>
<td>namd_r</td>
<td>4</td>
<td>19.7</td>
</tr>
<tr>
<td>parest_r</td>
<td>4</td>
<td>34.0</td>
</tr>
<tr>
<td>povray_r</td>
<td>4</td>
<td>18.2</td>
</tr>
<tr>
<td>lbm_r</td>
<td>4</td>
<td>36.2</td>
</tr>
<tr>
<td>wrf_r</td>
<td>4</td>
<td>28.3</td>
</tr>
<tr>
<td>blender_r</td>
<td>4</td>
<td>33.2</td>
</tr>
<tr>
<td>cam4_r</td>
<td>4</td>
<td>74.3</td>
</tr>
<tr>
<td>imagick_r</td>
<td>4</td>
<td>42.1</td>
</tr>
<tr>
<td>fotonik3d_r</td>
<td>4</td>
<td>22.9</td>
</tr>
<tr>
<td>roms_r</td>
<td>4</td>
<td>15.5</td>
</tr>
</tbody>
</table>

---

**Hardware**

**Software**

**Lenovo Global Technology**
Lenovo Global Technology
ThinkSystem ST50
(3.40 GHz, Intel Xeon E-2124G)

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

spec

SPEC CPU2017 Floating Point Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem ST50
(3.40 GHz, Intel Xeon E-2124G)

SPECrate2017_fp_base = 30.4
SPECrate2017_fp_peak = Not Run

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>
<th>Base</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>503.bwaves_r</td>
<td>4</td>
<td>530</td>
<td>75.6</td>
<td>530</td>
<td>75.6</td>
<td>531</td>
<td>75.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>507.cactuBSSN_r</td>
<td>4</td>
<td>197</td>
<td>25.6</td>
<td>198</td>
<td>25.6</td>
<td>198</td>
<td>25.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>508.namd_r</td>
<td>4</td>
<td>179</td>
<td>21.2</td>
<td>181</td>
<td>21.0</td>
<td>181</td>
<td>21.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>510.parest_r</td>
<td>4</td>
<td>532</td>
<td>19.7</td>
<td>532</td>
<td>19.7</td>
<td>532</td>
<td>19.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>511.povray_r</td>
<td>4</td>
<td>275</td>
<td>34.0</td>
<td>272</td>
<td>34.4</td>
<td>276</td>
<td>33.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>519.lbm_r</td>
<td>4</td>
<td>232</td>
<td>18.2</td>
<td>232</td>
<td>18.2</td>
<td>232</td>
<td>18.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>521.wrf_r</td>
<td>4</td>
<td>248</td>
<td>36.1</td>
<td>248</td>
<td>36.2</td>
<td>248</td>
<td>36.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>526.blender_r</td>
<td>4</td>
<td>216</td>
<td>28.2</td>
<td>215</td>
<td>28.3</td>
<td>215</td>
<td>28.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>527.cam4_r</td>
<td>4</td>
<td>211</td>
<td>33.2</td>
<td>211</td>
<td>33.2</td>
<td>209</td>
<td>33.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>538.imagick_r</td>
<td>4</td>
<td>133</td>
<td>74.8</td>
<td>134</td>
<td>74.3</td>
<td>140</td>
<td>70.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>544.nab_r</td>
<td>4</td>
<td>160</td>
<td>42.0</td>
<td>160</td>
<td>42.1</td>
<td>160</td>
<td>42.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
<td>4</td>
<td>680</td>
<td>22.9</td>
<td>681</td>
<td>22.9</td>
<td>682</td>
<td>22.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>554.roms_r</td>
<td>4</td>
<td>409</td>
<td>15.5</td>
<td>413</td>
<td>15.4</td>
<td>410</td>
<td>15.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Submit Notes

The taskset mechanism was used to bind copies to processors. The config file option 'submit' was used to generate taskset 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/cpu2017-1.0.5-ic18.0u2/lib/ia32:/home/cpu2017-1.0.5-ic18.0u2/lib/intel64"
LD_LIBRARY_PATH = "LD_LIBRARY_PATH:/home/cpu2017-1.0.5-ic18.0u2/je5.0.1-32:/home/cpu2017-1.0.5-ic18.0u2/je5.0.1-64"

Binaries compiled on a system with 1x Intel Core i7-6700K CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesytem page cache synced and cleared with:
sync; echo 3> /proc/sys/vm/drop_caches
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

(Continued on next page)
SPEC CPU2017 Floating Point Rate Result

Lenovo Global Technology

ThinkSystem ST50
(3.40 GHz, Intel Xeon E-2124G)

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base</th>
<th>30.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

Test Date: Nov-2018
Hardware Availability: Nov-2018
Software Availability: Aug-2018

General Notes (Continued)

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.

Platform Notes

BIOS configuration:
ICE Performance Mode set to 4HD Cooling Mode
Sysinfo program /home/cpu2017-1.0.5-ic18.0u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9 running on st50 Wed Nov 7 18:49:28 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) E-2124G CPU @ 3.40GHz
1 "physical id"s (chips)
4 "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 : 4
physical 0: cores 0 1 2 3

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 4
On-line CPU(s) list: 0-3
Thread(s) per core: 1
Core(s) per socket: 4
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2124G CPU @ 3.40GHz
Stepping: 10
CPU MHz: 4199.987
CPU max MHz: 4500.000
CPU min MHz: 800.0000
BogoMIPS: 6816.00

(Continued on next page)
Lenovo Global Technology

ThinkSystem ST50
(3.40 GHz, Intel Xeon E-2124G)

SPECrate2017_fp_base = 30.4
SPECrate2017_fp_peak = Not Run

Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 8192K
NUMA node0 CPU(s): 0-3
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 aperffmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpb intel_pt ssbd ibrs ibpb stibp tpr_shadow vnmi flexpriority ept vpid fsgsbase tsck_adjust bmi1 hle avx2 smep bmi2 ersedv rtms invpcid rtm mpx rdseed adx smap clflushopt xsaveopt xsavec xgetbv1 dtherm ida arat pln pts hwp hwp_notify hwp_act_window hwp_epp spec_ctrl intel_stibp flush_l1d

/platform/cpuinfo cache data
  cache size: 8192 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
  available: 1 nodes (0)
  node 0 cpus: 0 1 2 3
  node 0 size: 65372 MB
  node 0 free: 61661 MB
  node distances:
    node 0
    0: 10

From /proc/meminfo
  MemTotal: 65809780 KB
  HugePages_Total: 0
  Hugepagesize: 2048 KB

From /etc/*release* /etc/*version*
  os-release:
    NAME="Red Hat Enterprise Linux Server"
    VERSION="7.5 (Maipo)"
    ID=rhel
    ID_LIKE="fedora"
    VARIANT="Server"
    VARIANT_ID="server"
    VERSION_ID="7.5"
    PRETTY_NAME="Red Hat Enterprise Linux Server 7.5 (Maipo)"
  redhat-release: Red Hat Enterprise Linux Server release 7.5 (Maipo)
  system-release: Red Hat Enterprise Linux Server release 7.5 (Maipo)
  system-release-cpe: cpe:/o:redhat:enterprise_linux:7.5:ga:server

(Continued on next page)
Lenovo Global Technology
ThinkSystem ST50
(3.40 GHz, Intel Xeon E-2124G)

SPECrate2017_fp_base = 30.4
SPECrate2017_fp_peak = Not Run

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

Test Date: Nov-2018
Hardware Availability: Nov-2018
Software Availability: Aug-2018

Platform Notes (Continued)

uname -a:
    Linux st50 3.10.0-862.11.6.el7.x86_64 #1 SMP Fri Aug 10 16:55:11 UTC 2018 x86_64
    x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
CVE-2017-5754 (Meltdown): Mitigation: PTI
CVE-2017-5753 (Spectre variant 1): Mitigation: Load fences, __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS (kernel)

run-level 3 Nov 7 09:08

SPEC is set to: /home/cpu2017-1.0.5-ic18.0u2
    Filesystem  Type  Size  Used Avail Use% Mounted on
    /dev/sda2    xfs   381G   14G  367G   4% /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 ITE101U 09/12/2018
    Memory:
    4x SK Hynix HMA82GU7CJR8N-VK 16 GB 2 rank 2667

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
 CC  519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
==============================================================================
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
CXXC 508.namd_r(base) 510.parest_r(base)
==============================================================================
icpc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
 CC  511.povray_r(base) 526.blender_r(base)
==============================================================================

(Continued on next page)
## Lenovo Global Technology

**ThinkSystem ST50**  
(3.40 GHz, Intel Xeon E-2124G)

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base</th>
<th>30.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

<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>Nov-2018</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Nov-2018</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Aug-2018</td>
</tr>
</tbody>
</table>

### Compiler Version Notes (Continued)

icpc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

icc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

ifort (IFORT) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

### Base Compiler Invocation

**C benchmarks:**

icc -m64 -std=c11

**C++ benchmarks:**

icpc -m64

**Fortran benchmarks:**

ifort -m64

**Benchmarks using both Fortran and C:**

ifort -m64 icc -m64 -std=c11

(Continued on next page)
Spec CPU2017 Floating Point Rate Result

Lenovo Global Technology
ThinkSystem ST50
(3.40 GHz, Intel Xeon E-2124G)

SPECrates2017_fp_base = 30.4
SPECrates2017_fp_peak = Not Run

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

Base Compiler Invocation (Continued)

Benchmarks using both C and C++:
icpc -m64 icc -m64 -std=c11

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

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

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

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

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

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

(Continued on next page)
**SPEC CPU2017 Floating Point Rate Result**

**Lenovo Global Technology**

ThinkSystem ST50
(3.40 GHz, Intel Xeon E-2124G)

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

**SPECrate2017_fp_base** = 30.4

**SPECrate2017_fp_peak** = Not Run

**Base Optimization Flags (Continued)**

Benchmarks using both C and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qqopt-mem-layout-trans=3

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

The flags files that were used to format this result can be browsed at:

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-CFL-A.xml
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.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 v1.0.5 on 2018-11-07 05:49:28-0500.
Originally published on 2018-12-11.