Lenovo Global Technology
ThinkSystem ST50
(3.60 GHz, Intel Xeon E-2144G)

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

Threading

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base = 24.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak = Not Run</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon E-2144G
- **Max MHz.:** 4500
- **Nominal:** 3600
- **Enabled:** 4 cores, 1 chip, 2 threads/core
- **Orderable:** 1 chip
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 256 KB I+D on chip per core
- **L3:** 8 MB I+D on chip per chip
- **Other:** None
- **Memory:** 64 GB (4 x 16 GB 2Rx8 PC4-2666V-E)
- **Storage:** 1 x 480 GB SATA SSD
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux Server release 7.5 (Maipo)
- **Compiler:** C/C++: Version 18.0.2.199 of Intel C/C++
- **Fortran:** Version 18.0.2.199 of Intel Fortran Compiler for Linux
- **Parallel:** Yes
- **Firmware:** Lenovo BIOS Version ITE101U released Sep-2018
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Other:** jemalloc memory allocator V5.0.1
Lenovo Global Technology
ThinkSystem ST50
(3.60 GHz, Intel Xeon E-2144G)

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

SPECspeed2017_fp_base = 24.9
SPECspeed2017_fp_peak = Not Run

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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>603.bwaves_s</td>
<td>4</td>
<td>732</td>
<td>80.6</td>
<td>732</td>
<td>80.6</td>
<td>732</td>
<td>80.6</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>4</td>
<td>398</td>
<td>41.9</td>
<td>398</td>
<td>41.9</td>
<td>398</td>
<td>41.9</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>4</td>
<td>720</td>
<td>7.27</td>
<td>719</td>
<td>7.28</td>
<td>721</td>
<td>7.27</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>4</td>
<td>416</td>
<td>31.8</td>
<td>419</td>
<td>31.6</td>
<td>424</td>
<td>31.2</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>4</td>
<td>485</td>
<td>18.3</td>
<td>486</td>
<td>18.3</td>
<td>487</td>
<td>18.2</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>4</td>
<td>388</td>
<td>30.6</td>
<td>387</td>
<td>30.7</td>
<td>388</td>
<td>30.6</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>4</td>
<td>720</td>
<td>20.0</td>
<td>720</td>
<td>20.0</td>
<td>721</td>
<td>20.0</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>4</td>
<td>465</td>
<td>37.5</td>
<td>466</td>
<td>37.5</td>
<td>466</td>
<td>37.5</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>4</td>
<td>505</td>
<td>18.1</td>
<td>506</td>
<td>18.1</td>
<td>506</td>
<td>18.0</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>4</td>
<td>1012</td>
<td>15.6</td>
<td>1011</td>
<td>15.6</td>
<td>1011</td>
<td>15.6</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 24.9
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,1,0"
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"" OMP_STACKSIZE = "192M"

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
Files/sytem 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.
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.
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
SPEC CPU2017 Floating Point Speed Result

Lenovo Global Technology
ThinkSystem ST50
(3.60 GHz, Intel Xeon E-2144G)

SPECspeed2017_fp_base = 24.9
SPECspeed2017_fp_peak = Not Run

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

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

Platform Notes
Sysinfo program /home/cpu2017-1.0.5-ic18.0u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcede8f2999c33d61f64985e45859ea9
running on st50 Tue Oct 23 01:49:55 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-2144G CPU @ 3.60GHz
    1 "physical id"s (chips)
    8 "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 0 1 2 3

From lscpu:
  Architecture:         x86_64
  CPU op-mode(s):       32-bit, 64-bit
  Byte Order:           Little Endian
  CPU(s):               8
  On-line CPU(s) list:  0-7
  Thread(s) per core:   2
  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-2144G CPU @ 3.60GHz
  Stepping:             10
  CPU MHz:              4498.901
  CPU max MHz:          4500.0000
  CPU min MHz:          800.0000
  BogoMIPS:             7200.00
  Virtualization:       VT-x
  L1d cache:            32K
  L1i cache:            32K
  L2 cache:             256K
  L3 cache:             8192K
  NUMA node0 CPU(s):    0-7
  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 nopl xtopology nonstop_tsc
  aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg

(Continued on next page)
Lenovo Global Technology
ThinkSystem ST50
(3.60 GHz, Intel Xeon E-2144G)

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

SPECspeed2017_fp_base = 24.9
SPECspeed2017_fp_peak = Not Run

Platform Notes (Continued)

fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movcnt tsc_deadline_timer aes
xsavex f16c rdrand lahf_lmm abm 3dnowprefetch epb intel_pt ssbd ibrs ibpb stibp
ptr_shadow vwni flexpriority ept vpd fsqosbase tsc_adjust bmi1 hle avx2 smep bmi2
erms invpcid rtm mpx rdseed clflushopt xsaveopt xsavec xgetbv1 dtherm ida
arat pln pts hwp hwp_notify hwp_act_window hwp_epp spec_ctrl intel_stibp flush_lld

/proccpuinfo 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 4 5 6 7
node 0 size: 65372 MB
node 0 free: 62885 MB
node distances:
node 0
0: 10

From /proc/meminfo
MemTotal: 65809220 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

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)

(Continued on next page)
Lenovo Global Technology
ThinkSystem ST50
(3.60 GHz, Intel Xeon E-2144G)

SPECspeed2017_fp_base = 24.9
SPECspeed2017_fp_peak = Not Run

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

Platform Notes (Continued)

run-level 3 Oct 22 23:28

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  619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
------------------------------------------------------------------------------
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
==============================================================================
FC  607.cactuBSSN_s(base)
------------------------------------------------------------------------------
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.
------------------------------------------------------------------------------
==============================================================================
FC  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
------------------------------------------------------------------------------
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

CC  621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)

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

Lenovo Global Technology
ThinkSystem ST50
(3.60 GHz, Intel Xeon E-2144G)

SPECspeed2017_fp_base = 24.9
SPECspeed2017_fp_peak = Not Run

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

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

Compiler Version Notes (Continued)

ifort (IFORT) 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.

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
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

Base Optimization Flags

C benchmarks:
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

(Continued on next page)
## Lenovo Global Technology

**ThinkSystem ST50**  
*(3.60 GHz, Intel Xeon E-2144G)*

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>24.9</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

### Base Optimization Flags (Continued)

#### Fortran benchmarks:

- `-Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div`  
- `-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -gopenmp`  
- `-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc`

#### Benchmarks using both Fortran and C:

- `-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch`  
- `-ffinite-math-only -qopt-mem-layout-trans=3 -gopenmp -DSPEC_OPENMP`  
- `-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc`

#### Benchmarks using Fortran, C, and C++:

- `-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch`  
- `-ffinite-math-only -qopt-mem-layout-trans=3 -gopenmp -DSPEC_OPENMP`  
- `-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc`

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:


---

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 2018-10-22 13:49:54-0400.  
Originally published on 2018-11-27.