## Lenovo Global Technology

### ThinkSystem SD650

(3.10 GHz, Intel Xeon Gold 6254)

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<tr>
<th>SPECspeed2017_fp_base</th>
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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Jun-2019  
**Hardware Availability:** Apr-2019  
**Test Sponsor:** Lenovo Global Technology  
**Software Availability:** Oct-2018

### Hardware

- **CPU Name:** Intel Xeon Gold 6254  
- **Max MHz.:** 4000  
- **Nominal:** 3100  
- **Enabled:** 36 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:** 24.75 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R)  
- **Storage:** 1 x 480 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 19.0.0.117 of Intel C/C++  
- **Compiler:** Fortran: Version 19.0.0.117 of Intel Fortran  
- **Compiler for Linux:** None  
- **Parallel:** Yes  
- **Firmware:** Lenovo BIOS Version OTE135T 2.10 released Mar-2019  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** Not Applicable  
- **Other:** None
**SPEC CPU2017 Floating Point Speed Result**

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**Results Table**

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<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
<td>603.bwaves_s</td>
<td>36</td>
<td>117</td>
<td>505</td>
<td>116</td>
<td>509</td>
<td>117</td>
<td>502</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>36</td>
<td>105</td>
<td>158</td>
<td>105</td>
<td>158</td>
<td>106</td>
<td>158</td>
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<tr>
<td>619.lbm_s</td>
<td>36</td>
<td>53.7</td>
<td>97.5</td>
<td>53.3</td>
<td>98.4</td>
<td>53.7</td>
<td>97.5</td>
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<tr>
<td>621.wrf_s</td>
<td>36</td>
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<td>92.1</td>
<td>144</td>
<td>92.0</td>
<td>144</td>
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<tr>
<td>627.cam4_s</td>
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<td>88.3</td>
<td>100</td>
<td>88.3</td>
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<tr>
<td>628.pop2_s</td>
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<td>165</td>
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<td>72.0</td>
<td>167</td>
<td>70.9</td>
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<tr>
<td>638.imagick_s</td>
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<td>105</td>
<td>138</td>
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<td>138</td>
<td>110</td>
<td>131</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>36</td>
<td>65.6</td>
<td>266</td>
<td>65.6</td>
<td>266</td>
<td>65.7</td>
<td>266</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>36</td>
<td>109</td>
<td>83.9</td>
<td>108</td>
<td>84.4</td>
<td>108</td>
<td>84.1</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>36</td>
<td>135</td>
<td>117</td>
<td>134</td>
<td>117</td>
<td>133</td>
<td>118</td>
</tr>
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</table>

**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/lib/intel64"
- OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i9-799X 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.
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SPECspeed2017_fp_base = 140
SPECspeed2017_fp_peak = Not Run

CPU2017 License: 9017
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Test Date: Jun-2019
Hardware Availability: Apr-2019
Software Availability: Oct-2018

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Choose Operating Mode set to Custom Mode
C1 Enhanced Mode set to Enable
MONITOR/MWAIT set to Enable
Hyper-Threading set to Disable
Adjacent Cache Prefetch set to Disable
Sysinfo program /home/cpu2017-1.0.5-ic19/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcd8f2999c33d61f64985e45859ea9
running on localhost.localdomain Fri Jun 7 18:51:13 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) Gold 6254 CPU @ 3.10GHz
  2 "physical id"s (chips)
  36 "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 : 18
siblings : 18
  physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
  physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 36
On-line CPU(s) list: 0-35
Thread(s) per core: 1
Core(s) per socket: 18
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6254 CPU @ 3.10GHz
Stepping: 6
CPU MHz: 3100.000
BogoMIPS: 6200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K

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

- **L3 cache:**  25344K
- **NUMA node0 CPU(s):**  0-17
- **NUMA node1 CPU(s):**  18-35
- **Flags:** fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dtsc acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdscmap lm constant_tsc art arch_perfmon pebs bts rep_good nopl mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dtsc acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdscmap lm constant_tsc art arch_perfmon pebs bts rep_good nopl mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dtsc acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdscmap lm constant_tsc art arch_perfmon pebs bts rep_good nopl mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dtsc acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdscmap lm constant_tsc art arch_perfmon pebs bts rep_good nopl mce cx8 apic sep mtrr pge mca cmov

/proc/cpuinfo cache data

```markdown
| cache size | 25344 KB |
```

From `numactl --hardware`

```markdown
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 12 13 14 15 16 17
  - Node 0 size: 196280 MB
  - Node 0 free: 189034 MB
  - Node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
  - Node 1 size: 196608 MB
  - Node 1 free: 188328 MB
- Node distances:
  - Node 0: 10 21
  - Node 1: 21 10

From `/proc/meminfo`

```markdown
MemTotal: 395878484 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
```

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

```markdown
os-release:
```

```markdown
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)"
```

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**Platform Notes (Continued)**

redhat-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)  
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 Jun 7 15:02**

**SPEC is set to:** /home/cpu2017-1.0.5-ic19

**Filesystem**  
Type Size Used Avail Use% Mounted on  
/dev/mapper/rhel-root xfs 445G 53G 393G 12% /

**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 -[OTE135T2.10]- 03/21/2019  
Memory:  
4x NO DIMM NO DIMM  
12x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(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 19.0.0.117 Build 20180804  
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 19.0.0.117 Build 20180804

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SPECspeed2017_fp_base = 140

SPECspeed2017_fp_peak = Not Run

Compiler Version Notes (Continued)

Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel (R) C Intel (R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.0.117 Build 20180804
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 19.0.0.117 Build 20180804
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 19.0.0.117 Build 20180804
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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
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**Base Portability Flags**

- 603.bwaves_s: -DSPEC_LP64
- 607.cactuBSSN_s: -DSPEC_LP64
- 619.hm_s: -DSPEC_LP64
- 621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian -assume byterecl
- 627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
- 628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
- 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:**
- -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
- -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

**Fortran benchmarks:**
- -DSPEC_OPENMP -xCORE-AVX512 -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-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
- -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
- -nostandard-realloc-lhs -align array32byte

**Benchmarks using Fortran, C, and C++:**
- -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
- -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
- -nostandard-realloc-lhs -align array32byte

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:

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

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