Lenovo Global Technology
ThinkSystem SD650 V2
(3.60 GHz, Intel Xeon Gold 6334)

SPECrater®2017_fp_base = 179
SPECrater®2017_fp_peak = Not Run

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<tr>
<th>Copies</th>
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<tr>
<td>507.cactuBSSN_r</td>
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</tr>
<tr>
<td>508.namd_r</td>
<td>32</td>
</tr>
<tr>
<td>510.parest_r</td>
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<tr>
<td>511.povray_r</td>
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<td>519.lbm_r</td>
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<td>521.wrf_r</td>
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<tr>
<td>526.blender_r</td>
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<td>527.cam4_r</td>
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<tr>
<td>538.imagick_r</td>
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<tr>
<td>544.nab_r</td>
<td>32</td>
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<td>549.fotonik3d_r</td>
<td>32</td>
</tr>
<tr>
<td>554.roms_r</td>
<td>32</td>
</tr>
</tbody>
</table>

Hardware
CPU Name: Intel Xeon Gold 6334
Max MHz: 3700
Nominal: 3600
Enabled: 16 cores, 2 chips, 2 threads/core
Orderable: 2 chips
Cache L1: 32 KB I+48 KB D on chip per core
L2: 1.25 MB I+D on chip per core
L3: 18 MB I+D on chip per chip
Other: None
Memory: 512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R)
Storage: 1 x 480 GB SATA SSD
Other: None

Software
OS: Red Hat Enterprise Linux 8.3 (Ootpa)
Kernel 4.18.0-240.el8.x86_64
Compiler: C/C++: Version 2021.1 of Intel oneAPI DPC++/C++
Compiler Build 20201113 for Linux;
Fortran: Version 2021.1 of Intel Fortran Compiler
Classic Build 20201112 for Linux;
Parallel: No
Firmware: Lenovo BIOS Version U8E111A 1.02 released May-2021
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
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage
## Lenovo Global Technology

ThinkSystem SD650 V2  
(3.60 GHz, Intel Xeon Gold 6334)

<table>
<thead>
<tr>
<th>CPU2017 License: 9017</th>
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<th>Test Date: Jun-2021</th>
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<td>Tested by: Lenovo Global Technology</td>
<td>Hardware Availability: Jul-2021</td>
<td>Software Availability: Dec-2020</td>
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### Results Table

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</tbody>
</table>

### Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl 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"

### Environment Variables Notes

Environment variables set by runcpu before the start of the run:

```bash
LD_LIBRARY_PATH = 
"/home/cpu2017-1.1.8-ic2021.1-revB/lib/intel64:/home/cpu2017-1.1.8-ic202 
1.1-revB/je5.0.1-64"

MALLOC_CONF = "retain:true"
```

### General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM  
memory using Red Hat Enterprise Linux 8.1

Transparent Huge Pages enabled by default

(Continued on next page)...
Lenovo Global Technology
ThinkSystem SD650 V2
(3.60 GHz, Intel Xeon Gold 6334)

General Notes (Continued)

Prior to runcpu invocation
Filesystem page cache synced and cleared with:
sync; echo 3>/proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
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.
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
C-States set to Legacy
CPU Frequency Limits set to Restrict maximum frequency
Patrol Scrub set to Disabled
SNC set to Enabled

Sysinfo program /home/cpu2017-1.1.8-ic2021.1-revB/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Wed Jun 23 11:49:15 2021

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 6334 CPU @ 3.60GHz
  2 "physical id"s (chips)
  32 "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 : 8
siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7

From lscpu from util-linux 2.32.1:
Architecture:  x86_64
CPU op-mode(s): 32-bit, 64-bit
### Lenovo Global Technology

**ThinkSystem SD650 V2**  
(3.60 GHz, Intel Xeon Gold 6334)

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</table>

**SPECrates**

- **SPECrates\textsuperscript{\textregistered}2017\_fp\_base = 179**
- **SPECrates\textsuperscript{\textregistered}2017\_fp\_peak = Not Run**

**Test Details**

- **CPU2017 License:** 9017  
- **Test Sponsor:** Lenovo Global Technology  
- **Tested by:** Lenovo Global Technology  
- **Test Date:** Jun-2021  
- **Hardware Availability:** Jul-2021  
- **Software Availability:** Dec-2020

**Platform Notes (Continued)**

- **Byte Order:** Little Endian  
- **CPU(s):** 32  
- **On-line CPU(s) list:** 0-31  
- **Thread(s) per core:** 2  
- **Core(s) per socket:** 8  
- **Socket(s):** 2  
- **NUMA node(s):** 4  
- **Vendor ID:** GenuineIntel  
- **CPU family:** 6  
- **Model:** 106  
- **Model name:** Intel(R) Xeon(R) Gold 6334 CPU @ 3.60GHz  
- **Stepping:** 6  
- **CPU MHz:** 3600.000  
- **BogoMIPS:** 7200.00  
- **Virtualization:** VT-x  
- **L1d cache:** 48K  
- **L1i cache:** 32K  
- **L2 cache:** 1280K  
- **L3 cache:** 18432K  
- **NUMA node0 CPU(s):** 0-3,16-19  
- **NUMA node1 CPU(s):** 4-7,20-23  
- **NUMA node2 CPU(s):** 8-11,24-27  
- **NUMA node3 CPU(s):** 12-15,28-31  
- **Flags:** fpu vme de pse tsc msr pae mce 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 cpuid aperf perf_counter 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 cpuid aperf perf_counter

```
From numactl --hardware  
WARNING: a numactl 'node' might or might not correspond to a physical chip.  
available: 4 nodes (0-3)  
nodemcu 0 cpus: 0 1 2 3 16 17 18 19  
nodemcu 0 size: 127623 MB  
nodemcu 0 free: 128281 MB  
nodemcu 1 cpus: 4 5 6 7 20 21 22 23
```

(Continued on next page)
Lenovo Global Technology  
ThinkSystem SD650 V2  
(3.60 GHz, Intel Xeon Gold 6334)

SPEC CPU®2017 Floating Point Rate Result

SPECrate®2017_fp_base = 179
SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Jun-2021
Tested by: Lenovo Global Technology
Hardware Availability: Jul-2021
Software Availability: Dec-2020

Platform Notes (Continued)

node 1 size: 128049 MB
node 1 free: 128350 MB
node 2 cpus: 8 9 10 11 24 25 26 27
node 2 size: 128041 MB
node 2 free: 128764 MB
node 3 cpus: 12 13 14 15 28 29 30 31
node 3 size: 128231 MB
node 3 free: 128748 MB
node distances:
node 0 1 2 3
0: 10 11 20 20
1: 11 10 20 20
2: 20 20 10 11
3: 20 20 11 10

From /proc/meminfo
MemTotal: 528013500 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/sbin/tuned-adm active
No current active profile.

/usr/bin/lsb_release -d
Red Hat Enterprise Linux release 8.3 (Ootpa)

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

os-release:
NAME="Red Hat Enterprise Linux"
VERSION="8.3 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="8.3"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:
Linux localhost.localdomain 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 2020
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
CVE-2018-12207 (iTLB Multihit): Not affected

(Continued on next page)
## Lenovo Global Technology

ThinkSystem SD650 V2  
(3.60 GHz, Intel Xeon Gold 6334)

<table>
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### CPU2017 License: 9017

**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  

**Test Date:** Jun-2021  
**Hardware Availability:** Jul-2021  
**Software Availability:** Dec-2020

### Platform Notes (Continued)

- **CVE-2018-3620 (L1 Terminal Fault):** Not affected
- **Microarchitectural Data Sampling:** Not affected
- **CVE-2017-5754 (Meltdown):** Not affected
- **CVE-2018-3639 (Speculative Store Bypass):** Mitigation: Speculative Store Bypass disabled via prctl and seccomp
- **CVE-2017-5753 (Spectre variant 1):** Mitigation: usercopy/swapgs barriers and __user pointer sanitization
- **CVE-2017-5715 (Spectre variant 2):** Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
- **CVE-2020-0543 (Special Register Buffer Data Sampling):** Not affected
- **CVE-2019-11135 (TSX Asynchronous Abort):** Not affected

**run-level 3 Jun 23 11:47**

**SPEC is set to:** /home/cpu2017-1.1.8-ic2021.1-revB

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<tr>
<td>/dev/sda4</td>
<td>xfs</td>
<td>372G</td>
<td>125G</td>
<td>247G</td>
<td>34%</td>
<td>/home</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id

- **Vendor:** Lenovo
- **Product:** ThinkSystem SD650 V2
- **Product Family:** ThinkSystem
- **Serial:** 1234567890

Additional information from dmidecode 3.2 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.

**Memory:**

- 16x Samsung M393A4K40DB3-CWE 32 GB 2 rank 3200

**BIOS:**

- **BIOS Vendor:** Lenovo
- **BIOS Version:** U8E111A-1.02
- **BIOS Date:** 05/07/2021
- **BIOS Revision:** 1.2
- **Firmware Revision:** 1.40

(End of data from sysinfo program)

### Compiler Version Notes

```
C  | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
```

(Continued on next page)
Lenovo Global Technology
ThinkSystem SD650 V2
(3.60 GHz, Intel Xeon Gold 6334)

SPECrater®2017_fp_base = 179
SPECrater®2017_fp_peak = Not Run

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

Test Date: Jun-2021
Hardware Availability: Jul-2021
Software Availability: Dec-2020

Compiler Version Notes (Continued)

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| C++, C | 508.namd_r(base) 510.parest_r(base) |
| C++ oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

---

| C++, C, Fortran | 511.povray_r(base) 526.blender_r(base) |
| Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

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| C++, C, Fortran | 507.cactuBSSN_r(base) |
| Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

---

| Fortran | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base) |
| Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |
Lenovo Global Technology
ThinkSystem SD650 V2
(3.60 GHz, Intel Xeon Gold 6334)

SPECrate®2017_fp_base = 179
SPECrate®2017_fp_peak = Not Run

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

Compiler Version Notes (Continued)

Fortran, C | 521.wrf_r(base) 527.cam4_r(base)

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icx

Benchmarks using both C and C++:
icpx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifort

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.llvm_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

(Continued on next page)
Lenovo Global Technology
ThinkSystem SD650 V2
(3.60 GHz, Intel Xeon Gold 6334)

SPECraten®2017_fp_base = 179
SPECraten®2017_fp_peak = Not Run

Base Portability Flags (Continued)
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both Fortran and C:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-ffinite-math-only
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both C and C++:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using Fortran, C, and C++:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
Lenovo Global Technology
ThinkSystem SD650 V2
(3.60 GHz, Intel Xeon Gold 6334)

SPECrate®2017_fp_base = 179
SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9017
Test Date: Jun-2021
Test Sponsor: Lenovo Global Technology
Hardware Availability: Jul-2021
Tested by: Lenovo Global Technology
Software Availability: Dec-2020

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-qopt-multiple-gather-scatter-by-shuffles
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

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-ICElake-E.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-ICElake-E.xml
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml

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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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