Lenovo Global Technology
ThinkSystem SR630 V2
(2.40 GHz, Intel Xeon Platinum 8351N)

**SPECrates**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECrates</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate(2017_fp_base)</td>
<td>214</td>
</tr>
<tr>
<td>SPECrate(2017_fp_peak)</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon Platinum 8351N  
- **Max MHz:** 3500  
- **Nominal:** 2400  
- **Enabled:** 36 cores, 1 chip  
- **Orderable:** 1 chip  
- **Cache L1:** 32 KB I + 48 KB D on chip per core  
- **L2:** 1.25 MB I+D on chip per core  
- **L3:** 54 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R, running at 2933)  
- **Storage:** 1 x 960 GB SATA SSD  
- **Other:** None

**Software**

- **OS:** SUSE Linux Enterprise Server 15 SP2 (x86_64)  
  Kernel 5.3.18-22-default  
- **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 AFE109PT1 1.00 released Apr-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
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Base Seconds</th>
<th>Ratio</th>
<th>Peak Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>503.bwaves_r</td>
<td>36</td>
<td>1042</td>
<td>346</td>
<td>1042</td>
<td>347</td>
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<tr>
<td>507.cactuBSSN_r</td>
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<td>152</td>
<td>300</td>
<td>156</td>
<td>293</td>
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<td>508.namd_r</td>
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<td>193</td>
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<td>186</td>
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<tr>
<td>510.parest_r</td>
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<td>135</td>
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<td>135</td>
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<td>285</td>
<td>304</td>
<td>277</td>
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<tr>
<td>519.lbm_r</td>
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<td>296</td>
<td>128</td>
<td>294</td>
<td>129</td>
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<tr>
<td>521.wrf_r</td>
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<tr>
<td>526.blender_r</td>
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<tr>
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<tr>
<td>538.imagick_r</td>
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<td>310</td>
<td>145</td>
<td>620</td>
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<tr>
<td>544.nab_r</td>
<td>36</td>
<td>164</td>
<td>369</td>
<td>166</td>
<td>366</td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
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<td>1341</td>
<td>105</td>
<td>1341</td>
<td>105</td>
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<tr>
<td>554.roms_r</td>
<td>36</td>
<td>609</td>
<td>93.9</td>
<td>609</td>
<td>93.9</td>
</tr>
</tbody>
</table>

SPECrare®2017_fp_base = 214
SPECrare®2017_fp_peak = Not Run

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

## 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:

```
LD_LIBRARY_PATH = "/home/cpu2017-1.1.5-ic2021.1-revA-update1/lib/intel64:/home/cpu2017-1.1.5-ic2021.1-revA-update1/je5.0.1-64"
MALLOCONF = "retain:true"
```

## General Notes

Binaries compiled on a system with 1x Intel Core i9-7940X CPU + 64GB RAM
Memory using openSUSE Leap 15.2
Transparent Huge Pages enabled by default

(Continued on next page)
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SPECrate®2017_fp_base = 214
SPECrate®2017_fp_peak = Not Run

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

Test Date: May-2021
Hardware Availability: Jul-2021
Software Availability: Feb-2021

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 numacli 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
MONITOR/MWAIT set to Enabled
Hyper-Threading set to Disabled
Intel Virtualization Technology set to Disabled
SNC set to Enabled
XPT Prefetcher set to Disabled

Sysinfo program /home/cpu2017-1.1.5-ic2021.1-revA-update1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afea89d4b38e2f1c
running on localhost Tue May 11 05:33:07 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) Platinum 8351N CPU @ 2.40GHz
1 "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 : 36
siblings : 36
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
25 26 27 28 29 30 31 32 33 34 35

From lscpu:
Architecture: x86_64

(Continued on next page)
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<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tr>
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</tr>
</tbody>
</table>

**CPU2017 License**: 9017
**Test Sponsor**: Lenovo Global Technology
**Tested by**: Lenovo Global Technology
**CPU op-mode(s)**: 32-bit, 64-bit
**Byte Order**: Little Endian
**Address sizes**: 46 bits physical, 57 bits virtual
**CPU(s)**: 36
**On-line CPU(s) list**: 0-35
**Thread(s) per core**: 1
**Core(s) per socket**: 36
**Socket(s)**: 1
**NUMA node(s)**: 2
**Vendor ID**: GenuineIntel
**CPU family**: 6
**Model**: 106
**Model name**: Intel(R) Xeon(R) Platinum 8351N CPU @ 2.40GHz
**Stepping**: 6
**CPU MHz**: 3114.903
**BogoMIPS**: 4800.00
**Virtualization**: VT-x
**L1d cache**: 48K
**L1i cache**: 32K
**L2 cache**: 1280K
**L3 cache**: 55296K
**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 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 aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpref pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 invpcid_single ssbd mba ibrs ibpb ibrs_enabled tpr_shadow vmi flexpriority ept vpid ept_ad fsstrict node tsc_adjust bmi1 hle avx2 smep bmi2 emms invpcid rtm cmqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsavesopt xsaveopt xsaes xgetbv1 xsaves cssm_llc cssm_occmap llc cssm_mbb_total cssm_mbb_local wbnoinvd dtc mm a e avx_one.ejb a optk pku ospke avx512_vbmi2 gfn vaes vpcmullqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d arch_capabilities

/proc/cpuinfo cache data
  cache size: 55296 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 6 7 8 9 10 11 12 13 14 15 16 17
    node 0 size: 257634 MB
    node 0 free: 256794 MB
    node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35

(Continued on next page)
Platform Notes (Continued)

node 1 size: 258006 MB
node 1 free: 257320 MB
node distances:
node 0 1
0: 10 11
1: 11 10

From /proc/meminfo
MemTotal: 528016428 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
NAME="SLES"
VERSION="15-SP2"
VERSION_ID="15.2"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP2"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp2"

uname -a:
Linux localhost 5.3.18-22-default #1 SMP Wed Jun 3 12:16:43 UTC 2020 (720aeba) x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):
Not affected

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/swaps 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 May 11 03:35

SPEC is set to: /home/cpu2017-1.1.5-ic2021.1-revA-update1

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SPECrates®

SPECrates®

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: May-2021
Tested by: Lenovo Global Technology
Hardware Availability: Jul-2021
Software Availability: Feb-2021

Platform Notes (Continued)

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 892G 27G 865G 4% /

From /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkSystem SR630 V2 MB
Product Family: ThinkSystem
Serial: 1234567890

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.

Memory:
16x NO DIMM NO DIMM
16x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200, configured at 2933

BIOS:
BIOS Vendor: Lenovo
BIOS Version: AFE109PT1-1.00
BIOS Date: 04/28/2021
BIOS Revision: 1.0
Firmware Revision: 1.10

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C               | 519.lbm_r(base) 538.imagick_r(base) 544.nab_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.
==============================================================================
C++            | 508.namd_r(base) 510.parest_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.
==============================================================================
C++, C          | 511.povray_r(base) 526.blender_r(base)

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SPECrater®2017_fp_base = 214
SPECrater®2017_fp_peak = Not Run

Compiler Version Notes (Continued)

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.
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.

Fortran, C | 521.wrf_r(base) 527.cam4_r(base)
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
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Base Compiler Invocation

C benchmarks:
icx

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

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CPU2017 License: 9017
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Test Date: May-2021
Hardware Availability: Jul-2021
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Base Compiler Invocation (Continued)

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.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:
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-ff1to -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-merge-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

(Continued on next page)
Lenovo Global Technology
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SPECratenone

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

SPECratenone

Test Date: May-2021
Hardware Availability: Jul-2021
Software Availability: Feb-2021

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 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo
-no-prec-div -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 -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

Benchmarks using Fortran, C, and C++:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3
-no-prec-div -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

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-D.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-D.xml
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml
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</table>

SPEC CPU®2017 Floating Point Rate Result

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

Tested with SPEC CPU®2017 v1.1.5 on 2021-05-10 17:33:07-0400.
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