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

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

Copies

<table>
<thead>
<tr>
<th>Benchmark</th>
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<tbody>
<tr>
<td>500.perlbench_r</td>
<td>72</td>
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<td>557.xz_r</td>
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</table>

SPECrate®2017_int_base = 243
SPECrate®2017_int_peak = Not Run

Software
OS: Red Hat Enterprise Linux 8.3 (Ootpa)
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;
C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux

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: None
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage

Hardware
CPU Name: Intel Xeon Platinum 8351N
Max MHz: 3500
Nominal: 2400
Enabled: 36 cores, 1 chip, 2 threads/core
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

Compiler Build 20201113 for Linux;
Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux;
C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux

Parallel: No
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: None
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage
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Results Table

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<td>530</td>
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<td><strong>531</strong></td>
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<td>532</td>
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<td><strong>579</strong></td>
<td><strong>134</strong></td>
<td>577</td>
<td>135</td>
</tr>
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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-revB/lib/intel64:/home/cpu2017-1.1.5-ic2021.1-revB/lib/ia32:/home/cpu2017-1.1.5-ic2021.1-revB/je5.0.1-32"
 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
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
```
sync; echo 3> /proc/sys/vm/drop_caches
```

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

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General Notes (Continued)

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.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
DCU Streamer Prefetcher set to Disabled
Adjacent Cache Prefetch set to Disabled
UPI Link Disable set to Disabled 1 Link
SNC set to Enabled

Sysinfo program /home/cpu2017-1.1.5-ic2021.1-revB/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b3e2f1c
running on localhost.localdomain Fri Jun 4 06:45:10 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)
    72 "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 : 72
 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
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 72
On-line CPU(s) list: 0-71
Thread(s) per core: 2
Core(s) per socket: 36
Socket(s): 1

(Continued on next page)
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**SPECrates**
- **SPECrates®2017_int_base = 243**
- **SPECrates®2017_int_peak = Not Run**

<table>
<thead>
<tr>
<th>Platform Notes (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMA node(s): 2</td>
</tr>
<tr>
<td>Vendor ID: GenuineIntel</td>
</tr>
<tr>
<td>CPU family: 6</td>
</tr>
<tr>
<td>Model: 106</td>
</tr>
<tr>
<td>Model name: Intel(R) Xeon(R) Platinum 8351N CPU @ 2.40GHz</td>
</tr>
<tr>
<td>Stepping: 6</td>
</tr>
<tr>
<td>CPU MHz: 3179.798</td>
</tr>
<tr>
<td>CPU max MHz: 3500.0000</td>
</tr>
<tr>
<td>CPU min MHz: 800.0000</td>
</tr>
<tr>
<td>BogoMIPS: 4800.00</td>
</tr>
<tr>
<td>Virtualization: VT-x</td>
</tr>
<tr>
<td>L1d cache: 48K</td>
</tr>
<tr>
<td>L1i cache: 32K</td>
</tr>
<tr>
<td>L2 cache: 1280K</td>
</tr>
<tr>
<td>L3 cache: 55296K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s): 0-17,36-53</td>
</tr>
<tr>
<td>NUMA node1 CPU(s): 18-35,54-71</td>
</tr>
<tr>
<td>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 rdtsscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf fpi pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault ebpx cat_l3 invpcid_single intel_pinn ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cmqr dvt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cmq_lic cmq_occup_lic cmq_mbm_total cmq_mbm_local split_lock_detect wbinvd dtherm ida arat pln pts hwlp act_window hwlp epp hwlp pkgreq avx512vbmi umip pku ospke avx512_vbmi2 vfgni vaes vpcmwlqdf avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d arch_capabilities</td>
</tr>
</tbody>
</table>

```
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 36 37 38 39 40 41 42 43 44 45
  46 47 48 49 50 51 52 53
node 0 size: 245694 MB
node 0 free: 256724 MB
node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 54 55 56 57 58 59 60
  61 62 63 64 65 66 67 68 69 70 71
node 1 size: 246363 MB
node 1 free: 256745 MB
node distances:
  node 0 1
```

(Continued on next page)
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Test Date: Jun-2021
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Hardware Availability: Jul-2021
Software Availability: Feb-2021

Platform Notes (Continued)

0: 10 11
1: 11 10

From /proc/meminfo
MemTotal: 528005468 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/sbin/tuned-adm active
Current active profile: throughput-performance
/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

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

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

- **CVE-2019-11135 (TSX Asynchronous Abort):** Not affected

- **run-level 3 Jun 3 18:20**

- **SPEC is set to:** /home/cpu2017-1.1.5-ic2021.1-revB

- **Filesystem**  
  - Type: xfs
  - Size: 818G
  - Used: 11G
  - Avail: 807G
  - Use%: 2%
  - Mounted on: /home

- **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:** APE109PT1-1.00  
  - **BIOS Date:** 04/28/2021  
  - **BIOS Revision:** 1.0  
  - **Firmware Revision:** 1.10

(End of data from sysinfo program)

---

**Compiler Version Notes**

```
---------------------------------------------------------------------
C | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 
   | 525.x264_r(base) 557.xz_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++ | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 
   | 541.leela_r(base) 
---------------------------------------------------------------------
```

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**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.

---

**Base Compiler Invocation**

C benchmarks:  
icx

C++ benchmarks:  
icpx

Fortran benchmarks:  
ifort

**Base Portability Flags**

```  
500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64  
502.gcc_r: -DSPEC_LP64  
505.mcf_r: -DSPEC_LP64  
520.omnetpp_r: -DSPEC_LP64  
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX  
525.x264_r: -DSPEC_LP64  
531.deepsjeng_r: -DSPEC_LP64  
541.leela_r: -DSPEC_LP64  
548.exchange2_r: -DSPEC_LP64  
557.xz_r: -DSPEC_LP64  
```

**Base Optimization Flags**

```  
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math  
```

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Test Date: Jun-2021
Hardware Availability: Jul-2021
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### Base Optimization Flags (Continued)

**C benchmarks (continued):**
- `-flto`
- `-mfpmath=sse`
- `-funroll-loops`
- `-qopt-mem-layout-trans=4`
- `-mbranches-within-32B-boundaries`
- `-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`
- `-lqkmalloc`

**C++ benchmarks:**
- `-w`
- `-m64`
- `-Wl,-z,muldefs`
- `-xcore-AVX512`
- `-O3`
- `-ffast-math`
- `-flto`
- `-mfpmath=sse`
- `-funroll-loops`
- `-qopt-mem-layout-trans=4`
- `-mbranches-within-32B-boundaries`
- `-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`
- `-lqkmalloc`

**Fortran benchmarks:**
- `-w`
- `-m64`
- `-Wl,-z,muldefs`
- `-xcore-AVX512`
- `-O3`
- `-ipo`
- `-no-prec-div`
- `-qopt-mem-layout-trans=4`
- `-nostandard-realloc-lhs`
- `-align array32byte`
- `-auto`
- `-mbranches-within-32B-boundaries`
- `-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`
- `-lqkmalloc`

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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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 2021-06-03 18:45:09-0400.
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