## Lenovo Global Technology

**ThinkSystem SD630 V2**

*(3.10 GHz, Intel Xeon Gold 6346)*

### SPEC CPU®2017 Integer Speed Result

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>12.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

### CPU2017 License: 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**CPU Name:** Intel Xeon Gold 6346

**Max MHz:** 3600

**Nominal:** 3100

**Enabled:** 32 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:** 36 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

**Threads**

<table>
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<tr>
<th>SPECspeed®2017_int_base (12.1)</th>
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</table>

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base</th>
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<tbody>
<tr>
<td>perlbench</td>
<td>64</td>
<td>11.0</td>
</tr>
<tr>
<td>gcc</td>
<td>64</td>
<td>19.8</td>
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<tr>
<td>mcf</td>
<td>64</td>
<td>12.0</td>
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<tr>
<td>omnetpp</td>
<td>64</td>
<td>14.0</td>
</tr>
<tr>
<td>xalancbmk</td>
<td>64</td>
<td>17.6</td>
</tr>
<tr>
<td>x264</td>
<td>64</td>
<td>5.99</td>
</tr>
<tr>
<td>deepsjeng</td>
<td>64</td>
<td>4.90</td>
</tr>
<tr>
<td>leela</td>
<td>64</td>
<td>20.8</td>
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<tr>
<td>exchange2</td>
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<td>23.9</td>
</tr>
<tr>
<td>xz</td>
<td>64</td>
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</tr>
</tbody>
</table>

### Hardware

#### 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;

C/C++: Version 2021.1 of Intel C/C++ Compiler

Classic Build 20201112 for Linux

#### Parallel:

Yes

#### Firmware:

Lenovo BIOS Version U8E109PT1 1.01

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
SPEC CPU®2017 Integer Speed Result
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(3.10 GHz, Intel Xeon Gold 6346)

SPECspeed®2017_int_base = 12.1
SPECspeed®2017_int_peak = Not Run

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>23.9</td>
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</tr>
</tbody>
</table>

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"

Environment Variables Notes
Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH =
    "/home/cpu2017-1.1.5-ic2021.1-revB/lib/intel64:/home/cpu2017-1.1.5-ic202
    1.1-revB/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"

General Notes
Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Redhat Enterprise Linux 8.0
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.

(Continued on next page)
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General Notes (Continued)

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 Autonomous
CPU P-state Control set to Autonomous

Sysinfo program /home/cpu2017-1.1.5-ic2021.1-revB/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2fc
running on localhost.localdomain Mon May 10 05:14:30 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 6346 CPU @ 3.10GHz
    2  "physical id"s (chips)
    64 "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 : 16
    siblings : 32
          physical 0: cores 0 2 3 4 5 6 7 8 9 10 11 12 13 14 15
          physical 1: cores 0 2 3 4 5 6 7 8 9 10 11 12 13 14 15

From lscpu:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian
  CPU(s): 64
  On-line CPU(s) list: 0-63
  Thread(s) per core: 2
  Core(s) per socket: 16
  Socket(s): 2
  NUMA node(s): 2
  Vendor ID: GenuineIntel
  CPU family: 6
  Model: 106
  Model name: Intel(R) Xeon(R) Gold 6346 CPU @ 3.10GHz
  Stepping: 6
  CPU MHz: 800.000

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

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<th>Lenovo Global Technology</th>
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<tbody>
<tr>
<td>Test Date:</td>
<td>May-2021</td>
<td>Hardware Availability:</td>
<td>Jul-2021</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
<td>Software Availability:</td>
<td>Feb-2021</td>
</tr>
</tbody>
</table>

**SPECspeed®2017_int_base =** 12.1

**SPECspeed®2017_int_peak =** Not Run

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**Platform Notes (Continued)**

- **BogoMIPS:** 6200.00
- **Virtualization:** VT-x
- **L1d cache:** 48K
- **L1i cache:** 32K
- **L2 cache:** 1280K
- **L3 cache:** 36864K
- **NUMA node0 CPU(s):** 0-15,32-47
- **NUMA node1 CPU(s):** 16-31,48-63
- **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 aperfmperf pni pclmulqdq dtes64 monitor ds cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 invpcid_single intel_pinn ssbd mba ibrs libp bts ibrs_enhanced tpr_shadow vnumi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local split_lock_detect wbinvd dtherm ida arat pln pts hwp epp avx512vmbmi umip pku ospke avx512_vbmi2 gfn vaes vpcmldmq avx512_vnni avx512_bitalg tme avx512_vxopcntdq la57 rdpid md_clear pconfig flush_l1d arch_capabilities

From /proc/cpuinfo cache data
- cache size : 36864 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 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
  - node 0 size: 246165 MB
  - node 0 free: 256463 MB
  - node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
  - node 1 size: 247650 MB
  - node 1 free: 257252 MB
  - node distances:
    - node 0 1
      - 0: 10 20
      - 1: 20 10

From /proc/meminfo
- MemTotal: 528007256 KB
- HugePages_Total: 0
- Hugepagesize: 2048 KB

/sbin/tuned-adm active

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SPECspeed®2017_int_base = 12.1
SPECspeed®2017_int_peak = Not Run

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

Platform Notes (Continued)

Current active profile: throughput-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
CVE-2018-3639 (Speculative Store Bypass):
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 May 10 05:11

SPEC is set to: /home/cpu2017-1.1.5-ic2021.1-revB
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 372G 39G 333G 11% /home

From /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkSystem SD630 V2
Product Family: ThinkSystem

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SPECSpeed®2017_int_base = 12.1
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Platform Notes (Continued)

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 Samsung M393A4K40DB3-CWE 32 GB 2 rank 3200

BIOS:
  BIOS Vendor: Lenovo
  BIOS Version: U8E109PT1-1.01
  BIOS Date: 04/28/2021
  BIOS Revision: 1.1
  Firmware Revision: 1.40

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C      | 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base)
       | 625.x264_s(base) 657.xz_s(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++    | 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
       | 641.leela_s(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 | 648.exchange2_s(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.
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**SPECspeed®2017_int_base = 12.1**

**SPECspeed®2017_int_peak = Not Run**

### Base Compiler Invocation

C benchmarks:
- icx

C++ benchmarks:
- icpx

Fortran benchmarks:
- ifort

### Base Portability Flags

- 600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
- 602.gcc_s: -DSPEC_LP64
- 605.mcf_s: -DSPEC_LP64
- 620.omnetpp_s: -DSPEC_LP64
- 623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
- 625.x264_s: -DSPEC_LP64
- 631.deepsjeng_s: -DSPEC_LP64
- 641.leela_s: -DSPEC_LP64
- 648.exchange2_s: -DSPEC_LP64
- 657.xz_s: -DSPEC_LP64

### Base Optimization Flags

**C benchmarks:**
- -DSPEC_OPENMP -std=c11 -m64 -fiopenmp -Wl,-z,muldefs -xCORE-AVX2
- -O3 -ffast-math -flto -mfpmath=sse -funroll-loops
- -qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
- -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

**C++ benchmarks:**
- -DSPEC_OPENMP -m64 -Wl,-z,muldefs -xCORE-AVX2 -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:**
- -m64 -xCORE-AVX2 -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
- -nostandard-realloc-lhs -align array32byte -auto
- -mbranches-within-32B-boundaries
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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:
- [http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-ICElake-D.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-ICElake-D.xml)