Lenovo Global Technology
ThinkSystem ST650 V2
(2.80 GHz, Intel Xeon Gold 6342)

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

Threads

600.perlbench_s 96
   602.gcc_s 96
   605.mcf_s 96
   620.omnetpp_s 96
   623.xalancbmk_s 96
   625.x264_s 96
   631.deepsjeng_s 96
   641.leela_s 96
   648.exchange2_s 96
   657.xz_s 96

SPECspeed®2017_int_base = 11.8
SPECspeed®2017_int_peak = Not Run

Hardware
CPU Name: Intel Xeon Gold 6342
Max MHz: 3500
Nominal: 2800
Enabled: 48 cores, 2 chips, 2 threads/core
Orderable: 1.2 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: 1 TB (32 x 32 GB 2Rx8 PC4-3200AA-R)
Storage: 1 x 960 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: Yes
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
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**Test Date:** Jun-2021  
**Hardware Availability:** Jul-2021  
**Software Availability:** Dec-2020

---

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Peak Threads</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
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<td><strong>7.22</strong></td>
<td>96</td>
<td><strong>245</strong></td>
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<td>10.7</td>
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<td><strong>10.7</strong></td>
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<td>605.mcf_s</td>
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<td>242</td>
<td><strong>19.5</strong></td>
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<td>19.5</td>
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<td><strong>13.6</strong></td>
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<td>104</td>
<td>13.6</td>
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<td>625.x264_s</td>
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<td>17.1</td>
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<td><strong>17.1</strong></td>
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<td>631.deepsjeng_s</td>
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<td><strong>5.92</strong></td>
<td>96</td>
<td>242</td>
<td>5.92</td>
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<tr>
<td>641.leela_s</td>
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<td><strong>351</strong></td>
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<tr>
<td>648.exchange2_s</td>
<td>96</td>
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<td><strong>19.3</strong></td>
<td>96</td>
<td>152</td>
<td>19.4</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>96</td>
<td>258</td>
<td>23.9</td>
<td>96</td>
<td><strong>259</strong></td>
<td><strong>23.9</strong></td>
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</table>

**SPECspeed®2017_int_base = 11.8**  
**SPECspeed®2017_int_peak = Not Run**

---

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/cpu2017-1.1.8-ic2021.1-revB/lib/intel64:/home/cpu2017-1.1.8-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 Legacy

Sysinfo program /home/cpu2017-1.1.8-ic2021.1-revB/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Fri Jun 25 18:54:44 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 6342 CPU @ 2.80GHz
  2 "physical id"s (chips)
  96 "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 : 24
siblings : 48
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
physical 1: 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

From lscpu from util-linux 2.32.1:

Architecture:       x86_64
CPU op-mode(s):     32-bit, 64-bit
Byte Order:         Little Endian
CPU(s):             96
On-line CPU(s) list: 0-95
Thread(s) per core: 2
Core(s) per socket: 24
Socket(s):          2
NUMA node(s):       2
Vendor ID:          GenuineIntel
CPU family:         6
Model:              106
Model name:         Intel(R) Xeon(R) Gold 6342 CPU @ 2.80GHz
Stepping:           6
CPU MHz:            3300.896
BogoMIPS:           5600.00

(Continued on next page)
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SPECSpeed®2017_int_base = 11.8
SPECSpeed®2017_int_peak = Not Run

Platform Notes (Continued)

Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 36864K
NUMA node0 CPU(s): 0-23,48-71
NUMA node1 CPU(s): 24-47,72-95
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 xtrpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single intel_pinn ssbd mba ibrs ibpb stibp ibrs_enabled tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cqm rdt_a avx512ifar vxv512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsavevc xgetbv1 xsavec cqm_llc cqm_occupy_llc cqm_mbm_total cqm_mbm_local split_lock_detect wbnoiwvd dtherm ida arat pln pts avx512vmbmi umpk pku ospke avx512_vmbmi2 gfnl vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d arch_capabilities

From /proc/cpuinfo

/cache data

MemTotal: 1056481812 kB

From /proc/meminfo

Current active profile: balanced

(Continued on next page)
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| SPECspeed®2017_int_base = 11.8 |
| SPECspeed®2017_int_peak = Not Run |

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**Platform Notes (Continued)**

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

```ini
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
```

```bash
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): 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 25 18:52

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

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda4</td>
<td>xfs</td>
<td>818G</td>
<td>108G</td>
<td>710G</td>
<td>14%</td>
<td>/home</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id

- **Vendor:** Lenovo
- **Product:** ThinkSystem ST650V2
- **Product Family:** ThinkSystem
- **Serial:** 1234567890

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

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**Platform Notes (Continued)**

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:**
- 32x Samsung M393A4G43AB3-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**

```
<table>
<thead>
<tr>
<th>C</th>
<th>600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base)</th>
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</table>

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.
```

```
<table>
<thead>
<tr>
<th>C++</th>
<th>620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)</th>
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<td>641.leela_s(base)</td>
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</table>

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.
```

```
<table>
<thead>
<tr>
<th>Fortran</th>
<th>648.exchange2_s(base)</th>
</tr>
</thead>
</table>

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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### 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-AVX512
  - -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-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:**
  - -m64 -xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
  - -nostandard-realloc-lhs -align array32byte -auto
  - -mbranches-within-32B-boundaries
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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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