### SPEC CPU®2017 Integer Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL360 Gen10 Plus  
(3.60 GHz, Intel Xeon Gold 6334)

| SPECspeed®2017_int_base = 11.7 | SPECspeed®2017_int_peak = 12.0 |

**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Test Date:** Jun-2021  
**Hardware Availability:** Jun-2021  

**Tested by:** HPE  
**Software Availability:** Jun-2021

#### Hardware

- **CPU Name:** Intel Xeon Gold 6334  
- **Max MHz:** 3700  
- **Nominal:** 3600  
- **Enabled:** 16 cores, 2 chips  
- **Orderable:** 1, 2 chip(s)  
- **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:** 2 TB (32 x 64 GB 2Rx4 PC4-3200AA-R)  
- **Storage:** 1 x 800 GB SAS SSD, RAID 0  
- **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; C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux  
- **Parallel:** Yes  
- **Firmware:** HPE BIOS Version U46 v1.42 05/26/2021 released May-2021  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** 64-bit  
- **Other:** jemalloc memory allocator V5.0.1  
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage

| Threads | 0 | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | 7.00 | 8.00 | 9.00 | 10.0 | 11.0 | 12.0 | 13.0 | 14.0 | 15.0 | 16.0 | 17.0 | 18.0 | 19.0 | 20.0 | 21.0 |
|---------|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 600.perlbench_s | 16 | 7.49 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 602.gcc_s | 16 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 605.mcf_s | 16 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 620.omnetpp_s | 16 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 623.xalancbmk_s | 16 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 625.x264_s | 16 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 631.deepsjeng_s | 16 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 641.leela_s | 16 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 648.exchange2_s | 16 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 657.xz_s | 16 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

- **Threads:** (12.0)  
- **SPECspeed®2017_int_peak:** (11.7)  
- **SPECspeed®2017_int_base:** (11.7)  
- **SPECspeed®2017_int_peak:** (12.0)
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Results Table

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<th>Threads</th>
<th>Seconds</th>
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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"
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

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
MALLOCONF = "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
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

(Continued on next page)
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Test Sponsor: HPE
Tested by: HPE

Test Date: Jun-2021
Hardware Availability: Jun-2021
Software Availability: Jun-2021

General Notes (Continued)


Submitted by: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>
Submitted: Mon Jun 21 10:22:03 EDT 2021
Submission: cpu2017-20210621-27552.sub

Platform Notes

The system ROM used for this result contains Intel microcode version 0xd0002a0 for the Intel Xeon Gold 6334 processor.
BIOS Configuration:
Workload Profile set to General Peak Frequency Compute
Intel Hyper-Threading set to Disabled
Thermal Configuration set to Maximum Cooling
Memory Patrol Scrubbing set to Disabled
Advanced Memory Protection set to Advanced ECC
Last Level Cache (LLC) Prefetch set to Enabled
Last Level Cache (LLC) Dead Line Allocation set to Disabled
Enhanced Processor Performance set to Enabled
Workload Profile set to Custom
   Energy/Performance Bias set to Balanced Power
   DCU Stream Prefetcher set to Disabled
   Adjacent Sector Prefetch set to Disabled
   Minimum Processor Idle Power Package C-State set to No Package State
   Numa Group Size Optimization set to Flat

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca6c6d
running on localhost.localdomain Thu Jun 17 10:26:38 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)
      16 "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  : 8
   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:

(Continued on next page)
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Platform Notes (Continued)

Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 1
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6334 CPU @ 3.60GHz
Stepping: 6
CPU MHz: 2221.401
BogoMIPS: 7200.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 18432K
NUMA node0 CPU(s): 0-7
NUMA node1 CPU(s): 8-15
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 xtrp 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 ssbd mba ibpb stibp ibrs Enhanced tpr_shadow vmx flexpriority ept psep ad fsrmstartup 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 xsxveopt xsxvec xgetbv1 xsaves cmq llc cqm_occp llc cqm_mbm total cqm_mbb_local split_lock_detect wdbnoiwd dtherm ida arat pfn pts avx512v bmi umip pku ospke avx512_vbm2 gfn1 vaes vpcmldqg avx512_vnni avx512_bitalg tme avx512_vpopcntd q la57 rdpid md_clear pconfig flush_l1d arch_capabilities

/proc/cpuinfo cache data
    cache size : 18432 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
    node 0 size: 1022513 MB
    node 0 free: 1031123 MB
    node 1 cpus: 8 9 10 11 12 13 14 15

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**Platform Notes (Continued)**

- node 1 size: 1022820 MB  
- node 1 free: 1031694 MB  
- node distances:  
  - node 0 1  
    - 0: 10 20  
    - 1: 20 10

From `/proc/meminfo`  
- MemTotal: 2113499264 kB  
- HugePages_Total: 0  
- Hugepagesize: 2048 kB

/sbin/tuned-adm active  
- 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): 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

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

CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected  
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jun 17 10:22

SPEC is set to: /home/cpu2017
Filesystem          Type  Size  Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs   670G   85G  585G  13% /home

From /sys/devices/virtual/dmi/id
Vendor:         HPE
Product:        ProLiant DL360 Gen10 Plus
Product Family: ProLiant
Serial:         CN7013030H

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 Micron 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200

BIOS: 
BIOS Vendor:   HPE
BIOS Version:  U46
BIOS Date:     05/26/2021
BIOS Revision: 1.42
Firmware Revision: 2.42

(End of data from sysinfo program)

## Compiler Version Notes

```
C       | 600.perlbench_s(peak)
```

```
Intel(R) C 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.
```

```
C       | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak)
       | 625.x264_s(base, peak) 657.xz_s(base, peak)
```

```
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
```

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Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx
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Base Compiler Invocation (Continued)

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/
-1qkmalloc

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

Peak Compiler Invocation

C benchmarks (except as noted below):
icx

(Continued on next page)
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**Peak Compiler Invocation (Continued)**

600.perlbench_s: icc  
C++ benchmarks:  
icpx  
Fortran benchmarks:  
ifort

---

**Peak Portability Flags**

Same as Base Portability Flags

---

**Peak Optimization Flags**

C benchmarks:

600.perlbench_s: -W1,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)  
-xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4 -fno-strict-overflow  
-mbranches-within-32B-boundaries  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc  

602.gcc_s: -m64 -std=c11 -W1,-z,muldefs -fprofile-generate(pass 1)  
-fprofile-use=default.profdatal pass 2) -xCORE-AVX512 -flto  
-Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4  
-mbranches-within-32B-boundaries  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc  

605.mcf_s: basepeak = yes  
625.x264_s: -DSPEC_OPENMP -fiopenmp -std=c11 -m64 -W1,-z,muldefs  
-xCORE-AVX512 -flto -O3 -ffast-math  
-qopt-mem-layout-trans=4 -fno-alias  
-mbranches-within-32B-boundaries  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc  

657.xz_s: basepeak = yes  
C++ benchmarks:

(Continued on next page)
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## Peak Optimization Flags (Continued)

620.omnetpp_s: basepeak = yes  
623.xalancbmk_s: basepeak = yes  
631.deepsjeng_s: basepeak = yes  
641.leela_s: basepeak = yes  

Fortran benchmarks:  
648.exchange2_s: basepeak = yes

The flags files that were used to format this result can be browsed at  
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.0-ICX-revC.html

You can also download the XML flags sources by saving the following links:  
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml  
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.0-ICX-revC.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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