Hewlett Packard Enterprise
ProLiant DL360 Gen10 Plus
(2.20 GHz, Intel Xeon Gold 5320)

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

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

Hardware
CPU Name: Intel Xeon Gold 5320
Max MHz: 3400
Nominal: 2200
Enabled: 52 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: 39 MB I+D on chip per chip
Other: None
Memory: 2 TB (32 x 64 GB 2Rx4 PC4-3200AA-R, running at 2933)
Storage: 1 x 800 GB SAS SSD, RAID 0
Other: None

SPEC CPU®2017 Integer Speed Result

SPECspeed®2017_int_base = 11.5
SPECspeed®2017_int_peak = 11.8

Threads

600.perlbench_s 52
602.gcc_s 52
605.mcf_s 52
620.omnetpp_s 52
623.xalancbmk_s 52
625.x264_s 52
631.deepsjeng_s 52
641.leela_s 52
648.exchange2_s 52
657.xz_s 52

SPECspeed®2017_int_base (11.5)
SPECspeed®2017_int_peak (11.8)
**SPEC CPU®2017 Integer Speed Result**

Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL360 Gen10 Plus  
(2.20 GHz, Intel Xeon Gold 5320)  

<table>
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<th>Threads</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
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<td>5.76</td>
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<td>648.exchange2_s</td>
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<td>52</td>
<td>22.8</td>
<td></td>
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</table>

**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"
  - 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
- 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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ProLiant DL360 Gen10 Plus  
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**Spec CPU®2017 Integer Speed Result**  
Copyright 2017-2021 Standard Performance Evaluation Corporation  

General Notes (Continued)


Submitted by: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>
Submitted: Mon Jun 21 10:21:12 EDT 2021
Submission: cpu2017-20210621-27534.sub

Platform Notes

The system ROM used for this result contains Intel microcode version 0xd0002a0 for the Intel Xeon Gold 5320 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 982a61ec0915b55891ef0e16aaca64d
running on localhost.localdomain Sat Jun 19 08:34:23 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 5320 CPU @ 2.20GHz
  2 "physical id"s (chips)
  52 "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 : 26
siblings : 26
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
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 24 25
```

(Continued on next page)
Hewlett Packard Enterprise (Test Sponsor: HPE)
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SPECspeed®2017_int_base = 11.5
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CPU2017 License: 3
Test Sponsor: HPE
Test Date: Jun-2021
Tested by: HPE
Hardware Availability: Jun-2021
Software Availability: Jun-2021

Platform Notes (Continued)

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): 52
On-line CPU(s) list: 0-51
Thread(s) per core: 1
Core(s) per socket: 26
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 5320 CPU @ 2.20GHz
Stepping: 6
CPU MHz: 867.850
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 39936K
NUMA node0 CPU(s): 0-25
NUMA node1 CPU(s): 26-51
Flags: fpum vsme 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 arch_perfmon pebs bts rep_good nopl apic sm mce pmap csacie xtpr pdcm pcid dca sse4_1 mce x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cmp rdt_a avx512f avx512dq rdseed adx smap avx512ifsma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsave xsetbvb xsavec cqm llvm cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbb_local split_lock_detect wboi vmd dtherm ida arat pni pts avx512vbmi umip pku ospke avx512_vbmi2 gfnis vaes vpcm1mulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfi flush_l1d arch_capabilities

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 18 19 20 21 22 23 24 25
  node 0 size: 986251 MB

(Continued on next page)
<table>
<thead>
<tr>
<th>Platform Notes (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>node 0 free: 1031124 MB</td>
</tr>
<tr>
<td>node 1 cpus: 0 1</td>
</tr>
<tr>
<td>node 1 size: 984306 MB</td>
</tr>
<tr>
<td>node 1 free: 1031517 MB</td>
</tr>
<tr>
<td>node distances:</td>
</tr>
<tr>
<td>node 0 1</td>
</tr>
<tr>
<td>0: 10 20</td>
</tr>
<tr>
<td>1: 20 10</td>
</tr>
</tbody>
</table>

From /proc/meminfo
- MemTotal: 2113491460 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

/sbin/tuned-adm active
- Current active profile: throughput-performance

From /etc/*release* /etc/*version*
- NAME="Red Hat Enterprise Linux"
- VERSION="8.3 (Ootpa)"
- ID="rhel"
- ID_LIKE="fedora"
- VERSION_ID="8.3.300.1"
- 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)

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 barriers and __user pointer
- CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swaps
**SPEC CPU®2017 Integer Speed Result**

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)
ProLiant DL360 Gen10 Plus
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</table>

**SPECspeed®2017_int_base = 11.5**
**SPECspeed®2017_int_peak = 11.8**

**Platform Notes (Continued)**

- 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 19 08:31
SPEC is set to: /home/cpu2017
```
Filesystem  Type  Size  Used  Avail  Use%  Mounted on
/dev/mapper/rhel-home  xfs   670G   97G  573G   15%  /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, configured at 2933

**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**

==============================================================================
<table>
<thead>
<tr>
<th>C</th>
<th>600.perlbench_s(peak)</th>
</tr>
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</table>
==============================================================================

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.

==============================================================================
<table>
<thead>
<tr>
<th>C</th>
<th>600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak)</th>
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(Continued on next page)
Hewlett Packard Enterprise
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SPECspeed®2017_int_base = 11.5
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Compiler Version Notes (Continued)

<table>
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<tr>
<th>625.x264_s(base, peak) 657.xz_s(base, peak)</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.

Base Compiler Invocation

C benchmarks:
icx
SPEC CPU®2017 Integer Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen10 Plus
(2.20 GHz, Intel Xeon Gold 5320)

| SPECspeed®2017_int_base = 11.5 |
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE
Test Date: Jun-2021
Hardware Availability: Jun-2021
Software Availability: Jun-2021

Base Compiler Invocation (Continued)

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
-03 -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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### Peak Compiler Invocation

C benchmarks (except as noted below):
- icx

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.profdata(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

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen10 Plus
(2.20 GHz, Intel Xeon Gold 5320)

SPECspeed®2017_int_base = 11.5
SPECspeed®2017_int_peak = 11.8

Peak Optimization Flags (Continued)

C++ benchmarks:

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/HPE-Platform-Flags-Intel-V1.0-ICX-revC.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 v1.1.8 on 2021-06-19 08:34:22-0400.
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Originally published on 2021-07-06.