**SPEC CPU®2017 Integer Rate Result**

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL360 Gen10 Plus  
(2.10 GHz, Intel Xeon Gold 5318N)

<table>
<thead>
<tr>
<th>Test Sponsor:</th>
<th>Hardware Availability:</th>
<th>Software Availability:</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPE</td>
<td>Jun-2021</td>
<td>Dec-2020</td>
</tr>
</tbody>
</table>

| SPECrate®2017_int_base | 324                    |
| SPECrate®2017_int_peak | 336                    |

**CPU2017 License**: 3  
**Test Date**: Jun-2021  
**Hardware Availability**: Jun-2021  
**Tested by**: HPE  
**Software Availability**: Dec-2020

**Hardware**

- **CPU Name**: Intel Xeon Gold 5318N  
- **Max MHz**: 3400  
- **Nominal**: 2100  
- **Enabled**: 48 cores, 2 chips, 2 threads/core  
- **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**: 36 MB I+D on chip per chip  
- **Other**: None  
- **Memory**: 2 TB (32 x 64 GB 2Rx4 PC4-3200AA-R, running at 2666)  
- **Storage**: 1 x 400 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**: No  
- **Firmware**: HPE BIOS Version U46 v1.42 05/16/2021 released May-2021

- **File System**: xfs  
- **System State**: Run level 3 (multi-user)  
- **Base Pointers**: 64-bit  
- **Peak Pointers**: 32/64-bit  
- **Power Management**: BIOS set to prefer performance at the cost of additional power usage

The table lists the SPEC CPU®2017 Integer Rate Result with specific benchmarks and scores. The system configuration details are also provided, including CPU, memory, storage, and firmware information.
Hewlett Packard Enterprise  
ProLiant DL360 Gen10 Plus  
(2.10 GHz, Intel Xeon Gold 5318N)  

CPU2017 License: 3  
Test Sponsor: HPE  
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Test Date: Jun-2021  
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Results Table

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<td>569</td>
<td>182</td>
<td>568</td>
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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"  
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:  
LD_LIBRARY_PATH =  
"/home/cpu2017_1.1.8/lib/intel64:/home/cpu2017_1.1.8/lib/ia32:/home/cpu2017_1.1.8/jem5.0.1-32"  
MALLOCONF = "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

(Continued on next page)
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Copyright 2017-2021 Standard Performance Evaluation Corporation  

SPECrate®2017_int_base = 324  
SPECrate®2017_int_peak = 336  

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

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.  
jemalloc, a general purpose malloc implementation  
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5  

Submitted by: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>  
Submitted: Mon Jul 5 07:59:51 EDT 2021  
Submission: cpu2017-20210705-27727.sub  

Platform Notes  
The system ROM used for this result contains Intel microcode version 0xd0002a0 for  
the Intel Xeon Gold 5318N processor.  
BIOS Configuration:  
Workload Profile set to General Throughput Compute  
Memory Patrol Scrubbing set to Disabled  
Advanced Memory Protection set to Advanced ECC  
XPT Remote Prefetcher set to Enabled  
Last Level Cache (LLC) Dead Line Allocation set to Disabled  
Enhanced Processor Performance set to Enabled  
Enhanced Processor Performance Profile set to Aggressive  
Thermal Configuration set to Maximum Cooling  
Intel UPI Link Frequency set to Minimum  
Intel UPI Link Enablement set to Single Link  
D2K set to Disabled  
Workload Profile set to Custom  
DCU Stream Prefetcher set to Disabled  
Energy Efficient Turbo set to Enabled  
Adjacent Sector Prefetcher set to Disabled  
Intel UPI Link Power Management set to Enabled  

Sysinfo program /home/cpu2017_1.1.8/bin/sysinfo  
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf66d  
running on localhost.localdomain Tue Jun 22 16:20:58 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  

(Continued on next page)
Platform Notes (Continued)

From /proc/cpuinfo

```
        model name : Intel(R) Xeon(R) Gold 5318N CPU @ 2.10GHz
  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):        4
Vendor ID:           GenuineIntel
CPU family:          6
Model:               106
Model name:          Intel(R) Xeon(R) Gold 5318N CPU @ 2.10GHz
Stepping:            6
CPU MHz:             3211.040
BogoMIPS:            4200.00
Virtualization:      VT-x
L1d cache:           48K
L1i cache:           32K
L2 cache:            1280K
L3 cache:            36864K
NUMA node0 CPU(s):   0-11,48-59
NUMA node1 CPU(s):   12-23,60-71
NUMA node2 CPU(s):   24-35,72-83
NUMA node3 CPU(s):   36-47,84-95
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 art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc tsc
aperfmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrhaps pdcmt dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_-1 invpcid_single ssbd
mbe ibrs ibpb stibp 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 shani avx512bw
avx512vl xsaveopt xsaves xsavec xgetbv1 xsavec xsavec cqm llc cqm occcup llc cqm_mbb_total
```
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**Platform Notes (Continued)**

cqm_mbm_local split_lock_detect wbnoinvd dtherm ida arat pin pts avx512vbmi umip pku ospeavx512_vbm2 gfni vaes vpcmumldq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpmi md_clear pconfig flush_l1d arch_capabilities

/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: 4 nodes (0-3)
  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  26  27  28  29  30  31  32  33  34  35  36  37  38  39  40  41  42  43  44  45  46  47  48  49  50  51  52  53  54  55  56  57  58  59
  node 0 size: 505388 MB
  node 0 free: 515210 MB
  node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59
  node 1 size: 505508 MB
  node 1 free: 515630 MB
  node 2 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
  node 2 size: 506268 MB
  node 2 free: 515796 MB
  node 3 cpus: 60 61 62 63 64 65 66 67 68 69 70 71 82 83 84 85 86 87 88 89 90 91 92 93
  node 3 size: 505945 MB
  node 3 free: 515836 MB
  node distances:
    node 0 1 2 3
    0: 10 20 30 30
    1: 20 10 30 30
    2: 30 30 10 20
    3: 30 30 20 10

From /proc/meminfo
  MemTotal:  2113481264 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"

(Continued on next page)
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SPECrate®2017_int_base = 324
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Platform Notes (Continued)

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/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 22 16:19

SPEC is set to: /home/cpu2017_1.1.8
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel00-home xfs 372G 221G 151G 60% /home

From /sys/devices/virtual/dmi/id
Vendor: HPE
Product: ProLiant DL360 Gen10 Plus
Product Family: ProLiant
Serial: CN701108CQ

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 2666

BIOS:
   BIOS Vendor: HPE
   BIOS Version: U46

(Continued on next page)
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SPECrated®2017_int_base = 324
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Platform Notes (Continued)

BIOS Date: 05/16/2021
BIOS Revision: 1.42
Firmware Revision: 2.42

(End of data from sysinfo program)

Compiler Version Notes

C | 500.perlbench_r(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 | 502.gcc_r(peak)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version
2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

C | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
| 525.x264_r(base, peak) 557.xz_r(base, peak)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
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C | 500.perlbench_r(peak)

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C | 502.gcc_r(peak)

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### Compiler Version Notes (Continued)

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Test Sponsor: HPE
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Test Date: Jun-2021
Hardware Availability: Jun-2021
Software Availability: Dec-2020

Compiler Version Notes (Continued)

Fortran | 548.exchange2_r(base, peak)
------------------------------------------------------------------------------------------------------------------------
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.
------------------------------------------------------------------------------------------------------------------------

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

C benchmarks:
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math
-ftlo -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
-llqkmalloccoli

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen10 Plus
(2.10 GHz, Intel Xeon Gold 5318N)

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

SPECrate®2017_int_base = 324
SPECrate®2017_int_peak = 336
Test Date: Jun-2021
Hardware Availability: Jun-2021
Software Availability: Dec-2020

Base Optimization Flags (Continued)

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

Peak Compiler Invocation

C benchmarks (except as noted below):
icx
500.perlbench_r: icc

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Peak Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
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
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen10 Plus
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SPEC CPU®2017 Integer Rate Result
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SPECrate®2017_int_base = 324
SPECrate®2017_int_peak = 336

CPU2017 License: 3
Test Sponsor: HPE
Test Date: Jun-2021
Tested by: HPE
Hardware Availability: Jun-2021
Software Availability: Dec-2020

Peak Optimization Flags

C benchmarks:

500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass l) -prof-use(pass 2)
-xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

502.gcc_r: -m32
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/ia32_lin
-std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass l)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -f1to
-Ofas(pass l) -O3 -ffast-math -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc32-5.0.1/lib -ljemalloc

505.mcf_r: basepeak = yes

525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -f1to
-O3 -ffast-math -qopt-mem-layout-trans=4 -fno-alias
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

557.xz_r: basepeak = yes

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: basepeak = yes

531.deepsjeng_r: basepeak = yes

541.leela_r: 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-revE.html
### SPEC CPU®2017 Integer Rate Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL360 Gen10 Plus  
(2.10 GHz, Intel Xeon Gold 5318N)  

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Tested with SPEC CPU®2017 v1.1.8 on 2021-06-22 06:50:58-0400.  
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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-revE.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.0-ICX-revE.xml)