## SPEC CPU® 2017 Integer Rate Result

**Hewlett Packard Enterprise**
(test sponsor: HPE)

**ProLiant DL380 Gen10 Plus**
(2.20 GHz, Intel Xeon Gold 5320)

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**SPECrate® 2017 int_base = 362**

**SPECrate® 2017 int_peak = 374**

---

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

---

<table>
<thead>
<tr>
<th>Program</th>
<th>Copies</th>
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<tbody>
<tr>
<td>500.perlbench_r</td>
<td>104</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>104</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>104</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>104</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>104</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>104</td>
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<tr>
<td>531.deepsjeng_r</td>
<td>104</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>104</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>104</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>104</td>
</tr>
</tbody>
</table>

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**Hardware**

**CPU Name:** Intel Xeon Gold 5320  
**Max MHz:** 3400  
**Nominal:** 2200  
**Enabled:** 52 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:** 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

---

**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  
**Other:** jemalloc memory allocator V5.0.1  
**Power Management:** BIOS set to prefer performance at the cost of additional power usage
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL380 Gen10 Plus
(2.20 GHz, Intel Xeon Gold 5320)

CPU2017 License: 3
Test Sponsor: HPE
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Results Table

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<thead>
<tr>
<th>Benchmark</th>
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<td>564</td>
<td>199</td>
<td>566</td>
<td>199</td>
</tr>
</tbody>
</table>

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/jn5.0.1-32"
MALLOCONF_CONF = "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)
Hewlett Packard Enterprise
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SPECrate®2017_int_base = 362
SPECrate®2017_int_peak = 374

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

General Notes (Continued)

runcpu command invoked through numactl i.e.: runcpu --interleave=all...<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.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

Submitted by: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>
Submitted: Mon Aug 2 07:54:18 EDT 2021
Submission: cpu2017-20210802-28500.sub

Platform Notes

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 Min UPI Speed
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 Prefetch 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 982a61ec0915b5581ef0e16aca64d
running on localhost.localdomain Fri Jun 22 16:47:49 2018

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

(Continued on next page)
Platform Notes (Continued)

2 "physical id"s (chips)
104 "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 : 52
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

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): 104
On-line CPU(s) list: 0-103
Thread(s) per core: 2
Core(s) per socket: 26
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 5320 CPU @ 2.20GHz
Stepping: 6
CPU MHz: 860.518
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 39396K
NUMA node0 CPU(s): 0-12,52-64
NUMA node1 CPU(s): 13-25,65-77
NUMA node2 CPU(s): 26-38,78-90
NUMA node3 CPU(s): 39-51,91-103
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
aperfmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrac 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 ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad
fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cmq rdt_a avx512f avx512dq
rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw
avx512vl xsaveopt xsave xgetbv1 xsavec cmqm_llc cmqm_occup_llc cmqm_mbm_total

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

```
cqm_mbm_local split_lock_detect wbnoinvd dtherm ida arat pln pts avx512vbmi umip pk
ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme
avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d arch_capabilities
```

```
/proc/cpuinfo cache data
cache size : 39936 KB
```

From `numactl --hardware`

**WARNING:** a numactl 'node' might or might not correspond to a physical chip.

<table>
<thead>
<tr>
<th>available: 4 nodes (0-3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 52 53 54 55 56 57 58 59 60 61 62 63 64</td>
</tr>
<tr>
<td>node 0 size: 504544 MB</td>
</tr>
<tr>
<td>node 0 free: 515282 MB</td>
</tr>
<tr>
<td>node 1 cpus: 13 14 15 16 17 18 19 20 21 22 23 24 25 65 66 67 68 69 70 71 72 73 74 75 76 77</td>
</tr>
<tr>
<td>node 1 size: 505787 MB</td>
</tr>
<tr>
<td>node 1 free: 515380 MB</td>
</tr>
<tr>
<td>node 2 cpus: 26 27 28 29 30 31 32 33 34 35 36 37 38 78 79 80 81 82 83 84 85 86 87 88 89 90</td>
</tr>
<tr>
<td>node 2 size: 504139 MB</td>
</tr>
<tr>
<td>node 2 free: 515603 MB</td>
</tr>
<tr>
<td>node 3 cpus: 39 40 41 42 43 44 45 46 47 48 49 50 51 91 92 93 94 95 96 97 98 99 100 101 102 103</td>
</tr>
<tr>
<td>node 3 size: 504623 MB</td>
</tr>
<tr>
<td>node 3 free: 515739 MB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>node distances:</th>
</tr>
</thead>
<tbody>
<tr>
<td>node 0 1 2 3</td>
</tr>
<tr>
<td>0: 10 20 30 30</td>
</tr>
<tr>
<td>1: 20 10 30 30</td>
</tr>
<tr>
<td>2: 30 30 10 20</td>
</tr>
<tr>
<td>3: 30 30 20 10</td>
</tr>
</tbody>
</table>

From `/proc/meminfo`

```
MemTotal: 2113479016 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
```

From `/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"
```

(Continued on next page)
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Platform Notes (Continued)

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 Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swapgs barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2017-5715 (Spectre variant 2): Not affected
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jun 22 16:42

SPEC is set to: /home/cpu2017_1.1.8
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 670G 122G 548G 19% /home

From /sys/devices/virtual/dmi/id
Vendor:  HPE
Product:  ProLiant DL380 Gen10 Plus
Product Family:  ProLiant
Serial:  CN70490X8B

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

(Continued on next page)
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**Compiler Version Notes**

<table>
<thead>
<tr>
<th>C</th>
<th>500.perlbench_r(peak) 557.xz_r(peak)</th>
</tr>
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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.

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Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2021.1 Build 20201113
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<table>
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C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
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C       | 500.perlbench_r(peak) 557.xz_r(peak)

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C       | 502.gcc_r(peak)

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C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
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C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak)
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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
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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.zx_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math
-fflt0 -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

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL380 Gen10 Plus
(2.20 GHz, Intel Xeon Gold 5320)

SPECrate®2017_int_base = 362
SPECrate®2017_int_peak = 374

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<th>Test Date: Jul-2021</th>
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<td>Hardware Availability: Jun-2021</td>
</tr>
<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Dec-2020</td>
</tr>
</tbody>
</table>

**Base Optimization Flags (Continued)**

C benchmarks (continued):
- -lqkmalloc

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
  - 557.xz_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

(Continued on next page)
SPECCPU®2017 Integer Rate Result

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Peak Portability Flags (Continued)

541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:

500.perlbench_r: -Wl,-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/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 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-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 -flto
-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

531.deepsjeng_r: basepeak = yes

C++ benchmarks:

520.omnetpp_r: basepeak = yes
523.xalancbmk_r: basepeak = yes
531.deepsjeng_r: basepeak = yes

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Peak Optimization Flags (Continued)

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_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

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-revE.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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