### SPEC CPU®2017 Integer Speed Result

**Hewlett Packard Enterprise**

(Test Sponsor: HPE)  
ProLiant XL220n Gen10 Plus  
(3.00 GHz, Intel Xeon Gold 6354)  

<table>
<thead>
<tr>
<th>Test Sponsor</th>
<th>HPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU2017 License</td>
<td>3</td>
</tr>
<tr>
<td>Tested by</td>
<td>HPE</td>
</tr>
</tbody>
</table>

**SPECspeed®2017_int_base = 12.0**  
**SPECspeed®2017_int_peak = 12.3**  

#### Hardware

- **CPU Name**: Intel Xeon Gold 6354  
- **Max MHz**: 3600  
- **Nominal**: 3000  
- **Enabled**: 36 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**: 256 GB (16 x 16 GB 2Rx4 PC4-3200AA-R)  
- **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++  
  - Fortran: Version 2021.1 of Intel Fortran Compiler  
- **Parallel**: Yes  
- **Firmware**: HPE BIOS Version U47 v1.54 11/03/2021 released Nov-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
# SPEC CPU®2017 Integer Speed Result

## Hewlett Packard Enterprise

(บาดกศีร: HPE)

ProLiant XL220n Gen10 Plus

(3.00 GHz, Intel Xeon Gold 6354)

---

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

---

## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>36</td>
<td>244</td>
<td>7.28</td>
<td>243</td>
<td>7.32</td>
<td>242</td>
<td>7.34</td>
<td>36</td>
<td>212</td>
<td>8.39</td>
<td>210</td>
<td>8.43</td>
<td>209</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>36</td>
<td>366</td>
<td>10.9</td>
<td>360</td>
<td>11.1</td>
<td>360</td>
<td>11.1</td>
<td>36</td>
<td>353</td>
<td>11.3</td>
<td>353</td>
<td>11.3</td>
<td>348</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>36</td>
<td>237</td>
<td>19.9</td>
<td>234</td>
<td>20.2</td>
<td>233</td>
<td>20.3</td>
<td>36</td>
<td>237</td>
<td>19.9</td>
<td>234</td>
<td>20.2</td>
<td>233</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>36</td>
<td>140</td>
<td>11.6</td>
<td>103</td>
<td>13.7</td>
<td>103</td>
<td>13.8</td>
<td>36</td>
<td>140</td>
<td>11.6</td>
<td>103</td>
<td>13.8</td>
<td>103</td>
</tr>
<tr>
<td>623.xalancmk_s</td>
<td>36</td>
<td>103</td>
<td>13.7</td>
<td>103</td>
<td>13.8</td>
<td>103</td>
<td>13.8</td>
<td>36</td>
<td>103</td>
<td>13.7</td>
<td>103</td>
<td>13.8</td>
<td>103</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>36</td>
<td>101</td>
<td>17.4</td>
<td>101</td>
<td>17.4</td>
<td>101</td>
<td>17.4</td>
<td>36</td>
<td>97.0</td>
<td>18.2</td>
<td>97.2</td>
<td>18.2</td>
<td>97.1</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>36</td>
<td>236</td>
<td>6.07</td>
<td>236</td>
<td>6.07</td>
<td>236</td>
<td>6.07</td>
<td>36</td>
<td>236</td>
<td>6.07</td>
<td>236</td>
<td>6.07</td>
<td>236</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>36</td>
<td>264</td>
<td>23.4</td>
<td>264</td>
<td>23.4</td>
<td>266</td>
<td>23.2</td>
<td>36</td>
<td>264</td>
<td>23.4</td>
<td>266</td>
<td>23.4</td>
<td>266</td>
</tr>
</tbody>
</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)
SPEC CPU®2017 Integer Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant XL220n Gen10 Plus
(3.00 GHz, Intel Xeon Gold 6354)

SPECspeed®2017_int_base = 12.0
SPECspeed®2017_int_peak = 12.3

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

Test Date: Dec-2021
Hardware Availability: Nov-2021
Software Availability: Dec-2020

General Notes (Continued)


Submitted by: "Bucek, James" <james.bucek@hpe.com>
Submitted: Wed Jan 12 10:02:54 EST 2022
Submission: cpu2017-20220103-30727.sub

Platform Notes

The system ROM used for this result contains Intel microcode version 0xd0002f2 for the Intel Xeon Gold 6354 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 ProcessorIdle 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 982a61ec0915b55891ef0e16acaf64d
running on ssa Fri Jun 22 16:44:13 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 6354 CPU @ 3.00GHz
  2 "physical id"s (chips)
  36 "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 : 18
siblings : 18
  physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
  physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

From lscpu from util-linux 2.32.1:

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant XL220n Gen10 Plus
(3.00 GHz, Intel Xeon Gold 6354)

SPECspeed®2017_int_base = 12.0
SPECspeed®2017_int_peak = 12.3

Platform Notes (Continued)

Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 36
On-line CPU(s) list: 0-35
Thread(s) per core: 1
Core(s) per socket: 18
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6354 CPU @ 3.00GHz
Stepping: 6
CPU MHz: 1019.531
BogoMIPS: 6000.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 39936K
NUMA node0 CPU(s): 0-17
NUMA node1 CPU(s): 18-35
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 cpuid
aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrunc pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault ebp cat_l3 invpcid_single ssbd
ma ibrs ibpb ibrs_enhanced tpr_shadow vmmi flexpriority ept vpid ept_ad
fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ets invpcid umip rdt_a ldlim sha
avx512 vpopcnt dq xsaveopt xsaves xsavec xsaveopt xsave xsaveopt xsaveopt
xgetbv1 xsaves cqm_llc cqm_occup llc cqm_mbb_total cqm_mbb_local split_lock_detect
wbnoiwvd dtherm ida arat pfn at ptx avx512v bmi umip pku
ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_vital tme
avx512_vpopcntdq ia57 rdpid md_clear pconfig flush_lld 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
node 0 size: 124223 MB
node 0 free: 128072 MB
node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35

(Continued on next page)
Platform Notes (Continued)

 node 1 size: 124923 MB
 node 1 free: 128571 MB
 node distances:
   node  0  1
      0:  10  20
      1:  20  10

From /proc/meminfo
 MemTotal:       263810312 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 ssa 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 22 16:42

SPEC is set to: /home/cpu2017
Filesystem          Type  Size  Used Avail Use% Mounted on  
/dev/mapper/rhel-home xfs   372G   14G  359G   4% /home

From /sys/devices/virtual/dmi/id  
Vendor:         HPE  
Product:        ProLiant XL220n Gen10 Plus  
Product Family: ProLiant  
Serial:         SerNum.ACC  

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:  
16x Micron 18ASF2G72PDZ-3G2E1 16 GB 2 rank 3200

BIOS:  
BIOS Vendor:       HPE  
BIOS Version:      U47  
BIOS Date:         11/03/2021  
BIOS Revision:     1.54  
Firmware Revision: 2.55

(End of data from sysinfo program)

## Compiler Version Notes

<table>
<thead>
<tr>
<th>Compiler Version Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
</tr>
<tr>
<td>Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000</td>
</tr>
<tr>
<td>Copyright (C) 1985-2020 Intel Corporation. All rights reserved.</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>625.x264_s (base, peak) 657.xz_s (base, peak)</td>
</tr>
</tbody>
</table>

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant XL220n Gen10 Plus
(3.00 GHz, Intel Xeon Gold 6354)

SPECspeed®2017_int_base = 12.0
SPECspeed®2017_int_peak = 12.3

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

Test Sponsor: HPE
Hardware Availability: Nov-2021
Software Availability: Dec-2020

Compiler Version Notes (Continued)

Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

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, Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
---

C++     | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak)
| 631.deepsjeng_s(base, peak) 641.leela_s(base, peak)
---

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.
---

Fortran | 648.exchange2_s(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

(Continued on next page)
### 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:**

**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)
## 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: -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/usr/local/jemalloc64-5.0.1/lib -ljemalloc

602.gcc_s: -m64 -std=c11 -Wl,-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 -Wl,-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)
**SPEC CPU®2017 Integer Speed Result**

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)
ProLiant XL220n Gen10 Plus
(3.00 GHz, Intel Xeon Gold 6354)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base = 12.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak = 12.3</td>
</tr>
</tbody>
</table>

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

**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-revG.html](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.0-ICX-revG.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-revG.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.0-ICX-revG.xml)

SPEC CPU and SPECspeed are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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 2018-06-22 07:14:13-0400.
Report generated on 2022-01-18 18:59:03 by CPU2017 PDF formatter v6442.
Originally published on 2022-01-18.