## SPEC CPU®2017 Integer Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant XL220n Gen10 Plus  
(2.00 GHz, Intel Xeon Gold 6330)

| SPECspeed®2017_int_base = 10.6 | SPECspeed®2017_int_peak = 10.8 |

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

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

### Hardware

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_int_base (10.6)</th>
<th>SPECspeed®2017_int_peak (10.8)</th>
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<td>0</td>
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<td>0.00</td>
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<td>1</td>
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<td>2</td>
<td>7.33</td>
<td>9.73</td>
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<tr>
<td>3</td>
<td>10.1</td>
<td>17.9</td>
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<tr>
<td>4</td>
<td>14.2</td>
<td>19.8</td>
</tr>
<tr>
<td>5</td>
<td>18.0</td>
<td>21.4</td>
</tr>
</tbody>
</table>

**CPU Name:** Intel Xeon Gold 6330  
**Max MHz:** 3100  
**Nominal:** 2000  
**Enabled:** 56 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:** 42 MB I+D on chip per chip  
**Other:** None  
**Memory:** 256 GB (16 x 16 GB 2Rx4 PC4-3200AA-R, running at 2933)  
**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  
**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
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base Seconds</th>
<th>Ratio</th>
<th>Peak Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
<th>Peak Seconds</th>
<th>Ratio</th>
<th>Peak Seconds</th>
<th>Ratio</th>
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<td>605.mcf</td>
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<td>641.leela</td>
<td>56</td>
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<td>397</td>
<td>4.30</td>
<td>399</td>
<td>4.28</td>
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<td>4.30</td>
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<td>648.exchange2</td>
<td>56</td>
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<td>17.2</td>
<td>172</td>
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<td>172</td>
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<td>172</td>
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</tr>
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<td>657.xz</td>
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<td>288</td>
<td>21.5</td>
<td>288</td>
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<td>289</td>
<td>21.5</td>
<td>288</td>
<td>21.4</td>
</tr>
</tbody>
</table>

SPEC CPU®2017 Int Base = 10.6
SPEC CPU®2017 Int Peak = 10.8

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

General Notes (Continued)


Submitted by: "Bucek, James" <james.bucek@hpe.com>
Submitted: Wed Jan 12 10:02:54 EST 2022
Submission: cpu2017-20220103-30720.sub

Platform Notes

The system ROM used for this result contains Intel microcode version 0xd0002f2 for the Intel Xeon Gold 6330 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 982a61ec915b55891ef0e16aca64d
running on ssa Fri Jun 22 17:53:14 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 6330 CPU @ 2.00GHz
  2 "physical id"s (chips)
  56 "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 : 28
  siblings : 28
  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 26 27
  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 26 27

(Continued on next page)
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</tr>
<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Dec-2020</td>
</tr>
</tbody>
</table>

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**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):** 56
- **On-line CPU(s) list:** 0-55
- **Thread(s) per core:** 1
- **Core(s) per socket:** 28
- **Socket(s):** 2
- **NUMA node(s):** 2
- **Vendor ID:** GenuineIntel
- **CPU family:** 6
- **Model:** 106
- **Model name:** Intel(R) Xeon(R) Gold 6330 CPU @ 2.00GHz
- **Stepping:** 6
- **CPU MHz:** 800.659
- **BogoMIPS:** 4000.00
- **Virtualization:** VT-x
- **L1d cache:** 48K
- **L1i cache:** 32K
- **L2 cache:** 1280K
- **L3 cache:** 43008K
- **NUMA node0 CPU(s):** 0-27
- **NUMA node1 CPU(s):** 28-55
- **Flags:** fpu vme 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 xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrunc pdrshow dtes64e monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr 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 ibrs_enhanced tpr_shadow vmi flexpriority ept vpid ept_ad fs一套 independent choice of hardware or software (including addressable hardware) 一套 independent choice of hardware or software (including addressable hardware)

```
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 26 27
   node 0 size: 123243 MB
```

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Platform Notes (Continued)

node 0 free: 128286 MB
node 1 cpus: 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
node 1 size: 122475 MB
node 1 free: 128265 MB
node distances:
  node 0 1
  0: 10 20
  1: 20 10

From /proc/meminfo
  MemTotal: 263806004 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 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): Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swapgs barriers and __user pointer

(Continued on next page)
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 22 16:42

SPEC is set to: /home/cpu2017

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/mapper/rhel-home</td>
<td>xfs</td>
<td>372G</td>
<td>14G</td>
<td>359G</td>
<td>4%</td>
<td>/home</td>
</tr>
</tbody>
</table>

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, configured at 2933

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

==============================================================================
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)

(Continued on next page)
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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

(Continued on next page)
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### 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 -fllopenmp -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/
  -lqkmalloc`

#### Fortran benchmarks:

- `-m64 -xCORE-AVX512 -O3 -ipo -no-pref-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 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdatalihandle(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

(Continued on next page)
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CPU2017 License: 3
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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-revG.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-revG.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 2018-06-22 08:23:13-0400.
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