# SPEC® CPU2017 Integer Rate Result

## Hewlett Packard Enterprise

**Test Sponsor:** HPE  
**ProLiant ML350 Gen10**  
**(2.50 GHz, Intel Xeon Gold 6210U)**

<table>
<thead>
<tr>
<th>Test Date</th>
<th>May-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor</td>
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<tr>
<td>Hardware Availability</td>
<td>Apr-2019</td>
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<td>Software Availability</td>
<td>Feb-2019</td>
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<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>122</th>
</tr>
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<tbody>
<tr>
<td>SPECrate2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

### CPU2017 License
- **License:** 3

### Tested by
- **Tested by:** HPE

### Software
- **OS:** SUSE Linux Enterprise Server 15 (x86_64)  
  - Kernel 4.12.14-23-default
- **Compiler:** C/C++: Version 19.0.2.187 of Intel C/C++  
  - Compiler Build 20190117 for Linux;  
  - Fortran: Version 19.0.2.187 of Intel Fortran  
  - Compiler Build 20190117 for Linux
- **Parallel:** No
- **Firmware:** HPE BIOS Version U41 04/18/2019 released Apr-2019
- **File System:** btrfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Other:** None

### Hardware
- **CPU Name:** Intel Xeon Gold 6210U
- **Max MHz.:** 3900
- **Nominal:** 2500
- **Enabled:** 20 cores, 1 chip, 2 threads/core
- **Orderable:** 1, 2 chip(s)
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **Cache L2:** 1 MB I+D on chip per core
- **Cache L3:** 27.5 MB I+D on chip per chip
- **Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R)
- **Storage:** 1 x 400 GB SAS SSD, RAID 0
- **Other:** None

### Benchmark Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>SPECrate2017_int_base (122)</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench_r</td>
<td>40</td>
<td>93.3</td>
</tr>
<tr>
<td>gcc_r</td>
<td>40</td>
<td>101</td>
</tr>
<tr>
<td>mcf_r</td>
<td>40</td>
<td>162</td>
</tr>
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<td>omnetpp_r</td>
<td>40</td>
<td>80.6</td>
</tr>
<tr>
<td>xalancbmk_r</td>
<td>40</td>
<td>134</td>
</tr>
<tr>
<td>x264_r</td>
<td>40</td>
<td>253</td>
</tr>
<tr>
<td>deepsjeng_r</td>
<td>40</td>
<td>103</td>
</tr>
<tr>
<td>leela_r</td>
<td>40</td>
<td>96.0</td>
</tr>
<tr>
<td>exchange2_r</td>
<td>40</td>
<td>218</td>
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<td>xz_r</td>
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<td>81.4</td>
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SPECrate2017_int_base = 122
SPECrate2017_int_peak = Not Run

Results Table

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<tr>
<th>Benchmark</th>
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<tbody>
<tr>
<td>500.perlbench_r</td>
<td>40</td>
<td>682</td>
<td>93.3</td>
<td>683</td>
<td>93.3</td>
<td>683</td>
<td>93.3</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>40</td>
<td>562</td>
<td>101</td>
<td>561</td>
<td>101</td>
<td>563</td>
<td>101</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>40</td>
<td>399</td>
<td>162</td>
<td>400</td>
<td>161</td>
<td>400</td>
<td>162</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>40</td>
<td>651</td>
<td>80.6</td>
<td>651</td>
<td>80.6</td>
<td>653</td>
<td>80.4</td>
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<td>253</td>
<td>277</td>
<td>253</td>
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<tr>
<td>531.deepsjeng_r</td>
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<td>445</td>
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<td>444</td>
<td>103</td>
<td>445</td>
<td>103</td>
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<tr>
<td>541.leela_r</td>
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<td>96.1</td>
<td>690</td>
<td>96.0</td>
<td>690</td>
<td>96.0</td>
</tr>
<tr>
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<td>40</td>
<td>481</td>
<td>218</td>
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<td>218</td>
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<tr>
<td>557.xz_r</td>
<td>40</td>
<td>531</td>
<td>81.4</td>
<td>533</td>
<td>81.1</td>
<td>531</td>
<td>81.4</td>
</tr>
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</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017_u2/lib/ia32:/home/cpu2017_u2/lib/intel64"

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5
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)

(Continued on next page)
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(Test Sponsor: HPE)
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**SPECrate2017_int_base = 122**

**SPECrate2017_int_peak = Not Run**

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**General Notes (Continued)**

is mitigated in the system as tested and documented.

---

**Platform Notes**

BIOS Configuration:
- Thermal Configuration set to Maximum Cooling
- Memory Patrol Scrubbing set to Disabled
- LLC Prefetch set to Enabled
- LLC Dead Line Allocation set to Disabled
- Enhanced Processor Performance set to Enabled
- Workload Profile set to General Throughput Compute
- Workload Profile set to Custom
- Energy/Performance Bias set to Balanced Performance

Sysinfo program /home/cpu2017_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bced8f2999c33d61f64985e45859ea9
running on ml350-sles15 Thu May 23 14:40:18 2019

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 6210U CPU @ 2.50GHz
  1 "physical id"s (chips)
  40 "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 : 20
  siblings : 40
  physical 0: cores 0 1 2 3 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
```

From lscpu:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 40
On-line CPU(s) list: 0-39
Thread(s) per core: 2
Core(s) per socket: 20
Socket(s): 1
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6210U CPU @ 2.50GHz
Stepping: 7
```

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

CPU MHz: 2500.000
BogoMIPS: 5000.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 28160K
NUMA node0 CPU(s): 0-9,20-29
NUMA node1 CPU(s): 10-19,30-39
Flags: fpu vme de pse tsc msr pae mca cmov
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtsscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
dbg fma cx16 xtpr pdcm pcd dca sse4_1 sse4_2 x2apic movbe popcnt
tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault
epb cat_i3 cdq_l3 invpcid_single intel_pwpin mba tpr_shadow vnmi fxlpm ept
vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 4ms invpcid rtm cmq mpx rdtd
avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
xsaveopt xsavec xgetbv1 xsaves cmq_llc cmq_occup_llc cmq_mbm_total cmq_mbm_local
ibpb ibrs stibp dtherm ida arat pin pts pku ospke avx512_vnni arch_capabilities ssbd

/proc/cpuinfo cache data
    cache size : 28160 KB

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 20 21 22 23 24 25 26 27 28 29
    node 0 size: 96321 MB
    node 0 free: 95829 MB
    node 1 cpus: 10 11 12 13 14 15 16 17 18 19 30 31 32 33 34 35 36 37 38 39
    node 1 size: 96763 MB
    node 1 free: 96488 MB
    node distances:
        node 0 1
        0: 10 21
        1: 21 10

From /proc/meminfo
    MemTotal: 197718680 kB
    HugePages_Total: 0
    Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
    os-release:
        NAME="SLES"
        VERSION="15"

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Platform Notes (Continued)

VERSION_ID="15"
PRETTY_NAME="SUSE Linux Enterprise Server 15"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15"

uname -a:
Linux ml350-sles15 4.12.14-23-default #1 SMP Tue May 29 21:04:44 UTC 2018 (cd0437b)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
CVE-2017-5754 (Meltdown): Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation, IBPB, IBRS_FW

run-level 3 May 23 14:36

SPEC is set to: /home/cpu2017_u2

Additional information from dmidecode 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.
BIOS HPE U41 04/18/2019
Memory:
12x UNKNOWN NOT AVAILABLE
12x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

Compiler Version Notes

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Compiler Version Notes (Continued)

==============================================================================
CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
  541.leela_r(base)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
==============================================================================
FC  548.exchange2_r(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
  icc -m64 -std=c11

C++ benchmarks:
  icpc -m64

Fortran benchmarks:
  ifort -m64

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
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Base Optimization Flags

C benchmarks:
- -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-mem-layout-trans=4
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
- -lqkmalloc

C++ benchmarks:
- -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-mem-layout-trans=4
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
- -lqkmalloc

Fortran benchmarks:
- -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
- -lqkmalloc

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revA.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revA.xml
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-03.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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