# SPEC CPU®2017 Integer Rate Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL20 Gen10  
(3.80 GHz, Intel Xeon E-2276G)  

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>44.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

## CPU2017 License
3

## Test Sponsor
HPE

## Tested by
HPE

## Test Sponsor License
3

## Test Date
Oct-2019

## Hardware Availability
Nov-2019

## Software Availability
Oct-2019

### Copies

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<td>502.gcc_r</td>
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<tr>
<td>505.mcf_r</td>
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<tr>
<td>520.omnetpp_r</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
</tr>
<tr>
<td>525.x264_r</td>
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<tr>
<td>531.deepsjeng_r</td>
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<tr>
<td>541.leela_r</td>
</tr>
<tr>
<td>548.exchange2_r</td>
</tr>
<tr>
<td>557.xz_r</td>
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### Hardware

<table>
<thead>
<tr>
<th>CPU Name</th>
<th>Intel Xeon E-2276G</th>
</tr>
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<tbody>
<tr>
<td>Max MHz</td>
<td>4900</td>
</tr>
<tr>
<td>Nominal</td>
<td>3800</td>
</tr>
<tr>
<td>Enabled</td>
<td>6 cores, 1 chip, 2 threads/core</td>
</tr>
<tr>
<td>Orderable</td>
<td>1 chip</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>256 KB I+D on chip per core</td>
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<tr>
<td>L3:</td>
<td>12 MB I+D on chip per chip</td>
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<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>64 GB (4 x 16 GB 2Rx8 PC4-2666V-U)</td>
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<tr>
<td>Storage:</td>
<td>1 x 400 GB SATA SSD, RAID 0</td>
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<tr>
<td>Other:</td>
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### Software

<table>
<thead>
<tr>
<th>OS:</th>
<th>SUSE Linux Enterprise Server 15 (x86_64) SP1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kernel 4.12.14-195-default</td>
</tr>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 19.0.1.144 of Intel C/C++</td>
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<tr>
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<td>Compiler Build 20181018 for Linux;</td>
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<td></td>
<td>Fortran: Version 19.0.1.144 of Intel Fortran</td>
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<tr>
<td>File System:</td>
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<td>System State:</td>
<td>Run level 3 (multi-user)</td>
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<tr>
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<tr>
<td>Peak Pointers:</td>
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<td>Other:</td>
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<td>Power Management:</td>
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Page 1
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL20 Gen10  
(3.80 GHz, Intel Xeon E-2276G)  

SPECrates\textsuperscript{\textregistered}2017\_int\_base = 44.7  
SPECrates\textsuperscript{\textregistered}2017\_int\_peak = Not Run

Results Table

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</tbody>
</table>

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

Submit Notes

The taskset mechanism was used to bind copies to processors. The config file option 'submit' was used to generate taskset 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

General Notes

Environment variables set by runcpu before the start of the run:
  LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64"

  Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5
  Yes: 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.
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL20 Gen10
(3.80 GHz, Intel Xeon E-2276G)

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

SPECrater®2017_int_base = 44.7
SPECrater®2017_int_peak = Not Run

Test Date: Oct-2019
Hardware Availability: Nov-2019
Software Availability: Oct-2019

Platform Notes

BIOS Configuration:
Thermal Configuration set to Maximum Cooling
LLC prefetch set to Enabled
Workload Profile set to General Throughput Compute
Minimum Processor Idle Power Core C-State set to C1E
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-vb4y Mon Oct 14 02:48:37 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) E-2276G CPU @ 3.80GHz
1  "physical id"s (chips)
12 "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 : 6
siblings : 12
physical 0: cores 0 1 2 3 4 5

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 39 bits physical, 48 bits virtual
CPU(s): 12
On-line CPU(s) list: 0-11
Thread(s) per core: 2
Core(s) per socket: 6
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2276G CPU @ 3.80GHz
Stepping: 10
CPU MHz: 3800.000
BogoMIPS: 7584.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 12288K
NUMA node0 CPU(s): 0-11

(Continued on next page)
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</table>

### SPECrate®2017_int_base

<table>
<thead>
<tr>
<th>Specification:</th>
<th>Value</th>
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<tbody>
<tr>
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### SPECrate®2017_int_peak

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<tbody>
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**CPU2017 License:** 3
**Test Sponsor:** HPE
**Tested by:** HPE

**Platform Notes (Continued)**

Flags:
- fpu
- vme
- de
- pse
- tsc
- mce
- cx8
- apic
- sep
- mtrr
- pae
- cmov
- pat
- pse36
- clflush
- dts
- acpi
- mmx
- fxsr
- sse2
- ss
- ht
- tm
- pbe
- syscall
- nx
- pdpe1gb
- rdtscp
- lm
- constant_tsc
- art
- arch_perfmon
- pebs
- bts
- rep_good
- nopl
- xtopology
- nonstop_tsc
- cpuid
- aperf
- mperf
- tsc_known_freq
- pni
- pclmulqdq
- dtes64
- monitor
- ds_cpl
- vmx
- smx
- est
- tm2
- ssse3
- sdbg
- fma
- cx16
- xtpr
- pdcm
- pcid
- sse4_1
- sse4_2
- x2apic
- movbe
- popcnt
- tsc_deadline_timer
- aes
- xsave
- avx
- f16c
- rdrand
- lahf_lm
- abm
- 3dnowprefetch
- cpuid_fault
- epb
- invpcid_single
- pti
- ssbd
- ibrs
- ibpb
- stibp
- tpr_shadow
- vnmi
- flexpriority
- ept
- vpid
- fsgsbase
- tsc_adjust
- bmi1
- hle
- avx2
- smep
- bmi2
- erms
- invpcid
- rtm
- mpx
- rdseed
- adx
- smap
- clflushopt
- intel_pt
- xsaveopt
- xsavec
- xgetbv1
- xsaves
- dtherm
- ida
- arat
- pln
- pts
- md_clear
- flush_l1d

From /proc/cpuinfo cache data
- cache size : 12288 KB

From numactl --hardware
- WARNING: a numactl 'node' might or might not correspond to a physical chip.
- available: 1 nodes (0)
- node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11
- node 0 size: 64021 MB
- node 0 free: 63471 MB
- node distances:
- node 0
  - 0: 10

From /proc/meminfo
- MemTotal: 65557548 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
- os-release:
- NAME="SLES"
- VERSION="15-SP1"
- VERSION_ID="15.1"
- PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
- ID="sles"
- ID_LIKE="suse"
- ANSI_COLOR="0;32"
- CPE_NAME="cpe:/o:suse:sles:15:sp1"

uname -a:
- Linux linux-vb4y 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516) x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

- CVE-2017-5754 (Meltdown): Mitigation: PTI
- CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization

(Continued on next page)
Platform Notes (Continued)

CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation, IBPB: conditional, IBRS_FW, STIBP: conditional, RSB filling

run-level 3 Oct 14 02:46

SPEC is set to: /home/cpu2017

    Filesystem  Type Size  Used Avail Use% Mounted on
    /dev/sda3   xfs  270G   62G  209G  23% /home

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 U43 09/05/2019
    Memory:
        4x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

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<table>
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<tr>
<th>C</th>
<th>500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_r(base)</th>
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<tr>
<td></td>
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</tr>
<tr>
<td>Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018</td>
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<tr>
<td>Copyright (C) 1985-2018 Intel Corporation. All rights reserved.</td>
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</tr>
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<td>--------------------------------------------------------------------------------------------</td>
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<tr>
<td>C++</td>
<td>520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base)</td>
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<tr>
<td>Fortran</td>
<td>548.exchange2_r(base)</td>
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<td>Oct-2019</td>
</tr>
</tbody>
</table>

### 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
- 557.xz_r: -DSPEC_LP64

### Base Optimization Flags

- **C benchmarks:**  
  -Wl,-z,muldefs -xCORE-AVX2 -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-AVX2 -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-AVX2 -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
**SPEC CPU®2017 Integer Rate Result**

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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-revB.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-revB.xml

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.