



# SPEC® CPU2017 Integer Rate Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

### ProLiant DL560 Gen10

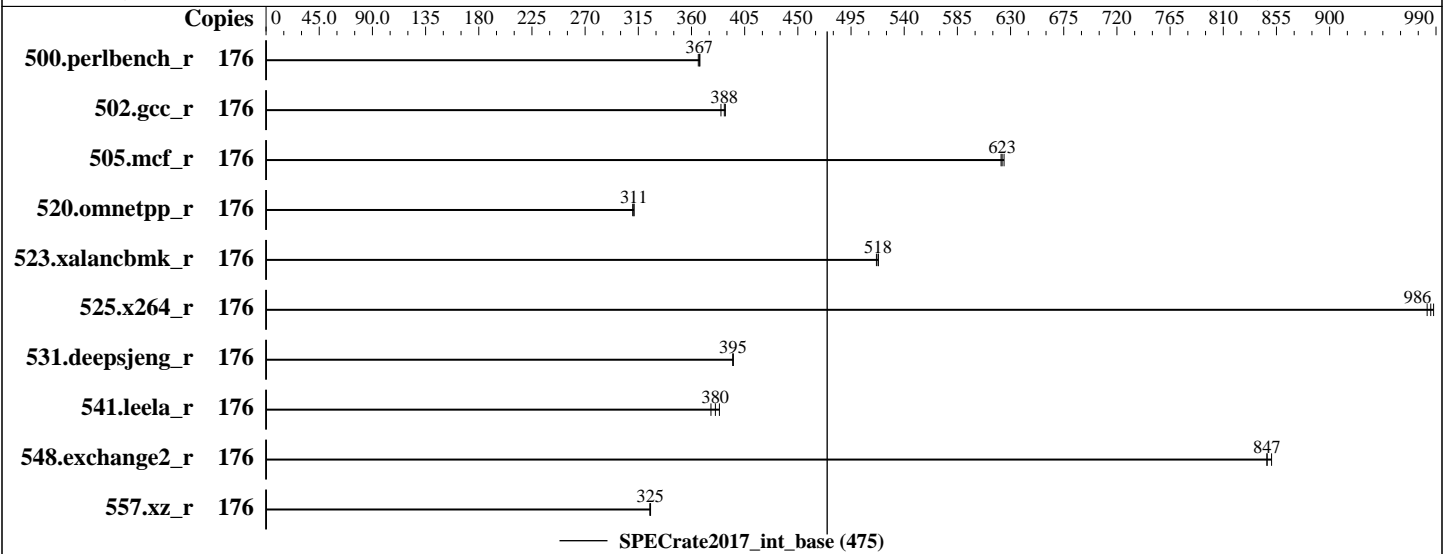
(2.10 GHz, Intel Xeon Gold 6238)

SPECrate2017\_int\_base = 475

SPECrate2017\_int\_peak = Not Run

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

**Test Date:** Jun-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** Feb-2019



### Hardware

CPU Name: Intel Xeon Gold 6238  
Max MHz.: 3700  
Nominal: 2100  
Enabled: 88 cores, 4 chips, 2 threads/core  
Orderable: 1, 2, 4 chip(s)  
Cache L1: 32 KB I + 32 KB D on chip per core  
L2: 1 MB I+D on chip per core  
L3: 30.25 MB I+D on chip per chip  
Other: None  
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)  
Storage: 1 x 400 GB SAS SSD, RAID 0  
Other: None

### 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 U34 02/02/2019 released Apr-2019  
File System: btrfs  
System State: Run level 3 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: Not Applicable  
Other: None



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## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	176	766	366	<b>764</b>	<b>367</b>	763	367							
502.gcc_r	176	641	389	647	385	<b>643</b>	<b>388</b>							
505.mcf_r	176	455	624	457	622	<b>457</b>	<b>623</b>							
520.omnetpp_r	176	742	311	<b>742</b>	<b>311</b>	744	310							
523.xalancbmk_r	176	359	518	360	516	<b>359</b>	<b>518</b>							
525.x264_r	176	<b>313</b>	<b>986</b>	314	983	312	988							
531.deepsjeng_r	176	511	395	<b>510</b>	<b>395</b>	510	395							
541.leela_r	176	760	384	774	376	<b>767</b>	<b>380</b>							
548.exchange2_r	176	544	847	<b>544</b>	<b>847</b>	542	851							
557.xz_r	176	584	325	<b>585</b>	<b>325</b>	585	325							

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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)

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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  
Advanced Memory Protection set to Advanced ECC

Sysinfo program /home/cpu2017\_u2/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9  
running on linux-vqdi Fri Jun 7 10:48:38 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 6238 CPU @ 2.10GHz
 4 "physical id"s (chips)
 176 "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      : 22
siblings       : 44
physical 0:    cores 0 1 2 3 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
physical 1:    cores 0 1 2 3 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
physical 2:    cores 0 1 2 3 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
physical 3:    cores 0 1 2 3 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
```

From lscpu:

```
Architecture:    x86_64
CPU op-mode(s):  32-bit, 64-bit
Byte Order:      Little Endian
CPU(s):          176
On-line CPU(s) list: 0-175
Thread(s) per core: 2
Core(s) per socket: 22
Socket(s):       4
NUMA node(s):   8
Vendor ID:      GenuineIntel
```

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## Platform Notes (Continued)

```

CPU family:           6
Model:                85
Model name:           Intel(R) Xeon(R) Gold 6238 CPU @ 2.10GHz
Stepping:             7
CPU MHz:              2100.000
BogoMIPS:             4200.00
Virtualization:      VT-x
L1d cache:           32K
L1i cache:           32K
L2 cache:            1024K
L3 cache:            30976K
NUMA node0 CPU(s):   0-10,88-98
NUMA node1 CPU(s):   11-21,99-109
NUMA node2 CPU(s):   22-32,110-120
NUMA node3 CPU(s):   33-43,121-131
NUMA node4 CPU(s):   44-54,132-142
NUMA node5 CPU(s):   55-65,143-153
NUMA node6 CPU(s):   66-76,154-164
NUMA node7 CPU(s):   77-87,165-175
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
aperfmpperf tsc_known_freq pni pclmulqdq dtes64 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 cdp_l3 invpcid_single intel_ppin mba tpr_shadow vnmi flexpriority ept
vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a
avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
ibpb ibrs stibp dtherm ida arat pln pts pku ospke avx512_vnni arch_capabilities ssbd

```

```

/proc/cpuinfo cache data
cache size : 30976 KB

```

```

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
available: 8 nodes (0-7)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 88 89 90 91 92 93 94 95 96 97 98
node 0 size: 96349 MB
node 0 free: 96001 MB
node 1 cpus: 11 12 13 14 15 16 17 18 19 20 21 99 100 101 102 103 104 105 106 107 108
109
node 1 size: 96734 MB
node 1 free: 96530 MB
node 2 cpus: 22 23 24 25 26 27 28 29 30 31 32 110 111 112 113 114 115 116 117 118 119
120
node 2 size: 96763 MB

```

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## Platform Notes (Continued)

```

node 2 free: 96602 MB
node 3 cpus: 33 34 35 36 37 38 39 40 41 42 43 121 122 123 124 125 126 127 128 129 130
131
node 3 size: 96763 MB
node 3 free: 96603 MB
node 4 cpus: 44 45 46 47 48 49 50 51 52 53 54 132 133 134 135 136 137 138 139 140 141
142
node 4 size: 96763 MB
node 4 free: 96641 MB
node 5 cpus: 55 56 57 58 59 60 61 62 63 64 65 143 144 145 146 147 148 149 150 151 152
153
node 5 size: 96763 MB
node 5 free: 96522 MB
node 6 cpus: 66 67 68 69 70 71 72 73 74 75 76 154 155 156 157 158 159 160 161 162 163
164
node 6 size: 96763 MB
node 6 free: 96630 MB
node 7 cpus: 77 78 79 80 81 82 83 84 85 86 87 165 166 167 168 169 170 171 172 173 174
175
node 7 size: 96762 MB
node 7 free: 96628 MB
node distances:
node  0  1  2  3  4  5  6  7
0:  10 21 31 31 31 31 31 31
1:  21 10 31 31 31 31 31 31
2:  31 31 10 21 31 31 31 31
3:  31 31 21 10 31 31 31 31
4:  31 31 31 31 10 21 31 31
5:  31 31 31 31 21 10 31 31
6:  31 31 31 31 31 31 10 21
7:  31 31 31 31 31 31 21 10

```

From /proc/meminfo

```

MemTotal:      792232760 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

From /etc/\*release\* /etc/\*version\*

```

os-release:
NAME="SLES"
VERSION="15"
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"

```

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## Platform Notes (Continued)

uname -a:

```
Linux linux-vqdi 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 Jun 7 10:47

SPEC is set to: /home/cpu2017\_u2

```
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 btrfs 371G 247G 122G 67% /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 U34 02/02/2019

Memory:

```
24x UNKNOWN NOT AVAILABLE
24x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933
```

(End of data from sysinfo program)

## Compiler Version Notes

```
=====  
CC 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base)
557.xz_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.
```

```
=====  
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
```

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## Compiler Version Notes (Continued)

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

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## 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-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

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## Base Optimization Flags (Continued)

C benchmarks (continued):

-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-ic19.0u1-flags-linux64.html>

<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-ic19.0u1-flags-linux64.xml>

<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](mailto:info@spec.org).

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