### SPEC® CPU2017 Integer Rate Result

Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL380 Gen10  
(2.20 GHz, Intel Xeon Platinum 8276)

<table>
<thead>
<tr>
<th>Test Sponsor:</th>
<th>HPE</th>
<th>Test Date:</th>
<th>Apr-2019</th>
</tr>
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<tbody>
<tr>
<td>Tested by:</td>
<td>HPE</td>
<td>Hardware Availability:</td>
<td>Apr-2019</td>
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<td>CPU2017 License:</td>
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<td>SPECrate2017_int_base</td>
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</tr>
<tr>
<td>SPECrate2017_int_peak</td>
<td>Not Run</td>
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#### Hardware

- **CPU Name**: Intel Xeon Platinum 8276  
- **Max MHz.**: 4000  
- **Nominal**: 2200  
- **Enabled**: 56 cores, 2 chips, 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**: 38.5 MB I+D on chip per chip  
- **Other**: None  
- **Memory**: 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R)  
- **Storage**: 1 x 480 GB SATA SSD, RAID 0  
- **Other**: None

#### Software

- **OS**: SUSE Linux Enterprise Server 15 (x86_64)  
- **Kernel**: 4.12.14-23-default  
- **Compiler**: C/C++: Version 19.0.1.144 of Intel C/C++  
- **Compiler Build**: 20181018 for Linux  
- **Fortran**: Version 19.0.1.144 of Intel Fortran  
- **Compiler Build**: 20181018 for Linux  
- **Parallel**: No  
- **Firmware**: HPE BIOS Version U30 02/02/2019 released Apr-2019  
- **File System**: xfs  
- **System State**: Run level 3 (multi-user)  
- **Base Pointers**: 64-bit  
- **Peak Pointers**: Not Applicable  
- **Other**: None

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<table>
<thead>
<tr>
<th>Test</th>
<th>Copies</th>
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<td>500.perlbench_r</td>
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<td>502.gcc_r</td>
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SPECrate2017_int_peak = Not Run

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Results Table

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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
Files system 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/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
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)
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/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on dl380-clx-sles15hs Tue Apr 16 14:27:43 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) Platinum 8276 CPU @ 2.20GHz
  2 "physical id"s (chips)
  112 "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 : 56
physical 0: cores 0 1 2 3 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
physical 1: cores 0 1 2 3 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 112
On-line CPU(s) list: 0-111
Thread(s) per core: 2
Core(s) per socket: 28
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU ID: 6
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Platform Notes (Continued)

Model: 85
Model name: Intel(R) Xeon(R) Platinum 8276 CPU @ 2.20GHz
Stepping: 7
CPU MHz: 2200.000
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 39424K
NUMA node0 CPU(s): 0-13,56-69
NUMA node1 CPU(s): 14-27,70-83
NUMA node2 CPU(s): 28-41,84-97
NUMA node3 CPU(s): 42-55,98-111

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  rdtsscp
lm  constant_tsc  art  arch_perfmon  pebs  bts  rep_good  nopl  xtopology  nonstop_tsc  cpuuid
aperfmrperf  tsc_known_freq  pni  pclmulqdq  dtes64  monitor  ds_cpl  vmx  smx  est  tm2  sse3
sdbg  fma  cx16  xtr Wich  pdcm  pcld  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  cd p_l3  invpcid_single  intel_pinn  mba  tpr_shadow  vmni  flexpriority  ept
vpid  fsgsbase  tsc_adjust  bni1  hle  avx2  smep  bmi2  erms  invpcid  rtm  cmq  mp  rd_rdt_a
avx512f  avx512dq  rdseed  adx  smap  clflushopt  clwb  intel_pt  avx512cd  avx512bw  avx512vl
xsaveopt  xsavec  xsaves  cqm_llc  cqm_occup_llc  cqm_mbm_total  cqm_mbm_local
ibpb  ibrs  stibp  dtherm  ida  arat  pln  pts  pku  ospe  avx512_vnni  arch_capabilities

From numactl --hardware

WARNING: a numactl 'node' might or might not correspond to a physical chip.

available: 4 nodes (0-3)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 56 57 58 59 60 61 62 63 64 65 66 67 68 69
node 0 size: 96277 MB
node 0 free: 95785 MB
node 1 cpus: 14 15 16 17 18 19 20 21 22 23 24 25 26 27 70 71 72 73 74 75 76 77 78 79 80
81 82 83
node 1 size: 96733 MB
node 1 free: 96531 MB
node 2 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 84 85 86 87 88 89 90 91 92 93 94
95 96 97
node 2 size: 96762 MB
node 2 free: 96608 MB
node 3 cpus: 42 43 44 45 46 47 48 49 50 51 52 53 54 55 98 99 100 101 102 103 104 105
106 107 108 109 110 111
node 3 size: 96564 MB
node 3 free: 96422 MB

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Platform Notes (Continued)

node distances:
node 0 1 2 3
0: 10 21 31 31
1: 21 10 31 31
2: 31 31 10 21
3: 31 31 21 10

From /proc/meminfo
MemTotal: 395609668 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"

uname -a:
Linux dl380-clx-sles15hs 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 Apr 16 14:25

SPEC is set to: /home/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 476G 65G 412G 14% /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 U30 02/02/2019
Memory:
24x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666

(Continued on next page)
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Platform Notes (Continued)

(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 19.0.1.144 Build 20181018 =
= Copyright (C) 1985-2018 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 19.0.1.144 Build 20181018 =
= Copyright (C) 1985-2018 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 19.0.1.144 Build 20181018 =
= Copyright (C) 1985-2018 Intel Corporation. All rights reserved. =
=------------------------------------------------------------------------------=

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64
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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:
-W1, -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:
-W1, -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:
-W1, -z, muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout=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
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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU2017 v1.0.5 on 2019-04-16 14:27:43-0400.  