SPEC® CPU2017 Integer Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML350 Gen10
(2.10 GHz, Intel Xeon Gold 6230)

SPECrate2017_int_base = 220
SPECrate2017_int_peak = Not Run

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

<table>
<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS: SUSE Linux Enterprise Server 15 (x86_64)</td>
<td>CPU Name: Intel Xeon Gold 6230</td>
</tr>
<tr>
<td>Kernel 4.12.14-23-default</td>
<td>Max MHz.: 3900</td>
</tr>
<tr>
<td>Compiler: C/C++: Version 19.0.2.187 of Intel C/C++</td>
<td>Nominal: 2100</td>
</tr>
<tr>
<td>Compiler Build 20190117 for Linux; Fortran: Version 19.0.2.187 of Intel Fortran</td>
<td>Enabled: 40 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Firmware: HPE BIOS Version U41 02/02/2019 released Apr-2019</td>
<td>Orderable: 1, 2 chip(s)</td>
</tr>
<tr>
<td>File System: btrfs</td>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>System State: Run level 3 (multi-user)</td>
<td>L2: 1 MB I+D on chip per core</td>
</tr>
<tr>
<td>Base Pointers: 64-bit</td>
<td>L3: 27.5 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Peak Pointers: Not Applicable</td>
<td>Other: None</td>
</tr>
<tr>
<td>Other: None</td>
<td>Memory: 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R)</td>
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<tr>
<th>Test Date: Apr-2019</th>
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<td>Software Availability: Feb-2019</td>
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<td>Storage: 1 x 400 GB SAS SSD, RAID 0</td>
<td>Software Availability: Feb-2019</td>
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</tbody>
</table>
Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tbody>
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<td>290</td>
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<tr>
<td>525.x264_r</td>
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<td>531.deepsjeng_r</td>
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<td>511</td>
<td>179</td>
<td>512</td>
<td>179</td>
<td>511</td>
<td>180</td>
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<td>541.leela_r</td>
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<td>548.exchange2_r</td>
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<td>557.xz_r</td>
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<td>149</td>
<td>579</td>
<td>149</td>
</tr>
</tbody>
</table>

**Results**

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
File 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_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)
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant ML350 Gen10  
(2.10 GHz, Intel Xeon Gold 6230)  

**SPECrate2017_int_base = 220**  
**SPECrate2017_int_peak = Not Run**

---

**General Notes (Continued)**

is mitigated in the system as tested and documented.

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**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 9bce8f2999c33d61f64985e45859ea9  
running on ml350-sles15 Fri Apr 19 15:38:03 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 6230 CPU @ 2.10GHz
   2 "physical id"s (chips)
   80 "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
physical 1: 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):             80
On-line CPU(s) list: 0-79
Thread(s) per core: 2
Core(s) per socket: 20
Socket(s):          2
NUMA node(s):       4
Vendor ID:          GenuineIntel
CPU family:         6
Model:              85
Model name:         Intel(R) Xeon(R) Gold 6230 CPU @ 2.10GHz
```

(Continued on next page)
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Platform Notes (Continued)

Stepping: 7
CPU MHz: 2100.000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 28160K
NUMA node0 CPU(s): 0-9,40-49
NUMA node1 CPU(s): 10-19,50-59
NUMA node2 CPU(s): 20-29,60-69
NUMA node3 CPU(s): 30-39,70-79
Flags: fpu vme de pse mtrr msr pae mca 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 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_pmc_org mba tpr_shadow vnlm flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ersed emms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_ptu avx512cd avx512bw avx512vl xsaveopt xsaves xsavec xsaveopt xsavec xsaveopt xsaveopt xsaveopt xsaveopt xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local ibpb ibrs stibp dtcpli arat pln pts pkpu 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: 4 nodes (0-3)
  node 0 cpus: 0 1 2 3 4 5 6 7 8 9 40 41 42 43 44 45 46 47 48 49
  node 0 size: 96321 MB
  node 0 free: 95806 MB
  node 1 cpus: 10 11 12 13 14 15 16 17 18 19 50 51 52 53 54 55 56 57 58 59
  node 1 size: 96764 MB
  node 1 free: 96589 MB
  node 2 cpus: 20 21 22 23 24 25 26 27 28 29 60 61 62 63 64 65 66 67 68 69
  node 2 size: 96764 MB
  node 2 free: 96606 MB
  node 3 cpus: 30 31 32 33 34 35 36 37 38 39 70 71 72 73 74 75 76 77 78 79
  node 3 size: 96762 MB
  node 3 free: 96605 MB
  node distances:
    node 0 1 2 3
      0: 10 21 31 31
      1: 21 10 31 31
      2: 31 31 10 21

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Platform Notes (Continued)

3: 31 31 21 10

From /proc/meminfo
   MemTotal: 395891060 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 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 Apr 19 15:34

SPEC is set to: /home/cpu2017_u2
   Filesystem Type Size Used Avail Use% Mounted on
   /dev/sdb2 btrfs 371G 209G 161G 57% /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 U41 02/02/2019
   Memory:
      24x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2933

(End of data from sysinfo program)
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Hardware Availability: Apr-2019
Software Availability: Feb-2019

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
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.
(Continued on next page)

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

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**Base Portability Flags (Continued)**

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

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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.

Tested with SPEC CPU2017 v1.0.5 on 2019-04-19 06:08:03-0400.