**SPEC® CPU2017 Integer Rate Result**

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant ML350 Gen10  
(1.90 GHz, Intel Xeon Bronze 3204)  

| SPECrate2017_int_base = 39.8 | SPECrate2017_int_peak = Not Run |

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

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name:</td>
<td>Intel Xeon Bronze 3204</td>
</tr>
<tr>
<td>Max MHz.:</td>
<td>1900</td>
</tr>
<tr>
<td>Nominal:</td>
<td>1900</td>
</tr>
<tr>
<td>Enabled:</td>
<td>12 cores, 2 chips</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1, 2 chip(s)</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>1 MB I+D on chip per core</td>
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<tr>
<td>L3:</td>
<td>8.25 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>384 GB (24 x 16 GB 2Rx8 PC4-2666V-R, running at 2133)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 400 GB SAS SSD, RAID 0</td>
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<tr>
<td>Other:</td>
<td>None</td>
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<tr>
<td>OS:</td>
<td>SUSE Linux Enterprise Server 15 (x86_64)</td>
</tr>
<tr>
<td>Compiler:</td>
<td>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</td>
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<tr>
<td>Parallel:</td>
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<tr>
<td>Firmware:</td>
<td>HPE BIOS Version U41 05/21/2019 released May-2019</td>
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<tr>
<td>File System:</td>
<td>xfs</td>
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<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
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<tr>
<td>Peak Pointers:</td>
<td>Not Applicable</td>
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<td>Other:</td>
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**Test Date:** Jun-2019  
**Hardware Availability:** May-2019  
**Software Availability:** Feb-2019
## Results Table

<table>
<thead>
<tr>
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<th>Seconds</th>
<th>Ratio</th>
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<td>557.xz_r</td>
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**SPECrate2017_int_base = 39.8**

**SPECrate2017_int_peak = Not Run**

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) is mitigated in the system as tested and documented.

(Continued on next page)
**SPEC CPU2017 Integer Rate Result**

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

---

**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 9bcde8f2999c33d61f64985e45859ea9  
running on ml350-sles15-utpal Tue Jun 25 04:36:46 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) Bronze 3204 CPU @ 1.90GHz
  - 2 "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 : 6
    - physical 0: cores 0 1 2 3 4 5
    - physical 1: cores 0 1 2 3 4 5

From `lscpu`:

- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 12
- On-line CPU(s) list: 0-11
- Thread(s) per core: 1
- Core(s) per socket: 6
- Socket(s): 2
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Bronze 3204 CPU @ 1.90GHz

(Continued on next page)
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**Tested by:** HPE

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

---

**Platform Notes (Continued)**

- Stepping: 6  
- CPU MHz: 1900.000  
- BogoMIPS: 3800.00  
- Virtualization: VT-x  
- L1d cache: 32K  
- L1i cache: 32K  
- L2 cache: 1024K  
- L3 cache: 8448K  
- NUMA node0 CPU(s): 0-2,6-8  
- NUMA node1 CPU(s): 3-5,9-11

**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 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_ppin mba tpr_shadow vnmi flexpriority ept  
vpid fsgsbase tsc_adjust bmi hle avx2 smep bmi2  
sems invpcid rtm cqm mpx rdt_a  
avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl  
xaaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local  
ibpb ibrs stibp dtherm arat pln pts pku ospke avx512_vnni arch_capabilities ssbd

---

/cache /proc/cpuinfo cache data  
cache size : 8448 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 6 7 8  
node 0 size: 193093 MB  
node 0 free: 192751 MB  
node 1 cpus: 3 4 5 9 10 11  
node 1 size: 193534 MB  
node 1 free: 193224 MB  
node distances:  
node 0 1  
0: 10 21  
1: 21 10

From /proc/meminfo  
MemTotal: 395906288 KB  
HugePages_Total: 0  
Hugepagesize: 2048 KB

From /etc/*release* /etc/*version*  
**os-release:** NAME="SLES"
Platform Notes (Continued)

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-utpal 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 25 04:34

SPEC is set to: /home/cpu2017_u2

    Filesystem  Type      Size  Used  Avail Use% Mounted on
    /dev/sda3    xfs       407G   45G  362G  11%  /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 05/21/2019
Memory:
    24x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666, configured at 2133

(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.

(Continued on next page)
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<th>Test Date: Jun-2019</th>
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<td>Hardware Availability: May-2019</td>
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---

**Compiler Version Notes (Continued)**

```bash
CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base)
```

---

```bash
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.
```

---

```bash
FC 548.exchange2_r(base)
```

---

```bash
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:**
```bash
icc -m64 -std=c11
```

**C++ benchmarks:**
```bash
icpc -m64
```

**Fortran benchmarks:**
```bash
ifort -m64
```

**Base Portability Flags**

```bash
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
```
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**SPECrate2017_int_base = 39.8**

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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-revB.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-Platform-Flags-Intel-V1.2-CLX-revB.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.

Tested with SPEC CPU2017 v1.0.5 on 2019-06-24 19:06:45-0400.