## SPEC® CPU2017 Integer Rate Result

### Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant BL460c Gen10
(1.80 GHz, Intel Xeon Silver 4108)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base = 64.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_int_peak = Not Run</td>
</tr>
</tbody>
</table>

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</tr>
<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Sep-2017</td>
</tr>
</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>Copies</th>
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<td>1</td>
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<td>25</td>
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<td>38</td>
<td>69.6</td>
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<tr>
<td>51</td>
<td>119</td>
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<tr>
<td>64</td>
<td>54.3</td>
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<tr>
<td>77</td>
<td>50.2</td>
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<tr>
<td>90</td>
<td>118</td>
</tr>
<tr>
<td>103</td>
<td>45.3</td>
</tr>
</tbody>
</table>

#### CPU Name
Intel Xeon Silver 4108

#### Max MHz.
3000

#### Nominal
1800

#### Enabled
16 cores, 2 chips, 2 threads/core

#### Orderable
1, 2 chip(s)

#### Cache L1
32 KB I + 32 KB D on chip per core

#### L2
1 MB I+D on chip per core

#### L3
11 MB I+D on chip per chip

#### Other
None

#### Memory
192 GB (12 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)

#### Storage
1 x 480 GB SATA SSD, RAID 0

#### Other
None

### Software

<table>
<thead>
<tr>
<th>OS:</th>
<th>SUSE Linux Enterprise Server 12 (x86_64) SP3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kernel:</td>
<td>4.4.73-5-default</td>
</tr>
</tbody>
</table>

| Compiler: | C/C++: Version 18.0.0.128 of Intel C/C++ |
| Compiler for Linux: | |
| Fortran: | Version 18.0.0.128 of Intel Fortran |
| Compiler for Linux: | |

#### Parallel
No

#### Firmware
HPE BIOS Version I41 11/14/2017 released Nov-2017

#### File System:
xfs

#### System State:
Run level 3 (multi-user)

#### Base Pointers:
64-bit

#### Peak Pointers:
Not Applicable

#### Other:
jemalloc memory allocator library V5.0.1
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Results Table

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<thead>
<tr>
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SPECrate2017_int_base = 64.6
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"
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>
irqbalance disabled with "service irqbalance stop"
tuned profile set with "tuned-adm profile throughput-performance"
VM Dirty ratio was set to 40 using "echo 40 > /proc/sys/vm/dirty_ratio"
Numa balancing was disabled using "echo 0 > /proc/sys/kernel/numa_balancing"

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/jes.5.0.1-32:/home/cpu2017/jes.5.0.1-64"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.4

No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

(Continued on next page)
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Tested by: HPE

General Notes (Continued)

is mitigated in the system as tested and documented.
No: 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.
No: 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.

This benchmark result is intended to provide perspective on past performance using the historical hardware and/or software described on this result page.

The system as described on this result page was formerly generally available. At the time of this publication, it may not be shipping, and/or may not be supported, and/or may fail to meet other tests of General Availability described in the SPEC OSG Policy document, http://www.spec.org/osg/policy.htm.

This measured result may not be representative of the result that would be measured were this benchmark run with hardware and software available as of the publication date.

jemalloc: configured and built at default for 32bit (i686) and 64bit (x86_64) targets; built with RedHat Enterprise 7.4, and the system compiler gcc 4.8.5; sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases

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
Workload Profile set to General Throughput Compute
Minimum Processor Idle Power Core C-State set to C1E State
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on bl460c16suse Sat Dec 16 02:40:36 2017

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) Silver 4108 CPU @ 1.80GHz
  2 "physical id"s (chips)
  32 "processors"

(Continued on next page)
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Platform Notes (Continued)

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 : 8
siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7

From /proc/cpuinfo:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 32
On-line CPU(s) list: 0-31
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4108 CPU @ 1.80GHz
Stepping: 4
CPU MHz: 1795.780
BogoMIPS: 3591.56
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0-7,16-23
NUMA node1 CPU(s): 8-15,24-31
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 rdsvc
pl llc
From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 32
On-line CPU(s) list: 0-31
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
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NUMA node1 CPU(s): 8-15,24-31
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 rdsvc
pl llc
From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 2 nodes (0-1)
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### Platform Notes (Continued)

- node 0 cpus: 0 1 2 3 4 5 6 7 16 17 18 19 20 21 22 23
- node 0 size: 96350 MB
- node 0 free: 95950 MB
- node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
- node 1 size: 96765 MB
- node 1 free: 96388 MB
- node distances:
  - node 0: 10 21
  - node 1: 21 10

From /proc/meminfo

```
MemTotal:       197750024 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

From /etc/*release*, /etc/*version*

```
SuSE-release:  
  SUSE Linux Enterprise Server 12 (x86_64)  
  VERSION = 12  
  PATCHLEVEL = 3  
  # This file is deprecated and will be removed in a future service pack or release.  
  # Please check /etc/os-release for details about this release.  
os-release:  
  NAME="SLES"  
  VERSION="12-SP3"  
  VERSION_ID="12.3"  
  PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"  
  ID="sles"  
  ANSI_COLOR="0;32"  
  CPE_NAME="cpe:/o:suse:sles:12:sp3"
```

```
uname -a:  
  Linux bl460c16suse 4.4.73-5-default #1 SMP Tue Jul 4 15:33:39 UTC 2017 (b7ce4e4)  
  x86_64 x86_64 x86_64 GNU/Linux
```

run-level 3 Dec 16 02:39

SPEC is set to: /home/cpu2017

```
Filesystem   Type  Size  Used Avail Use% Mounted on
/dev/sda4     xfs   852G  232G  620G  28% /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 I41 11/14/2017

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**Platform Notes (Continued)**

Memory:
- 4x UNKNOWN NOT AVAILABLE
- 12x UNKNOWN NOT AVAILABLE
- 16 GB 2 rank 2666, configured at 2400

(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)

icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

FC  548.exchange2_r(base)

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

**Base Compiler Invocation**

C benchmarks:
- icc

C++ benchmarks:
- icpc

Fortran benchmarks:
- ifort
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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:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc

Fortran benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
-L/usr/local/je5.0.1-64/lib -ljemalloc

Base Other Flags

C benchmarks:
-m64 -std=c11

C++ benchmarks:
-m64

Fortran benchmarks:
-m64

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-SKX-revG.html
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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-SEX-revG.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SEX-revG.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 v1.0.2 on 2017-12-16 02:40:35-0500.  