## CPU2017 Floating Point Rate Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant ML350 Gen10  
(2.60 GHz, Intel Xeon Silver 4112)

<table>
<thead>
<tr>
<th>Test Sponsor</th>
<th>HPE</th>
<th>Hardware Availability: Feb-2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested by</td>
<td>HPE</td>
<td>Software Availability:</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>Software</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OS</td>
<td>SUSE Linux Enterprise Server 12 (x86_64) SP3</td>
<td></td>
</tr>
<tr>
<td>Compiler</td>
<td>C/C++: Version 18.0.0.128 of Intel C/C++</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fortran: Version 18.0.0.128 of Intel Fortran</td>
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<tr>
<td>Parallel</td>
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<td></td>
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<tr>
<td>Firmware</td>
<td>HPE BIOS Version U41 02/14/2018 released Feb-2018</td>
<td></td>
</tr>
<tr>
<td>File System</td>
<td>xfs</td>
<td></td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
<td></td>
</tr>
<tr>
<td>Base Pointers</td>
<td>64-bit</td>
<td></td>
</tr>
<tr>
<td>Peak Pointers</td>
<td>Not Applicable</td>
<td></td>
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<tr>
<td>Other</td>
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### Hardware

<table>
<thead>
<tr>
<th>CPU Name</th>
<th>Intel Xeon Silver 4112</th>
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</thead>
<tbody>
<tr>
<td>Max MHz.</td>
<td>3000</td>
</tr>
<tr>
<td>Nominal</td>
<td>2600</td>
</tr>
<tr>
<td>Enabled</td>
<td>8 cores, 2 chips, 2 threads/core</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>
</tr>
<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>192 GB (12 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)</td>
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<tr>
<td>Storage:</td>
<td>1 x 400 GB SATA SSD, RAID 0</td>
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<tr>
<td>Other:</td>
<td>None</td>
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### Software

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### Specrate2017_fp_base = 49.0

### Specrate2017_fp_peak = Not Run

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**Hewlett Packard Enterprise**
(Test Sponsor: HPE)
ProLiant ML350 Gen10
(2.60 GHz, Intel Xeon Silver 4112)

**SPECrate2017_fp_base =** 49.0
**SPECrate2017_fp_peak =** Not Run

CPU2017 License: 3
Test Date: Mar-2018
Test Sponsor: HPE
Hardware Availability: Feb-2018
Tested by: HPE
Software Availability: Feb-2018

### Results Table

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</tbody>
</table>

**SPECrate2017_fp_base =** 49.0
**SPECrate2017_fp_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
Filesystem page cache cleared with:
shell invocation of 'sync; echo 3 > /proc/sys/vm/drop_caches' prior to run
runspec command invoked through numactl i.e.:
numactl --interleave=all runspec <etc>
irqbalance disabled with "systemctl stop irqbalance"
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/je5.0.1-32:/home/cpu2017/je5.0.1-64"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM

(Continued on next page)
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<thead>
<tr>
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<td>Test Date</td>
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</tr>
</tbody>
</table>

**General Notes (Continued)**

memory using Redhat Enterprise Linux 7.4
Yes: 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.

**Platform Notes**

BIOS Configuration:
- Thermal Configuration set to Maximum Cooling
- LLC prefetch set to Enabled
- LLC Dead Line Allocation set to Disabled
- Memory Patrol Scrubbing 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 96c45e4568ad54c135fd618b5c091c0f
- running on linux-nhco Wed Mar 14 14:01:24 2018

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 4112 CPU @ 2.60GHz
- 2 "physical id"s (chips)
- 16 "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 : 4
  - siblings : 8
  - physical 0: cores 1 2 4 5
  - physical 1: cores 1 2 4 5

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 16
- On-line CPU(s) list: 0-15
- Thread(s) per core: 2
- Core(s) per socket: 4
- Socket(s): 2
- NUMA node(s): 2

(Continued on next page)
### Platform Notes (Continued)

Vendor ID:             GenuineIntel  
CPU family:            6  
Model:                 85  
Model name:            Intel(R) Xeon(R) Silver 4112 CPU @ 2.60GHz  
Stepping:              4  
CPU MHz:               2593.918  
BogoMIPS:              5187.83  
Virtualization:        VT-x  
L1d cache:             32K  
L1i cache:             32K  
L2 cache:              1024K  
L3 cache:              8448K  
NUMA node0 CPU(s):     0-3,8-11  
NUMA node1 CPU(s):     4-7,12-15  
Flags:                 fpu vme de pse tsc msr pae mce 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 aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrunc pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat epb invpcid_single pln pts dtherm intel_pt rsb_ctxtsw spec_ctrl retpoline kaiser tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ibrk invpcid rtm cqm px aavx512f aavx512dq rdseed adx smap clflushopt clwb aavx512cd aavx512bw aavx512vl xsaveopt xsaves xsaveopt xgetbv1 cqm_llc cqm_occup_llc pku ospke

/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 3 8 9 10 11  
node 0 size: 96350 MB  
node 0 free: 95987 MB  
node 1 cpus: 4 5 6 7 12 13 14 15  
node 1 size: 96766 MB  
node 1 free: 96427 MB  
node distances:  
  node 0 1  
  0: 10 21  
  1: 21 10

From /proc/meminfo  
MemTotal: 197751248 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB
Hewlett Packard Enterprise
(Test Sponsor: HPE)
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CPU2017 License: 3
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Tested by: HPE

Software Availability: Feb-2018

Platform Notes (Continued)

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 linux-nhco 4.4.114-94.11-default #1 SMP Thu Feb 1 19:28:26 UTC 2018 (4309ff9)
  x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Mar 14 13:51

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 331G 48G 283G 15% /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 02/14/2018
Memory:
  4x HPE 840756-091 16 GB 2 rank 2666, configured at 2400
  12x UNKNOWN NOT AVAILABLE
  8x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC  519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
(Continued on next page)
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ProLiant ML350 Gen10
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Test Date: Mar-2018
Hardware Availability: Feb-2018
Software Availability: Feb-2018

Compiler Version Notes (Continued)

==============================================================================
CXXC 508.namd_r(base) 510.parest_r(base)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

==============================================================================
CC 511.povray_r(base) 526.blender_r(base)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
iccc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

==============================================================================
FC 507.cactuBSSN_r(base)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
iccc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
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==============================================================================
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Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using both C and C++:
icpc icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only

(Continued on next page)
SPEC CPU2017 Floating Point Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML350 Gen10
(2.60 GHz, Intel Xeon Silver 4112)

SPECrates2017_fp_base = 49.0
SPECrates2017_fp_peak = Not Run

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE
Test Date: Mar-2018
Hardware Availability: Feb-2018
Software Availability: Feb-2018

Base Optimization Flags (Continued)

C++ benchmarks (continued):
-qopt-mem-layout-trans=3

Fortran benchmarks:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nstandard-realloc-lhs -align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nstandard-realloc-lhs -align array32byte

Benchmarks using both C and C++:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nstandard-realloc-lhs -align array32byte

Base Other Flags

C benchmarks:
-m64 -std=c11

C++ benchmarks:
-m64

Fortran benchmarks:
-m64

Benchmarks using both Fortran and C:
-m64 -std=c11

Benchmarks using both C and C++:
-m64 -std=c11

Benchmarks using Fortran, C, and C++:
-m64 -std=c11

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.html
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revH.html
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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 2018-03-14 14:01:24-0400.