# SPEC CPU®2017 Integer Rate Result

## Hewlett Packard Enterprise
### (Test Sponsor: HPE)
#### ProLiant DL380 Gen10
##### (2.40 GHz, Intel Xeon Silver 4214R)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>SPECrate®2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>143</td>
<td>149</td>
</tr>
</tbody>
</table>

### Hardware
- **CPU Name:** Intel Xeon Silver 4214R
- **Max MHz:** 3500
- **Nominal:** 2400
- **Enabled:** 24 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:** 16.5 MB I+D on chip per chip
- **Other:** None
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R, running at 2400)
- **Storage:** 1 x 400 GB SAS SSD
- **Other:** None

### Software
- **OS:** SUSE Linux Enterprise Server 15 SP1 (x86_64)
- **Kernel:** 4.12.14-195-default
- **Compiler:** C/C++: Version 19.0.4.227 of Intel C/C++ Compiler Build 20190416 for Linux;
  Fortran: Version 19.0.4.227 of Intel Fortran Compiler Build 20190416 for Linux;
- **Parallel:** No
- **Firmware:** HPE BIOS Version U30 v2.22 (11/13/2019) released Feb-2020
- **File System:** btrfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 32/64-bit
- **Other:** Jemalloc memory allocator V5.0.1
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage

### Test Details
- **CPU2017 License:** 3
- **Test Sponsor:** HPE
- **Tested by:** HPE
- **Software Availability:** Jun-2019
- **Hardware Availability:** Feb-2020
- **Test Date:** Mar-2020
SPEC CPU®2017 Integer Rate Result

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SPECrate®2017_int_base = 143
SPECrate®2017_int_peak = 149

CPU2017 License: 3
Test Sponsor: HPE
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>500.perlbench_r</td>
<td>48</td>
<td>720</td>
<td>106</td>
<td>721</td>
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<td>720</td>
<td>106</td>
<td>48</td>
<td>624</td>
<td>122</td>
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<tr>
<td>502.gcc_r</td>
<td>48</td>
<td>571</td>
<td>119</td>
<td>573</td>
<td>119</td>
<td>566</td>
<td>120</td>
<td>48</td>
<td>502</td>
<td>135</td>
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<td>136</td>
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<td>505.mcf_r</td>
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</tr>
<tr>
<td>520.omnetpp_r</td>
<td>48</td>
<td>655</td>
<td>96.2</td>
<td>657</td>
<td>95.9</td>
<td>653</td>
<td>96.5</td>
<td>48</td>
<td>654</td>
<td>96.2</td>
<td>656</td>
<td>96.0</td>
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<tr>
<td>523.xalancbmk_r</td>
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<td>314</td>
<td>161</td>
<td>313</td>
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<td>313</td>
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<td>525.x264_r</td>
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<td>296</td>
<td>284</td>
<td>294</td>
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<td>48</td>
<td>287</td>
<td>293</td>
<td>283</td>
<td>297</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>48</td>
<td>465</td>
<td>118</td>
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<td>465</td>
<td>118</td>
<td>48</td>
<td>466</td>
<td>118</td>
<td>465</td>
<td>118</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>48</td>
<td>719</td>
<td>111</td>
<td>728</td>
<td>109</td>
<td>740</td>
<td>107</td>
<td>48</td>
<td>722</td>
<td>110</td>
<td>719</td>
<td>111</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>48</td>
<td>447</td>
<td>281</td>
<td>447</td>
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<td>447</td>
<td>282</td>
<td>48</td>
<td>447</td>
<td>281</td>
<td>447</td>
<td>281</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>48</td>
<td>559</td>
<td>92.7</td>
<td>560</td>
<td>92.6</td>
<td>561</td>
<td>92.5</td>
<td>48</td>
<td>559</td>
<td>92.7</td>
<td>559</td>
<td>92.7</td>
</tr>
</tbody>
</table>

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>

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
   LD_LIBRARY_PATH = 
      "/home/cpu2017/lib/intel64:/home/cpu2017/lib/ia32:/home/cpu2017/je5.0.1-32"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM

(Continued on next page)
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CPU2017 License: 3  
Test Sponsor: HPE  
Tested by: HPE  

## General Notes (Continued)

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.


## 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 Power

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edebfe6e46a485a0011 running on linux-r6ge Fri Mar 6 09:48:59 2020

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 4214R CPU @ 2.40GHz
-  2 "physical id"s (chips)
-  48 "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 : 12
-  siblings : 24
-  physical 0: cores  0 1 2 3 4 5 8 9 10 11 12 13
-  physical 1: cores  0 1 2 3 4 5 8 9 10 11 12 13

From lscpu:
- Architecture: x86_64

(Continued on next page)
Hewlett Packard Enterprise
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ProLiant DL380 Gen10
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**SPEC CPU®2017 Integer Rate Result**

Copyright 2017-2020 Standard Performance Evaluation Corporation

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

---

<table>
<thead>
<tr>
<th>Platform Notes (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU op-mode(s): 32-bit, 64-bit</td>
</tr>
<tr>
<td>Byte Order: Little Endian</td>
</tr>
<tr>
<td>Address sizes: 46 bits physical, 48 bits virtual</td>
</tr>
<tr>
<td>CPU(s): 48</td>
</tr>
<tr>
<td>On-line CPU(s) list: 0-47</td>
</tr>
<tr>
<td>Thread(s) per core: 2</td>
</tr>
<tr>
<td>Core(s) per socket: 12</td>
</tr>
<tr>
<td>Socket(s): 2</td>
</tr>
<tr>
<td>NUMA node(s): 4</td>
</tr>
<tr>
<td>Vendor ID: GenuineIntel</td>
</tr>
<tr>
<td>CPU family: 6</td>
</tr>
<tr>
<td>Model: 85</td>
</tr>
<tr>
<td>Model name: Intel(R) Xeon(R) Silver 4214R CPU @ 2.40GHz</td>
</tr>
<tr>
<td>Stepping: 7</td>
</tr>
<tr>
<td>CPU MHz: 2400.000</td>
</tr>
<tr>
<td>BogoMIPS: 4800.00</td>
</tr>
<tr>
<td>Virtualization: VT-x</td>
</tr>
<tr>
<td>L1d cache: 32K</td>
</tr>
<tr>
<td>L1i cache: 32K</td>
</tr>
<tr>
<td>L2 cache: 1024K</td>
</tr>
<tr>
<td>L3 cache: 16896K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s): 0-5, 24-29</td>
</tr>
<tr>
<td>NUMA node1 CPU(s): 6-11, 30-35</td>
</tr>
<tr>
<td>NUMA node2 CPU(s): 12-17, 36-41</td>
</tr>
<tr>
<td>NUMA node3 CPU(s): 18-23, 42-47</td>
</tr>
<tr>
<td>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 art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpdr 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_pinn ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ibrm invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_voluntary cqm_movable cqm_mbb_local dtherm ida arat pln pts kpu ospke avx512_vnni md_clear flush_l1d arch_capabilities</td>
</tr>
</tbody>
</table>

/proc/cpuinfo cache data  

cache size : 16896 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 24 25 26 27 28 29  
- node 0 size: 96360 MB  
- node 0 free: 96064 MB

---

**Test Date:** Mar-2020  
**Hardware Availability:** Feb-2020  
**Software Availability:** Jun-2019

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**SPECrate®2017_int_peak = 149**  
**SPECrate®2017_int_base = 143**

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Hardware Availability: Feb-2020
Software Availability: Jun-2019

Test Date: Mar-2020

Platform Notes (Continued)

node 1 cpus: 6 7 8 9 10 11 30 31 32 33 34 35
node 1 size: 96736 MB
node 1 free: 94605 MB
node 2 cpus: 12 13 14 15 16 17 36 37 38 39 40 41
node 2 size: 96765 MB
node 2 free: 96557 MB
node 3 cpus: 18 19 20 21 22 23 42 43 44 45 46 47
node 3 size: 96764 MB
node 3 free: 96561 MB
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: 395905884 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release*/etc/*version*
os-release:
NAME="SLES"
VERSION="15-SP1"
VERSION_ID="15.1"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp1"

uname -a:
Linux linux-r6ge 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling (Meltdown): Not affected
CVE-2017-5754 (Speccurate Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5753 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

(Continued on next page)
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Platform Notes (Continued)

run-level 3 Mar 6 09:46
SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 btrfs 371G 146G 225G 40% /home

From /sys/devices/virtual/dmi/id
BIOS: HPE U30 11/13/2019
Vendor: HPE
Product: ProLiant DL380 Gen10
Product Family: ProLiant
Serial: 2M294204YX

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.
Memory:
24x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2933

Compiler Version Notes

C  | 502.gcc_r(peak)

Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version
19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C  | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak)
   | 525.x264_r(base, peak) 557.xz_r(base, peak)

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
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C  | 502.gcc_r(peak)

Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version
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### Compiler Version Notes (Continued)

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---

```plaintext
C             | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak)  
              | 525.x264_r(base, peak) 557.xz_r(base, peak)
```

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

---

```plaintext
C++           | 523.xalancbmk_r(peak)
```

Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version  
19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

---

```plaintext
C++           | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base) 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)
```

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

---

```plaintext
C++           | 523.xalancbmk_r(peak)
```

Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version  
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Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

---

```plaintext
C++           | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base) 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)
```

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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(Continued on next page)
# SPEC CPU®2017 Integer Rate Result

## Compiler Version Notes (Continued)

Fortran | 548.exchange2_r (base, peak)
--- | ---

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
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## Base Compiler Invocation

C benchmarks:
```shell
icc -m64 -std=c11
```

C++ benchmarks:
```shell
icpc -m64
```

Fortran benchmarks:
```shell
ifort -m64
```

## Base Portability Flags

500.perlbm_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:
```shell
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-1qkmalloc
```

C++ benchmarks:
```shell
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
```
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**Base Optimization Flags (Continued)**

C++ benchmarks (continued):
- `-qopt-mem-layout-trans=4`
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64`
- `-lqkmalloc`

Fortran benchmarks:
- `-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div`
- `-qopt-mem-layout-trans=4`
- `-nostandard-realloc-lhs`
- `-align array32byte`
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64`
- `-lqkmalloc`

**Peak Compiler Invocation**

C benchmarks (except as noted below):
```
icc -m64 -std=c11
```


C++ benchmarks (except as noted below):
```
icpc -m64
```

523.xalancbmk_r: `icpc -m32 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/ia32_lin`

Fortran benchmarks:
```
ifort -m64
```

**Peak Portability Flags**

500.perlbench_r: `-DSPEC_LP64 -DSPEC_LINUX_X64`
502.gcc_r: `-D_FILE_OFFSET_BITS=64`
505.mcf_r: `-DSPEC_LP64`
520.omnetpp_r: `-DSPEC_LP64`
523.xalancbmk_r: `-D_FILE_OFFSET_BITS=64 -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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**Test Date:** Mar-2020  
**Hardware Availability:** Feb-2020  
**Software Availability:** Jun-2019

### Peak Optimization Flags

#### C benchmarks:

- `500.perlbench_r -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=4 -fno-strict-overflow -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64 -lqkmalloc`

- `502.gcc_r -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=4 -L/usr/local/je5.0.1-32/lib -ljemalloc`

- `505.mcf_r -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64 -lqkmalloc`

- `525.x264_r -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4 -fno-alias -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64 -lqkmalloc`

- `557.xz_r: Same as 505.mcf_r`

#### C++ benchmarks:

- `520.omnetpp_r -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64 -lqkmalloc`

- `523.xalanckmk_r -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=4 -L/usr/local/je5.0.1-32/lib -ljemalloc`

- `531.deepsjeng_r: Same as 520.omnetpp_r`

- `541.leela_r: Same as 520.omnetpp_r`

#### Fortran benchmarks:

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL380 Gen10
(2.40 GHz, Intel Xeon Silver 4214R)

<table>
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<th>SPECrate®2017_int_base = 143</th>
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<tbody>
<tr>
<td>SPECrate®2017_int_peak = 149</td>
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Test Date: Mar-2020
Hardware Availability: Feb-2020
Software Availability: Jun-2019

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

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

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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