## SPEC® CPU2017 Integer Rate Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL360 Gen10  
(2.10 GHz, Intel Xeon Gold 6230)

**SPECratenet2017_int_base = 184**  
**SPECratenet2017_int_peak = Not Run**

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name: Intel Xeon Gold 6230</td>
<td>OS: CentOS Linux release 7.6.1810 (x86_64)</td>
</tr>
<tr>
<td>Max MHz.: 3900</td>
<td>Kernel 3.10.0-957.21.3.el7.x86_64</td>
</tr>
<tr>
<td>Nominal: 2100</td>
<td>Compiler: C/C++: Version 19.0.2.187 of Intel C/C++</td>
</tr>
<tr>
<td>Enabled: 40 cores, 2 chips, 2 threads/core</td>
<td>Compiler Build 20190117 for Linux; Fortran: Version 19.0.2.187 of Intel Fortran</td>
</tr>
<tr>
<td>Orderable: 1, 2 chip(s)</td>
<td>Compiler Build 20190117 for Linux</td>
</tr>
<tr>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
<td>Parallel: No</td>
</tr>
<tr>
<td>L2: 1 MB I+D on chip per core</td>
<td>Firmware: HPE BIOS Version U32 05/03/2019 released May-2019</td>
</tr>
<tr>
<td>L3: 27.5 MB I+D on chip per chip</td>
<td>System State: Run level 5 (multi-user)</td>
</tr>
<tr>
<td>Other: None</td>
<td>Base Pointers: 64-bit</td>
</tr>
<tr>
<td>Memory: 128 GB (8 x 16 GB 1Rx8 PC4-2933Y-R)</td>
<td>Peak Pointers: Not Applicable</td>
</tr>
<tr>
<td>Storage: 1 x 894 GB SAS SSD, RAID 0</td>
<td>Other: None</td>
</tr>
<tr>
<td>Other: None</td>
<td></td>
</tr>
</tbody>
</table>

**Overview**

- **CPU2017 License:** 3  
- **Test Sponsor:** HPE  
- **Tested by:** HPE  
- **Test Date:** Jul-2019  
- **Hardware Availability:** May-2019  
- **Software Availability:** Jun-2019

**Software**

- Compiler: 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

**Copy Count**

<table>
<thead>
<tr>
<th>Test</th>
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<tbody>
<tr>
<td>500.perlbench_r</td>
<td>80</td>
<td>158</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>80</td>
<td>134</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>80</td>
<td>229</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>80</td>
<td>108</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>80</td>
<td>181</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>80</td>
<td>421</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>80</td>
<td>168</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>80</td>
<td>160</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>80</td>
<td>356</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>80</td>
<td>128</td>
</tr>
</tbody>
</table>

**Performance**

The HP ProLiant DL360 Gen10 system, equipped with an Intel Xeon Gold 6230 processor running at 2.10 GHz, was tested using the SPEC CPU2017 benchmark suite. The system was configured with 128 GB of memory and 1 x 894 GB SAS SSD, RAID 0. The test results, including SPECrate2017_int_base and SPECrate2017_int_peak, were recorded on July 20, 2019. The tests were sponsored by HPE, and the hardware and software availability dates are May 2019 and June 2019, respectively. The system met all the required specifications as outlined in the test report.
**SPEC CPU2017 Integer Rate Result**

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)
ProLiant DL360 Gen10
(2.10 GHz, Intel Xeon Gold 6230)

SPECrate2017_int_base = 184
SPECrate2017_int_peak = Not Run

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

**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
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<tr>
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<td>520.omnetpp_r</td>
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<td>100</td>
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<td>181</td>
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<tr>
<td>525.x264_r</td>
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<td>333</td>
<td>421</td>
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<td>335</td>
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<tr>
<td>531.deepsjeng_r</td>
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<td>546</td>
<td>168</td>
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<td>168</td>
<td>547</td>
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<tr>
<td>541.leela_r</td>
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<td>824</td>
<td>161</td>
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<td>160</td>
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<td>159</td>
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<tr>
<td>548.exchange2_r</td>
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<td>586</td>
<td>358</td>
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<tr>
<td>557.xz_r</td>
<td>80</td>
<td>674</td>
<td>128</td>
<td>674</td>
<td>128</td>
<td>674</td>
<td>128</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>
```

**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)

(Continued on next page)
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Test Sponsor: HPE
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Test Date: Jul-2019
Hardware Availability: May-2019
Software Availability: Jun-2019

General Notes (Continued)

is mitigated in the system as tested and documented.

Platform Notes

BIOS Configuration:
  Workload Profile set to High Performance Compute
  Intel Virtualization Technology set to Enabled
Sysinfo program /home/cpu2017_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on localhost.localdomain Sat Jul 27 05:54:46 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) 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 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
    physical 1: cores 0 1 2 3 4 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):          2
  Vendor ID:             GenuineIntel
  CPU family:            6
  Model:                 85
  Model name:            Intel(R) Xeon(R) Gold 6230 CPU @ 2.10GHz
  Stepping:              6
  CPU MHz:               2100.000
  BogoMIPS:              4200.00
  Virtualization:        VT-x
  L1d cache:             32K
  L1i cache:             32K

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SPEC CPU2017 Integer Rate Result
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Platform Notes (Continued)

    ID_LIKE="rhel fedora"
    VERSION_ID="7"
    PRETTY_NAME="CentOS Linux 7 (Core)"
    ANSI_COLOR="0;31"
    CPE_NAME="cpe:/o:centos:centos:7"
    redhat-release: CentOS Linux release 7.6.1810 (Core)
    system-release: CentOS Linux release 7.6.1810 (Core)
    system-release-cpe: cpe:/o:centos:centos:7

uname -a:
    Linux localhost.localdomain 3.10.0-957.21.3.el7.x86_64 #1 SMP Tue Jun 18 16:35:19 UTC 2019 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: Load fences, __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB

run-level 5 Jul 25 02:29

SPEC is set to: /home/cpu2017_u2
   Filesystem              Type Size Used Avail Use% Mounted on
   /dev/mapper/centos-home xfs  839G  9.9G  830G  2% /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 U32 05/03/2019
Memory:
   16x UNKNOWN NOT AVAILABLE
   8x UNKNOWN NOT AVAILABLE 16 GB 1 rank 2933

(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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Compiler Version Notes (Continued)

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
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Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Base Portability Flags

502.gcc_r: -DSPEC_LP64 -DSPEC_LINUX_X64
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=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)