### SPEC® CPU2017 Integer Speed Result

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)

ProLiant DL360 Gen10
(2.10 GHz, Intel Xeon Platinum 8160M)

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base = 8.90</th>
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<tbody>
<tr>
<td>SPECspeed2017_int_peak = Not Run</td>
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**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Tested by:** HPE  
**Test Date:** Nov-2018  
**Hardware Availability:** Oct-2018  
**Software Availability:** Mar-2018

#### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_int_base</th>
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<tr>
<td>600.perlbench_s</td>
<td>48</td>
<td>6.22</td>
<td>Not Run</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>48</td>
<td>9.11</td>
<td></td>
</tr>
<tr>
<td>605.mcf_s</td>
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<td>11.2</td>
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</tr>
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<td>620.omnetpp_s</td>
<td>48</td>
<td>7.12</td>
<td></td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>48</td>
<td>9.31</td>
<td></td>
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<tr>
<td>625.x264_s</td>
<td>48</td>
<td>11.6</td>
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</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>48</td>
<td>5.08</td>
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</tr>
<tr>
<td>641.leela_s</td>
<td>48</td>
<td>4.34</td>
<td></td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>48</td>
<td>13.2</td>
<td></td>
</tr>
<tr>
<td>657.xz_s</td>
<td>48</td>
<td>22.1</td>
<td></td>
</tr>
</tbody>
</table>

#### Software

**OS:** Red Hat Enterprise Linux Server release 7.4 (Maipo)  
**Compiler:** C/C++: Version 18.0.2.199 of Intel C/C++  
**Compiler for Linux:** Fortran: Version 18.0.2.199 of Intel Fortran  
**Compiler for Linux:**  
**Parallel:** Yes  
**Firmware:** HPE BIOS Version U32 10/15/2018 released Oct-2018  
**File System:** xfs  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** Not Applicable  
**Other:** jemalloc memory allocator V5.0.1

#### Hardware

**CPU Name:** Intel Xeon Platinum 8160M  
**Max MHz.:** 3700  
**Nominal:** 2100  
**Enabled:** 48 cores, 2 chips  
**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:** 33 MB I+D on chip per chip  
**Other:** None  
**Memory:** 192 GB (24 x 8 GB 2Rx8 PC4-2666V-R)  
**Storage:** 1 x 400 GB SATA SSD, RAID 0  
**Other:** None
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Results Table

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<tr>
<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
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SPECspeed2017_int_peak = Not Run

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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 numacltl i.e.:
    numacltl --interleave=all runcpu <etc>
IRQ balance service was stopped using "systemctl stop irqbalance.service"
Tuned-adm profile was set to Throughput-Performance using "tuned-adm profile throughput-performance"

General Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i7-6700K CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5

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.
jemalloc, a general purpose malloc implementation

(Continued on next page)
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**General Notes (Continued)**

built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5  

---

**Platform Notes**

BIOS Configuration:  
Hyper-Threading set to Disabled  
Thermal Configuration set to Maximum Cooling  
LLC Prefetch set to Enabled  
LLC Dead Line Allocation set to Disabled  
Stale A to S set to Disabled  
XPT Prefetch set to Disabled  
Memory Patrol Scrubbing set to Disabled  
Workload Profile set to General Peak Frequency Compute  
Energy/Performance Bias set to Maximum Performance  
Workload Profile set to Custom  
Numa Group Size Optimization set to Flat  
Uncore Frequency Scaling set to Auto  
Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcde8f2999c33d6f64985e45859ea9  
running on dl360-rhel7.4-mk Wed Nov 28 12:37:26 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) Platinum 8160M CPU @ 2.10GHz  
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 : 24  
siblings : 24  
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29  
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

From lscpu:  
Architecture: x86_64  
CPU op-mode(s): 32-bit, 64-bit  
Byte Order: Little Endian  
CPU(s): 48  
On-line CPU(s) list: 0-47  
Thread(s) per core: 1  
Core(s) per socket: 24  
Socket(s): 2

(Continued on next page)
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**SPECspeed2017_int_peak = Not Run**

**Platform Notes (Continued)**

- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Platinum 8160M CPU @ 2.10GHz
- Stepping: 4
- CPU MHz: 2100.000
- BogoMIPS: 4200.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 33792K
- NUMA node0 CPU(s): 0-23
- NUMA node1 CPU(s): 24-47
- Flags: `fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acpica mxsr ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch ebx cat_l3 cdp_l3 invpcid_single intel_pt spec_ctrl ibpb_support tpr_shadow vmx flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rd_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512v1 xsaveopt xsavec xgetbv1 cqm_11c cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts`

/proc/cpuinfo cache data  
```
cache size : 33792 KB
```

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

From /proc/meminfo  
```
MemTotal:       197724720 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

From /etc/*release* /etc/*version*  
```
os-release:
  NAME="Red Hat Enterprise Linux Server"
  VERSION="7.4 (Maipo)"
  ID="rhel"
  ID_LIKE="fedora"
  VARIANT="Server"
  VARIANT_ID="server"
  VERSION_ID="7.4"
  PRETTY_NAME="Red Hat Enterprise Linux Server 7.4 (Maipo)"
```

(Continued on next page)
Platform Notes (Continued)

    redhat-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
    system-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
    system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server

    uname -a:
    Linux dl360-rhel7.4-mk 3.10.0-693.20.1.el7.x86_64 #1 SMP Wed Feb 7 16:53:38 EST 2018
     x86_64 x86_64 x86_64 GNU/Linux

   Kernel self-reported vulnerability status:

    CVE-2017-5754 (Meltdown): Mitigation: PTI
    CVE-2017-5753 (Spectre variant 1): Mitigation: Load fences
    CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS (kernel)

    run-level 3 Nov 28 11:51

    SPEC is set to: /home/cpu2017

    Filesystem              Type  Size  Used Avail Use% Mounted on
    /dev/mapper/rhel00-home xfs   318G   13G  305G   4% /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 10/15/2018
    Memory:
     24x UNKNOWN NOT AVAILABLE 8 GB 2 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC  600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base)
    657.xz_s(base)
==============================================================================
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================
CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
    641.leela_s(base)
==============================================================================
icpc (ICC) 18.0.2 20180210
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Compiler Version Notes (Continued)

==============================================================================
FC 648.exchange2_s(base)
==============================================================================
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11
C++ benchmarks:
icpc -m64
Fortran benchmarks:
ifort -m64

Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-W1, -z, muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -gopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

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Base Optimization Flags (Continued)

C++ benchmarks:
- W1, -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:
- W1, -z, muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- qopt-mem-layout-trans=3 -nostandard-realloc-lhs
- L/usr/local/je5.0.1-64/lib -ljemalloc

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-revH.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-SKX-revH.xml
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.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 2018-11-28 12:37:26-0500.
Originally published on 2019-02-05.