Hewlett Packard Enterprise  
ProLiant DL560 Gen10  
(3.50 GHz, Intel Xeon Gold 6144) 

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base =</th>
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</thead>
<tbody>
<tr>
<td>SPECspeed2017_int_peak =</td>
<td>Not Run</td>
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</tbody>
</table>

**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Tested by:** HPE  
**Test Date:** Dec-2017  
**Hardware Availability:** Oct-2017  
**Software Availability:** Sep-2017

### Hardware

- **CPU Name:** Intel Xeon Gold 6144  
- **Max MHz.:** 4200  
- **Nominal:** 3500  
- **Enabled:** 32 cores, 4 chips, 2 threads/core  
- **Orderable:** 1, 2, 4 chip(s)  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **L2:** 1 MB I+D on chip per core  
- **L3:** 24.75 MB I+D on chip per chip  
- **Memory:** 768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)  
- **Storage:** 1 x 480 GB SATA SSD, RAID 0  
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux Server release 7.3 (Maipo)  
- **Compiler:** C/C++: Version 18.0.0.128 of Intel C/C++  
- **Compiler for Linux:** Fortran: Version 18.0.0.128 of Intel Fortran  
- **Firmware:** Yes  
- **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

---

### SPECspeed2017_int_base (9.19) Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_int_base</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>64</td>
<td>9.15</td>
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<tr>
<td>602.gcc_s</td>
<td>64</td>
<td>11.9</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>64</td>
<td>4.96</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>64</td>
<td>10.3</td>
</tr>
<tr>
<td>623.xalanchmk_s</td>
<td>64</td>
<td>11.7</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>64</td>
<td>5.64</td>
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<tr>
<td>641.leela_s</td>
<td>64</td>
<td>4.97</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>64</td>
<td>15.2</td>
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<tr>
<td>657.xz_s</td>
<td>64</td>
<td>22.9</td>
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</table>

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**Threads:** 64

---

**Test Sponsor:** HPE  
**Hardware Availability:** Oct-2017  
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---

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SPEC CPU2017 Integer Speed Result

Hewlett Packard Enterprise
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

SPECspeed2017_int_base = 9.19
SPECspeed2017_int_peak = Not Run

Results Table

<table>
<thead>
<tr>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>9.44</td>
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<td>11.7</td>
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<td>631.deepsjeng_s</td>
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<td>641.leela_s</td>
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<td>270</td>
<td>22.9</td>
<td>270</td>
<td>22.9</td>
</tr>
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SPECspeed2017_int_base = 9.19
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
Filesystem page cache cleared with:
shell invocation of 'sync; echo 3 > /proc/sys/vm/drop_caches' prior to run
irqbalance service stopped using "systemctl stop irqbalance.service"
Used throughput-performance profile for tuned-adm: "tuned-adm profile throughput-performance profile"

General Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINIT = "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 i7-4790 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) 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.
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

General Notes (Continued)

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
LLC Prefetch set to Enabled
LLC Dead Line Allocation set to Disabled
Memory Patrol Scrubbing set to Disabled
Stale A to S set to Enabled
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
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bdc091c0f
running on RHEL7.3-DQW Fri Dec 8 12:08:21 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) Gold 6144 CPU @ 3.50GHz
  4 "physical id"s (chips)
  64 "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 : 8
  siblings : 16
  physical 0: cores 0 2 3 9 16 19 26 27
  physical 1: cores 0 2 3 9 16 19 26 27
  physical 2: cores 0 2 3 9 16 19 26 27

(Continued on next page)
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Platform Notes (Continued)

    physical 3: cores 0 2 3 9 16 19 26 27

From lscpu:
    Architecture: x86_64
    CPU op-mode(s): 32-bit, 64-bit
    Byte Order: Little Endian
    CPU(s): 64
    On-line CPU(s) list: 0-63
    Thread(s) per core: 2
    Core(s) per socket: 8
    Socket(s): 4
    NUMA node(s): 8
    Vendor ID: GenuineIntel
    CPU family: 6
    Model: 85
    Model name: Intel(R) Xeon(R) Gold 6144 CPU @ 3.50GHz
    Stepping: 4
    CPU MHz: 3500.000
    BogoMIPS: 7005.94
    Virtualization: VT-x
    L1d cache: 32K
    L1i cache: 32K
    L2 cache: 1024K
    L3 cache: 25344K
    NUMA node0 CPU(s): 0-3,32-35
    NUMA node1 CPU(s): 4-7,36-39
    NUMA node2 CPU(s): 8-11,40-43
    NUMA node3 CPU(s): 12-15,44-47
    NUMA node4 CPU(s): 16-19,48-51
    NUMA node5 CPU(s): 20-23,52-55
    NUMA node6 CPU(s): 24-27,56-59
    NUMA node7 CPU(s): 28-31,60-63

/proc/cpuinfo cache data
    cache size : 25344 KB

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

From /proc/meminfo
    MemTotal: 792071360 KB
    HugePages_Total: 0
    Hugepagesize: 2048 KB

From /etc/*release* /etc/*version*
    os-release:
        NAME="Red Hat Enterprise Linux Server"

(Continued on next page)
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Software Availability: Sep-2017

Platform Notes (Continued)

VERSION="7.3 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="7.3"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.3 (Maipo)"
ANSI_COLOR="0;31"
CPE_NAME="cpe:/o:redhat:enterprise_linux:7.3:GA:server"
redhat-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)

uname -a:
Linux RHEL7.3-DQW 3.10.0-514.e17.x86_64 #1 SMP Wed Oct 19 11:24:13 EDT 2016 x86_64
x86_64 x86_64 GNU/Linux

run-level 3 Dec 8 11:51

SPEC is set to: /home/cpu2017

Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda4      xfs   442G   13G  430G   3% /

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 U34 09/29/2017
Memory:
48x UNKNOWN NOT AVAILABLE 16 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) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================
CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
  641.leela_s(base)
==============================================================================
icpc (ICC) 18.0.0 20170811

(Continued on next page)
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</tbody>
</table>

**Compiler Version Notes (Continued)**

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

```
FC  648.exchange2_s(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

**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:
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc
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**Base Optimization Flags (Continued)**

C++ benchmarks:
-Wl,-z,muldefs -xCORE-AVX2 -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-AVX2 -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-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

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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 2017-12-08 13:08:21-0500.
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