Hewlett Packard Enterprise  
ProLiant XL420 Gen9  
(2.20 GHz, Intel Xeon E5-2650 v4)  

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Feb-2018</th>
</tr>
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<tr>
<td>Hardware Availability:</td>
<td>Oct-2017</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Sep-2017</td>
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** SPECspeed2017_int_base = 6.73 **  
** SPECspeed2017_int_peak = Not Run **

<table>
<thead>
<tr>
<th>Test Sponsor:</th>
<th>HPE</th>
</tr>
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<tr>
<td>Tested by:</td>
<td>HPE</td>
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<tr>
<td>CPU2017 License:</td>
<td>3</td>
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| Software | OS: SUSE Linux Enterprise Server 12 (x86_64) SP3  
<table>
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<tr>
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<tbody>
<tr>
<td></td>
<td>Kernel 4.4.73-5-default</td>
</tr>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 18.0.0.128 of Intel C/C++</td>
</tr>
<tr>
<td></td>
<td>Fortran: Version 18.0.0.128 of Intel Fortran Compiler for Linux</td>
</tr>
<tr>
<td>Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
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<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Other:</td>
<td>jemalloc memory allocator library V5.0.1</td>
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| Hardware | CPU Name: Intel Xeon E5-2650 v4  
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Max MHz.:</td>
<td>2900</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2200</td>
</tr>
<tr>
<td>Enabled:</td>
<td>24 cores, 2 chips</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>256 KB I+D on chip per core</td>
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<tr>
<td>L3:</td>
<td>30 MB I+D on chip per chip</td>
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<tr>
<td>Other:</td>
<td>None</td>
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<tr>
<td>Memory:</td>
<td>512 GB (8 x 64 GB 4Rx4 PC4-2400T-L)</td>
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<tr>
<td>Storage:</td>
<td>2 x 400 GB SAS SSD, RAID 0</td>
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<tr>
<td>Other:</td>
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### Threads

<table>
<thead>
<tr>
<th>Thread</th>
<th>Threads</th>
<th>SPECspeed2017_int_base (6.73)</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>24</td>
<td>7.33</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>24</td>
<td>8.36</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>24</td>
<td>5.61</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>24</td>
<td>6.93</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>24</td>
<td>8.18</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>24</td>
<td>3.97</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>24</td>
<td>3.45</td>
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<tr>
<td>648.exchange2_s</td>
<td>24</td>
<td>10.1</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

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** SPEC® CPU2017 Integer Speed Result **  
Copyright 2017-2018 Standard Performance Evaluation Corporation
SPEC CPU2017 Integer Speed Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant XL420 Gen9
(2.20 GHz, Intel Xeon E5-2650 v4)

SPECSpeed2017_int_base =  6.73
SPECSpeed2017_int_peak =  Not Run

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

Test Date:  Feb-2018
Hardware Availability:  Oct-2017
Software Availability:  Sep-2017

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>24</td>
<td>423</td>
<td>4.19</td>
<td>431</td>
<td>4.12</td>
<td>420</td>
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<td>548</td>
<td>7.27</td>
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<td>543</td>
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<td>620.omnetpp_s</td>
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<td>291</td>
<td>5.61</td>
<td>318</td>
<td>5.13</td>
<td>285</td>
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<td>623.xalancbmk_s</td>
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<td>205</td>
<td>6.93</td>
<td>207</td>
<td>6.83</td>
<td>204</td>
<td>6.96</td>
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<td>625.x264_s</td>
<td>24</td>
<td>216</td>
<td>8.18</td>
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<td>215</td>
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<td>631.deepsjeng_s</td>
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<td>362</td>
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<td>10.1</td>
<td>290</td>
<td>10.1</td>
<td>292</td>
<td>10.1</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>24</td>
<td>367</td>
<td>16.8</td>
<td>366</td>
<td>16.9</td>
<td>371</td>
<td>16.7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SPECSpeed2017_int_base =  6.73
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.
Filesystme page cache cleared with:
shell invocration of 'sync; echo 3 > /proc/sys/vm/drop_caches' prior to run
irqbalance service stopped using "systemcti 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_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 i7-4790 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.
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;
**SPEC CPU2017 Integer Speed Result**

Test Sponsor: HPE  
ProLiant XL420 Gen9  
(2.20 GHz, Intel Xeon E5-2650 v4)

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

**Test Date:** Feb-2018  
**Software Availability:** Sep-2017

---

**Platform Notes**

BIOS Configuration:
- Intel Hyperthreading set to Disabled
- Power Profile set to Maximum Performance
- QPI Snoop Configuration set to Home Snoop
- Collaborative Power Control set to Disabled
- Thermal Configuration set to Maximum Cooling
- Power Profile set to Custom
- Minimum Processor Idle Power Core C-State set to C6 state
- Processor Power and Utilization Monitoring set to Disabled
- Memory Patrol Scrubbing set to Disabled
- Memory Refresh Rate set to 1x Refresh
- Sysinfo program /home/cpu2017/bin/sysinfo
- Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
- running on apollo4200gen9 Sat Feb 10 07:44:09 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) CPU E5-2650 v4@ 2.20GHz
- 2 "physical id"s (chips)
- 24 "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 : 12
- 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
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 24
- On-line CPU(s) list: 0-23
- Thread(s) per core: 1
- Core(s) per socket: 12
- Socket(s): 2
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 79
- Model name: Intel(R) Xeon(R) CPU E5-2650 v4@ 2.20GHz
- Stepping: 1
- CPU MHz: 2197.474
- BogoMIPS: 4394.94

(Continued on next page)
Hewlett Packard Enterprise
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ProLiant XL420 Gen9
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SPEC CPU2017 Integer Speed Result
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SPECspeed2017_int_base = 6.73
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Platform Notes (Continued)

Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 30720K
NUMA node0 CPU(s): 0-5,12-17
NUMA node1 CPU(s): 6-11,18-23
Flags: fpu vme de pse mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdel1gb rdtsscp
lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc aperf perf
eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat epb pln pts dtherm intel_pt
trp_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
erms invpcid rtm cqm rdseed adx smap xsaveopt cqm_llc cqm_occup_llc

/cache size : 30720 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 4 5 12 13 14 15 16 17
   node 0 size: 257636 MB
   node 0 free: 257252 MB
   node 1 cpus: 6 7 8 9 10 11 18 19 20 21 22 23
   node 1 size: 257893 MB
   node 1 free: 257538 MB
   node distances:
   node 0 1
   0: 10 21
   1: 21 10

From /proc/meminfo
MemTotal: 527903020 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP3

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.

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

```
# 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 apollo4200gen9 4.4.73-5-default #1 SMP Tue Jul 4 15:33:39 UTC 2017 (b7ce4e4)
  x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Feb 10 07:25

SPEC is set to: /home/cpu2017

Filesystem    Type Size  Used Avail Use% Mounted on
/dev/sda4     xfs  703G   29G  674G   5% /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 HP U19 10/25/2017
  Memory:
    8x UNKNOWN NOT AVAILABLE
    8x UNKNOWN NOT AVAILABLE 64 GB 4 rank 2400

(End of data from sysinfo program)
```
SPEC CPU2017 Integer Speed Result

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Test Date: Feb-2018
Hardware Availability: Oct-2017
Software Availability: Sep-2017

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,defs -xCORE-AVX2 -ipo -03 -no-prec-div
-qqopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

(Continued on next page)
## SPEC CPU2017 Integer Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant XL420 Gen9  
(2.20 GHz, Intel Xeon E5-2650 v4)  

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<tr>
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<td>Not Run</td>
</tr>
</tbody>
</table>

**Test Date:** Feb-2018  
**Hardware Availability:** Oct-2017  
**Software Availability:** Sep-2017

### 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-HSW-revG.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-HSW-revG.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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