SPEC® CPU2017 Integer Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL560 Gen10
(2.10 GHz, Intel Xeon Platinum 8176)

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

SPECspeed2017_int_base = 9.14

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SPECspeed2017_int_peak = Not Run

SPECspeed2017_int_base = 9.14

Hardware

CPU Name: Intel Xeon Platinum 8176
Max MHz.: 3800
Nominal: 2100
Enabled: 112 cores, 4 chips
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: 38.5 MB I+D on chip per chip
Other: None
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
Compiler for Linux
Parallel: Yes
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: jemalloc: jemalloc memory allocator library
V5.0.1;
jemalloc: configured and built at default for 32bit (i686) and 64bit (x86_64) targets;
jemalloc: built with the RedHat Enterprise 7.4,
and the system compiler gcc 4.8.5;
jemalloc: sources available from jemalloc.net or releases
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### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench_s</td>
<td>112</td>
<td>280</td>
<td>6.34</td>
<td>278</td>
<td>6.38</td>
<td>279</td>
<td>6.37</td>
<td></td>
</tr>
<tr>
<td>gcc_s</td>
<td>112</td>
<td>435</td>
<td>9.15</td>
<td>433</td>
<td>9.21</td>
<td>435</td>
<td>9.15</td>
<td></td>
</tr>
<tr>
<td>mcf_s</td>
<td>112</td>
<td>425</td>
<td>11.1</td>
<td>426</td>
<td>11.1</td>
<td>426</td>
<td>11.1</td>
<td></td>
</tr>
<tr>
<td>omnetpp_s</td>
<td>112</td>
<td>219</td>
<td>7.44</td>
<td>217</td>
<td>7.53</td>
<td>216</td>
<td>7.57</td>
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</tr>
<tr>
<td>xalancbmk_s</td>
<td>112</td>
<td>147</td>
<td>9.61</td>
<td>147</td>
<td>9.65</td>
<td>147</td>
<td>9.65</td>
<td></td>
</tr>
<tr>
<td>x264_s</td>
<td>112</td>
<td>152</td>
<td>11.6</td>
<td>151</td>
<td>11.7</td>
<td>151</td>
<td>11.7</td>
<td></td>
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<tr>
<td>deepsjeng_s</td>
<td>112</td>
<td>276</td>
<td>5.19</td>
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<td>5.19</td>
<td>276</td>
<td>5.19</td>
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<td>leela_s</td>
<td>112</td>
<td>386</td>
<td>4.42</td>
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<td>4.40</td>
<td>386</td>
<td>4.41</td>
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<tr>
<td>exchange2_s</td>
<td>112</td>
<td>213</td>
<td>13.8</td>
<td>214</td>
<td>13.8</td>
<td>213</td>
<td>13.8</td>
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</tr>
<tr>
<td>xz_s</td>
<td>112</td>
<td>265</td>
<td>23.3</td>
<td>264</td>
<td>23.4</td>
<td>261</td>
<td>23.7</td>
<td></td>
</tr>
</tbody>
</table>

### 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  
IRQ balance service was stop using "service irqbalance stop"  
Tuned-adm profile was set to Throughtput-Performance

### General Notes

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

### Platform Notes

BIOS Configuration:  
Intel Hyperthreading 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 Enabled  
Memory Patrol Scrubbing set to Disabled

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Platform Notes (Continued)

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 /cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bccc091c0f
running on DL560-Gen10 Tue Nov 7 14:48:07 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) Platinum 8176 CPU @ 2.10GHz
               4 "physical id"s (chips)
               112 "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 : 28
     siblings : 28
     physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
          28 29 30
     physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
          28 29 30
     physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
          28 29 30
     physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
          28 29 30

From lscpu:
  Architecture:       x86_64
  CPU op-mode(s):     32-bit, 64-bit
  Byte Order:         Little Endian
  CPU(s):             112
  On-line CPU(s) list: 0-111
  Thread(s) per core: 1
  Core(s) per socket: 28
  Socket(s):          4
  NUMA node(s):       4
  Vendor ID:          GenuineIntel
  CPU family:         6
  Model:              85
  Model name:         Intel(R) Xeon(R) Platinum 8176 CPU @ 2.10GHz
  Stepping:           4
  CPU MHz:            2100.000
  BogoMIPS:           4205.20
  Virtualization:     VT-x

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**Platform Notes (Continued)**

```
L1d cache:             32K  
L1i cache:             32K  
L2 cache:              1024K  
L3 cache:              39424K  
NUMA node0 CPU(s):     0-27  
NUMA node1 CPU(s):     28-55  
NUMA node2 CPU(s):     56-83  
NUMA node3 CPU(s):     84-111  

From /proc/cpuinfo cache data

cache size : 39424 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 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27  
node 0 size:  196266 MB  
node 0 free:  191554 MB  
node 1 cpus:  28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52  
53 54 55  
node 1 size:  196608 MB  
node 1 free:  192179 MB  
node 2 cpus:  56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80  
81 82 83  
node 2 size:  196608 MB  
node 2 free:  191917 MB  
node 3 cpus:  84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105  
106 107 108 109 110 111  
node 3 size:  196607 MB  
node 3 free:  192137 MB  

node distances:

node 0  1  2  3  
0:  10  21  21  21  
1:  21  10  21  21  
2:  21  21  10  21  
3:  21  21  21  10

From /proc/meminfo

MemTotal:       792066452 kB  
HugePages_Total:       0  
Hugepagesize:       2048 kB

From /etc/*release*/etc/*version*

os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.3 (Maipo)"
ID="rhel"
```

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<td>Test Date: Nov-2017</td>
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<tr>
<td></td>
<td>Hardware Availability: Oct-2017</td>
</tr>
<tr>
<td></td>
<td>Software Availability: Sep-2017</td>
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</table>

**Platform Notes (Continued)**

```
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 DL560-Gen10 3.10.0-514.el7.x86_64 #1 SMP Wed Oct 19 11:24:13 EDT 2016 x86_64
x86_64 x86_64 GNU/Linux
```

```
run-level 3 Nov 7 14:36
```

```
SPEC is set to: /cpu2017
  Filesystem  Type  Size  Used Avail Use% Mounted on
  /dev/sdb1   xfs  447G  32G  416G   8% /
```

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

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Software Availability: Sep-2017

Compiler Version Notes (Continued)

==============================================================================
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:
-W1,-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

C++ benchmarks:
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div

(Continued on next page)
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**Base Optimization Flags (Continued)**

C++ benchmarks (continued):
- `-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-revG.html](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-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-SKX-revG.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-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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