SPEC® CPU2017 Integer Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL560 Gen10
(2.00 GHz, Intel Xeon Platinum 8164)

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

**Hardware**

- **CPU Name:** Intel Xeon Platinum 8164
- **Max MHz.:** 3700
- **Nominal:** 2000
- **Enabled:** 104 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:** 35.75 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
- **Firmware:** HPE BIOS Version U34 released Oct-2017 (tested with U34 9/29/2017)
- **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

---

**SPECspeed2017_int_base = 8.93**

**SPECspeed2017_int_peak = Not Run**

---

**Threads**

- **600.perlbench_s** 104
- **602.gcc_s** 104
- **605.mcf_s** 104
- **620.omnetpp_s** 104
- **623.xalanchmk_s** 104
- **625.x264_s** 104
- **631.deepsjeng_s** 104
- **641.leela_s** 104
- **648.exchange2_s** 104
- **657.xz_s** 104

--- SPECspeed2017_int_base (8.93)

---

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

**Test Date:** Oct-2017
**Software:**

Red Hat Enterprise Linux Server release 7.3 (Maipo)
Kernel 3.10.0-514.el7.x86_64
C/C++: Version 18.0.0.128 of Intel C/C++
Compiler for Linux:
Fortran: Version 18.0.0.128 of Intel Fortran
SPEC CPU2017 Integer Speed Result
Copyright 2017-2018 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL560 Gen10
(2.00 GHz, Intel Xeon Platinum 8164)

SPECspeed2017_int_base = 8.93
SPECspeed2017_int_peak = Not Run

CPU2017 License: 3
Test Date: Oct-2017
Test Sponsor: HPE
Tested by: HPE
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>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Base</td>
<td></td>
<td></td>
<td>Peak</td>
<td></td>
</tr>
<tr>
<td>Benchmark</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600.perlbench_s</td>
<td>104</td>
<td>287</td>
<td>6.19</td>
<td>285</td>
<td>6.23</td>
<td>285</td>
<td>6.23</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>104</td>
<td>440</td>
<td>9.04</td>
<td>444</td>
<td>8.97</td>
<td>440</td>
<td>9.06</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>104</td>
<td>432</td>
<td>10.9</td>
<td>434</td>
<td>10.9</td>
<td>434</td>
<td>10.9</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>104</td>
<td>226</td>
<td>7.22</td>
<td>224</td>
<td>7.29</td>
<td>226</td>
<td>7.32</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>104</td>
<td>151</td>
<td>9.41</td>
<td>150</td>
<td>9.42</td>
<td>151</td>
<td>9.40</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>104</td>
<td>153</td>
<td>11.6</td>
<td>153</td>
<td>11.5</td>
<td>153</td>
<td>11.5</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>104</td>
<td>282</td>
<td>5.08</td>
<td>282</td>
<td>5.07</td>
<td>282</td>
<td>5.08</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>104</td>
<td>397</td>
<td>4.30</td>
<td>397</td>
<td>4.30</td>
<td>397</td>
<td>4.30</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>104</td>
<td>219</td>
<td>13.4</td>
<td>219</td>
<td>13.4</td>
<td>220</td>
<td>13.4</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>104</td>
<td>268</td>
<td>23.1</td>
<td>271</td>
<td>22.8</td>
<td>268</td>
<td>23.1</td>
</tr>
</tbody>
</table>

SPECspeed2017_int_base = 8.93
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
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

(Continued on next page)
SPEC CPU2017 Integer Speed Result

Hewlett Packard Enterprise

ProLiant DL560 Gen10

(2.00 GHz, Intel Xeon Platinum 8164)

SPECspeed2017_int_base = 8.93

SPECspeed2017_int_peak = Not Run

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

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

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 96c45e4568ad54c135fd618b0c091c0f
running on DL560-Gen10 Tue Oct 31 10:53:15 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 8164 CPU @ 2.00GHz
4 "physical id"s (chips)
104 "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 : 26
siblings : 26
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28 29
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28 29
physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28 29
physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 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): 104
On-line CPU(s) list: 0-103
Thread(s) per core: 1
Core(s) per socket: 26
Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8164 CPU @ 2.00GHz
Stepping: 4
CPU MHz: 2000.000
BogoMIPS: 4004.79
Virtualization: VT-x

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL560 Gen10
(2.00 GHz, Intel Xeon Platinum 8164)

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

SPECspeed2017_int_base = 8.93
SPECspeed2017_int_peak = Not Run

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

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

Platform Notes (Continued)

L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0-25
NUMA node1 CPU(s): 26-51
NUMA node2 CPU(s): 52-77
NUMA node3 CPU(s): 78-103

/proc/cpuinfo cache data
cache size : 36608 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
node 0 size: 196266 MB
node 0 free: 191561 MB
node 1 cpus: 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51
node 1 size: 196608 MB
node 1 free: 191870 MB
node 2 cpus: 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77
node 2 size: 196608 MB
node 2 free: 192183 MB
node 3 cpus: 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103
node 3 size: 196607 MB
node 3 free: 192207 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: 792067508 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"

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL560 Gen10
(2.00 GHz, Intel Xeon Platinum 8164)

SPEC CPU2017 Integer Speed Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

SPECspeed2017_int_base = 8.93
SPECspeed2017_int_peak = Not Run

<table>
<thead>
<tr>
<th>CPU2017 License: 3</th>
<th>Test Date: Oct-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: HPE</td>
<td>Hardware Availability: Oct-2017</td>
</tr>
<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Sep-2017</td>
</tr>
</tbody>
</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 Oct 31 10:46

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.

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL560 Gen10
(2.00 GHz, Intel Xeon Platinum 8164)

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL560 Gen10
(2.00 GHz, Intel Xeon Platinum 8164)

SPECspeed2017_int_base = 8.93
SPECspeed2017_int_peak = Not Run

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

Test Date: Oct-2017
Hardware Availability: Oct-2017
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 -gopenmp -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)
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL560 Gen10  
(2.00 GHz, Intel Xeon Platinum 8164)

<table>
<thead>
<tr>
<th>SPEC CPU2017 Integer Speed Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_int_base = 8.93</td>
</tr>
<tr>
<td>SPECspeed2017_int_peak = Not Run</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CPU2017 License: 3</th>
<th>Test Date: Oct-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: HPE</td>
<td>Hardware Availability: Oct-2017</td>
</tr>
<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Sep-2017</td>
</tr>
</tbody>
</table>

**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-SKK-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-SKK-revG.xml

SPEC is a registered trademark of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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 2017-10-31 11:53:15-0400.
Originally published on 2017-12-12.