# SPEC® CPU2017 Integer Speed Result

## Specified System

**Hewlett Packard Enterprise**

**Synergy 660 Gen10**

(2.70 GHz, Intel Xeon Gold 5220S)

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

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### Test Results

<table>
<thead>
<tr>
<th>SPECattr</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_int_base</td>
<td>9.72</td>
</tr>
<tr>
<td>SPECspeed2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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### Hardware

- **CPU Name:** Intel Xeon Gold 5220S  
- **Max MHz.:** 3900  
- **Nominal:** 2700  
- **Enabled:** 72 cores, 4 chips  
- **Orderable:** 2, 4 chip(s)  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **Cache L2:** 1 MB I+D on chip per core  
- **Cache L3:** 24.75 MB I+D on chip per chip  
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R, running at 2666)  
- **Storage:** 1 x 480 GB SATA SSD, RAID 0  
- **Other:** None

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### Software

- **OS:** SUSE Linux Enterprise Server 15 (x86_64)  
- **Kernel:** 4.12.14-23-default  
- **Compiler:** C/C++: Version 19.0.2.187 of Intel C/C++ Compiler Build 20190117 for Linux; Fortran: Version 19.0.2.187 of Intel Fortran Compiler Build 20190117 for Linux  
- **Parallel:** Yes  
- **Firmware:** HPE BIOS Version I43 04/18/2019 released Apr-2019  
- **File System:** btrfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** Not Applicable  
- **Other:** jemalloc memory allocator V5.0.1

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### Test Details

- **Test Date:** Jul-2019  
- **Hardware Availability:** Apr-2019  
- **Software Availability:** Feb-2019

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### Benchmarks

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_int_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench</td>
<td>72</td>
<td>6.75</td>
</tr>
<tr>
<td>gcc</td>
<td>72</td>
<td>8.87</td>
</tr>
<tr>
<td>mcf</td>
<td>72</td>
<td>12.0</td>
</tr>
<tr>
<td>omnetpp</td>
<td>72</td>
<td>7.73</td>
</tr>
<tr>
<td>xalanchmk</td>
<td>72</td>
<td>12.2</td>
</tr>
<tr>
<td>x264</td>
<td>72</td>
<td>14.4</td>
</tr>
<tr>
<td>deepsjeng</td>
<td>72</td>
<td>5.28</td>
</tr>
<tr>
<td>leela</td>
<td>72</td>
<td>4.75</td>
</tr>
<tr>
<td>exchange2</td>
<td>72</td>
<td>14.0</td>
</tr>
<tr>
<td>xz</td>
<td>72</td>
<td>22.0</td>
</tr>
</tbody>
</table>

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**Note:** The SPECspeed2017_int_base result is 9.72, and it is not applicable for the SPECspeed2017_int_peak result.
SPEC CPU2017 Integer Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
Synergy 660 Gen10
(2.70 GHz, Intel Xeon Gold 5220S)

SPECspeed2017_int_base = 9.72
SPECspeed2017_int_peak = Not Run

CPU2017 License: 3
Test Sponsor: HPE
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Test Date: Jul-2019
Hardware Availability: Apr-2019
Software Availability: Feb-2019

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>600.perlbench_s</td>
<td>72</td>
<td>264</td>
<td>6.72</td>
<td>261</td>
<td>6.80</td>
<td>263</td>
<td>6.75</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>72</td>
<td>448</td>
<td>8.89</td>
<td>449</td>
<td>8.87</td>
<td>454</td>
<td>8.78</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>72</td>
<td>390</td>
<td>12.1</td>
<td>394</td>
<td>12.0</td>
<td>393</td>
<td>12.0</td>
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<tr>
<td>620.omnetpp_s</td>
<td>72</td>
<td>207</td>
<td>7.88</td>
<td>211</td>
<td>7.73</td>
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<td>7.72</td>
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<tr>
<td>623.xalancbmk_s</td>
<td>72</td>
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<td>12.2</td>
<td>117</td>
<td>12.1</td>
<td>116</td>
<td>12.2</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>72</td>
<td>123</td>
<td>14.4</td>
<td>123</td>
<td>14.4</td>
<td>123</td>
<td>14.4</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>72</td>
<td>271</td>
<td>5.29</td>
<td>272</td>
<td>5.28</td>
<td>272</td>
<td>5.28</td>
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<tr>
<td>641.leela_s</td>
<td>72</td>
<td>359</td>
<td>4.76</td>
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<td>4.75</td>
<td>359</td>
<td>4.75</td>
</tr>
<tr>
<td>648.exchange2_s</td>
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<td>210</td>
<td>14.0</td>
<td>210</td>
<td>14.0</td>
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<td>14.0</td>
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<tr>
<td>657.xz_s</td>
<td>72</td>
<td>280</td>
<td>22.1</td>
<td>285</td>
<td>21.7</td>
<td>280</td>
<td>22.0</td>
</tr>
</tbody>
</table>

SPECspeed2017_int_base = 9.72
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

General Notes

Environment variables set by runcpu before the start of the run:
    KMP_AFFINITY = "granularity=fine,compact"
    LD_LIBRARY_PATH = "/home/cpu2017_u2/lib/ia32:/home/cpu2017_u2/lib/intel64:
                    /home/cpu2017_u2/jemalloc5.0.1-32:/home/cpu2017_u2/jemalloc5.0.1-64"
    OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5
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

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

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SPECspeed2017_int_base = 9.72

CPU2017 License: 3
Test Date: Jul-2019
Test Sponsor: HPE
Hardware Availability: Apr-2019
Tested by: HPE
Software Availability: Feb-2019

General Notes (Continued)


Platform Notes

BIOS Configuration:
Hyper-Threading set to Disabled
Thermal Configuration set to Maximum Cooling
Memory Patrol Scrubbing set to Disabled
LLC Prefetch set to Enabled
LLC Dead Line Allocation set to Disabled
Enhanced Processor Performance set to Enabled
Workload Profile set to General Peak Frequency Compute
  Minimum Processor Idle Power Core C-State set to C1E State
  Energy/Performance Bias set to Balanced Power
Workload Profile set to Custom
Numa Group Size Optimization set to Flat
Sysinfo program /home/cpu2017_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on sy660-gen10 Tue Jul 2 15:32:38 2019

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 5220S CPU @ 2.70GHz
4 "physical id"s (chips)
  72 "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 : 18
siblings : 18
  physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
  physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
  physical 2: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
  physical 3: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

From lscpu:
Architecture:        x86_64
CPU op-mode(s):      32-bit, 64-bit
Byte Order:          Little Endian
CPU(s):              72
On-line CPU(s) list: 0-71
Thread(s) per core:  1
Core(s) per socket:  18
Socket(s):           4

(Continued on next page)
From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
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Platform Notes (Continued)

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:    791966300 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
  os-release:
    NAME="SLES"
    VERSION="15"
    VERSION_ID="15"
    PRETTY_NAME="SUSE Linux Enterprise Server 15"
    ID="sles"
    ID_LIKE="suse"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:15"

uname -a:
    Linux sy660-gen10 4.12.14-23-default #1 SMP Tue May 29 21:04:44 UTC 2018 (cd0437b)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown):          Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation, IBPB, IBRS_FW

run-level 3 Jul 2 15:32

SPEC is set to: /home/cpu2017_u2
  Filesystem  Type   Size  Used Avail Use% Mounted on
  /dev/sdb2   btrfs  445G  126G  320G   29%   /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 I43 04/18/2019
Memory:
    24x UNKNOWN NOT AVAILABLE

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Platform Notes (Continued)

24x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933, configured at 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)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
  641.leela_s(base)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
FC  648.exchange2_s(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64
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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-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-L/home/cpu2017_u2/je5.0.1-64/ -ljemalloc

C++ benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
-lqkmalloc

Fortran benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.html
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.xml
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.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 2019-07-02 16:32:37-0400.