SPEC® CPU2017 Integer Speed Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)
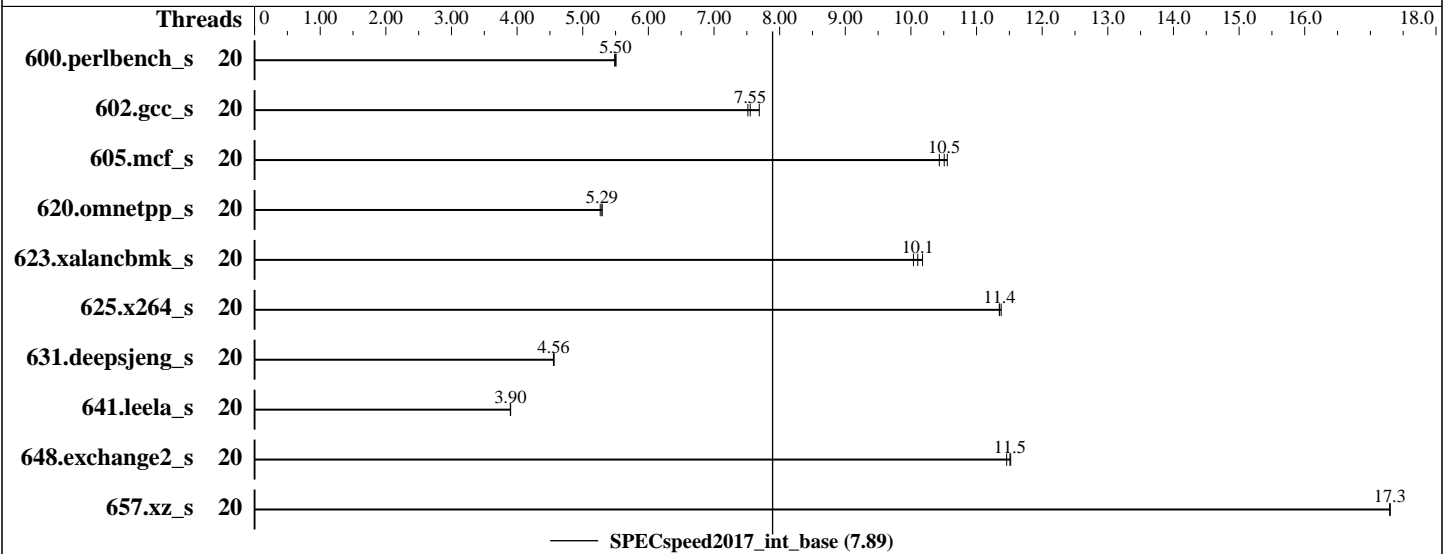
Synergy 480 Gen10
(2.20 GHz, Intel Xeon Silver 4210)

$SPECspeed2017\_int\_base =$ 7.89

$SPECspeed2017\_int\_peak =$ Not Run

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

Threads

- 600.perlbench_s 20 — 5.50
- 602.gcc_s 20 — 7.55
- 605.mcf_s 20 — 10.5
- 620.omnetpp_s 20 — 5.29
- 623.xalancbmk_s 20 — 10.1
- 625.x264_s 20 — 11.4
- 631.deepsjeng_s 20 — 4.56
- 641.leela_s 20 — 3.90
- 648.exchange2_s 20 — 11.5
- 657.xz_s 20 — 17.3

Scale: 0, 1.00, 2.00, 3.00, 4.00, 5.00, 6.00, 7.00, 8.00, 9.00, 10.0, 11.0, 12.0, 13.0, 14.0, 15.0, 16.0, 18.0

—— **SPECspeed2017_int_base (7.89)**

Hardware

CPU Name:	Intel Xeon Silver 4210
Max MHz.:	3200
Nominal:	2200
Enabled:	20 cores, 2 chips
Orderable:	1, 2 chip(s)
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	1 MB I+D on chip per core
L3:	13.75 MB I+D on chip per chip
Other:	None
Memory:	384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R, running at 2400)
Storage:	1 x 400 GB SAS SSD, RAID 0
Other:	None

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 I42 05/22/2019 released May-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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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	20	324	5.49	322	5.51	**323**	**5.50**							
602.gcc_s	20	518	7.69	530	7.52	**527**	**7.55**							
605.mcf_s	20	**449**	**10.5**	447	10.6	453	10.4							
620.omnetpp_s	20	310	5.27	308	5.29	**308**	**5.29**							
623.xalancbmk_s	20	**140**	**10.1**	139	10.2	141	10.0							
625.x264_s	20	155	11.3	155	11.4	**155**	**11.4**							
631.deepsjeng_s	20	**314**	**4.56**	314	4.56	315	4.55							
641.leela_s	20	**438**	**3.90**	437	3.90	438	3.90							
648.exchange2_s	20	255	11.5	257	11.5	**255**	**11.5**							
657.xz_s	20	**357**	**17.3**	357	17.3	357	17.3							
SPECspeed2017_int_base =		**7.89**												
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/je5.0.1-32:/home/cpu2017_u2/je5.0.1-64"
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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General Notes (Continued)

sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases

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 sy480g10-2 Mon Jul  8 12:33:51 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) Silver 4210 CPU @ 2.20GHz
       2  "physical id"s (chips)
       20 "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 : 10
       siblings  : 10
       physical 0: cores 0 1 2 3 4 8 9 10 11 12
       physical 1: cores 0 1 2 3 4 8 9 10 11 12

 From lscpu:
      Architecture:        x86_64
      CPU op-mode(s):      32-bit, 64-bit
      Byte Order:          Little Endian
      CPU(s):              20
      On-line CPU(s) list: 0-19
      Thread(s) per core:  1
      Core(s) per socket:  10
      Socket(s):           2
      NUMA node(s):        2
      Vendor ID:           GenuineIntel
```

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Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

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Platform Notes (Continued)

```
        CPU family:          6
        Model:               85
        Model name:          Intel(R) Xeon(R) Silver 4210 CPU @ 2.20GHz
        Stepping:            6
        CPU MHz:             2200.000
        BogoMIPS:            4400.00
        Virtualization:      VT-x
        L1d cache:           32K
        L1i cache:           32K
        L2 cache:            1024K
        L3 cache:            14080K
        NUMA node0 CPU(s):   0-9
        NUMA node1 CPU(s):   10-19
        Flags:               fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
    pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
    lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
    aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
    sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt
    tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault
    epb cat_l3 cdp_l3 invpcid_single intel_ppin mba tpr_shadow vnmi flexpriority ept
    vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a
    avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
    xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
    ibpb ibrs stibp dtherm ida arat pln pts pku ospke avx512_vnni arch_capabilities ssbd

 /proc/cpuinfo cache data
   cache size : 14080 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 6 7 8 9
   node 0 size: 193048 MB
   node 0 free: 192505 MB
   node 1 cpus: 10 11 12 13 14 15 16 17 18 19
   node 1 size: 193307 MB
   node 1 free: 193042 MB
   node distances:
   node   0   1
     0:  10  21
     1:  21  10

 From /proc/meminfo
   MemTotal:       395628828 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB
```

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Platform Notes (Continued)

```
  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 sy480g10-2 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 8 12:31

  SPEC is set to: /home/cpu2017_u2
     Filesystem      Type    Size   Used Avail Use% Mounted on
     /dev/sdb2       btrfs  371G   93G  277G  26% /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 I42 05/22/2019
     Memory:
      24x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2933, configured at 2400

  (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
```

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Compiler Version Notes (Continued)

```
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`

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`

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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

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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