# SPEC® CPU2017 Integer Speed Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

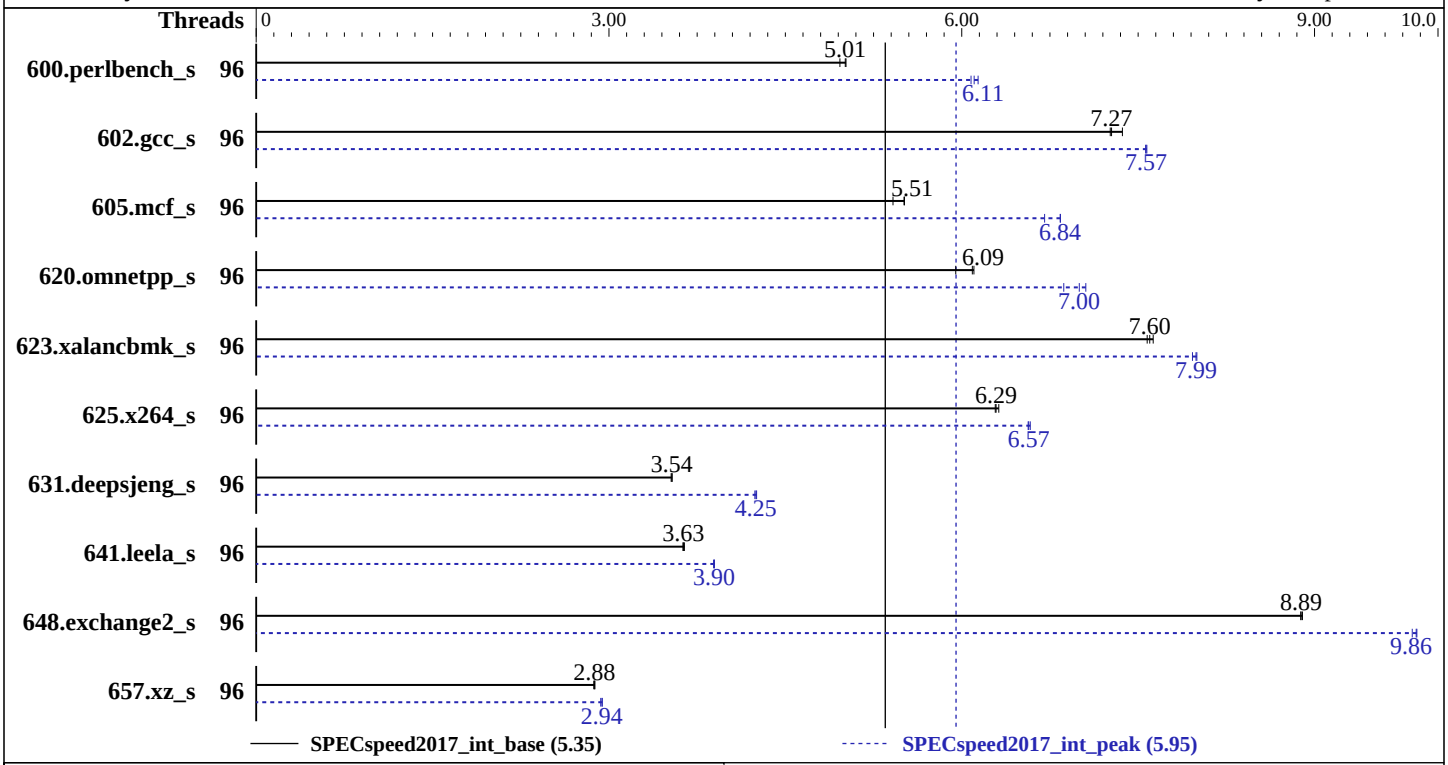
ProLiant DL580 Gen9
(2.20 GHz, Intel Xeon E7-8890 v4)

SPECspeed2017_int_base = 5.35

SPECspeed2017_int_peak = 5.95

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

**Test Date:** Dec-2016
**Hardware Availability:** Aug-2016
**Software Availability:** Sep-2016




## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon E7-8890 v4 |
| Max MHz.: | 3400 |
| Nominal: | 2200 |
| Enabled: | 96 cores, 4 chips |
| Orderable: | 2,4 chips |
| Cache L1: | 32 KB I + 32 KB D on chip per core |
| L2: | 256 KB I+D on chip per core |
| L3: | 60 MB I+D on chip per chip |
| Other: | None |
| Memory: | 512 GB (32 x 16 GB 2Rx4 PC4-2400T-R, running at 1600) |
| Storage: | 1 x 800 GB NVMe PCIe SSD, RAID 0 |
| Other: | None |

## Software

| | |
|---|---|
| OS: | SUSE Linux Enterprise Server 12 (x86_64) SP1, Kernel 3.12.49-11-default |
| Compiler: | C/C++: Version 17.0.0.098 of Intel C/C++ Compiler for Linux; Fortran: Version 17.0.0.098 of Intel Fortran Compiler for Linux |
| Parallel: | No |
| Firmware: | U17 v2.30 08/06/2016 |
| File System: | xfs |
| System State: | Run level 3 (multi-user) |
| Base Pointers: | 64-bit |
| Peak Pointers: | 32/64-bit |
| Other: | Microquill SmartHeap V10.2 |

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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 | 96 | 354 | 5.02 | 358 | 4.96 | **354** | **5.01** | 96 | 289 | 6.14 | **291** | **6.11** | 292 | 6.08 |
| 602.gcc_s | 96 | 541 | 7.37 | 548 | 7.26 | **547** | **7.27** | 96 | **526** | **7.57** | 526 | 7.57 | 526 | 7.56 |
| 605.mcf_s | 96 | 872 | 5.42 | 856 | 5.51 | **857** | **5.51** | 96 | 704 | 6.70 | **690** | **6.84** | 690 | 6.84 |
| 620.omnetpp_s | 96 | **268** | **6.09** | 274 | 5.95 | 267 | 6.10 | 96 | 237 | 6.87 | **233** | **7.00** | 231 | 7.06 |
| 623.xalancbmk_s | 96 | 186 | 7.63 | **186** | **7.60** | 187 | 7.58 | 96 | 177 | 8.00 | 178 | 7.96 | **177** | **7.99** |
| 625.x264_s | 96 | **280** | **6.29** | 281 | 6.28 | 279 | 6.32 | 96 | **269** | **6.57** | 268 | 6.58 | 269 | 6.56 |
| 631.deepsjeng_s | 96 | **405** | **3.54** | 405 | 3.54 | 406 | 3.53 | 96 | 338 | 4.24 | 337 | 4.26 | **337** | **4.25** |
| 641.leela_s | 96 | **470** | **3.63** | 470 | 3.63 | 469 | 3.64 | 96 | 439 | 3.89 | **438** | **3.90** | 438 | 3.90 |
| 648.exchange2_s | 96 | 331 | 8.88 | **331** | **8.89** | 330 | 8.90 | 96 | 299 | 9.83 | 298 | 9.87 | **298** | **9.86** |
| 657.xz_s | 96 | 2154 | 2.87 | **2148** | **2.88** | 2146 | 2.88 | 96 | 2101 | 2.94 | 2110 | 2.93 | **2102** | **2.94** |

**SPECspeed2017_int_base = 5.35**

**SPECspeed2017_int_peak = 5.95**

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
```

## General Notes

```
Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017_rc4_930/lib/ia32:/home/cpu2017_rc4_930/lib/intel64:/home/cpu2017_rc4_930/sh10.2"
OMP_STACKSIZE = "192M"

 Binaries compiled on a system with 1x Intel Core i7-4790K CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.2
```

## Platform Notes

```
BIOS Configuration:
  HP Power Profile set to Balanced Power and Performance
  QPI Snoop Configuration set to Home Snoop
  Collaborative Power Control set to Disabled
  Thermal Configuration set to Maximum Cooling
  Processor Power and Utilization Monitoring set to Disabled
  Intel Hyper Threading set to Disabled
  Memory Refresh Rate set to 1x Refresh
Sysinfo program /home/cpu2017_rc4_930/Docs/sysinfo
Rev: r5007 of 2016-11-15 fc8dc82f217779bedfed4d694d580ba9
running on linux-vi0i Wed Dec  7 10:12:28 2016
```

**(Continued on next page)**

## Platform Notes (Continued)

```
This section contains SUT (System Under Test) info as seen by some common
utilities.
For more information on this section, see
http://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo
   model name : Intel(R) Xeon(R) CPU E7-8890 v4 @ 2.20GHz
      4 "physical id"s (chips)
      96 "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 : 24
      siblings  : 24
      physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
   cache size : 61440 KB

The view from numactl --hardware follows.  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 48 49 50 51 52 53 54 55 56 57 58 59
  node 0 size: 129079 MB
  node 0 free: 124322 MB
  node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23 60 61 62 63 64 65 66 67 68 69
  70 71
  node 1 size: 129277 MB
  node 1 free: 126982 MB
  node 2 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 72 73 74 75 76 77 78 79 80 81
  82 83
  node 2 size: 129277 MB
  node 2 free: 126789 MB
  node 3 cpus: 36 37 38 39 40 41 42 43 44 45 46 47 84 85 86 87 88 89 90 91 92 93
  94 95
  node 3 size: 129275 MB
  node 3 free: 120551 MB
  node distances:
  node   0   1   2   3
    0:  10  21  21  21
    1:  21  10  21  21
```

**(Continued on next page)**

## Platform Notes (Continued)

```
     2:  21  21  10  21
     3:  21  21  21  10

  From /proc/meminfo
     MemTotal:       529314968 kB
     HugePages_Total:       0
     Hugepagesize:       2048 kB

  From /etc/*release* /etc/*version*
     SuSE-release:
        SUSE Linux Enterprise Server 12 (x86_64)
        VERSION = 12
        PATCHLEVEL = 1
        # This file is deprecated and will be removed in a future service pack or
        release.
        # Please check /etc/os-release for details about this release.
     os-release:
        NAME="SLES"
        VERSION="12-SP1"
        VERSION_ID="12.1"
        PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"
        ID="sles"
        ANSI_COLOR="0;32"
        CPE_NAME="cpe:/o:suse:sles:12:sp1"

  uname -a:
     Linux linux-vi0i 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
     (8d714a0) x86_64 x86_64 x86_64 GNU/Linux

  run-level 3 Dec 6 09:58

  SPEC is set to: /home/cpu2017_rc4_930
     Filesystem     Type  Size  Used Avail Use% Mounted on
     /dev/nvme0n1p4 xfs   703G  274G  429G  39% /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 U17 08/06/2016
    Memory:
     64x UNKNOWN NOT AVAILABLE
     32x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2400 MHz, configured at 1600 MHz

  (End of data from sysinfo program)
   Regarding the sysinfo display about the memory installed, the correct amount of
```

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## Platform Notes (Continued)

```
memory is 512 GB and the dmidecode description should have one line reading as:
32x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2400 MHz, configured at 1600 MHz
```

## Compiler Version Notes

```
==============================================================================
CC   600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base, peak)
     625.x264_s(base, peak) 657.xz_s(base, peak)
------------------------------------------------------------------------------
icc (ICC) 17.0.0 20160721
Copyright (C) 1985-2016 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
CXXC 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak)
     631.deepsjeng_s(base, peak) 641.leela_s(base, peak)
------------------------------------------------------------------------------
icpc (ICC) 17.0.0 20160721
Copyright (C) 1985-2016 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
FC   648.exchange2_s(base, peak)
------------------------------------------------------------------------------
ifort (IFORT) 17.0.0 20160721
Copyright (C) 1985-2016 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`

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## Base Portability Flags (Continued)

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:
`-qopt-prefetch -qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP`

C++ benchmarks:
`-Wl,-z,muldefs -qopt-prefetch -qopt-mem-layout-trans=3`
`-DSPEC_SUPPRESS_OPENMP -L/sh10.2 -lsmartheap64`

Fortran benchmarks:
`-DSPEC_SUPPRESS_OPENMP -qopt-prefetch -qopt-mem-layout-trans=3`
`-nostandard-realloc-lhs`

## Peak Compiler Invocation

C benchmarks:
`icc -m64 -std=c11`

C++ benchmarks:
`icpc -m64`

Fortran benchmarks:
`ifort -m64`

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

600.perlbench_s: `-prof-gen`(pass 1) `-prof-use`(pass 2) `-O2 -xCORE-AVX2 -auto-p32 -ipo -qopt-prefetch -O3 -no-prec-div -qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP`

602.gcc_s: `Same as 600.perlbench_s`

605.mcf_s: `-prof-gen`(pass 1) `-prof-use`(pass 2) `-ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP`

625.x264_s: `Same as 600.perlbench_s`

657.xz_s: `Same as 600.perlbench_s`

C++ benchmarks:

620.omnetpp_s: `-Wl,-z,muldefs -prof-gen`(pass 1) `-prof-use`(pass 2) `-ipo -xCORE-AVX2 -O3 -no-prec-div -auto-p32 -qopt-prefetch -qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -L/sh10.2 -lsmartheap64`

623.xalancbmk_s: `Same as 620.omnetpp_s`

631.deepsjeng_s: `-Wl,-z,muldefs -prof-gen`(pass 1) `-prof-use`(pass 2) `-ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -L/sh10.2 -lsmartheap64`

641.leela_s: `Same as 620.omnetpp_s`

Fortran benchmarks:
`-prof-gen`(pass 1) `-prof-use`(pass 2) `-DSPEC_SUPPRESS_OPENMP -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -qopt-mem-layout-trans=3 -nostandard-realloc-lhs`

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic17.0-official-linux64-revD.html
http://www.spec.org/cpu2017/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic17.0-official-linux64-revD.xml
http://www.spec.org/cpu2017/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml

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