### SPEC CPU®2017 Integer Rate Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL380 Gen10  
(2.20 GHz, Intel Xeon Silver 4114)

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**CPU2017 License:** 3  
**Test Date:** Oct-2017  
**Hardware Availability:** Oct-2017

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

| **Copies** | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |
|------------|---|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 500.perlbench_r | 40 |   |    |    |    |    | 71.8 |    |    |    | 71.8 |    |    |    |    |    |    |    |    |    |    |
| 502.gcc_r | 40 |    |    |    |    |    | 84.7 |    |    |    | 84.7 |    |    |    |    |    |    |    |    |    |
| 505.mcf_r | 40 |    |    |    |    |    | 62.6 | 118 |    |    | 94.7 |    |    |    |    |    |    |    |    |
| 520.omnetpp_r | 40 |    |    |    |    |    | 62.6 | 118 |    |    | 94.7 |    |    |    |    |    |    |    |
| 523.xalancbmk_r | 40 |    |    |    |    |    | 94.7 |    |    |    | 94.7 |    |    |    |    |    |    |    |    |
| 525.x264_r | 40 |    |    |    |    |    | 80.7 | 179 |    |    | 179 |    |    |    |    |    |    |    |
| 531.deepsjeng_r | 40 |    |    |    |    |    | 74.1 |    |    |    | 74.1 |    |    |    |    |    |    |    |    |
| 541.leela_r | 40 |    |    |    |    |    | 64.6 | 175 |    |    | 175 |    |    |    |    |    |    |    |
| 548.exchange2_r | 40 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 557.xz_r | 40 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |

### Hardware

- **CPU Name:** Intel Xeon Silver 4114  
- **Max MHz:** 3000  
- **Nominal:** 2200  
- **Enabled:** 20 cores, 2 chips, 2 threads/core  
- **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:** 192 GB (24 x 8 GB 2Rx8 PC4-2666V-R, running at 2400)  
- **Storage:** 1 x 960 GB SATA SSD, RAID 0  
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 12 (x86_64) SP2  
- **Kernel:** 4.4.21-69-default  
- **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:** No  
- **Firmware:** HPE BIOS Version U30 released Oct-2017 (tested with U30 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; 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  
- **Power Management:** --
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
<td>perfbench_r</td>
<td>40</td>
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<td>mcf_r</td>
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<td>549</td>
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<td>547</td>
<td>118</td>
<td>557</td>
<td>116</td>
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<td>omnetpp_r</td>
<td>40</td>
<td>838</td>
<td>62.6</td>
<td>832</td>
<td>63.1</td>
<td>857</td>
<td>61.3</td>
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<td>447</td>
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<tr>
<td>x264_r</td>
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<td>392</td>
<td>179</td>
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<td>179</td>
<td>391</td>
<td>179</td>
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<tr>
<td>deepsjeng_r</td>
<td>40</td>
<td>563</td>
<td>81.4</td>
<td>568</td>
<td>80.7</td>
<td>568</td>
<td>80.7</td>
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<tr>
<td>leela_r</td>
<td>40</td>
<td>894</td>
<td>74.1</td>
<td>892</td>
<td>74.3</td>
<td>895</td>
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<tr>
<td>exchange2_r</td>
<td>40</td>
<td>599</td>
<td>175</td>
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<tr>
<td>xz_r</td>
<td>40</td>
<td>669</td>
<td>64.6</td>
<td>669</td>
<td>64.6</td>
<td>670</td>
<td>64.5</td>
</tr>
</tbody>
</table>

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
	sync; echo 3> /proc/sys/vm/drop_caches
runspec command invoked through numactl i.e.:
	numactl --interleave=all runspec <etc>
irqbalance disabled with "service irqbalance stop"
tuned profile set with "tuned-adm profile throughput-performance"
VM Dirty ratio was set to 40 using "echo 40 > /proc/sys/vm/dirty_ratio"
Numa balancing was disabled using "echo 0 > /proc/sys/kernel/numa_balancing"

General Notes

Environment variables set by runcpu before the start of the run:
   LD_LIBRARY_PATH = "/home/spec2017/lib/ia32:/home/spec2017/lib/intel64:/home/spec2017/je5.0.1-32"
   LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/spec2017/je5.0.1-64"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.4
# SPEC CPU®2017 Integer Rate Result

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)

**ProLiant DL380 Gen10**
(2.20 GHz, Intel Xeon Silver 4114)

## Platform Notes

**BIOS Configuration:**
- Thermal Configuration set to Maximum Cooling
- Memory Patrol Scrubbing set to Disabled
- LLC Prefetcher set to Enabled
- LLC Dead Line Allocation set to Disabled
- Workload Profile set to Throughput Frequency Compute
- Minimum Processor Idle Power Core C-State set to C1E State
- Workload Profile set to Custom
- Sub-NUMA Clustering set to Disabled

**Sysinfo program /home/spec2017/bin/sysinfo**
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on sys1-dl380-lic-srvr Thu Oct 26 00:41:43 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) Silver 4114 CPU @ 2.20GHz
- 2 "physical id"s (chips)
- 40 "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 : 20
  - 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): 40
- On-line CPU(s) list: 0-39
- Thread(s) per core: 2
- Core(s) per socket: 10
- Socket(s): 2
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Silver 4114 CPU @ 2.20GHz
- Stepping: 4
- CPU MHz: 2194.876
- BogoMIPS: 4389.75
- Virtualization: VT-x

---

**SPECrate®2017_int_base = 93.6**

**SPECrate®2017_int_peak = Not Run**

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**Platform Notes (Continued)**

- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 14080K
- NUMA node0 CPU(s): 0-9,20-29
- NUMA node1 CPU(s): 10-19,30-39
- Flags: fpu vme de pse tsc msr pae mce 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 aperfmpref eagerfpu 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 ida pln pts dtherm intel_pt tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaveopt xsaves xgetbv1 cqm_llc cqm_ordc

```
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 20 21 22 23 24 25 26 27 28 29
   node 0 size: 96275 MB
   node 0 free: 94997 MB
   node 1 cpus: 10 11 12 13 14 15 16 17 18 19 30 31 32 33 34 35 36 37 38 39
   node 1 size: 96648 MB
   node 1 free: 95395 MB
   node distances:
     node   0   1
     0: 10 21
     1: 21 10
```

```
From /proc/meminfo
   MemTotal: 197554156 kB
   HugePages_Total: 0
   Hugepagesize: 2048 kB
```

```
/usr/bin/lsb_release -d
   SUSE Linux Enterprise Server 12 SP2
```

From /etc/*release*/ /etc/*version*
   SuSE-release:
     SUSE Linux Enterprise Server 12 (x86_64)
     VERSION = 12
     PATCHLEVEL = 2
     # This file is deprecated and will be removed in a future service pack or release.

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**Platform Notes (Continued)**

```
# Please check /etc/os-release for details about this release.
os-release:
  NAME="SLES"
  VERSION="12-SP2"
  VERSION_ID="12.2"
  PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
  ID="sles"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
(9464f67) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Oct 25 10:01

SPEC is set to: /home/spec2017
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sdb4      xfs   400G   15G  386G   4% /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 U30 09/29/2017
- Memory: 24x UNKNOWN NOT AVAILABLE 8 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

**Compiler Version Notes**

```
-- C --
| 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) |
| 525.x264_r(base) 557.xz_r(base) |

-- icc (ICC) 18.0.0 20170811 --
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

-- C++ --
| 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) |
| 541.leela_r(base) |

-- icpc (ICC) 18.0.0 20170811 --
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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### Compiler Version Notes (Continued)

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**Fortran | 548.exchange2_r(base)**

ifort (IFORT) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

---

### Base Compiler Invocation

**C benchmarks:**

```diff
c -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc
```

**C++ benchmarks:**

```diff
c++ -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
```

**Fortran benchmarks:**

```diff
ifort
```

### Base Portability Flags

- `500.perlbench_r`: `-DSPEC_LP64 -DSPEC_LINUX_X64`
- `502.gcc_r`: `-DSPEC_LP64`
- `505.mcf_r`: `-DSPEC_LP64`
- `520.omnetpp_r`: `-DSPEC_LP64`
- `523.xalancbmk_r`: `-DSPEC_LP64 -DSPEC_LINUX`
- `525.x264_r`: `-DSPEC_LP64`
- `531.deepsjeng_r`: `-DSPEC_LP64`
- `541.leela_r`: `-DSPEC_LP64`
- `548.exchange2_r`: `-DSPEC_LP64`
- `557.xz_r`: `-DSPEC_LP64`

### Base Optimization Flags

**C benchmarks:**

```bash
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc
```

**C++ benchmarks:**

```bash
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
```

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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:
- `-W1,-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-revD.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-revD.xml

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Tested with SPEC CPU®2017 v1.0.2 on 2017-10-26 01:41:42-0400.
Originally published on 2017-11-14.