## SPEC® CPU2017 Integer Rate Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL560 Gen10  
(2.10 GHz, Intel Xeon Platinum 8170)

**SPECrate2017_int_base = 457**  
**SPECrate2017_int_peak = Not Run**

### Hardware

- **CPU Name:** Intel Xeon Platinum 8170  
- **Max MHz.:** 3700  
- **Nominal:** 2100  
- **Enabled:** 104 cores, 4 chips, 2 threads/core  
- **Orderable:** 1, 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:** 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:** No  
- **Firmware:** HPE BIOS Version U34 09/29/2017 released Oct-2017  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** 64-bit  
- **Other:** None

### Test Information

- **CPU2017 License:** 3  
- **Test Date:** Jan-2018  
- **Hardware Availability:** Oct-2017  
- **Test Sponsor:** HPE  
- **Tested by:** HPE  
- **Software Availability:** Sep-2017

### Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Scores</th>
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<tbody>
<tr>
<td>perlbench_r</td>
<td>208</td>
<td>450</td>
</tr>
<tr>
<td>gcc_r</td>
<td>208</td>
<td>451</td>
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<tr>
<td>mcf_r</td>
<td>208</td>
<td>450</td>
</tr>
<tr>
<td>omnetpp_r</td>
<td>208</td>
<td>454</td>
</tr>
<tr>
<td>xalancbmk_r</td>
<td>208</td>
<td>450</td>
</tr>
<tr>
<td>x264_r</td>
<td>208</td>
<td>450</td>
</tr>
<tr>
<td>deepsjeng_r</td>
<td>208</td>
<td>446</td>
</tr>
<tr>
<td>leela_r</td>
<td>208</td>
<td>418</td>
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<tr>
<td>exchange2_r</td>
<td>208</td>
<td>416</td>
</tr>
<tr>
<td>xz_r</td>
<td>208</td>
<td>415</td>
</tr>
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</table>

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**SPECrate2017_int_base (457)**
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### SPECrate2017_int_base = 457

### SPECrate2017_int_peak = Not Run

#### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tbody>
<tr>
<td>500.perlbench_r</td>
<td>208</td>
<td>861</td>
<td>384</td>
<td>870</td>
<td>381</td>
<td>864</td>
<td>383</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>208</td>
<td>802</td>
<td>367</td>
<td>941</td>
<td>313</td>
<td>929</td>
<td>317</td>
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<tr>
<td>505.mcf_r</td>
<td>208</td>
<td>615</td>
<td>547</td>
<td>652</td>
<td>516</td>
<td>661</td>
<td>508</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>208</td>
<td>955</td>
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<td>523.xalancbmk_r</td>
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<td>525.x264_r</td>
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<td>531.deepsjeng_r</td>
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<td>535</td>
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<td>541.leela_r</td>
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<td>825</td>
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<tr>
<td>548.exchange2_r</td>
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<td>565</td>
<td>965</td>
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<td>962</td>
</tr>
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<td>557.xz_r</td>
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<td>762</td>
<td>295</td>
<td>761</td>
<td>295</td>
<td>761</td>
<td>295</td>
</tr>
</tbody>
</table>

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### 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
```

runcpu command invoked through numactl i.e.:

```
    numactl --interleave=all runcpu <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/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/jc5.0.1-32"
```

```
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017/jc5.0.1-64"
```

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.4

No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

(Continued on next page)
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SPECrate2017_int_peak = Not Run
SPECrate2017_int_base = 457

CPU2017 License: 3
Test Sponsor: HPE
Test Date: Jan-2018
Tested by: HPE
Hardware Availability: Oct-2017
Software Availability: Sep-2017

General Notes (Continued)

is mitigated in the system as tested and documented.
No: 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.
No: 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.
This benchmark result is intended to provide perspective on
past performance using the historical hardware and/or
software described on this result page.

The system as described on this result page was formerly
generally available. At the time of this publication, it may
not be shipping, and/or may not be supported, and/or may fail
to meet other tests of General Availability described in the

This measured result may not be representative of the result
that would be measured were this benchmark run with hardware
and software available as of the publication date.

Platform Notes

BIOS Configuration:
Thermal Configuration set to Maximum Cooling
Memory Patrol Scrubbing set to Disabled
LLC Prefetch set to Enabled
LLC Dead Line Allocation set to Disabled
Stale A to S set to Enabled
Workload Profile set to General Throughput Compute
Minimum Processor Idle Power Core C-State set to C1E State
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on rhel-2gb Tue Jan 9 13:54:22 2018

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 8170 CPU @ 2.10GHz
4 "physical id"s (chips)
208 "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 : 52

(Continued on next page)
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Platform Notes (Continued)

physical 0: cores 0 1 2 3 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 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 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 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): 208
On-line CPU(s) list: 0-207
Thread(s) per core: 2
Core(s) per socket: 26
Socket(s): 4
NUMA node(s): 8
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8170 CPU @ 2.10GHz
Stepping: 4
CPU MHz: 2100.000
BogoMIPS: 4205.60
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0-12,104-116
NUMA node1 CPU(s): 13-25,117-129
NUMA node2 CPU(s): 26-38,130-142
NUMA node3 CPU(s): 39-51,143-155
NUMA node4 CPU(s): 52-64,156-168
NUMA node5 CPU(s): 65-77,169-181
NUMA node6 CPU(s): 78-90,182-194
NUMA node7 CPU(s): 91-103,195-207

/proc/cpuinfo cache data
  cache size : 36608 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

From /proc/meminfo
  MemTotal: 792265736 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB
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**Platform Notes (Continued)**

From /etc/*release* /etc/*version*

```
os-release:
  NAME="Red Hat Enterprise Linux Server"
  VERSION="7.3 (Maipo)"
  ID="rhel"
  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 rhel-2gb 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 Jan 9 13:50

SPEC is set to: /home/cpu2017
  Filesystem     Type  Size  Used Avail Use% Mounted on
  /dev/sda4      xfs   442G   79G  364G  18% /
```

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 SMI BIOS" 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  500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base)
     557.xz_r(base)
==============================================================================
```

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

```
==============================================================================
CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
```

(Continued on next page)
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Software Availability: Sep-2017

Compiler Version Notes (Continued)

541.leela_r(base)

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

FC 548.exchange2_r(base)

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

Base Compiler Invocation

C benchmarks:
iccc

C++ benchmarks:
icpc

Fortran benchmarks:
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:
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div

(Continued on next page)
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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

C++ benchmarks:
- `-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div` -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-SKX-revH.html](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revH.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-revH.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revH.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 v1.0.2 on 2018-01-09 14:54:21-0500.