SPEC CPU®2017 Integer Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL20 Gen10
(3.60 GHz, Intel Xeon E-2234)

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

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>10.4</th>
</tr>
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<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>Not Run</td>
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| SPECspeed®2017_int_base | 10.4 |

HPE

Test Date: Oct-2019
Hardware Availability: Nov-2019
Software Availability: Oct-2019

Threads

<table>
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<tr>
<th>Benchmark</th>
<th>Threads</th>
</tr>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>4</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>4</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>4</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>4</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>4</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>4</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>4</td>
</tr>
<tr>
<td>641.leea_s</td>
<td>4</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>4</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>4</td>
</tr>
</tbody>
</table>

SPECspeed®2017_int_base (10.4)

Hardware

CPU Name: Intel Xeon E-2234
Max MHz: 4800
Nominal: 3600
Enabled: 4 cores, 1 chip
Orderable: 1 chip(s)
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 256 KB I+D on chip per core
L3: 8 MB I+D on chip per chip
Other: None
Memory: 64 GB (4 x 16 GB 2Rx8 PC4-2666V-U)
Storage: 1 x 400 GB SATA SSD, RAID 0
Other: None

Software

OS: SUSE Linux Enterprise Server 15 (x86_64) SP1 4.12.14-195-default
Compiler: C/C++: Version 19.0.1.144 of Intel C/C++ Compiler Build 20181018 for Linux;
Fortran: Version 19.0.1.144 of Intel Fortran Compiler Build 20181018 for Linux
Parallel: Yes
Firmware: HPE BIOS Version U43 09/05/2019 released Sep-2019
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: jemalloc memory allocator v5.0.1
Power Management: --
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Results Table

<table>
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<tr>
<th>Benchmark</th>
<th>Base Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Peak Threads</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench_s</td>
<td>4</td>
<td>237</td>
<td>7.48</td>
<td>237</td>
<td>7.48</td>
<td>236</td>
</tr>
<tr>
<td>gcc_s</td>
<td>4</td>
<td>336</td>
<td>11.8</td>
<td>336</td>
<td>11.9</td>
<td>336</td>
</tr>
<tr>
<td>mcf_s</td>
<td>4</td>
<td>300</td>
<td>15.7</td>
<td>300</td>
<td>15.7</td>
<td>298</td>
</tr>
<tr>
<td>omnetpp_s</td>
<td>4</td>
<td>239</td>
<td>6.82</td>
<td>239</td>
<td>6.82</td>
<td>240</td>
</tr>
<tr>
<td>xalancbmk_s</td>
<td>4</td>
<td>91.5</td>
<td>15.5</td>
<td>92.0</td>
<td>15.4</td>
<td>91.3</td>
</tr>
<tr>
<td>x264_s</td>
<td>4</td>
<td>102</td>
<td>17.4</td>
<td>102</td>
<td>17.4</td>
<td>102</td>
</tr>
<tr>
<td>deepsjeng_s</td>
<td>4</td>
<td>224</td>
<td>6.39</td>
<td>224</td>
<td>6.39</td>
<td>224</td>
</tr>
<tr>
<td>leela_s</td>
<td>4</td>
<td>296</td>
<td>5.77</td>
<td>296</td>
<td>5.77</td>
<td>296</td>
</tr>
<tr>
<td>x2_amk_s</td>
<td>4</td>
<td>171</td>
<td>17.2</td>
<td>172</td>
<td>17.1</td>
<td>170</td>
</tr>
<tr>
<td>xz_s</td>
<td>4</td>
<td>691</td>
<td>8.95</td>
<td>691</td>
<td>8.95</td>
<td>691</td>
</tr>
</tbody>
</table>

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/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"
OMP_STACKSIZE = "192M"
Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5

Yes: 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: configured and built at default for 32bit (i686) and 64bit (x86_64) targets; built with RedHat Enterprise 7.5, and the system compiler gcc 4.8.5;
Hewlett Packard Enterprise  
(Test Sponsor: HPE) 
ProLiant DL20 Gen10  
(3.60 GHz, Intel Xeon E-2234) 

SPECspeed®2017_int_base = 10.4
SPECspeed®2017_int_peak = Not Run

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</table>

Platform Notes

BIOS Configuration:
Hyper Threading set to Disabled
Thermal Configuration set to Maximum Cooling
LLC Prefetch set to Enabled
Workload Profile set to General Peak Frequency Compute
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-vb4y Mon Sep 23 17:13:46 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) E-2234 CPU @ 3.60GHz
  1 "physical id"s (chips)
  4 "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 : 4
siblings : 4
physical 0: cores 0 1 2 3

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 39 bits physical, 48 bits virtual
CPU(s): 4
On-line CPU(s) list: 0-3
Thread(s) per core: 1
Core(s) per socket: 4
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2234 CPU @ 3.60GHz
Stepping: 10
CPU MHz: 3600.000
BogoMIPS: 7200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 8192K
NUMA node0 CPU(s): 0-3

(Continued on next page)
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Platform Notes (Continued)

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
aperfmpref tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
sdbg fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer
aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpcid_single
pti ssbd ibrs ibpb stibp tpr_shadow vmi mfocus l1d_tsc lm constant_tsc arch_perfmon
pebs bts rep_good nopl xtopology nonstop_tsc cpuid

/proc/cpuinfo cache data
    cache size : 8192 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
    available: 1 nodes (0)
    node 0 cpus: 0 1 2 3
    node 0 size: 64023 MB
    node 0 free: 63505 MB
    node distances:
    node 0
      0:  10

From /proc/meminfo
    MemTotal: 65560080 kB
    HugePages_Total: 0
    Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
    os-release:
        NAME="SLES"
        VERSION="15-SP1"
        VERSION_ID="15.1"
        PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
        ID="sles"
        ID_LIKE="suse"
        ANSI_COLOR="0;32"
        CPE_NAME="cpe:/o:suse:sles:15:sp1"

uname -a:
    Linux linux-vb4y 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
    x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown): Mitigation: PTI
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization

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Platform Notes (Continued)

CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation, IBPB: conditional, IBRS_FW, RSB filling

run-level 3 Sep 23 17:12

SPEC is set to: /home/cpu2017

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 U43 09/05/2019
Memory: 4x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

-----------------------------------------------
C
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 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

-----------------------------------------------
C++
620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
641.leela_s(base)
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Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

-----------------------------------------------
Fortran | 648.exchange2_s(base)
-----------------------------------------------

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 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

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench</td>
<td>-DSPEC_LP64 -DSPEC_LINUX_X64</td>
</tr>
<tr>
<td>gcc</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>mcf</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>omnetpp</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>xalancbmk</td>
<td>-DSPEC_LP64 -DSPEC_LINUX</td>
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<tr>
<td>x264</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>deepsjeng</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>leela</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>exchange2</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>xz</td>
<td>-DSPEC_LP64</td>
</tr>
</tbody>
</table>

### Base Optimization Flags

**C benchmarks:**
```
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-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=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
-lqkmalloc
```

**Fortran benchmarks:**
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs
```
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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-CLX-revB.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-CLX-revB.xml

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

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