SPEC CPU®2017 Integer Speed Result
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Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus
(2.00 GHz, AMD EPYC 7702)

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

Test Date: Mar-2020
Hardware Availability: Dec-2019
Software Availability: Aug-2019

HPE

Hewlett Packard Enterprise

SPECspeed®2017_int_base = 8.76
SPECspeed®2017_int_peak = 8.92

600.perlbench_s
602.gcc_s
605.mcf_s
620.omnetpp_s
623.xalancbmk_s
625.x264_s
631.deepsjeng_s
641.leela_s
648.exchange2_s
657.xz_s

Threads 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 17.0 18.0 19.0 20.0 21.0
128
1 4.75 5.00 9.63 9.61 14.8 15.7
128
1 5.05 5.00 9.27 9.86 12.4 12.7
128
1 4.86 4.95 4.14 4.08 16.2 16.1
128
1 4.14 4.08 16.2 16.1
128
1 4.86 4.95 16.2 16.1
128
1 4.86 4.95 16.2 16.1

--- SPECspeed®2017_int_base (8.76) ---
--- SPECspeed®2017_int_peak (8.92) ---

Hardware

CPU Name: AMD EPYC 7702
Max MHz: 3350
Nominal: 2000
Enabled: 128 cores, 2 chips
Orderable: 1, 2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 512 KB I+D on chip per core
L3: 256 MB I+D on chip per chip,
16 MB shared / 4 cores
Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R)
Storage: 1 x 800 GB SAS SSD, RAID 0
Other: None

Software

OS:
SUSE Linux Enterprise Server 15 (x86_64) SP1
Kernel 4.12.14-195-default
Compiler:
C/C++/Fortran: Version 2.0.0 of AOCC
Parallel:
Yes
Firmware:
HPE BIOS Version A42 12/12/2019 released Dec-2019
File System:
Btrfs
System State:
Run level 3 (multi-user)
Base Pointers:
64-bit
Peak Pointers:
32/64-bit
Other:
jemalloc: jemalloc memory allocator library v5.2.0
Power Management:
BIOS set to prefer performance at the cost of additional power usage
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RESULTS

<table>
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<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>128</td>
<td>374</td>
<td>4.75</td>
<td>372</td>
<td>4.77</td>
<td>377</td>
<td>4.71</td>
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<tr>
<td>602.gcc_s</td>
<td>128</td>
<td>413</td>
<td>9.63</td>
<td>415</td>
<td>9.60</td>
<td>413</td>
<td>9.64</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>128</td>
<td>319</td>
<td>14.8</td>
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<td>14.8</td>
<td>319</td>
<td>14.8</td>
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<tr>
<td>620.omnetpp_s</td>
<td>128</td>
<td>323</td>
<td>5.06</td>
<td>328</td>
<td>4.97</td>
<td>323</td>
<td>5.05</td>
</tr>
<tr>
<td>623.xalanchmk_s</td>
<td>128</td>
<td>152</td>
<td>9.30</td>
<td>155</td>
<td>9.16</td>
<td>153</td>
<td>9.27</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>128</td>
<td>141</td>
<td>12.5</td>
<td>142</td>
<td>12.4</td>
<td>142</td>
<td>12.4</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>128</td>
<td>295</td>
<td>4.86</td>
<td>294</td>
<td>4.87</td>
<td>297</td>
<td>4.83</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>128</td>
<td>181</td>
<td>16.2</td>
<td>181</td>
<td>16.2</td>
<td>181</td>
<td>16.2</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>128</td>
<td>300</td>
<td>20.6</td>
<td>300</td>
<td>20.6</td>
<td>300</td>
<td>20.6</td>
</tr>
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SPECspeed®2017_int_base = 8.76
SPECspeed®2017_int_peak = 8.92

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

The AMD64 AOCC Compiler Suite is available at
http://developer.amd.com/amd-aocc/

Submit Notes

The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.
See the configuration file for details.

Operating System Notes

'ulimit -s unlimited' was used to set environment stack size
'ulimit -l 2097152' was used to set environment locked pages in memory limit

runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

Set dirty_ratio=8 to limit dirty cache to 8% of memory
Set swappiness=1 to swap only if necessary
Set zone_reclaim_mode=1 to free local node memory and avoid remote memory
sync then drop_caches=3 to reset caches before invoking runcpu

dirty_ratio, swappiness, zone_reclaim_mode and drop_caches were
all set using privileged echo (e.g. echo 1 > /proc/sys/vm/swappiness).

Transparent huge pages set to 'always' for this run (OS default)
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**CPU2017 License:** 3  
**Test Date:** Mar-2020  
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**Software Availability:** Aug-2019

**Environment Variables Notes**

Environment variables set by runcpu before the start of the run:
- `GOMP_CPU_AFFINITY = "0-127"
- `LD_LIBRARY_PATH = "/home/cpu2017-bbn/amd_speed_aocc200_rome_C_lib/64;/home/cpu2017-bbn/amd_speed_aocc200_rome_C_lib/32:"`
- `MALLOC_CONF = "retain:true"
- `OMP_DYNAMIC = "false"
- `OMP_SCHEDULE = "static"
- `OMP_STACKSIZE = "128M"
- `OMP_THREAD_LIMIT = "128"

Environment variables set by runcpu during the 600.perlbench_s peak run:
- `GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 602.gcc_s peak run:
- `GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 605.mcf_s peak run:
- `GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 620.omnetpp_s peak run:
- `GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 623.xalancbmk_s peak run:
- `GOMP_CPU_AFFINITY = "0"
- `OMP_STACKSIZE = "128M"

Environment variables set by runcpu during the 625.x264_s peak run:
- `GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 631.deepsjeng_s peak run:
- `GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 641.leela_s peak run:
- `GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 648.exchange2_s peak run:
- `GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 657.xz_s peak run:
- `GOMP_CPU_AFFINITY = "0-127"`
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General Notes

Binaries were compiled on a system with 2x AMD EPYC 7601 CPU + 512GB Memory using Fedora 26

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: configured and built with GCC v9.1.0 in Ubuntu 19.04 with -O3 -znver2 -flto
jemalloc 5.2.0 is available here: https://github.com/jemalloc/jemalloc/releases/download/5.2.0/jemalloc-5.2.0.tar.bz2

Platform Notes

BIOS Configuration
Thermal Configuration set to Maximum Cooling
SMT Mode set to Disabled
Determinism Control set to Manual
Performance Determinism set to Power Deterministic
Minimum Processor Idle Power Core C-State set to C6 State
Memory Patrol Scrubbing set to Disabled
Workload Profile set to General Peak Frequency Compute
NUMA memory domains per socket set to Four memory domains per socket
C-State Efficiency mode set to Disabled

Sysinfo program /home/cpu2017-bbn/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbe6e46a485a0011
running on linux-30t0 Thu Feb 14 19:52:20 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 : AMD EPYC 7702 64-Core Processor
  2 "physical id"s (chips)
  128 "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 : 64
siblings : 64
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52

(Continued on next page)
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**Test Date:** Mar-2020  
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**Platform Notes (Continued)**

53 54 55 56 57 58 59 60 61 62 63  
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24  
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52  
53 54 55 56 57 58 59 60 61 62 63

From lscpu:

- **Architecture:** x86_64  
- **CPU op-mode(s):** 32-bit, 64-bit  
- **Byte Order:** Little Endian  
- **Address sizes:** 48 bits physical, 48 bits virtual  
- **CPU(s):** 128  
- **On-line CPU(s) list:** 0-127  
- **Thread(s) per core:** 1  
- **Core(s) per socket:** 64  
- **Socket(s):** 2  
- **NUMA node(s):** 8  
- **Vendor ID:** AuthenticAMD  
- **CPU family:** 23  
- **Model:** 49  
- **Model name:** AMD EPYC 7702 64-Core Processor  
- **Stepping:** 0  
- **CPU MHz:** 2000.000  
- **CPU max MHz:** 2000.0000  
- **CPU min MHz:** 1500.000  
- **BogoMIPS:** 3992.32  
- **Virtualization:** AMD-V  
- **L1d cache:** 32K  
- **L1i cache:** 32K  
- **L2 cache:** 512K  
- **L3 cache:** 16384K  
- **NUMA node0 CPU(s):** 0-15  
- **NUMA node1 CPU(s):** 16-31  
- **NUMA node2 CPU(s):** 32-47  
- **NUMA node3 CPU(s):** 48-63  
- **NUMA node4 CPU(s):** 64-79  
- **NUMA node5 CPU(s):** 80-95  
- **NUMA node6 CPU(s):** 96-111  
- **NUMA node7 CPU(s):** 112-127  
- **Flags:** fpu vme de pse tsc msr pae mce cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm constant_tsc rep_good nopl xtopology nonstop_tsc cpuid extapicid aperfmpref perf npi pclmulqdq monitor ssse3 fma cx16 sse4_1 sse4_2 movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw  
- **ibm skinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_l2 mwaitx cpb cat_l3 cdp_l3 hw_pstate ssbd ibrs ibpb stibp vmmcall fsgsbase bm1 avx2 ssemp bmi2 cqm rdt_a rdseed adx smap clflushopt clwb sha ni xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local clzero irperf xsaveerptr arat npt

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Platform Notes (Continued)

lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter
pfthreshold avic v_vmsave_vmload vgif umip rdpid overflow_recov succor smca

/proc/cpuinfo cache data
  cache size : 512 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
  available: 8 nodes (0-7)
  node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
  node 0 size: 128709 MB
  node 0 free: 128324 MB
  node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
  node 1 size: 129019 MB
  node 1 free: 128799 MB
  node 2 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
  node 2 size: 129019 MB
  node 2 free: 128592 MB
  node 3 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
  node 3 size: 129007 MB
  node 3 free: 128817 MB
  node 4 cpus: 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
  node 4 size: 128990 MB
  node 4 free: 128781 MB
  node 5 cpus: 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
  node 5 size: 129019 MB
  node 5 free: 128846 MB
  node 6 cpus: 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111
  node 6 size: 129019 MB
  node 6 free: 128766 MB
  node 7 cpus: 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127
  node 7 size: 129018 MB
  node 7 free: 128845 MB
node distances:

From /proc/meminfo
  MemTotal: 1056568632 kB
  HugePages_Total: 0

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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-30t0 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-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled
  via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Full AMD retpoline, IBPB:
  conditional, IBRS_FW, STIBP: disabled, RSB filling

run-level 3 Feb 14 19:51

SPEC is set to: /home/cpu2017-bbn
  Filesystem Type Size Used Avail Use% Mounted on
  /dev/sdc2 btrfs 743G 26G 717G 4% /home

From /sys/devices/virtual/dmi/id
  BIOS: HPE A42 12/12/2019
  Vendor: HPE
  Product: ProLiant DL385 Gen10 Plus
  Product Family: ProLiant
  Serial: CN79340HC5

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.
  Memory:

(Continued on next page)
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Platform Notes (Continued)

16x Micron 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200
16x UNKNOWN NOT AVAILABLE

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C  | 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)
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
   AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
==============================================================================

C++ | 623.xalanbk_s(peak)
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
   AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
==============================================================================

C++ | 620.omnetpp_s(base, peak) 623.xalanbk_s(base)
   631.deepsjeng_s(base, peak) 641.leela_s(base, peak)
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Target: i386-unknown-linux-gnu
Thread model: posix

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SPEC sandy2017_int_base = 8.76
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Compiler Version Notes (Continued)

InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

C++
- 620.omnetpp_s(base, peak)
- 623.xalancbmk_s(base)
- 631.deepsjeng_s(base, peak)
- 641.leela_s(base, peak)

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AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

Fortran
- 648.exchange2_s(base, peak)

AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

Base Compiler Invocation

C benchmarks:
- clang

C++ benchmarks:
- clang++

Fortran benchmarks:
- flang

Base Portability Flags

- 600.perlbench_s: -DSPEC_LINUX_X64 -DSPEC_LP64
- 602.gcc_s: -DSPEC_LP64
- 605.mcf_s: -DSPEC_LP64
- 620.omnetpp_s: -DSPEC_LP64
- 623.xalancbmk_s: -DSPEC_LINUX -DSPEC_LP64
- 625.x264_s: -DSPEC_LP64

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Base Portability Flags (Continued)

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:
- flto -Wl,-mllvm -Wl,-function-specialize
- Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
- Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
- march=znver2 -fstruct-layout=3 -mllvm -unroll-threshold=50
- fremap-arrays -mllvm -function-specialize -mllvm -enable-gvn-hoist
- mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp
- mllvm -vector-library=LIBMVEC -mllvm -inline-threshold=1000
- flv-function-specialization -z muldefs -DSPEC_OPENMP -fopenmp
- DUSE_OPENMP -fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm
- ljemalloc -lflang

C++ benchmarks:
- flto -Wl,-mllvm -Wl,-function-specialize
- Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
- Wl,-mllvm -Wl,-reduce-array-computations=3
- Wl,-mllvm -Wl,-suppress-fmas -O3 -ffast-math -march=znver2
- mllvm -loop-unswitch-threshold=200000 -mllvm -vector-library=LIBMVEC
- mllvm -unroll-threshold=100 -flv-function-specialization
- mllvm -enable-partial-unswitch -z muldefs -DSPEC_OPENMP -fopenmp
- DUSE_OPENMP -fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm
- ljemalloc -lflang

Fortran benchmarks:
- flto -Wl,-mllvm -Wl,-function-specialize
- Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
- Wl,-mllvm -Wl,-reduce-array-computations=3 -ffast-math
- Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop
- Wl,-mllvm -Wl,-enable-lv-split -O3 -march=znver2 -funroll-loops
- Mrecursive -mllvm -vector-library=LIBMVEC -z muldefs
- mllvm -disable-indvar-simplify -mllvm -unroll-aggressive
- mllvm -unroll-threshold=150 -DSPEC_OPENMP -fopenmp -DUSE_OPENMP
- fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc
- lflang
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus
(2.00 GHz, AMD EPYC 7702)

SPEC CPU®2017 Integer Speed Result
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SPECspeed®2017_int_base = 8.76
SPECspeed®2017_int_peak = 8.92

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

Test Date: Mar-2020
Hardware Availability: Dec-2019
Software Availability: Aug-2019

Base Other Flags

C benchmarks:
- -Wno-return-type

C++ benchmarks:
- -Wno-return-type

Fortran benchmarks:
- -Wno-return-type

Peak Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
flang

Peak Portability Flags

600.perlbench_s: -DSPEC_LINUX_X64 -DSPEC_LP64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LINUX -D_FILE_OFFSET_BITS=64
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

Peak Optimization Flags

C benchmarks:
600.perlbench_s: -flto -Wl,-mllvm -Wl,-function-specialize
- -Wl,-mllvm -Wl,-region-vectorize
- -Wl,-mllvm -Wl,-vector-library=LIIBMVEC

(Continued on next page)
Peak Optimization Flags (Continued)

600.perlbench (continued):
-Wl,-mllvm -Wl,-reduce-array-computations=3
-fprofile-instr-use(pass 1)
-fprofile-instr-use(pass 2) -Ofast -march=znver2
-mno-sse4a -fstruct-layout=5
-mllvm -vectorize-memory-aggressively
-mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -unroll-threshold=50 -fprofile-instr-use
-mllvm -vector-library=LIBMVEC
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp -mllvm -inline-threshold=1000
-flv-function-specialization -DSPEC_OPENMP -fopennmp
-DUSE_OPENMP -lmvec -ldl -ljemalloc -fopennmp=libomp -lomp
-lpthread -ldl -ljemalloc -lflang

602.gcc (continued):
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver2 -mno-sse4a -fstruct-layout=5
-mllvm -vectorize-memory-aggressively
-mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -unroll-threshold=50 -fprofile-instr-use
-mllvm -vector-library=LIBMVEC
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp -mllvm -inline-threshold=1000
-flv-function-specialization -z muldefs -DSPEC_OPENMP
-fopennmp -DUSE_OPENMP -fgnu89-inline -fopennmp=libomp
-lomp -lpthread -ldl -ljemalloc

605.mcf (continued):
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver2 -mno-sse4a -fstruct-layout=5
-mllvm -vectorize-memory-aggressively
-mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -unroll-threshold=50 -fprofile-instr-use
-mllvm -vector-library=LIBMVEC
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp -mllvm -inline-threshold=1000
-flv-function-specialization -DSPEC_OPENMP -fopennmp
-DUSE_OPENMP -lmvec -lamdlibm -fopennmp=libomp -lomp
-lpthread -ldl -ljemalloc -lflang

(Continued on next page)
Hewlett Packard Enterprise  
ProLiant DL385 Gen10 Plus  
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Peak Optimization Flags (Continued)

625.x264_s: Same as 600.perlbench_s

657.xz_s:  
- flto -Wl,-mllvm -Wl,-function-specialize  
- Wl,-mllvm -Wl,-region-vectorize  
- Wl,-mllvm -Wl,-vector-library=LIBMVEC  
- Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast  
- march=znver2 -mno-sse4a -fstruct-layout=5  
- mllvm -vectorize-memory-aggressively  
- mllvm -function-specialize -mllvm -enable-gvn-hoist  
- mllvm -unroll-threshold=50 -fremap-arrays  
- mllvm -vector-library=LIBMVEC  
- mllvm -reduce-array-computations=3  
- mllvm -global-vectorize-slp -mllvm -inline-threshold=1000  
- flv-function-specialization -DSPEC_OPENMP -fopenmp  
- DUSE_OPENMP -fopenmp=libomp -lomp -lpthread -ldl  
- lmvec -lamlidibm -ljemalloc -lflang

C++ benchmarks:

620.omnetpp_s:  
- flto -Wl,-mllvm -Wl,-function-specialize  
- Wl,-mllvm -Wl,-region-vectorize  
- Wl,-mllvm -Wl,-vector-library=LIBMVEC  
- Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast  
- march=znver2 -flv-function-specialization  
- mllvm -unroll-threshold=100  
- mllvm -enable-partial-unswitch  
- mllvm -loop-unswitch-threshold=200000  
- mllvm -vector-library=LIBMVEC  
- mllvm -inline-threshold=1000 -DSPEC_OPENMP -fopenmp  
- DUSE_OPENMP -fopenmp=libomp -lomp -lpthread -ldl  
- lmvec -lamlidibm -ljemalloc -lflang

623.xalancbmk_s:  
- m32 - flto -Wl,-mllvm -Wl,-function-specialize  
- Wl,-mllvm -Wl,-region-vectorize  
- Wl,-mllvm -Wl,-vector-library=LIBMVEC  
- Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast  
- march=znver2 -flv-function-specialization  
- mllvm -unroll-threshold=100  
- mllvm -enable-partial-unswitch  
- mllvm -loop-unswitch-threshold=200000  
- mllvm -vector-library=LIBMVEC  
- mllvm -inline-threshold=1000 -DSPEC_OPENMP -fopenmp  
- DUSE_OPENMP -fopenmp=libomp -lomp -lpthread -ldl  
- ljemalloc

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SPEC CPU®2017 Integer Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus
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SPECspeed®2017_int_base = 8.76
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Test Date: Mar-2020
Hardware Availability: Dec-2019
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Peak Optimization Flags (Continued)

631.deepsjeng_s: Same as 620.omnetpp_s

641.leela_s: Same as 620.omnetpp_s

Fortran benchmarks:
-ffto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -ffast-math
-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop
-Wl,-mllvm -Wl,-enable-lv-split -O3 -march=znver2 -funroll-loops
-Mrecursive -mllvm -vector-library=LIBMVEC
-mllvm -disable-indvar-simplify -mllvm -unroll-aggressive
-mllvm -unroll-threshold=150 -DSPEC_OPENMP -fopenmp -DUSE_OPENMP
-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc
-llflang

Peak Other Flags

C benchmarks:
-Wno-return-type

C++ benchmarks (except as noted below):
-Wno-return-type

623.xalancbmk_s: -Wno-return-type
-L/sppo/dev/cpu2017/v110/amd_speed_aocc200_rome_C_lib/32

Fortran benchmarks:
-Wno-return-type

The flags files that were used to format this result can be browsed at

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPES-Platform-Flags-AMD-V1.2-EPYC-revH.xml
http://www.spec.org/cpu2017/flags/aocc200-flags-C1-HPE.xml
## SPEC CPU®2017 Integer Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL385 Gen10 Plus  
(2.00 GHz, AMD EPYC 7702)

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**Test Date:** Mar-2020  
**Hardware Availability:** Dec-2019  
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