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

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HPE

CPU2017 License: 003
Test Sponsor: HPE
Tested by: HPE

Test Date: May-2019
Hardware Availability: Oct-2019
Software Availability: Aug-2019

Threads

<table>
<thead>
<tr>
<th>Test Case</th>
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<tr>
<td>603.bwaves_s</td>
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</tr>
<tr>
<td>654.roms_s</td>
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</tbody>
</table>

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 A40 07/20/2019 released Aug-2019
File System: btrfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc: jemalloc memory allocator library v5.1.0
Power Management: Disabled

Hardware

CPU Name: AMD EPYC 7702
Max MHz: 3350
Nominal: 2000
Enabled: 128 cores, 2 chips
Orderable: 1, 2 chip(s)
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 4Rx4 PC4-2933Y-L)
Storage: 1 x HPE 240 GB SATA 6G M.2 SSD
Other: None

SPECspeed®2017_fp_base = 169
SPECspeed®2017_fp_energy_base = 347
SPECspeed®2017_fp_peak = 170
SPECspeed®2017_fp_energy_peak = 348
# SPEC CPU®2017 Floating Point Speed Result

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(Test Sponsor: HPE)  
ProLiant DL385 Gen10  
(2.00 GHz, AMD EPYC 7702)

---

## Power

Max. Power (W): 715.0  
Idle Power (W): 204.2  
Min. Temperature (C): 23.81  
Elevation (m): 132  
Line Standard: 208 V / 60 Hz / 1 phase / 2 wires  
Provisioning: Line-powered

## Power Settings

Management FW: Version 1.43 of iLO5 released May 23 2019  
Memory Mode: Normal

## Power Analyzer

Power Analyzer: 10.216.1.13:8888  
Hardware Vendor: Yokogawa  
Model: YokogawaWT210  
Serial Number: 91GC21887  
Input Connection: GPIB via NI GIPB-USB-HS  
Metrology Institute: NIST  
Calibration By: TRANSCAT  
Calibration Label: 5-E62NT-80-1  
Calibration Date: 11-Jun-2019  
PTDaemon® Version: 1.9.1 (a2d19f26; 2019-07-17)  
Setup Description: SUT Power Supply 1 via neoXt NXB 20815

## Power-Relevant Hardware

Power Supply: 1 x 800 W (non-redundant)  
Details: HPE 800W Flex Slot Titanium Hot Plug Low Halogen Power Supply Kit (865438-B21)  
Backplane: None  
Other Storage: Embedded SATA Controller  
Storage Model #: 875488-B21  
NICs Installed: 1 x HPE Ethernet 4-port 331i Adapter @ 1 Gb  
NICs Enabled (FW/OS): 4 / 4  
NICs Connected/Speed: 2 @ 1 Gb  
Other HW Model #: 6 x High Performance Fans (867810-B21)

## Temperature Meter

Temperature Meter: 10.216.1.13:8889  
Hardware Vendor: Digi International Inc.  
Model: DigiWATCHPORT_H  
Serial Number: V45084325  
Input Connection: USB  
PTDaemon® Version: 1.9.1 (a2d19f26; 2019-07-17)  
Setup Description: 5 mm in front of SUT main intake

## Base Results Table

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

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### Compiler Notes


### 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.:
```
nuamctl --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_cache=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)
The date was incorrectly set for this system. The test date should be Aug-2019.
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ProLiant DL385 Gen10
(2.00 GHz, AMD EPYC 7702)

| SPECspeed®2017_fp_base | 169 |
| SPECspeed®2017_fp_energy_base | 347 |
| SPECspeed®2017_fp_peak | 170 |
| SPECspeed®2017_fp_energy_peak | 348 |

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-127"
LD_LIBRARY_PATH = 
"/cpu2017/amd_speed_aocc200_rome_C_lib/64;/cpu2017/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 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-127"

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 5.1.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2

Submitted by: "Bucek, James" <james.bucek@hpe.com>
Submitted: Tue Sep 17 00:02:18 EDT 2019
Submission: cpu2017-20190903-17795.sub
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10
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CPU2017 License: 003
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Test Sponsor: HPE
Hardware Availability: Oct-2019
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Software Availability: Aug-2019

General Notes (Continued)

Submitted by: "Bucek, James" <james.bucek@hpe.com>
Submitted: Tue Sep 17 09:00:11 EDT 2019
Submission: cpu2017-20190903-17795.sub

Platform Notes

BIOS Configuration:
AMD SMT Option set to Disabled
Thermal Configuration set to Optimal Cooling
Determinism Control set to Manual
Performance Determinism set to Power Deterministic
Memory Patrol Scrubbing set to Disabled
NUMA memory domains per socket set to Four memory domains per socket
Last-Level Cache (LLC) as NUMA Node set to Enabled
Workload Profile set to General Throughput Compute
Minimum Processor Idle Power Core C-State set to C6 State

Sysinfo program /cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbble6e46a485a0011
running on dl385gen10 Wed May 29 06:14:24 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 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

(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result

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Platform Notes (Continued)

| 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:           | AMD EPYC 7702 64-Core Processor |
| CPU family:          | 23 |
| Model:               | 49 |
| Stepping:            | 0 |
| CPU MHz:             | 2000.000 |
| CPU max MHz:         | 2000.000 |
| CPU min MHz:         | 1500.000 |
| BogoMIPS:            | 3992.51 |
| 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 cx8 apic sep mtrr pge mca cmov
pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm
constant_tsc rep_good nop1 xtopology nonstop_tsc cpuid extd_apicid aperfmperf pni
pclmulqdq monitor ssse3 fma cx16 sse4_1 sse4_2 movbe popcnt aes xsave avx f16c
rdiﬀ rredir lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnopprefetch
osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb perfctr_l2 mwaitx cpb
cat_l3 cdpl_l3 hw_pstate ssbd ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2
cqmm rdt_a rdseed adx smap clflushopt clwb sha ni xsaveopt xsaves xgetbv1 xsaves
cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local clzero lperf xsaverptr arat npt
lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter
pfthreshold avic v_vmsave_vmload vgif umip rdpl1d overflow_recov succor smca

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

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10
(2.00 GHz, AMD EPYC 7702)

SPEC CPU®2017 Floating Point Speed Result
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CPU2017 License: 003
Test Sponsor: HPE
Tested by: HPE
Test Date: May-2019
Hardware Availability: Oct-2019
Software Availability: Aug-2019

Platform Notes (Continued)

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: 128802 MB
    node 0 free: 128512 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: 128726 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: 128689 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: 128814 MB
    node 4 cpus: 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
    node 4 size: 129019 MB
    node 4 free: 128873 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: 128901 MB
    node 6 cpus: 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111
    node 6 size: 128990 MB
    node 6 free: 128861 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: 128895 MB
    node distances:
      node 0 1 2 3 4 5 6 7
    0:  10 12 12 12 32 32 32 32
    1:  12 10 12 12 32 32 32 32
    2:  12 12 10 12 32 32 32 32
    3:  12 12 12 10 32 32 32 32
    4:  32 32 32 32 10 12 12 12
    5:  32 32 32 32 12 10 12 12
    6:  32 32 32 32 12 12 10 12
    7:  32 32 32 32 12 12 12 10

From /proc/meminfo
    MemTotal:       1056663620 kB
    HugePages_Total:       0
    Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
    os-release:
        NAME="SLES"

(Continued on next page)
Platform Notes (Continued)

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 dl385gen10 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): Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: disabled, RSB filling

run-level 3 May 29 06:12

SPEC is set to: /cpu2017

Filesystem     Type   Size  Used Avail Use% Mounted on
/dev/sda2      btrfs  222G   43G  178G  20% /

From /sys/devices/virtual/dmi/id
BIOS:       HPE A40 07/20/2019
Vendor:     HPE
Product:    ProLiant DL385 Gen10
Product Family: ProLiant
Serial:    7CE724P4SJ

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.

Memory:
   16x UNKNOWN NOT AVAILABLE
   16x UNKNOWN NOT AVAILABLE 64 GB 4 rank 2933

(Continued on next page)
# SPEC CPU®2017 Floating Point Speed Result

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

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**CPU2017 License:** 003  
**Test Sponsor:** HPE  
**Tested by:** HPE

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</tbody>
</table>

## Platform Notes (Continued)

(End of data from sysinfo program)

### Power Settings Notes

PTDaemon to measure power and temperature was run on a ProLiant DL360 Gen9 as a controller with 2x Intel Xeon E5-2660 v3 CPU and 128 GB of memory using Windows Server 2012 R2. 
Power management in the OS was disabled by setting Linux CPU governor to performance for all cores:  
\`cpupower frequency-set -r -g performance\`

Power management in the BIOS was default except for any settings mentioned in BIOS Configuration. 
No power management settings were set in the management firmware.

The Embedded SATA controller was the HPE Smart Array S100i SR Gen10 SW RAID. 
The system was configured with 3 drive cage blanks, 6 High Performance Fans, 
16 DIMM blanks, 2 high performance heatsinks (882098-B21) and baffles that fit over 
the high performance heatsinks in order to produce correct airflow and cooling. 
The run was started and observed through the management firmware.

## Compiler Version Notes

---  

### C

| 619.lbm_s(base, peak) | 638.imagick_s(base, peak) | 644.nab_s(base, peak) |

AOCCLLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins)  
AOCCLLVM.2.0.0.B191.2019_07_19 (based on LLVM AOCCLLVM.2.0.0.B191.2019_07_19)

Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /sppo/dev/compilers/aoccllvm-2.0.0/bin

---  

### C++, Fortran

| 607.cactuBSSN_s(base, peak) |

AOCCLLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins)  
AOCCLLVM.2.0.0.B191.2019_07_19 (based on LLVM AOCCLLVM.2.0.0.B191.2019_07_19)

Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /sppo/dev/compilers/aoccllvm-2.0.0/bin

---  

(Continued on next page)
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CPU2017 License: 003
Test Sponsor: HPE
Tested by: HPE

Compiler Version Notes (Continued)

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, C
621.wrf_s(base, peak) 627.cam4_s(base, peak)
628.pop2_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

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

(Continued on next page)
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Test Date: May-2019
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Base Compiler Invocation (Continued)

Benchmarks using Fortran, C, and C++:
clang++ clang flang

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64
628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_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
- -fly-function-specialization -z muldefs -DSPEC_OPENMP -fopenmp
- -DUSE_OPENMP -fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm
- -ljemalloc -llflang

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 -O3 -march=znver2
- -funroll-loops -Mrecursive -mllvm -vector-library=LIBMVEC -z muldefs
- -kieee -fno-finite-math-only -DSPEC_OPENMP -fopenmp -DUSE_OPENMP
- -fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc

(Continued on next page)
### Base Optimization Flags (Continued)

**Fortran benchmarks (continued):**
- `-lflang`

**Benchmarks using both Fortran and C:**
- `-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-slpa`
  - `-mllvm -vector-library=LIBMVEC -mllvm -inline-threshold=1000`
  - `-fly-function-specialization -funroll-loops -Mrecursive -z muldefs`
  - `-Kieee -fno-finite-math-only -DSPEC_OPENMP -fopenmp -DUSE_OPENMP`
  - `-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc -lflang`

**Benchmarks using Fortran, C, and C++:**
- `-std=c++98 -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`
- `-fstruct-layout=3 -mllvm -unroll-threshold=50 -fremap-arrays`
- `-mllvm -function-specialize -mllvm -enable-gvn-hoist`
- `-mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slpa`
  - `-mllvm -vector-library=LIBMVEC -mllvm -inline-threshold=1000`
  - `-fly-function-specialization -mllvm -loop-unswitch-threshold=200000`
  - `-mllvm -unroll-threshold=100 -mllvm -enable-partial-unswitch`
  - `-funroll-loops -Mrecursive -z muldefs -Kieee -fno-finite-math-only`
  - `-DSPEC_OPENMP -fopenmp -DUSE_OPENMP -fopenmp=libomp -lomp -lpthread`
  - `-ldl -lmvec -lamdlibm -ljemalloc -lflang`

### Base Other Flags

**C benchmarks:**
- `-Wno-return-type`

**Fortran benchmarks:**
- `-Wno-return-type`

**Benchmarks using both Fortran and C:**
- `-Wno-return-type`
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Base Other Flags (Continued)

Benchmarks using Fortran, C, and C++:
- -Wno-return-type

Peak Compiler Invocation

C benchmarks:
clang
Fortran benchmarks:
flang
Benchmarks using both Fortran and C:
flang clang
Benchmarks using Fortran, C, and C++:
clang++ clang flang

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
619.lbm_s: basepeak = yes
638.imagick_s: basepeak = yes
644.nab_s: basepeak = yes

Fortran benchmarks:

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

603.bwaves_s (continued):
- -march=znver2 -funroll-loops -Mrecursive
- -mlllvm -vector-library=LIBMVEC -Kieee
- -fno-finite-math-only -DSPEC_OPENMP -fopenmp -DUSE_OPENMP
- -fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm
- -ljemalloc -lflang

649.fotonik3d_s: basepeak = yes

654.roms_s: basepeak = yes

### Benchmarks using both Fortran and C:

621.wrf_s: -flto -Wl, -mlllvm -Wl, -function-specialize
- -Wl, -mlllvm -Wl, -region-vectorize
- -Wl, -mlllvm -Wl, -vector-library=LIBMVEC
- -Wl, -mlllvm -Wl, -reduce-array-computations=3 -Ofast
- -march=znver2 -mno-sse4a -fstruct-layout=5
- -mlllvm -vectorize-memory-aggressively
- -mlllvm -function-specialize -mlllvm -enable-gvn-hoist
- -mlllvm -unroll-threshold=50 -fremap-arrays
- -mlllvm -vector-library=LIBMVEC
- -mlllvm -reduce-array-computations=3
- -mlllvm -global-vectorize-slp -mlllvm -inline-threshold=1000
- -flv-function-specialization -O3 -funroll-loops
- -Mrecursive -Kieee -fno-finite-math-only -DSPEC_OPENMP
- -fopenmp -DUSE_OPENMP
- -fopenmp=libomp -lomp -lpthread
- -ldl -lmvec -lmalloc -ljemalloc -lflang

627.cam4_s: basepeak = yes

628.pop2_s: Same as 621.wrf_s

### Benchmarks using Fortran, C, and C++:

- -std=c++98 -flto -Wl, -mlllvm -Wl, -function-specialize
- -Wl, -mlllvm -Wl, -region-vectorize
- -Wl, -mlllvm -Wl, -vector-library=LIBMVEC
- -Wl, -mlllvm -Wl, -reduce-array-computations=3 -Ofast -march=znver2
- -mno-sse4a -fstruct-layout=5 -mlllvm -vectorize-memory-aggressively
- -mlllvm -function-specialize -mlllvm -enable-gvn-hoist
- -mlllvm -unroll-threshold=50 -fremap-arrays
- -mlllvm -vector-library=LIBMVEC
- -mlllvm -reduce-array-computations=3
- -mlllvm -global-vectorize-slp -mlllvm -inline-threshold=1000
- -flv-function-specialization -mlllvm -unroll-threshold=100
- -mlllvm -enable-partial-unswitch -mlllvm -loop-unswitch-threshold=200000

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

Benchmarks using Fortran, C, and C++ (continued):

- `-O3`  
- `-funroll-loops`  
- `-Mrecursive`  
- `-Kieee`  
- `-fno-finite-math-only`  
- `-DSPEC_OPENMP`  
- `-fopenmp`  
- `-DUSE_OPENMP`  
- `-fopenmp=libomp`  
- `-lomp`  
- `-lpthread`  
- `-ldl`  
- `-lmvec`  
- `-lamdlibm`  
- `-ljemalloc`  
- `-lflang`

### Peak Other Flags

- C benchmarks: `-Wno-return-type`
- Fortran benchmarks: `-Wno-return-type`
- Benchmarks using both Fortran and C: `-Wno-return-type`
- Benchmarks using Fortran, C, and C++: `-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/HPE-Platform-Flags-AMD-V1.2-EPYC-revF.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revF.xml)

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