Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus
(2.75 GHz, AMD EPYC 7453)

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE
Test Date: May-2021
Hardware Availability: Apr-2021
Software Availability: Mar-2021

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<th>SPECspeed®2017_fp_peak</th>
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**SPECspeed®2017_fp_base** = 185
**SPECspeed®2017_fp_peak** = 189

**Hardware**

- **CPU Name:** AMD EPYC 7453
- **Max MHz:** 3450
- **Nominal:** 2750
- **Enabled:** 56 cores, 2 chips, 2 threads/core
- **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:** 64 MB I+D on chip per chip, 16 MB shared / 7 cores
- **Other:** None
- **Memory:** 2 TB (16 x 128 GB 4Rx4 PC4-3200AA-L)
- **Storage:** 1 x 182 GB SATA SSD, RAID 0
- **Other:** None

**Software**

- **OS:** Ubuntu 20.04.1 LTS (x86_64)
- **Kernel:** 5.4.0-42-generic
- **Compiler:** C/C++/Fortran: Version 3.0.0 of AOCC
- **Parallel:** Yes
- **Firmware:** HPE BIOS Version A42 v2.42 04/29/2021 released Apr-2021
- **File System:** ext4
- **System State:** Run level 5 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** jemalloc: jemalloc memory allocator library v5.1.0
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage
## Results Table

<table>
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</tbody>
</table>

### Compiler Notes


### Submit Notes

The config file option 'submit' was used.
'numaclt' 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 numaclt i.e.:
numactl --interleave=all runcpu <etc>

'echo 8 > /proc/sys/vm/dirty_ratio' run as root to limit dirty cache to 8% of memory.
'echo 1 > /proc/sys/vm/swappiness' run as root to limit swap usage to minimum necessary.
'echo 1 > /proc/sys/vm/zone_reclaim_mode' run as root to free node-local memory and avoid remote memory usage.
'sync; echo 3 > /proc/sys/vm/drop_caches' run as root to reset filesystem caches.
'sysctl -w kernel.randomize_va_space=0' run as root to disable address space layout randomization (ASLR) to reduce run-to-run variability.

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.
SPEC CPU®2017 Floating Point Speed Result

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SPECspeed®2017_fp_base = 185
SPECspeed®2017_fp_peak = 189

Operating System Notes (Continued)

To enable Transparent Hugepages (THP) for all allocations,
'echo always > /sys/kernel/mm/transparenthugepage/alwaysenabled' and
'echo always > /sys/kernel/mm/transparenthugepage/defrag' run as root.
To enable THP only on request for peak runs of 628.pop2_s, and 638.imagick_s,
'echo madvise > /sys/kernel/mm/transparenthugepage/alwaysenabled' run as root.
To disable THP for peak runs of 627.cam4_s, 644.nab_s, 649.fotonik3d_s, and 654.roms_s,
'echo never > /sys/kernel/mm/transparenthugepage/alwaysenabled' run as root.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-111"
LD_LIBRARY_PATH =
"/home/cpu2017_B1/amd_speed_aocc300_milan_B_lib/64;/home/cpu2017_B1/amd_speed_aocc300_milan_B_lib/32;"
MALLOCCONFIG = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREADLIMIT = "112"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0 56 1 57 2 58 3 59 4 60 5 61 6 62 7 63 8 64 9 65 10 66
11 67 12 68 13 69 14 70 15 71 16 72 17 73 18 74 19 75 20 76 21 77 22 78
23 79 24 80 25 81 26 82 27 83 28 84 29 85 30 86 31 87 32 88 33 89 34 90
35 91 36 92 37 93 38 94 39 95 40 96 41 97 42 98 43 99 44 100 45 101 46
102 47 103 48 104 49 105 50 106 51 107 52 108 53 109 54 110 55 111"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0 56 1 57 2 58 3 59 4 60 5 61 6 62 7 63 8 64 9 65 10 66
11 67 12 68 13 69 14 70 15 71 16 72 17 73 18 74 19 75 20 76 21 77 22 78
23 79 24 80 25 81 26 82 27 83 28 84 29 85 30 86 31 87 32 88 33 89 34 90
35 91 36 92 37 93 38 94 39 95 40 96 41 97 42 98 43 99 44 100 45 101 46
102 47 103 48 104 49 105 50 106 51 107 52 108 53 109 54 110 55 111"

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0-55"

General Notes

Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 1TiB Memory using openSUSE 15.2

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

(Continued on next page)
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ProLiant DL385 Gen10 Plus
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SPEC CPU®2017 Floating Point Speed Result
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SPECspeed®2017_fp_base = 185
SPECspeed®2017_fp_peak = 189

General Notes (Continued)

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 v4.8.2 in RHEL 7.4
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: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>
Submitted: Mon Jun 7 11:54:36 EDT 2021
Submission: cpu2017-20210607-26891.sub

Platform Notes

BIOS Configuration
Workload Profile set to General Peak Frequency Compute
Deteriorism Control set to Manual
Performance Determinism set to Power Deterministic
Last-Level Cache (LLC) as NUMA Node set to Enabled
NUMA memory domains per socket set to One memory domain per socket
Thermal Configuration set to Maximum Cooling
Workload Profile set to Custom
Infinity Fabric Power Management set to Disabled
Infinity Fabric Performance State set to P0
Power Regulator set to OS Control Mode

Sysinfo program /home/cpu2017_B1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on dl385g10v2 Wed Apr 1 12:27:13 2020

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 7453 28-Core Processor
          2 "physical id"s (chips)
          112 "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 : 28
siblings : 56
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30

(Continued on next page)
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SPECspeed®2017_fp_base = 185
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Platform Notes (Continued)

physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30

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): 112
On-line CPU(s) list: 0-111
Thread(s) per core: 2
Core(s) per socket: 28
Socket(s): 2
NUMA node(s): 8
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7453 28-Core Processor
Stepping: 1
Frequency boost: enabled
CPU MHz: 1796.455
CPU max MHz: 2750.0000
CPU min MHz: 1500.0000
BogoMIPS: 5489.59
Virtualization: AMD-V
L1d cache: 1.8 MiB
L1i cache: 1.8 MiB
L2 cache: 28 MiB
L3 cache: 128 MiB
NUMA node0 CPU(s): 0-6, 56-62
NUMA node1 CPU(s): 7-13, 63-69
NUMA node2 CPU(s): 14-20, 70-76
NUMA node3 CPU(s): 21-27, 77-83
NUMA node4 CPU(s): 28-34, 84-90
NUMA node5 CPU(s): 35-41, 91-97
NUMA node6 CPU(s): 42-48, 98-104
NUMA node7 CPU(s): 49-55, 105-111
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Full AMD retpoline, IBPB conditional, IBRS_FW, STIBP always-on, RSB filling
(Continued on next page)
### Platform Notes (Continued)

Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

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
        pdelgb rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid
        aperfmperf pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 movbe popcnt aes
        xsave avx f16c rdrandr lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a
        misalignsse 3dnowprefetch osw ibs skinit wdt tce topoext perfctr_core perfctr_nb
        bpext perfctr.llc mwaitx cpb cat_l3 cdar_l3 invpcid_single hw_pstate ssbd mba ibrs
        ibpb stibp vmmcnonf fsgsbase bni1 avx2 smep bni2 invpcid cqm rdt_a rdseed adx smap
        clflushopt clwb sha ni xsaveopt xsavec xgetbv1 xsave xsaves cqm_llc cqm_occup_llc
        cqm_mbb_total cqm_mbb_local clzero irperf xsaverptr wbnoinvd arat npt lbv svm_lock
        nrip_save tsc_scale vmcb_clean flushbyasid decodeassist pausefilter pfthreshold
        v_vmsave_vmlod vgif umip pkp ospace vaes vpclmulqdq 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.

```bash
  available: 8 nodes (0-7)
  node 0 cpus:  0 1 2 3 4 5 6 56 57 58 59 60 61 62
  node 0 size: 257798 MB
  node 0 free: 257433 MB
  node 1 cpus:  7 8 9 10 11 12 13 63 64 65 66 67 68 69
  node 1 size: 258044 MB
  node 1 free: 257700 MB
  node 2 cpus: 14 15 16 17 18 19 20 70 71 72 73 74 75 76
  node 2 size: 258020 MB
  node 2 free: 257697 MB
  node 3 cpus: 21 22 23 24 25 26 27 77 78 79 80 81 82 83
  node 3 size: 245933 MB
  node 3 free: 245702 MB
  node 4 cpus: 28 29 30 31 32 33 34 84 85 86 87 88 89 90
  node 4 size: 258044 MB
  node 4 free: 257856 MB
  node 5 cpus: 35 36 37 38 39 40 41 91 92 93 94 95 96 97
  node 5 size: 258044 MB
  node 5 free: 257837 MB
  node 6 cpus: 42 43 44 45 46 47 48 98 99 100 101 102 103 104
  node 6 size: 258044 MB
  node 6 free: 257844 MB
  node 7 cpus: 49 50 51 52 53 54 55 105 106 107 108 109 110 111
  node 7 size: 258041 MB
  node 7 free: 257830 MB
  node distances:
  node 0 1 2 3 4 5 6 7
```

(Continued on next page)
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SPECspeed®2017_fp_base = 185
SPECspeed®2017_fp_peak = 189

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

Platform Notes (Continued)

0:  10  11  11  11  32  32  32  32
1:  11  10  11  11  32  32  32  32
2:  11  11  10  11  32  32  32  32
3:  11  11  11  10  32  32  32  32
4:  32  32  32  32  10  11  11  11
5:  32  32  32  32  11  10  11  11
6:  32  32  32  32  11  11  10  11
7:  32  32  32  32  11  11  11  10

From /proc/meminfo
MemTotal:       2101220680 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

/sbin/tuned-adm active
   Current active profile: throughput-performance

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

/usr/bin/lsb_release -d
Ubuntu 20.04.1 LTS

From /etc/*release* /etc/*version*
debian_version: bullseye/sid
os-release:
   NAME="Ubuntu"
   VERSION="20.04.1 LTS (Focal Fossa)"
   ID=ubuntu
   ID_LIKE=debian
   PRETTY_NAME="Ubuntu 20.04.1 LTS"
   VERSION_ID="20.04"
   HOME_URL="https://www.ubuntu.com/"
   SUPPORT_URL="https://help.ubuntu.com/"

uname -a:
Linux dl385g10v2 5.4.0-42-generic #46-Ubuntu SMP Fri Jul 10 00:24:02 UTC 2020 x86_64
x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit): Not affected
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

(Continued on next page)
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**Platform Notes (Continued)**

CVE-2017-5753 (Spectre variant 1):
Mitigation: usercopy/swapgs barriers and __user pointer sanitization

CVE-2017-5715 (Spectre variant 2):
Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: always-on, RSB filling

CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 5 Apr 1 12:23

SPEC is set to: /home/cpu2017_B1

```
Filesystem                        Type  Size  Used Avail Use% Mounted on
/dev/mapper/ubuntu--vg-ubuntu--lv ext4  182G   65G  108G  38% /
```

From /sys/devices/virtual/dmi/id
Vendor:         HPE
Product:        ProLiant DL385 Gen10 Plus
Product Family: ProLiant
Serial:         CN79340HC3

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 Samsung M386AAG40AM3-CWE 128 GB 4 rank 3200
  16x UNKNOWN NOT AVAILABLE
```

BIOS:

```
BIOS Vendor:       HPE
BIOS Version:      A42
BIOS Date:         04/29/2021
BIOS Revision:     2.42
Firmware Revision: 2.40
```

(End of data from sysinfo program)

**Compiler Version Notes**

```
==============================================================================
C               | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base, peak)
------------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: A0CC_3.0.0-Build#78 2020_12_10) (based on
```

(Continued on next page)
**Compiler Version Notes (Continued)**

LLVM Mirror. Version.12.0.0
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

-----------------------------------------------

C++, C, Fortran | 607.cactuBSSN_s(base, peak)

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror. Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror. Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror. Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

-----------------------------------------------

Fortran         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
| 654.roms_s(base, peak)

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror. Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

-----------------------------------------------

Fortran, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
| 628.pop2_s(base, peak)

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror. Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror. Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

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SPECPATHWAY®2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus
(2.75 GHz, AMD EPYC 7453)

SPECspeed®2017_fp_base = 185
SPECspeed®2017_fp_peak = 189

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

Test Date: May-2021
Hardware Availability: Apr-2021
Software Availability: Mar-2021

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Compiler Version Notes (Continued)

LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocccompiler-3.0.0/bin

------------------------------------------

Base 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

------------------------------------------

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:
-m64 -mno-adx -mno-sse4a -W1,-mlllvm -W1,-region-vectorize
-W1,-mlllvm -W1,-function-specialize
-W1,-mlllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mlllvm -W1,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5

(Continued on next page)
Hewlett Packard Enterprise
ProLiant DL385 Gen10 Plus
(2.75 GHz, AMD EPYC 7453)

SPECspeed®2017_fp_base = 185
SPECspeed®2017_fp_peak = 189

Base Optimization Flags (Continued)

C benchmarks (continued):
-mlirvm -unroll-threshold=50 -mlirvm -inline-threshold=1000
-fremap-arrays -mlirvm -function-specialize -flv-function-specialization
-mlirvm -enable-gvn-hoist -mlirvm -global-vectorize-slp=true
-mlirvm -enable-licm-vrp -mlirvm -reduce-array-computations=3 -z muldefs
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang -lflangrti

Fortran benchmarks:
-m64 -mno-adx -mno-sse4a -W1,-mlirvm -W1,-enable-X86-prefetching
-W1,-mlirvm -W1,-enable-licm-vrp -W1,-mlirvm -W1,-region-vectorize
-W1,-mlirvm -W1,-function-specialize
-W1,-mlirvm -W1,-align-all-nofallthru-blocks=6
-W1,-mlirvm -W1,-reduce-array-computations=3 -Hz,1,0x1 -03
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mlirvm -fuse-tile-inner-loop -funroll-loops
-mlirvm -extra-vectorizer-passes -mlirvm -lsr-in-nested-loop
-mlirvm -enable-licm-vrp -mlirvm -reduce-array-computations=3
-mlirvm -global-vectorize-slp=true -z muldefs -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrti

Benchmarks using both Fortran and C:
-m64 -mno-adx -mno-sse4a -W1,-mlirvm -W1,-enable-X86-prefetching
-W1,-mlirvm -W1,-enable-licm-vrp -W1,-mlirvm -W1,-region-vectorize
-W1,-mlirvm -W1,-function-specialize
-W1,-mlirvm -W1,-align-all-nofallthru-blocks=6
-W1,-mlirvm -W1,-reduce-array-computations=3 -03 -march=znver3
-fveclib=AMDLIBM -ffast-math -futto -fstruct-layout=5
-mlirvm -unroll-threshold=50 -mlirvm -inline-threshold=1000
-fremap-arrays -mlirvm -function-specialize -flv-function-specialization
-mlirvm -enable-gvn-hoist -mlirvm -global-vectorize-slp=true
-mlirvm -enable-licm-vrp -mlirvm -reduce-array-computations=3 -Hz,1,0x1
-Mrecursive -mlirvm -fuse-tile-inner-loop -funroll-loops
-mlirvm -extra-vectorizer-passes -mlirvm -lsr-in-nested-loop -z muldefs
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang -lflangrti

Benchmarks using Fortran, C, and C++:
-m64 -mno-adx -mno-sse4a -std=c++98
-W1,-mlirvm -W1,-x86-use-vzeroupper=false
-W1,-mlirvm -W1,-region-vectorize -W1,-mlirvm -W1,-function-specialize
-W1,-mlirvm -W1,-align-all-nofallthru-blocks=6
-W1,-mlirvm -W1,-reduce-array-computations=3 -03 -march=znver3
-fveclib=AMDLIBM -ffast-math -futto -fstruct-layout=5
-mlirvm -unroll-threshold=50 -mlirvm -inline-threshold=1000
-fremap-arrays -mlirvm -function-specialize -flv-function-specialization

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Hewlett Packard Enterprise
ProLiant DL385 Gen10 Plus
(2.75 GHz, AMD EPYC 7453)

SPECspeed®2017_fp_base = 185
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CPU2017 License: 3
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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-mlir -enable-gvn-hoist -mlir -global-vectorize-slp=true
-mlir -enable-licm-vrp -mlir -reduce-array-computations=3
-mlir -enable-partial-unswitch -mlir -unroll-threshold=100
-finline-agressive -mlir -loop-unswitch-threshold=200000
-mlir -reroll-loops -mlir -aggressive-loop-unswitch
-mlir -extra-vectorizer-passes -mlir -convert-pow-exp-to-int=false
-Hz,1,0x1 -Mrecursive -mlir -fuse-tile-inner-loop -funroll-loops
-mlir -lrs-in-nested-loop -z muldefs -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrti

Base Other Flags

C benchmarks:
-Wno-unused-command-line-argument -Wno-return-type

Fortran benchmarks:
-Wno-unused-command-line-argument -Wno-return-type

Benchmarks using both Fortran and C:
-Wno-unused-command-line-argument -Wno-return-type

Benchmarks using Fortran, C, and C++:
-Wno-unused-command-line-argument -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
SPEC CPU®2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus
(2.75 GHz, AMD EPYC 7453)

SPECspeed®2017_fp_base = 185
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CPU2017 License: 3
Test Date: May-2021
Test Sponsor: HPE
Hardware Availability: Apr-2021
Tested by: HPE
Software Availability: Mar-2021

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes
638.imagick_s: basepeak = yes


Fortran benchmarks:

603.bwaves_s: basepeak = yes
649.fotonik3d_s: basepeak = yes


Benchmarks using both Fortran and C:

621.wrf_s: basepeak = yes
627.cam4_s: -m64 -mno-adx -mno-sse4a -Wl,-mllv -Wl,-enable-X86-prefetching

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## SPEC CPU®2017 Floating Point Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL385 Gen10 Plus  
(2.75 GHz, AMD EPYC 7453)

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### Peak Optimization Flags (Continued)

627.cam4_s (continued):
- `Wl,-mllvm -Wl,-enable-licm-vrp`
- `Wl,-mllvm -Wl,-function-specialize`
- `Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
- `Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast`
- `march=znver3 -fveclib=AMDLIBM -ffast-math -flto`
- `fstruct-layout=5 -mllvm -unroll-threshold=50`
- `fremap-arrays -flv-function-specialization`
- `mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist`
- `mllvm -global-vectorize-slp=true`
- `mllvm -function-specialize -mllvm -enable-licm-vrp`
- `mllvm -reduce-array-computations=3 -Mrecursive`
- `DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm`
- `ljemalloc -lflang`

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

### Peak Other Flags

C benchmarks:
- `Wno-unused-command-line-argument -Wno-return-type`

Fortran benchmarks:
- `Wno-unused-command-line-argument -Wno-return-type`

Benchmarks using both Fortran and C:
- `Wno-unused-command-line-argument -Wno-return-type`

Benchmarks using Fortran, C, and C++:
- `Wno-unused-command-line-argument -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-revQ.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revQ.xml)
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### Hewlett Packard Enterprise

(2.75 GHz, AMD EPYC 7453)

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

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