**SPEC CPU®2017 Floating Point Speed Result**

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
**ProLiant DL385 Gen11**  
(2.70 GHz, AMD EPYC 9334)

**SPECspeed®2017_fp_base = 321**  
**SPECspeed®2017_fp_peak = 326**

**Threads**

<table>
<thead>
<tr>
<th>Program</th>
<th>Threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
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</tr>
<tr>
<td>619.lbm_s</td>
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</tr>
<tr>
<td>621.wrf_s</td>
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</tr>
<tr>
<td>627.cam4_s</td>
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</tr>
<tr>
<td>628.pop2_s</td>
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</tr>
<tr>
<td>638.imagick_s</td>
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</tr>
<tr>
<td>644.nab_s</td>
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</tr>
<tr>
<td>649.fotonik3d_s</td>
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</tr>
<tr>
<td>654.roms_s</td>
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</tr>
</tbody>
</table>

**SPECspeed®2017_fp_peak**

<table>
<thead>
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<th>Threads</th>
</tr>
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<tbody>
<tr>
<td>603.bwaves_s</td>
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</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
</tr>
</tbody>
</table>

**Software**

- **OS:** Ubuntu 22.04.1 LTS  
- **Kernel:** 5.15.0-56-generic  
- **Compiler:** C/C++/Fortran: Version 4.0.0 of AOCC  
- **Parallel:** Yes  
- **Firmware:** HPE BIOS Version v1.12 11/24/2022 released Nov-2022  
- **File System:** ext4  
- **System State:** Run level 5 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** 64-bit  
- **Other:** None  
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage

**Hardware**

- **CPU Name:** AMD EPYC 9334  
- **Max MHz:** 3900  
- **Nominal:** 2700  
- **Enabled:** 64 cores, 2 chips  
- **Orderable:** 1,2 chips  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **L2:** 1 MB I+D on chip per core  
- **L3:** 128 MB I+D on chip per chip, 32 MB shared / 8 cores  
- **Other:** None  
- **Memory:** 1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)  
- **Storage:** 1 x 480 GB SATA SSD  
- **Other:** None
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL385 Gen11  
(2.70 GHz, AMD EPYC 9334)  

**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Tested by:** HPE  
**Test Date:** Dec-2022  
**Hardware Availability:** Dec-2022  
**Software Availability:** Nov-2022

### Results Table

<table>
<thead>
<tr>
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<th>Seconds</th>
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</tbody>
</table>

**SPECspeed®2017_fp_base = 321**  
**SPECspeed®2017_fp_peak = 326**

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 limit  
'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>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty_ratio=8' run as root.  
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.  
To free node-local memory and avoid remote memory usage,  
'sysctl -w vm.zone_reclaim_mode=1' run as root.  
To clear filesystem caches, 'sync; sysctl -w vm.drop_caches=3' run as root.  
To disable address space layout randomization (ASLR) to reduce run-to-run variability, 'sysctl -w kernel.randomize_va_space=0' run as root.  
To enable Transparent Hugepages (THP) for all allocations,
Operating System Notes (Continued)

'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
To always enable THP for peak runs of:
603.bwaves_s, 607.cactuBSSN_s, 619.lbm_s, 627.cam4_s, 628.pop2_s, 638.imagick_s, 644.nab_s, 649.fotonik3d_s:
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled; echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
To disable THP for peak runs of 621.wrf_s:
'echo never > /sys/kernel/mm/transparent_hugepage/enabled; echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
To enable THP only on request for peak runs of 654.roms_s:
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled; echo madvise > /sys/kernel/mm/transparent_hugepage/defrag' run as root.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-63"
LD_LIBRARY_PATH = "/home/cpu2017/amd_speed_aocc400_genoa_B_lib/lib;"
LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"
MALLOCONF = "oversize_threshold:0,retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "64"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 638.imagick_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 649.fotonik3d_s peak run:
GOMP_CPU_AFFINITY = "0-63"
PGHPF_ZMEM = "yes"
Environment Variables Notes (Continued)

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0 32 1 33 2 34 3 35 4 36 5 37 6 38 7 39 8 40 9 41 10 42
  11 43 12 44 13 45 14 46 15 47 16 48 17 49 18 50 19 51 20 52 21 53 22 54
  23 55 24 56 25 57 26 58 27 59 28 60 29 61 30 62 31 63"

General Notes

Binaries were compiled on a system with 2x AMD EPYC 9174F CPU + 1.5TiB Memory using RHEL 8.6

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.

Platform Notes

BIOS Configuration
  Workload Profile set to General Peak Frequency Compute
  Determinism Control set to Manual
  Performance Determinism set to Power Deterministic
  AMD SMT Option set to Disabled
  Last-Level Cache (LLC) as NUMA Node set to Enabled
  ACPI C2 Latency set to 18 microseconds
  Memory PStates set to Disabled
  Thermal Configuration set to Maximum Cooling
  Workload Profile set to Custom
  Power Regulator set to OS Control Mode

The system ROM used for this result contains microcode version 0xa10110e for the AMD EPYC 9nn4X family of processors. The reference code/AGESA version used in this ROM is version GenoaPI 1.0.0.1-L6

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca6d46d
running on admin1 Mon Jun 27 19:41:21 2022

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

(Continued on next page)
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ProLiant DL385 Gen11

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CPU2017 License: 3
Test Date: Dec-2022
Test Sponsor: HPE
Hardware Availability: Dec-2022
Tested by: HPE
Software Availability: Nov-2022

Platform Notes (Continued)

model name : AMD EPYC 9334 32-Core Processor
2 "physical id"s (chips)
64 "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 : 32
siblings : 32
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
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

From lscpu from util-linux 2.37.2:

Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Address sizes: 52 bits physical, 57 bits virtual
Byte Order: Little Endian
CPU(s): 64
On-line CPU(s) list: 0-63
Vendor ID: AuthenticAMD
Model name: AMD EPYC 9334 32-Core Processor
CPU family: 25
Model: 17
Thread(s) per core: 1
Core(s) per socket: 32
Socket(s): 2
Stepping: 1
Frequency boost: enabled
CPU max MHz: 3911.0000
CPU min MHz: 400.0000
BogoMIPS: 5391.78
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr
pg e mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt
pdpe1gb rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid
aperfperf rapl pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe
popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a
misalignsse 3dnowprefetch osvw ibr skinit wdt tce topoext perfctr_core perfctr_nb
bext perfctr_llc mwaitx cpi cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs
ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 ibr smp cmv censor cmvem crdt_a avx512f
avx512dq rdsseed adx smap avx512ifma clflushopt clwb avx512cd sha_ni avx512bw
avx512vl xsaveopt xsave xgetbv1 xsaves cmq llc cmq_occup llc cmq_mbb_total
cmq_mbb_local avx512_bf16 clzero irperf xsaveprtr rdpru wbnoinvd amd_ppin cppc arat
npt lbrv svm_lock nirr_save tsc_scale vmcb_clean flushbyasid decodeassis
st psfilter pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi umip pku
ospke avx512_vbmi2 gfni vaes vpcm16dq avx512_vnni avx512_bitalg avx512_vpopcntdq
la57 rdpid overflow_recov succor smca ibrm flush_l1d
Virtualization: AMD-V

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

- L1d cache: 2 MiB (64 instances)
- L1i cache: 2 MiB (64 instances)
- L2 cache: 64 MiB (64 instances)
- L3 cache: 256 MiB (8 instances)
- NUMA node(s): 8
- NUMA node0 CPU(s): 0–7
- NUMA node1 CPU(s): 16–23
- NUMA node2 CPU(s): 24–31
- NUMA node3 CPU(s): 8–15
- NUMA node4 CPU(s): 32–39
- NUMA node5 CPU(s): 48–55
- NUMA node6 CPU(s): 56–63
- NUMA node7 CPU(s): 40–47
- Vulnerability Itlb multihit: Not affected
- Vulnerability L1tf: Not affected
- Vulnerability Mds: Not affected
- Vulnerability Meltdown: Not affected
- Vulnerability Mmio stale data: Not affected
- Vulnerability Retbleed: 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; Retpolines, IBPB conditional, IBRS_FW, STIBP disabled, RSB filling, PBRSB-eIBRS Not affected
- Vulnerability Srbds: Not affected
- Vulnerability Txs async abort: Not affected

From lscpu --cache:

<table>
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<tr>
<th>NAME</th>
<th>ONE-SIZE</th>
<th>ALL-SIZE</th>
<th>WAYS</th>
<th>TYPE</th>
<th>LEVEL</th>
<th>SETS</th>
<th>PHY-LINE</th>
<th>COHERENCY-SIZE</th>
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<td>32K</td>
<td>2M</td>
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<td>32M</td>
<td>256M</td>
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<td>Unified</td>
<td>3</td>
<td>32768</td>
<td>1</td>
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</table>

/proc/cpuinfo cache data
- cache size: 1024 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
- node 0 size: 193223 MB
- node 0 free: 193010 MB
- node 1 cpus: 16 17 18 19 20 21 22 23
- node 1 size: 193533 MB
- node 1 free: 193362 MB

(Continued on next page)
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Test Date: Dec-2022
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Platform Notes (Continued)

node 2 cpus: 24 25 26 27 28 29 30 31
node 2 size: 193533 MB
node 2 free: 193314 MB
node 3 cpus: 8 9 10 11 12 13 14 15
node 3 size: 193533 MB
node 3 free: 193360 MB
node 4 cpus: 32 33 34 35 36 37 38 39
node 4 size: 193533 MB
node 4 free: 193241 MB
node 5 cpus: 48 49 50 51 52 53 54 55
node 5 size: 193498 MB
node 5 free: 193206 MB
node 6 cpus: 56 57 58 59 60 61 62 63
node 6 size: 193490 MB
node 6 free: 193137 MB
node 7 cpus: 40 41 42 43 44 45 46 47
node 7 size: 193533 MB
node 7 free: 193293 MB

node distances:

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<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>

From /proc/meminfo
MemTotal: 1585030988 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 22.04.1 LTS

From /etc/*release* /etc/*version*
debian_version: bookworm/sid
os-release: PRETTY_NAME="Ubuntu 22.04.1 LTS"

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen11
(2.70 GHz, AMD EPYC 9334)

SPECspeed®2017_fp_base = 321
SPECspeed®2017_fp_peak = 326

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

Platform Notes (Continued)

NAME="Ubuntu"
VERSION_ID="22.04"
VERSION="22.04.1 LTS (Jammy Jellyfish)"
VERSION_CODENAME=jammy
ID=ubuntu
ID_LIKE=debian
HOME_URL="https://www.ubuntu.com/

uname -a:
    Linux admin1 5.15.0-56-generic #62-Ubuntu SMP Tue Nov 22 19:54:14 UTC 2022 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
mmio_stale_data: Not affected
retbleed: Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store
Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swappgs
barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Retpolines, IBPB:
conditional, IBRS_FW, STIBP:
disabled, RSB filling,
PBRSB-eIBRS: Not affected
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 5 Jun 27 18:30

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/ubuntu--vg-ubuntu--lv ext4 98G 19G 75G 20% /

From /sys/devices/virtual/dmi/id
Vendor: HPE
Product: ProLiant DL385 Gen11
Product Family: ProLiant
Serial: DL385GEN11-003

Additional information from dmidecode 3.3 follows. WARNING: Use caution when you
interpret this section. The 'dmidecode' program reads system data which is "intended to

(Continued on next page)
Platform Notes (Continued)

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:
13x Hynix HMCG94MEBRA121N 64 GB 2 rank 4800
11x Hynix HMCG94MEBRA123N 64 GB 2 rank 4800

BIOS:
BIOS Vendor:       HPE
BIOS Version:      1.12
BIOS Date:         11/24/2022
BIOS Revision:     1.12
Firmware Revision: 1.10

(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 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin

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

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin

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

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)
ProLiant DL385 Gen11
(2.70 GHz, AMD EPYC 9334)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>321</td>
<td>326</td>
</tr>
</tbody>
</table>

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

**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 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-llflag

**Fortran benchmarks:**

-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -Mrecursive
-funroll-loops -mllvm -lsr-in-nested-loop
-mllvm -reduce-array-computations=3 -zopt -fopenmp=libomp -lomp
-lamdlibm -lamdalloc -llflag

**Benchmarks using both Fortran and C:**

-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver4
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-llflag

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

-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen11
(2.70 GHz, AMD EPYC 9334)

SPECspeed®2017_fp_base = 321
SPECspeed®2017_fp_peak = 326

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-\( \text{-Wl,-mllvm -Wl,-reduce-array-computations=3} \)
-\( \text{-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4} \)
-\( \text{-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7} \)
-\( \text{-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000} \)
-\( \text{-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3} \)
-\( \text{-DSPEC_OPENMP -zopt -mllvm -unroll-threshold=100 -finline-aggressive} \)
-\( \text{-mllvm -loop-unswitch-threshold=200000 -Mrecursive -funroll-loops} \)
-\( \text{-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc} \)
-\( \text{-lflang} \)

Base Other Flags

C benchmarks:
-\( \text{-Wno-return-type -Wno-unused-command-line-argument} \)

Fortran benchmarks:
-\( \text{-Wno-unused-command-line-argument} \)

Benchmarks using both Fortran and C:
-\( \text{-Wno-return-type -Wno-unused-command-line-argument} \)

Benchmarks using Fortran, C, and C++:
-\( \text{-Wno-return-type -Wno-unused-command-line-argument} \)

Peak Compiler Invocation

C benchmarks:
\( \text{clang} \)

Fortran benchmarks:
\( \text{flang} \)

Benchmarks using both Fortran and C:
\( \text{flang clang} \)

Benchmarks using Fortran, C, and C++:
\( \text{clang++ clang flang} \)
SPEC CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen11
(2.70 GHz, AMD EPYC 9334)

SPECspeed®2017_fp_base = 321
SPECspeed®2017_fp_peak = 326

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

Test Date: Dec-2022
Hardware Availability: Dec-2022
Software Availability: Nov-2022

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
619.lbm_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-freemap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -liflag

638.imagick_s: Same as 619.lbm_s

644.nab_s: basepeak = yes

Fortran benchmarks:
603.bwaves_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP
-Ofast -march=znver4 -fveclib=AMDLIBM -ffast-math
-fopenmp -Mrecursive -mllvm -reduce-array-computations=3
-fvector-transform -fscalar-transform -fopenmp=libomp
-lomp -lamdlibm -lamdalloc -liflag

649.fotonik3d_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP
-Ofast -march=znver4 -fveclib=AMDLIBM -ffast-math
-fopenmp -flto -Mrecursive
-mllvm -reduce-array-computations=3 -zopt -fopenmp=libomp
-lomp -lamdlibm -lamdalloc -liflag

654.roms_s: Same as 603.bwaves_s

Benchmark using both Fortran and C:
621.wrf_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast

(Continued on next page)
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL385 Gen11  
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| SPECspeed\textsuperscript{®}2017\_fp\_base | 321 |
| SPECspeed\textsuperscript{®}2017\_fp\_peak | 326 |

CPU2017 License: 3  
Test Sponsor: HPE  
Tested by: HPE  
Test Date: Dec-2022  
Hardware Availability: Dec-2022  
Software Availability: Nov-2022

Peak Optimization Flags (Continued)

621.wrf\textsubscript{s} (continued):
-\texttt{-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp}
-\texttt{-flto -fstruct-layout=9 -mllv -unroll-threshold=50}
-\texttt{-fremap-arrays -fstrip-mining}
-\texttt{-mllv -inline-threshold=1000}
-\texttt{-mllv -reduce-array-computations=3 -DSPEC\_OPENMP -zopt}
-\texttt{-O3 -Mrecursive -funroll-loops -mllv -lsr-in-nested-loop}
-\texttt{-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang}

627.cam4\textsubscript{s}: -m64 -Wl,-align-all-nofallthru-blocks=6  
-\texttt{-Wl,-mllv -Wl,-reduce-array-computations=3}
-\texttt{-Wl,-mllv -Wl,-enable-X86-prefetching -Ofast}
-\texttt{-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp}
-\texttt{-flto -fstruct-layout=9 -mllv -unroll-threshold=50}
-\texttt{-fremap-arrays -fstrip-mining}
-\texttt{-mllv -inline-threshold=1000}
-\texttt{-mllv -reduce-array-computations=3 -DSPEC\_OPENMP -zopt}
-\texttt{-Mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdalloc}
-\texttt{-lflang}

628.pop2\textsubscript{s}: -m64 -Wl,-align-all-nofallthru-blocks=6  
-\texttt{-Wl,-mllv -Wl,-reduce-array-computations=3}
-\texttt{-Wl,-mllv -Wl,-enable-X86-prefetching -Ofast}
-\texttt{-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp}
-\texttt{-flto -fstruct-layout=9 -mllv -unroll-threshold=50}
-\texttt{-fremap-arrays -fstrip-mining}
-\texttt{-mllv -inline-threshold=1000}
-\texttt{-mllv -reduce-array-computations=3 -DSPEC\_OPENMP -zopt}
-\texttt{-Mrecursive -fvector-transform -fscalar-transform}
-\texttt{-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang}

Benchmarks using Fortran, C, and C++:

607.cactuBSSN\textsubscript{s}: basepeak = yes

Peak Other Flags

C benchmarks:
-\texttt{-Wno-return-type -Wno-unused-command-line-argument}

Fortran benchmarks:
-\texttt{-Wno-unused-command-line-argument}

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

Benchmarks using both Fortran and C:
- W-no-return-type -W-no-unused-command-line-argument

Benchmarks using Fortran, C, and C++:
- W-no-return-type -W-no-unused-command-line-argument

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-Genoa-rev2.1.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-Genoa-rev2.1.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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