## SPEC CPU®2017 Floating Point Speed Result

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**Hewlett Packard Enterprise**
(Test Sponsor: HPE)
ProLiant DL385 Gen11
(4.10 GHz, AMD EPYC 9174F)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>261</td>
<td>268</td>
</tr>
</tbody>
</table>

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

### Hardware

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>1460</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
<td>208</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>32</td>
<td>208</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>32</td>
<td>162</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>32</td>
<td>135</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>32</td>
<td>71.4</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>32</td>
<td>258</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>32</td>
<td>402</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
<td>213</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
<td>401</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

**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

**CPU Name:** AMD EPYC 9174F
**Max MHz:** 4400
**Nominal:** 4100
**Enabled:** 32 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:** 256 MB I+D on chip per chip,
32 MB shared / 2 cores
**Other:** None

**Memory:** 1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)
**Storage:** 1 x 480 GB SATA SSD
**Other:** None

**Test Date:** Jan-2023
**Hardware Availability:** Dec-2022
**Software Availability:** Nov-2022
Hewlett Packard Enterprise
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SPECspeed®2017_fp_base = 261
SPECspeed®2017_fp_peak = 268

Results Table

<table>
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<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Threads</td>
<td>Seconds</td>
</tr>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>40.3</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
<td>47.3</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>32</td>
<td>25.0</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>32</td>
<td>81.7</td>
</tr>
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<td>32</td>
<td>65.4</td>
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<td>32</td>
<td>166</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>32</td>
<td>55.8</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>32</td>
<td>43.5</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
<td>42.4</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
<td>39.2</td>
</tr>
</tbody>
</table>

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,

(Continued on next page)
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---

### 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'  
r OUN 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'  
r UN 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'  
r UN as root. 
```

---

### Environment Variables Notes

Environment variables set by runcpu before the start of the run:
- GOMP_CPU_AFFINITY = "0-31"  
- LD_LIBRARY_PATH = "/home/CPU2017/amd_speed_aocc400_genoa_B_lib/lib:"  
- LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"  
- MALLOC_CONF = "oversize_threshold:0,retain:true"  
- OMP_DYNAMIC = "false"  
- OMP_SCHEDULE = "static"  
- OMP_STACKSIZE = "128M"  
- OMP_THREAD_LIMIT = "32"

Environment variables set by runcpu during the 603.bwaves_s peak run:
- GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 621.wrf_s peak run:
- GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 627.cam4_s peak run:
- GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 628.pop2_s peak run:
- GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 638.imagick_s peak run:
- GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 649.fotonik3d_s peak run:
- GOMP_CPU_AFFINITY = "0-31"
- PGHPF_ZMEM = "yes"

Environment variables set by runcpu during the 654.roms_s peak run:
- GOMP_CPU_AFFINITY = "0 16 1 17 2 18 3 19 4 20 5 21 6 22 7 23 8 24 9 25 10 26"

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Environment Variables Notes (Continued)

11 27 12 28 13 29 14 30 15 31"

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 CST 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 982a61ec0915b55891ef0e16aaca64d
running on admin1 Mon Jun 27 19:06:53 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
model name : AMD EPYC 9174F 16-Core Processor
  2 "physical id"s (chips)
  32 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following (Continued on next page)
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Platform Notes (Continued)

excerpts from /proc/cpuinfo might not be reliable. Use with caution.)

```plaintext
cpu cores : 16
siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
```

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):                            32
On-line CPU(s) list:               0-31
Vendor ID:                         AuthenticAMD
Model name:                        AMD EPYC 9174F 16-Core Processor
CPU family:                        25
Model:                             17
Thread(s) per core:                1
Core(s) per socket:                16
Socket(s):                         2
Stepping:                          1
Frequency boost:                   enabled
CPU max MHz:                       4409.0000
CPU min MHz:                       400.0000
BogoMIPS:                          8187.04
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
                                   pdcmpect l1t constant_tsc rep_good nopl nonstop_tsc cpubid extd_apicid
                                   aperfnrperf rapl pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe
                                   popcnt aes avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a
                                   misalignsse 3dnowprefetch osrv ibs skinit wdt tce topoext perfctr_core perfctr_nb
                                   bportal perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs
                                   ibpbi stibp vmmcall fsqsbase bm11 avx2 smep bmi2 erms invpcid cmq rdt_a avx512f
                                   avx512dq rdseed adx smap avx512ifma clflushopt clwb avx512cd sha_ni avx512bw
                                   avx512vl xsaveopt xsaves xgetbvb xsavees cmq_llc cqm_occup_llc cmq_mmb_total
                                   cmq_mbm_local avx512_bf16 clzero irperfx xsaveerptr rdprr wboinvd amd_pippin cpcc arat
                                   npt lbrv svm_lock nrip_save_tsc_scale vmcb_clean flushbyasid decodeassists
                                   pausefilter pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi umip pku
                                   ospke avx512_vbmi2 gfni vaes vpc1mulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq
                                   la57 rdpid overflow_recover succor smca fsrm flush_lld
Virtualization:                   AMD-V
L1d cache:                        1 MiB (32 instances)
L1i cache:                        1 MiB (32 instances)
L2 cache:                         32 MiB (32 instances)
L3 cache:                         512 MiB (16 instances)
NUMA node(s):                     16
NUMA node0 CPU(s):                0,1
```

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

- **NUMA node1 CPU(s):** 8, 9
- **NUMA node2 CPU(s):** 4, 5
- **NUMA node3 CPU(s):** 12, 13
- **NUMA node4 CPU(s):** 6, 7
- **NUMA node5 CPU(s):** 14, 15
- **NUMA node6 CPU(s):** 2, 3
- **NUMA node7 CPU(s):** 10, 11
- **NUMA node8 CPU(s):** 16, 17
- **NUMA node9 CPU(s):** 24, 25
- **NUMA node10 CPU(s):** 20, 21
- **NUMA node11 CPU(s):** 28, 29
- **NUMA node12 CPU(s):** 22, 23
- **NUMA node13 CPU(s):** 30, 31
- **NUMA node14 CPU(s):** 18, 19
- **NUMA node15 CPU(s):** 26, 27

**Vulnerability Itlb multihit:** Not affected
**Vulnerability Itlif:** 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 Srbdss:** Not affected
**Vulnerability Tsx async abort:** Not affected

---

**From lscpu --cache:**
```
NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d  32K   1M    8 Data   1 64  1   64
L1i  32K   1M    8 Instruction 1 64  1   64
L2   1M    32M   8 Unified  2 2048 1 64
L3   32M   512M  16 Unified 3 32768 1 64
```

**From numactl --hardware**
```
WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 16 nodes (0-15)
node 0 cpus: 0 1
node 0 size: 96456 MB
node 0 free: 96316 MB
node 1 cpus: 8 9
```

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CPU2017 License: 3
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**Platform Notes (Continued)**

```
node 1 size: 96767 MB
node 1 free: 96618 MB
node 2 cpus: 4 5
node 2 size: 96767 MB
node 2 free: 96670 MB
node 3 cpus: 12 13
node 3 size: 96767 MB
node 3 free: 96571 MB
node 4 cpus: 6 7
node 4 size: 96767 MB
node 4 free: 96695 MB
node 5 cpus: 14 15
node 5 size: 96731 MB
node 5 free: 96639 MB
node 6 cpus: 2 3
node 6 size: 96767 MB
node 6 free: 96635 MB
node 7 cpus: 10 11
node 7 size: 96767 MB
node 7 free: 96671 MB
node 8 cpus: 16 17
node 8 size: 96767 MB
node 8 free: 96629 MB
node 9 cpus: 24 25
node 9 size: 96767 MB
node 9 free: 96702 MB
node 10 cpus: 20 21
node 10 size: 96767 MB
node 10 free: 96701 MB
node 11 cpus: 28 29
node 11 size: 96767 MB
node 11 free: 96706 MB
node 12 cpus: 18 19
node 12 size: 96767 MB
node 12 free: 96706 MB
node 13 cpus: 30 31
node 13 size: 96767 MB
node 13 free: 96701 MB
node 14 cpus: 18 19
node 14 size: 96767 MB
node 14 free: 96706 MB
node 15 cpus: 26 27
node 15 size: 96767 MB
node 15 free: 96706 MB
node distances:
node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
  0: 10 11 11 11 11 11 11 32 32 32 32 32 32 32 32 32
```
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Platform Notes (Continued)


From /proc/meminfo
MemTotal:       1585035472 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"
   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:

(Continued on next page)
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Platform Notes (Continued)

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/swapgs 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 437G 38G 381G 9% /

From /sys/devices/virtual/dmi/id
Vendor: HPE
Product: ProLiant DL385 Gen11
Product Family: ProLiant
Serial: DL385G11-008

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 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:
24x Samsung M321R8GA0BB0-CQKDG 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)
**SPEC CPU®2017 Floating Point Speed Result**

**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
```

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

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

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Compiler Version Notes (Continued)

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

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
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen11
(4.10 GHz, AMD EPYC 9174F)

SPECspeed®2017_fp_base = 261
SPECspeed®2017_fp_peak = 268

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

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 -lamlidlibm -lamdalloc
-lflang

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
-lamlidlibm -lamdalloc -lflang

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
-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 -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamlidlibm -lamdalloc
-lflang

Benchmarks using Fortran, C, and C++:
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -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 -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamlidlibm -lamdalloc
-lflang
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen11
(4.10 GHz, AMD EPYC 9174F)

SPECspeed®2017_fp_base = 261
SPECspeed®2017_fp_peak = 268

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

Test Date: Jan-2023
Hardware Availability: Dec-2022
Software Availability: Nov-2022

Base Other Flags

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

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

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

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

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: -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

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

638.imagick_s (continued):
- freemap-arrays -fstrip-mining
- mlvm -inline-threshold=1000
- mlvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
- fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

644.nab_s: basepeak = yes

Fortran benchmarks:

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

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

654.roms_s: Same as 603.bwaves_s

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -Wl, -mlvm -Wl, -align-all-nofallthru-blocks=6
-Wl, -mlvm -Wl, -reduce-array-computations=3
-Wl, -mlvm -Wl, -enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mlvm -unroll-threshold=50
-freemap-arrays -fstrip-mining
-mlvm -inline-threshold=1000
-mlvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-O3 -Mrecursive -funroll-loops -mlvm -lsr-in-nested-loop
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

627.cam4_s: -m64 -Wl, -mlvm -Wl, -align-all-nofallthru-blocks=6
-Wl, -mlvm -Wl, -reduce-array-computations=3
-Wl, -mlvm -Wl, -enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mlvm -unroll-threshold=50
### Peak Optimization Flags (Continued)

627.cam4_s (continued):
- fremap-arrays -fstrip-mining
- mllvm -inline-threshold=1000
- mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
- Mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdalloc
  -lflang

628.pop2_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
- Wl,-mllvm -Wl,-reduce-array-computations=3
- Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast
- march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
- flto -fstruct-layout=9 -mllvm -unroll-threshold=50
- fremap-arrays -fstrip-mining
- mllvm -inline-threshold=1000
- mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
- Mrecursive -fvector-transform -fscalar-transform
  -fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

### Peak Other Flags

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

**Fortran benchmarks:**
- -Wno-unused-command-line-argument

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

**Benchmarks using Fortran, C, and C++:**
- -Wno-return-type -Wno-unused-command-line-argument

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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-Genoa-rev2.1.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-Genoa-rev2.1.xml)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen11
(4.10 GHz, AMD EPYC 9174F)

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