### SPEC CPU®2017 Floating Point Speed Result

**Hewlett Packard Enterprise**  
ProLiant DL365 Gen11  
(3.60 GHz, AMD EPYC 9474F)

**SPECspeed®2017_fp_base = 385**  
**SPECspeed®2017_fp_peak = 391**

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name: AMD EPYC 9474F</td>
<td>OS: Ubuntu 22.04.1 LTS</td>
</tr>
<tr>
<td>Max MHz: 4100</td>
<td>Kernel 5.15.0-50-generic</td>
</tr>
<tr>
<td>Nominal: 3600</td>
<td>Compiler: C/C++/Fortran: Version 4.0.0 of AOCC</td>
</tr>
<tr>
<td>Enabled: 96 cores, 2 chips</td>
<td>Parallel: Yes</td>
</tr>
<tr>
<td>Orderable: 1.2 chips</td>
<td>Firmware: HPE BIOS Version v1.12 11/24/2022 released</td>
</tr>
<tr>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
<td>File System: ext4</td>
</tr>
<tr>
<td>L2: 1 MB I+D on chip per core</td>
<td>System State: Run level 5 (multi-user)</td>
</tr>
<tr>
<td>L3: 256 MB I+D on chip per chip, 32 MB shared / 6 cores</td>
<td>Base Pointers: 64-bit</td>
</tr>
<tr>
<td>Other: None</td>
<td>Peak Pointers: 64-bit</td>
</tr>
<tr>
<td>Memory: 1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)</td>
<td>Other: None</td>
</tr>
<tr>
<td>Storage: 1 x 480 GB SATA SSD</td>
<td>Power Management: BIOS and OS set to prefer performance at the cost of additional power usage</td>
</tr>
<tr>
<td>Other: None</td>
<td></td>
</tr>
</tbody>
</table>

<table>
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<tr>
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<td>Software Availability: Nov-2022</td>
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**Test Sponsor:** HPE  
Hewlett Packard Enterprise  
ProLiant DL365 Gen11  
(3.60 GHz, AMD EPYC 9474F)

**CPU2017 License:** 3  
**Test Date:** Jan-2023  
**Hardware Availability:** Dec-2022  
**Test Sponsor:** HPE  
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<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (385)</th>
<th>SPECspeed®2017_fp_peak (391)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>96</td>
<td>96</td>
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<tr>
<td>100</td>
<td>96</td>
<td>96</td>
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<td>1500</td>
<td>96</td>
<td>96</td>
</tr>
<tr>
<td>1550</td>
<td>96</td>
<td>96</td>
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**603.bwaves_s**  
607.cactuBSSN_s  
619.lbm_s  
621.wrf_s  
627.cam4_s  
628.pop2_s  
638.imagick_s  
644.nab_s  
649.fotonik3d_s  
654.roms_s  

**Threads**

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<td>1500</td>
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<tr>
<td>1550</td>
<td>96</td>
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**Specspeed®2017_fp_base = 385**  
**Specspeed®2017_fp_peak = 391**
Spec CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL365 Gen11
(3.60 GHz, AMD EPYC 9474F)

SPECspeed®2017_fp_base = 385
SPECspeed®2017_fp_peak = 391

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>96</td>
<td>38.7</td>
<td>1520</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td>28.3</td>
<td>589</td>
<td>28.3</td>
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<td>28.2</td>
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<tr>
<td>619.lbm_s</td>
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<tr>
<td>621.wrf_s</td>
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<td>627.cam4_s</td>
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<tr>
<td>628.pop2_s</td>
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<td>139</td>
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<tr>
<td>638.imagick_s</td>
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<td>622</td>
<td>23.2</td>
<td>621</td>
<td>23.3</td>
<td>620</td>
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<tr>
<td>644.nab_s</td>
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<td>21.4</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>96</td>
<td>43.4</td>
<td>210</td>
<td>42.3</td>
<td>216</td>
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<td>215</td>
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<tr>
<td>654.roms_s</td>
<td>96</td>
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<td>613</td>
<td>25.7</td>
<td>612</td>
<td>25.8</td>
<td>609</td>
<td>25.8</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.

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)
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 = "0-95"
LD_LIBRARY_PATH = "/home/cpu2017/amd_speed_aocc400_genoa_B_lib/lib;"
LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"
MALLOCC_CONF = "oversize_threshold:0,retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "96"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-95"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0-95"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-95"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0-95"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-95"

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)
(Continued on next page)
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

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

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.

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

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 982a61ec0915b55891ef0e16acafc64d
running on admin1 Tue Jun 28 00:38:24 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 9474F 48-Core Processor
  2 "physical id"s (chips)
  96 "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 : 48
siblings : 48
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
  32 33 34 35 36 37 40 41 42 43 44 45 48 49 50 51 52 53 56 57 58 59 60 61
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
  32 33 34 35 36 37 40 41 42 43 44 45 48 49 50 51 52 53 56 57 58 59 60 61

From lscpu from util-linux 2.37.2:
Architecture: x86_64

(Continued on next page)
Platform Notes (Continued)

CPU op-mode(s): 32-bit, 64-bit
Address sizes: 52 bits physical, 57 bits virtual
Byte Order: Little Endian
CPU(s): 96
On-line CPU(s) list: 0-95
Vendor ID: AuthenticAMD
Model name: AMD EPYC 9474F 48-Core Processor
CPU family: 25
Model: 17
Thread(s) per core: 1
Core(s) per socket: 48
Socket(s): 2
Stepping: 1
Frequency boost: enabled
CPU max MHz: 4114.0000
CPU min MHz: 400.0000
BogoMIPS: 7188.96
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 nopl nonstop_tsc cpuid ext_apicid aperfmperf rapi 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 osvw lmskinit wdt tce topoext perfctr_core perfctr_nb perfctr_l1d mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsqsbase bm1 avx2 smep bm12 erns invpcid cmq rdt_a avx512f avx512dq rdseed advx avx512ifma clflushopt clwb avx512cd sha_nl avx512bw avx512vl xsaveopt xsaves xgetbv1 xsaves cmq_occup_l1c cmq_mbb_total cmq_mbb_local avx512_bf16 clzero irperf xsavertr rdrpu wbnoinvd amd_ppin ccmp arat npt lbv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold avic v_vmsave_vmload vgif v_specctrl avx512vbmi umip pku ospe avx512_vbmi2 gfi vaes vpcm1ulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq la57 rdpid overflow_recov succor smca fsrm flush_l1d

Virtualization: AMD-V
L1d cache: 3 MiB (96 instances)
L1i cache: 3 MiB (96 instances)
L2 cache: 96 MiB (96 instances)
L3 cache: 512 MiB (16 instances)
NUMA node(s): 16
NUMA node0 CPU(s): 0-5
NUMA node1 CPU(s): 24-29
NUMA node2 CPU(s): 12-17
NUMA node3 CPU(s): 36-41
NUMA node4 CPU(s): 18-23
NUMA node5 CPU(s): 42-47
NUMA node6 CPU(s): 6-11
NUMA node7 CPU(s): 30-35
NUMA node8 CPU(s): 48-53

(Continued on next page)
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Platform Notes (Continued)

NUMA node9 CPU(s): 72-77
NUMA node10 CPU(s): 60-65
NUMA node11 CPU(s): 84-89
NUMA node12 CPU(s): 66-71
NUMA node13 CPU(s): 90-95
NUMA node14 CPU(s): 54-59
NUMA node15 CPU(s): 78-83
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 Tsx async abort: Not affected

From lscpu --cache:
NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 32K 3M 8 Data 1 64 1 64
L1i 32K 3M 8 Instruction 1 64 1 64
L2 1M 96M 8 Unified 2 2048 1 64
L3 32M 512M 16 Unified 3 32768 1 64

/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: 16 nodes (0-15)
node 0 cpus: 0 1 2 3 4 5
node 0 size: 96456 MB
node 0 free: 96251 MB
node 1 cpus: 24 25 26 27 28 29
node 1 size: 96766 MB
node 1 free: 96545 MB
node 2 cpus: 12 13 14 15 16 17
node 2 size: 96766 MB
node 2 free: 96545 MB
node 3 cpus: 36 37 38 39 40 41
node 3 size: 96766 MB
node 3 free: 96612 MB

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

- node 4 cpus: 18 19 20 21 22 23
- node 4 size: 96730 MB
- node 4 free: 96551 MB
- node 5 cpus: 42 43 44 45 46 47
- node 5 size: 96766 MB
- node 5 free: 96578 MB
- node 6 cpus: 6 7 8 9 10 11
- node 6 size: 96766 MB
- node 6 free: 96537 MB
- node 7 cpus: 30 31 32 33 34 35
- node 7 size: 96766 MB
- node 7 free: 96643 MB
- node 8 cpus: 48 49 50 51 52 53
- node 8 size: 96766 MB
- node 8 free: 96669 MB
- node 9 cpus: 72 73 74 75 76 77
- node 9 size: 96766 MB
- node 9 free: 96667 MB
- node 10 cpus: 60 61 62 63 64 65
- node 10 size: 96766 MB
- node 10 free: 96673 MB
- node 11 cpus: 84 85 86 87 88 89
- node 11 size: 96766 MB
- node 11 free: 96659 MB
- node 12 cpus: 66 67 68 69 70 71
- node 12 size: 96766 MB
- node 12 free: 96667 MB
- node 13 cpus: 90 91 92 93 94 95
- node 13 size: 96766 MB
- node 13 free: 96622 MB
- node 14 cpus: 54 55 56 57 58 59
- node 14 size: 96766 MB
- node 14 free: 96670 MB
- node 15 cpus: 78 79 80 81 82 83
- node 15 size: 96766 MB
- node 15 free: 96666 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 11 32 32 32 32 32 32 32
- 1: 11 10 11 11 11 11 11 11 32 32 32 32 32 32 32
- 8: 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32

(Continued on next page)
 Platform Notes (Continued)


From /proc/meminfo
   MemTotal:       1585015520 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

/sbin/tuned-adm active
   Current active profile: balanced

/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 5.15.0-50-generic #56-Ubuntu SMP Tue Sep 20 13:23:26 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

(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result
Copyright 2017-2023 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL365 Gen11
(3.60 GHz, AMD EPYC 9474F)

SPECspeed®2017_fp_base = 385
SPECspeed®2017_fp_peak = 391

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

Platform Notes (Continued)

Bypass disabled via prctl and seccomp
Mitigation: usercopy/swapsgs barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1):
Mitigation: Retpolines, IBPB: conditional, IBRS_FW, STIBP: disabled, RSB filling, PBRSB-eIBRS: Not affected
CVE-2017-5715 (Spectre variant 2):
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 5 Jun 28 00:00
SPEC is set to: /home/cpu2017

From /sys/devices/virtual/dmi/id
Vendor:         HPE
Product:        ProLiant DL365 Gen11
Product Family: ProLiant
Serial:         DL365G11-001

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 SMBSIO" standard.
Memory:
  24x Hynix HMCG94AEBRA103N 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
==============================================================================
<table>
<thead>
<tr>
<th>C</th>
<th>619.lbm_s(base, peak) 638.imagick_s(base, peak)</th>
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<tbody>
<tr>
<td></td>
<td>644.nab_s(base, peak)</td>
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</table>
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Hewlett Packard Enterprise
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**SPECspeed®2017_fp_base = 385**
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<td>Jan-2023</td>
<td>Dec-2022</td>
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<tr>
<th>Software Availability</th>
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<tbody>
<tr>
<td>Nov-2022</td>
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</tbody>
</table>

Compiler Version Notes (Continued)

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)

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

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

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

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

Compiler Version Notes (Continued)

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

Base Optimization Flags

C benchmarks:
-m64 -Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlllvm -Wl,-reduce-array-computations=3 -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mlllvm -unroll-threshold=50 -mlllvm -inline-threshold=1000

(Continued on next page)
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Software Availability: Nov-2022

Base Optimization Flags (Continued)

C benchmarks (continued):
-fremap-arrays -fstrip-mining -mlllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang

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

Benchmarks using both Fortran and C:
-m64 -Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-mlllvm -Wl,-reduce-array-computations=3
-Wl,-mlllvm -Wl,-enable-X86-prefetching -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mlllvm -unroll-threshold=50 -mlllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mlllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -Mrecursive -funroll-loops
-mlllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang

Benchmarks using Fortran, C, and C++:
-m64 -Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-mlllvm -Wl,-reduce-array-computations=3
-Wl,-mlllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mlllvm -unroll-threshold=50 -mlllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mlllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -mlllvm -unroll-threshold=100 -finline-aggressive
-mlllvm -loop-unswitch-threshold=200000 -Mrecursive -funroll-loops
-mlllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang

Base Other Flags

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

Fortran benchmarks:
-Wno-unused-command-line-argument
SPEC CPU®2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
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HPE

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CPU2017 License: 3
Test Sponsor: HPE
Test Date: Jan-2023
Tested by: HPE

Test Sponsor: HPE
Hardware Availability: Dec-2022
Software Availability: Nov-2022

Base Other Flags (Continued)

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: -m64 -Wl,-mllvm -Wl,-align-all-nofallthrublocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -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
-fopenmp=libomp -lomp -lamdlibm -lamdaloc -lflang

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

638.imagick_s: basepeak = yes

644.nab_s: basepeak = yes

Fortran benchmarks:

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

649.fotonik3d_s: basepeak = yes

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-mlllvm -Wl,-reduce-array-computations=3
-mlllvm -m64 -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mlllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mlllvm -inline-threshold=1000
-mlllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-o3 -Mrecursive -funroll-loops -mlllvm -lsr-in-nested-loop
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

627.cam4_s: -m64 -Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-mlllvm -m64 -Wl,-reduce-array-computations=3
-mlllvm -m64 -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mlllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mlllvm -inline-threshold=1000
-mlllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-Mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang

628.pop2_s: -m64 -Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-mlllvm -m64 -Wl,-reduce-array-computations=3
-mlllvm -m64 -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
Peak Optimization Flags (Continued)

628.pop2_s (continued):
- 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

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
http://www.spec.org/cpu2017/flags/aocc400-flags.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
http://www.spec.org/cpu2017/flags/aocc400-flags.xml

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.