## SPEC CPU®2017 Floating Point Speed Result

**Hewlett Packard Enterprise**  
**ProLiant DL345 Gen11**  
(2.75 GHz, AMD EPYC 9454P)

**SPECspeed®2017_fp_base = 254**  
**SPECspeed®2017_fp_peak = 258**

<table>
<thead>
<tr>
<th>Test Sponsor:</th>
<th>HPE</th>
<th>Hardware Availability:</th>
<th>Nov-2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested by:</td>
<td>HPE</td>
<td>Software Availability:</td>
<td>Nov-2022</td>
</tr>
</tbody>
</table>

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (254)</th>
<th>SPECspeed®2017_fp_peak (258)</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>48</td>
<td>795</td>
<td>940</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>48</td>
<td>407</td>
<td>407</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>48</td>
<td>141</td>
<td>141</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>48</td>
<td>190</td>
<td>198</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>48</td>
<td>169</td>
<td>169</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>48</td>
<td>93.8</td>
<td>97.1</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>48</td>
<td>331</td>
<td>331</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>48</td>
<td>487</td>
<td>487</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>48</td>
<td>152</td>
<td>152</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>48</td>
<td>336</td>
<td>349</td>
</tr>
</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>AMD EPYC 9454P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz:</td>
<td>3800</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2750</td>
</tr>
<tr>
<td>Enabled:</td>
<td>48 cores, 1 chip</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1 chip</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>256 MB I+D on chip per chip, 32 MB shared / 6 cores</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>384 GB (12 x 32 GB 2Rx8 PC5-4800B-R)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 1.6 TB NVMe SSD, RAID 0</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>OS:</th>
<th>Red Hat Enterprise Linux 9.0 (Plow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++/Fortran: Version 4.0.0 of AOCC</td>
</tr>
<tr>
<td>Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>Firmware:</td>
<td>HPE BIOS Version v1.12 11/24/2022 released Nov-2022</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Power Management:</td>
<td>BIOS and OS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>
Spec CPU®2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen11
(2.75 GHz, AMD EPYC 9454P)

SPECspeed®2017_fp_base = 254
SPECspeed®2017_fp_peak = 258

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>48</td>
<td>74.2</td>
<td>795</td>
<td>74.4</td>
<td>793</td>
<td>74.3</td>
<td>794</td>
<td>48</td>
<td>74.2</td>
<td>795</td>
<td>74.1</td>
<td>796</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>48</td>
<td>40.5</td>
<td>411</td>
<td>41.5</td>
<td>402</td>
<td>40.9</td>
<td>407</td>
<td>48</td>
<td>40.7</td>
<td>410</td>
<td>41.9</td>
<td>398</td>
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<tr>
<td>619.lbm_s</td>
<td>48</td>
<td>37.1</td>
<td>141</td>
<td>37.3</td>
<td>140</td>
<td>37.2</td>
<td>141</td>
<td>48</td>
<td>37.3</td>
<td>140</td>
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<td>142</td>
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<tr>
<td>621.wrf_s</td>
<td>48</td>
<td>69.6</td>
<td>190</td>
<td>69.4</td>
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<td>69.5</td>
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<td>48</td>
<td>66.9</td>
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<td>66.7</td>
<td>198</td>
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<td>627.cam4_s</td>
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<td>52.4</td>
<td>169</td>
<td>52.5</td>
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<td>52.5</td>
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<tr>
<td>628.pop2_s</td>
<td>48</td>
<td>127</td>
<td>93.4</td>
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<td>638.imagick_s</td>
<td>48</td>
<td>43.8</td>
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<td>59.6</td>
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<td>59.8</td>
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<td>654.roms_s</td>
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<td>46.9</td>
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<td>46.8</td>
<td>336</td>
<td>46.7</td>
<td>337</td>
<td>48</td>
<td>45.1</td>
<td>349</td>
<td>45.0</td>
<td>350</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.

(Continued on next page)
Operating System Notes (Continued)

To enable Transparent Hugepages (THP) for all allocations,
'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 = "0-47"
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 = "48"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0 24 1 25 2 26 3 27 4 28 5 29 6 30 7 31 8 32 9 33 10 34
11 35 12 36 13 37 14 38 15 39 16 40 17 41 18 42 19 43 20 44 21 45 22 46
23 47"
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen11
(2.75 GHz, AMD EPYC 9454P)

SPECspeed®2017_fp_base = 254
SPECspeed®2017_fp_peak = 258

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

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 0x0A10110e 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 982a61ec0915b55891ef0e16aca64d
running on localhost.localdomain Thu Apr 7 05:31:28 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 9454P 48-Core Processor
  1 "physical id"s (chips)
  48 "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 6 7 8 9 10 11 12 13 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 32 33 34 35 36 37 40 41 42 43 44 45 48 49 50 51 52 53 54 55 56 57 58 59 60 61

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen11
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SPECspeed®2017_fp_base = 254
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE
Hardware Availability: Nov-2022
Software Availability: Nov-2022

Platform Notes (Continued)

From lscpu from util-linux 2.37.4:
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): 48
On-line CPU(s) list: 0-47
Vendor ID: AuthenticAMD
BIOS Vendor ID: Advanced Micro Devices, Inc.
Model name: AMD EPYC 9454P 48-Core Processor
BIOS Model name: AMD EPYC 9454P 48-Core Processor
CPU family: 25
Model: 17
Thread(s) per core: 1
Core(s) per socket: 48
Socket(s): 1
Stepping: 1
Frequency boost: enabled
CPU max MHz: 3810.7910
CPU min MHz: 1500.0000
BogoMIPS: 5491.86
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 extd_apicid aperfmerp rapl pni pclmulqdq monitor vsyscall svm_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw ibs skinit wdt tcpe topoext perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsqosbase bmi1 avx2 smep bmi2 ems invpcid cqm rdt_a avx512f avx512fd qd rseed adx smap avx512ifma clflushopt clwb avx512cd sha ni avx512bw avx512vl xsaveopt xsaves xsave xsaves cgq llc cgq_occup_llc cgq_mmb_total cgq_mmb_local avx512 lf16 czero irperf xsaveopt xsaveopt ptr rdpru wbinvd amd_ppin arat npt lbv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pthreshold avic v_umsave_vmload vgig v_spec_ctrl avx512vbmi umip pku ospe avx512vbmii gfi vaes vpcmulq dq avx512_vnni avx512_vbitalg avx512_vpopcntdq 1a57 rdpid overflow_recov succor smca fsrm flush_l1d
Virtualization: AMD-V
L1d cache: 1.5 MiB (48 instances)
L1i cache: 1.5 MiB (48 instances)
L2 cache: 48 MiB (48 instances)
L3 cache: 256 MiB (8 instances)
NUMA node(s): 8
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
Hewlett Packard Enterprise
[Test Sponsor: HPE]
ProLiant DL345 Gen11
(2.75 GHz, AMD EPYC 9454P)

SPEC CPU®2017 Floating Point Speed Result
Copyright 2017-2023 Standard Performance Evaluation Corporation

SPECspeed®2017_fp_base = 254
SPECspeed®2017_fp_peak = 258

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE
Test Date: Jan-2023
Hardware Availability: Nov-2022
Software Availability: Nov-2022

Platform Notes (Continued)

NUMA node5 CPU(s):               42-47
NUMA node6 CPU(s):               6-11
NUMA node7 CPU(s):               30-35
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
Vulnerability Spectre v1:        Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2:        Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP disabled, RSB filling
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  1.5M   8 Data            1    64        1             64
L1i  32K  1.5M   8 Instruction     1    64        1             64
L2   1M   48M   8 Unified          2  2048        1             64
L3   32M  256M  16 Unified         3 32768        1             64

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
node 0 size: 48136 MB
node 0 free: 47882 MB
node 1 cpus: 24 25 26 27 28 29
node 1 size: 48382 MB
node 1 free: 48242 MB
node 2 cpus: 12 13 14 15 16 17
node 2 size: 48382 MB
node 2 free: 47917 MB
node 3 cpus: 36 37 38 39 40 41
node 3 size: 48382 MB
node 3 free: 48242 MB
node 4 cpus: 18 19 20 21 22 23
node 4 size: 48382 MB
node 4 free: 48131 MB
node 5 cpus: 42 43 44 45 46 47
node 5 size: 48297 MB
node 5 free: 48158 MB

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

```
node 6 cpus: 6 7 8 9 10 11
node 6 size: 48382 MB
node 6 free: 48222 MB
node 7 cpus: 30 31 32 33 34 35
node 7 size: 48382 MB
node 7 free: 48242 MB
node distances:
  node   0   1   2   3   4   5   6   7
  0:  10  11  11  11  11  11  11  11
  1:  11  10  11  11  11  11  11  11
  2:  11  11  10  11  11  11  11  11
  3:  11  11  11  10  11  11  11  11
  4:  11  11  11  11  10  11  11  11
  5:  11  11  11  11  11  10  11  11
  6:  11  11  11  11  11  11  10  11
  7:  11  11  11  11  11  11  11  10

From /proc/meminfo
  MemTotal:       396010920 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

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

```
From /etc/*release*/etc/*version*

  os-release:
    NAME="Red Hat Enterprise Linux"
    VERSION="9.0 (Plow)"
    ID="rhel"
    ID_LIKE="fedora"
    VERSION_ID="9.0"
    PLATFORM_ID="platform:el9"
    PRETTY_NAME="Red Hat Enterprise Linux 9.0 (Plow)"
    ANSI_COLOR="0;31"
  redhat-release: Red Hat Enterprise Linux release 9.0 (Plow)
  system-release: Red Hat Enterprise Linux release 9.0 (Plow)
  system-release-cpe: cpe:/o:redhat:enterprise_linux:9::baseos

uname -a:
  Linux localhost.localdomain 5.14.0-70.13.1.el9_0.x86_64 #1 SMP PREEMPT Thu Apr 14 12:42:38 EDT 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
```

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen11
(2.75 GHz, AMD EPYC 9454P)

**SPECspeed®2017_fp_base = 254**

**SPECspeed®2017_fp_peak = 258**

<table>
<thead>
<tr>
<th>CPU2017 License</th>
<th>Test Date</th>
<th>Hardware Availability</th>
<th>Software Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Jan-2023</td>
<td>Nov-2022</td>
<td>Nov-2022</td>
</tr>
</tbody>
</table>

**Platform Notes (Continued)**

- Microarchitectural Data Sampling:
  - CVE-2017-5754 (Meltdown): Not affected
  - CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl
  - CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swapsgs barriers and __user pointer sanitization
  - CVE-2017-5715 (Spectre variant 2): Mitigation: Retpolines, IBPB: conditional, IBRS_FW, STIBP: disabled, RSB filling
  - CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
  - CVE-2019-11135 (TSX Asynchronous Abort): Not affected

**run-level 3 Apr 7 05:30**

**SPEC is set to: /home/CPU2017**

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/mapper/rhel-home</td>
<td>xfs</td>
<td>819G</td>
<td>23G</td>
<td>796G</td>
<td>3%</td>
<td>/home</td>
</tr>
</tbody>
</table>

**From /sys/devices/virtual/dmi/id**

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Product</th>
<th>Product Family</th>
<th>Serial</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPE</td>
<td>ProLiant DL345 Gen11</td>
<td>ProLiant</td>
<td>DL345G11-004</td>
</tr>
</tbody>
</table>

**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:**

12x Hynix HMCG88MEBRA113N 32 GB 2 rank 4800

**BIOS:**

<table>
<thead>
<tr>
<th>BIOS Vendor</th>
<th>BIOS Version</th>
<th>BIOS Date</th>
<th>BIOS Revision</th>
<th>Firmware Revision</th>
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</thead>
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<tr>
<td>HPE</td>
<td>1.12</td>
<td>11/24/2022</td>
<td>1.12</td>
<td>1.10</td>
</tr>
</tbody>
</table>

(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)
```

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen11
(2.75 GHz, AMD EPYC 9454P)

SPECspeed®2017_fp_base = 254
SPECspeed®2017_fp_peak = 258

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

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)

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)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin

Fortran, C | 623.fotonik3d_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

(Continued on next page)
Hewlett Packard Enterprise
ProLiant DL345 Gen11
(2.75 GHz, AMD EPYC 9454P)

SPECspeed®2017_fp_base = 254
SPECspeed®2017_fp_peak = 258

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

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

Compiler Version Notes (Continued)

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

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,-mlvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlvm -Wl,-reduce-array-computations=3 -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7

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Hewlett Packard Enterprise
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ProLiant DL345 Gen11
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SPECspeed®2017_fp_base = 254
SPECspeed®2017_fp_peak = 258

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

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

Base Optimization Flags (Continued)

C benchmarks (continued):
-mlirvm -unroll-threshold=50 -mlirvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mlirvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-llvm

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

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

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

Base Other Flags

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

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

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_w: -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 
-fremap-arrays -fstrip-mining 
-mllvm -inline-threshold=1000 
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt 
-fopenmp=libomp -lomp -lamdlibm -lamdaloc -llflang 
```

(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,-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 -lflang

649.fotonik3d_s: basepeak = yes

654.roms_s: Same as 603.bwaves_s

Benchmarks 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
-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
-O3 -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

627.cam4_s: basepeak = yes

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++:

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

(Continued on next page)
Hewlett Packard Enterprise
ProLiant DL345 Gen11
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SPECspeed®2017_fp_base = 254
SPECspeed®2017_fp_peak = 258

CPU2017 License: 3  Test Date:  Jan-2023
Test Sponsor: HPE  Hardware Availability: Nov-2022
Tested by: HPE  Software Availability: Nov-2022

Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
- Wl, -mlvm -Wl, -reduce-array-computations=3
- Wl, -mlvm -Wl, -x86-use-vzeroupper=false -Ofast -march=znver4
- fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=9
- mlvm -unroll-threshold=50 -fremap-arrays -fstrip-mining
- mlvm -inline-threshold=1000 -mlvm -reduce-array-computations=3
- DSPEC_OPENMP -zopt -finline-aggressive -mlvm -unroll-threshold=100
- Mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

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-rev2.2.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-rev2.2.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.

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