Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL345 Gen11  
(3.25 GHz, AMD EPYC 9354P)  

SPECspeed®2017_fp_base = 143  
SPECspeed®2017_fp_peak = 144

<table>
<thead>
<tr>
<th>Thread</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>16</td>
<td>201</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>16</td>
<td>75.5</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>16</td>
<td>75.6</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>16</td>
<td>144</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>16</td>
<td>71.7</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>16</td>
<td>90.9</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>16</td>
<td>92.6</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>16</td>
<td>121</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>16</td>
<td>121</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>16</td>
<td>183</td>
</tr>
</tbody>
</table>

**Hardware**

CPU Name: AMD EPYC 9354P  
Max MHz: 3800  
Nominal: 3250  
Enabled: 32 cores, 1 chip  
Orderable: 1 chip  
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 / 4 cores  
Other: None  
Memory: 384 GB (12 x 32 GB 2Rx8 PC5-4800B-R)  
Storage: 1 x 1.6 TB NVMe SSD, RAID 0  
Other: None

**Software**

OS: Ubuntu 22.04.1 LTS  
Kernel: 5.15.0-53-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

---

Copyright 2017-2023 Standard Performance Evaluation Corporation
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen11
(3.25 GHz, AMD EPYC 9354P)

CPU2017 License: 3
Test Sponsor: HPE
Test Date: Dec-2022
Tested by: HPE

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>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>16</td>
<td>111</td>
<td>531</td>
<td>111</td>
<td>532</td>
<td>16</td>
<td>111</td>
<td>532</td>
<td>16</td>
<td>111</td>
<td>532</td>
</tr>
<tr>
<td>607.cactubssn_s</td>
<td>16</td>
<td>83.3</td>
<td>200</td>
<td>83.1</td>
<td>201</td>
<td>16</td>
<td>82.4</td>
<td>202</td>
<td>16</td>
<td>82.8</td>
<td>203</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>16</td>
<td>69.4</td>
<td>75.5</td>
<td>69.4</td>
<td>75.4</td>
<td>69.2</td>
<td>75.7</td>
<td>69.4</td>
<td>75.5</td>
<td>68.5</td>
<td>76.5</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>16</td>
<td>91.9</td>
<td>144</td>
<td>91.5</td>
<td>144</td>
<td>92.3</td>
<td>143</td>
<td>88.5</td>
<td>149</td>
<td>88.9</td>
<td>149</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>16</td>
<td>124</td>
<td>71.5</td>
<td>124</td>
<td>71.7</td>
<td>124</td>
<td>71.7</td>
<td>123</td>
<td>71.8</td>
<td>125</td>
<td>71.1</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>16</td>
<td>130</td>
<td>91.0</td>
<td>131</td>
<td>90.4</td>
<td>131</td>
<td>90.9</td>
<td>128</td>
<td>92.6</td>
<td>128</td>
<td>92.6</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>16</td>
<td>119</td>
<td>121</td>
<td>119</td>
<td>121</td>
<td>119</td>
<td>121</td>
<td>119</td>
<td>121</td>
<td>119</td>
<td>121</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>16</td>
<td>90.9</td>
<td>192</td>
<td>90.9</td>
<td>192</td>
<td>91.1</td>
<td>192</td>
<td>90.9</td>
<td>192</td>
<td>90.9</td>
<td>192</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>16</td>
<td>82.8</td>
<td>110</td>
<td>83.8</td>
<td>109</td>
<td>83.5</td>
<td>109</td>
<td>83.5</td>
<td>109</td>
<td>83.5</td>
<td>109</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>16</td>
<td>86.2</td>
<td>183</td>
<td>86.1</td>
<td>183</td>
<td>86.1</td>
<td>183</td>
<td>82.8</td>
<td>190</td>
<td>82.8</td>
<td>190</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 143
SPECspeed®2017_fp_peak = 144

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.

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 enable THP only on request for peak runs of 628.pop2_s:
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root.
To disable THP for peak runs of 627.cam4_s, 649.fotonik3d_s, and 654.roms_s,
'echo never > /sys/kernel/mm/transparent_hugepage/enabled' run as root.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-15"
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 = "16"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 638.imagick_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0 8 1 9 2 10 3 11 4 12 5 13 6 14 7 15"
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen11
(3.25 GHz, AMD EPYC 9354P)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_peak</th>
<th>SPECspeed®2017_fp_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>144</td>
<td>143</td>
</tr>
</tbody>
</table>

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 982a61ec0915b55891ef0e16acafc64d
running on admin1 Mon Jun 27 18:33:36 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 9354P 32-Core Processor
1 "physical id"s (chips)
32 "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

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

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)

**ProLiant DL345 Gen11**
(3.25 GHz, AMD EPYC 9354P)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>143</td>
<td>144</td>
</tr>
</tbody>
</table>

#### Platform Notes (Continued)

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 9354P 32-Core Processor
- **CPU family:** 25
- **Model:** 17
- **Thread(s) per core:** 1
- **Core(s) per socket:** 32
- **Socket(s):** 1
- **Stepping:** 1
- **Frequency boost:** enabled
- **CPU max MHz:** 3800.0000
- **CPU min MHz:** 400.0000
- **BogoMIPS:** 6489.58
- **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 aperfmperf rafi pni pclmulqdq monitor ssse3 fma cx16 pdcm sse4_1 sse4_2 x2apic movbe popcnt aes avx f16c rdrand lahf_lm cmp_legacy svm extastic cr8_legacy abm sse4a misalighnsb 3dnowprefetch osvw lbs skinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 erms invpcid cmp rdt_a avx512f avx512d rdseed adx smap avx512ifma clflushopt clwb avx512cd sha ni avx512bw avx512vl xsaveopt xsave cxt save xsaveopt xsaves cmqm_llc cmqm_occupp llc cmqm_mbb_total cmqm_mbb_local avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd amdm ppcpp arat npt lbrv svm_lock nrpd_save tsc_scale vmbc_clean flushbyasin decodeassist pausefilter pfthreshold avic v_msave_vmload vgif v_spec_ctrl avx512vbmi umip pku ospe avx512_vbmi2 gfin vaex pvcmlqdq avx512_vni avx512_bitalg avx512_vpopcntdq la57 rdpid overflow_recover succor smca fsma flush_l1d

**Virtualization:** AMD-V

- **L1d cache:** 1 MiB (32 instances)
- **L1i cache:** 1 MiB (32 instances)
- **L2 cache:** 32 MiB (32 instances)
- **L3 cache:** 256 MiB (8 instances)

**NUMA node(s):**
- 8
- **NUMA node0 CPU(s):** 0-3
- **NUMA node1 CPU(s):** 16-19
- **NUMA node2 CPU(s):** 8-11
- **NUMA node3 CPU(s):** 24-27
- **NUMA node4 CPU(s):** 12-15
- **NUMA node5 CPU(s):** 28-31
- **NUMA node6 CPU(s):** 4-7

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

## Hewlett Packard Enterprise

**Test Sponsor:** HPE  
**ProLiant DL345 Gen11**  
**(3.25 GHz, AMD EPYC 9354P)**

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>Test Date:</th>
<th>Test Sponsor:</th>
<th>Hardware Availability:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Dec-2022</td>
<td>HPE</td>
<td>Dec-2022</td>
</tr>
</tbody>
</table>

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

### SPECspeed®2017_fp_base = 143  
### SPECspeed®2017_fp_peak = 144

## Platform Notes (Continued)

- **NUMA node7 CPU(s):** 20-23
- **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 Srbd:** Not affected
- **Vulnerability Tsx async abort:** Not affected

From `lscpu --cache`:

<table>
<thead>
<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>
</tr>
</thead>
<tbody>
<tr>
<td>L1d</td>
<td>32K</td>
<td>1M</td>
<td>8</td>
<td>Data</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L1i</td>
<td>32K</td>
<td>1M</td>
<td>8</td>
<td>Instruction</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L2</td>
<td>1M</td>
<td>32M</td>
<td>8</td>
<td>Unified</td>
<td>2</td>
<td>2048</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L3</td>
<td>32M</td>
<td>256M</td>
<td>16</td>
<td>Unified</td>
<td>3</td>
<td>32768</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</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.

<table>
<thead>
<tr>
<th>available:</th>
<th>8 nodes (0-7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>node 0 cpus:</td>
<td>0 1 2 3</td>
</tr>
<tr>
<td>node 0 size:</td>
<td>48072 MB</td>
</tr>
<tr>
<td>node 0 free:</td>
<td>47876 MB</td>
</tr>
<tr>
<td>node 1 cpus:</td>
<td>16 17 18 19</td>
</tr>
<tr>
<td>node 1 size:</td>
<td>48382 MB</td>
</tr>
<tr>
<td>node 1 free:</td>
<td>48265 MB</td>
</tr>
<tr>
<td>node 2 cpus:</td>
<td>8 9 10 11</td>
</tr>
<tr>
<td>node 2 size:</td>
<td>48382 MB</td>
</tr>
<tr>
<td>node 2 free:</td>
<td>48159 MB</td>
</tr>
<tr>
<td>node 3 cpus:</td>
<td>24 25 26 27</td>
</tr>
<tr>
<td>node 3 size:</td>
<td>48382 MB</td>
</tr>
<tr>
<td>node 3 free:</td>
<td>48292 MB</td>
</tr>
<tr>
<td>node 4 cpus:</td>
<td>12 13 14 15</td>
</tr>
<tr>
<td>node 4 size:</td>
<td>48382 MB</td>
</tr>
<tr>
<td>node 4 free:</td>
<td>48155 MB</td>
</tr>
<tr>
<td>node 5 cpus:</td>
<td>28 29 30 31</td>
</tr>
<tr>
<td>node 5 size:</td>
<td>48347 MB</td>
</tr>
<tr>
<td>node 5 free:</td>
<td>48178 MB</td>
</tr>
</tbody>
</table>

(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 DL345 Gen11
(3.25 GHz, AMD EPYC 9354P)

---

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_peak</th>
<th>SPECspeed®2017_fp_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>144</td>
<td>143</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>HPE</td>
</tr>
<tr>
<td>Tested by:</td>
<td>HPE</td>
</tr>
</tbody>
</table>

---

**Platform Notes (Continued)**

node 6 cpus: 4 5 6 7
node 6 size: 48382 MB
node 6 free: 48155 MB
node 7 cpus: 20 21 22 23
node 7 size: 48342 MB
node 7 free: 48240 MB

**node distances:**

<table>
<thead>
<tr>
<th>node</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>1:</td>
<td>11</td>
<td>10</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>2:</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>3:</td>
<td>12</td>
<td>12</td>
<td>11</td>
<td>10</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>4:</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>5:</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>11</td>
<td>10</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>6:</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>7:</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>

---

From /proc/meminfo
MemTotal: 395957332 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 5.15.0-53-generic #59~Ubuntu SMP Mon Oct 17 18:53:30 UTC 2022 x86_64 x86_64 x86_64 GNU/Linux

(Continued on next page)
Platform Notes (Continued)

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
rebleed: 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 98G 18G 75G 20% /

From /sys/devices/virtual/dmi/id
Vendor: HPE
Product: ProLiant DL345 Gen11
Product Family: ProLiant
Serial: DL3x5GEN11

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:
4x Hynix HMCG88AEBA168N 32 GB 2 rank 4800
4x Hynix HMCG88MEBA113N 32 GB 2 rank 4800
4x Hynix HMCG88MEBA115N 32 GB 2 rank 4800

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

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen11
(3.25 GHz, AMD EPYC 9354P)

SPECspeed®2017_fp_base = 143
SPECspeed®2017_fp_peak = 144

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

Platform Notes (Continued)

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 |

-----------------------------------------------
| 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 |

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

------------------------------------------------------------------------------
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
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.ibm_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

(Continued on next page)
**Base Portability Flags (Continued)**

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`
- `-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`
- `-lamdlibm -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` `-lamdlibm -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-unswhitch-threshold=200000` `-Mrecursive -funroll-loops`
- `-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp` `-lamdlibm -lamdalloc`
- `-lflang`
### Hewlett Packard Enterprise

**Test Sponsor:** HPE  
**ProLiant DL345 Gen11**  
**Dimensions:** (3.25 GHz, AMD EPYC 9354P)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base = 143</th>
<th>SPECspeed®2017_fp_peak = 144</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>CPU2017 License: 3</th>
<th>Test Date: Dec-2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: HPE</td>
<td>Hardware Availability: Dec-2022</td>
</tr>
<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Nov-2022</td>
</tr>
</tbody>
</table>

### 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: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flt -fstruct-layout=9 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
```

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

619.lbm_s (continued):
-mlirvm -reduce-array-computations=3 -DSPEC.OpenMP -zopt
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

638.imagick_s: Same as 619.lbm_s

644.nab_s: basepeak = yes

Fortran benchmarks:

603.bwaves_s: -m64 -Wl,--mlirvm -Wl,%align-all-noallithru-blocks=6
-Wl,--mlirvm -Wl,--reduce-array-computations=3
-Wl,--mlirvm -Wl,--enable-X86-prefetching -DSPEC.OpenMP
-Ofast -march=znver4 -fveclib=AMDLIBM -ffast-math
-fopenmp -mrecursive -mlirvm -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,--mlirvm -Wl,%align-all-noallithru-blocks=6
-Wl,--mlirvm -Wl,--reduce-array-computations=3
-Wl,--mlirvm -Wl,--enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-ffto -fstruct-layout=9 -mlirvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mlirvm -inline-threshold=1000
-mlirvm -reduce-array-computations=3 -DSPEC.OpenMP -zopt
-O3 -mrecursive -funroll-loops -mlirvm -lrs-in-nested-loop
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

627.cam4_s: -m64 -Wl,--mlirvm -Wl,%align-all-noallithru-blocks=6
-Wl,--mlirvm -Wl,%reduce-array-computations=3
-Wl,--mlirvm -Wl,%enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-ffto -fstruct-layout=9 -mlirvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mlirvm -inline-threshold=1000
-mlirvm -reduce-array-computations=3 -DSPEC.OpenMP -zopt
-mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang

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

628.pop2_s: -m64 -Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlllvm -Wl,-reduce-array-computations=3
-Wl,-mlllvm -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-fflat -fstruct-layout=9 -mlllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mlllvm -inline-threshold=1000
-mlllvm -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,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlllvm -Wl,-reduce-array-computations=3
-Wl,-mlllvm -Wl,-x86-use-vzeroupper=false -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 -finline-aggressive -mlllvm -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-rev2.1.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
<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed(^{2017})(_{\text{fp_peak}})</td>
<td>144</td>
</tr>
<tr>
<td>SPECspeed(^{2017})(_{\text{fp_base}})</td>
<td>143</td>
</tr>
</tbody>
</table>

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)

**ProLiant DL345 Gen11**
(3.25 GHz, AMD EPYC 9354P)

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

**SPEC CPU\(^{2017}\) License: 3**
**Test Date: Dec-2022**
**Hardware Availability: Dec-2022**
**Software Availability: Nov-2022**