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

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL365 Gen11  
(3.25 GHz, AMD EPYC 9354)

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>3</th>
<th>Test Date:</th>
<th>Jan-2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>HPE</td>
<td>Hardware Availability:</td>
<td>Dec-2022</td>
</tr>
<tr>
<td>Tested by:</td>
<td>HPE</td>
<td>Software Availability:</td>
<td>Nov-2022</td>
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| SPECspeed®2017_fp_base = 319 | SPECspeed®2017_fp_peak = 324 |

<table>
<thead>
<tr>
<th>-threads-</th>
<th>603.bwaves_s</th>
<th>64</th>
</tr>
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<tbody>
<tr>
<td>Threads</td>
<td>0, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
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</tr>
<tr>
<td>619.libm_s</td>
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<tr>
<td>621.wrf_s</td>
<td>64</td>
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<td>627.cam4_s</td>
<td>64</td>
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<tr>
<td>628.pop2_s</td>
<td>64</td>
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</tr>
<tr>
<td>638.imagick_s</td>
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<tr>
<td>644.nab_s</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
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**Hardware**

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>AMD EPYC 9354</th>
</tr>
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<tbody>
<tr>
<td>Max MHz:</td>
<td>3800</td>
</tr>
<tr>
<td>Nominal:</td>
<td>3250</td>
</tr>
<tr>
<td>Enabled:</td>
<td>64 cores, 2 chips</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1.2 chips</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 / 4 cores</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 480 GB SATA SSD</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
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**Software**

<table>
<thead>
<tr>
<th>OS:</th>
<th>Ubuntu 22.04.1 LTS</th>
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</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>
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<tr>
<td>File System:</td>
<td>ext4</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 5 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>64-bit</td>
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<tr>
<td>Other:</td>
<td>None</td>
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<tr>
<td>Power Management:</td>
<td>BIOS and OS set to prefer performance at the cost of additional power usage</td>
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</tbody>
</table>
SPEC CPU®2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL365 Gen11
(3.25 GHz, AMD EPYC 9354)

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

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
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<td>603.bwaves_s</td>
<td>64</td>
<td>34.6</td>
<td>1710</td>
<td>34.6</td>
<td>1700</td>
<td>34.5</td>
<td>1710</td>
<td>64</td>
<td>34.4</td>
<td>1710</td>
<td>34.6</td>
<td>1700</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td>475</td>
<td>35.2</td>
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<td>198</td>
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<td>26.2</td>
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<td>621.wrf_s</td>
<td>64</td>
<td>33.9</td>
<td>179</td>
<td>72.8</td>
<td>182</td>
<td>72.9</td>
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<td>64</td>
<td>64.9</td>
<td>204</td>
<td>64.6</td>
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<tr>
<td>627.cam4_s</td>
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<tr>
<td>628.pop2_s</td>
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<td>72.7</td>
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<td>638.imagick_s</td>
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<td>35.0</td>
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<td>35.0</td>
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<td>644.nab_s</td>
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<td>649.fotonik3d_s</td>
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<td>654.roms_s</td>
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<td>544</td>
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</table>

RESULTS:

SPECspeed®2017_fp_base = 319
SPECspeed®2017_fp_peak = 324

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

The AMD64 AOCC Compiler Suite is available at
http://developer.amd.com/amd-aocc/

Submit Notes

The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.
See the configuration file for details.

Operating System Notes

'ulimit -s unlimited' was used to set environment stack size limit
'ulimit -l 2097152' was used to set environment locked pages in memory limit
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

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

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

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITIY = "0-63"
LD_LIBRARY_PATH = "/home/new_cpu2017/amd_speed_aocc400_genoa_B_lib/lib:"
LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"
MALLOCONF = "oversize_threshold:0,retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "64"

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

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITIY = "0-63"

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

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

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

General Notes

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

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

(Continued on next page)
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/new_cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d running on admin1 Tue Jun 28 00:08:01 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 9354 32-Core Processor
  - 2 "physical id"s (chips)
  - 64 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
- cpu cores : 32
- siblings : 32
- physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
- physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

From lscpu from util-linux 2.37.2:
- Architecture: x86_64
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SPECspeed®2017_fp_base = 319
SPECspeed®2017_fp_peak = 324

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

Platform Notes (Continued)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU op-mode(s):</td>
<td>32-bit, 64-bit</td>
</tr>
<tr>
<td>Address sizes:</td>
<td>52 bits physical, 57 bits virtual</td>
</tr>
<tr>
<td>Byte Order:</td>
<td>Little Endian</td>
</tr>
<tr>
<td>CPU(s):</td>
<td>64</td>
</tr>
<tr>
<td>On-line CPU(s) list:</td>
<td>0-63</td>
</tr>
<tr>
<td>Vendor ID:</td>
<td>AuthenticAMD</td>
</tr>
<tr>
<td>Model name:</td>
<td>AMD EPYC 9354 32-Core Processor</td>
</tr>
<tr>
<td>CPU family:</td>
<td>25</td>
</tr>
<tr>
<td>Model:</td>
<td>17</td>
</tr>
<tr>
<td>Thread(s) per core:</td>
<td>1</td>
</tr>
<tr>
<td>Core(s) per socket:</td>
<td>32</td>
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<tr>
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<td>2</td>
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<tr>
<td>Stepping:</td>
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</tr>
<tr>
<td>Frequency boost:</td>
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</tr>
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<td>CPU max MHz:</td>
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<td>CPU min MHz:</td>
<td>400.0000</td>
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<tr>
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<td>Flags:</td>
<td>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 rapi pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw lse skinit wdt tce topoext perfctr_core perfctr_nb bpez perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 2 ens invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb avx512cd sha ni avx512bw avx512vl xsaveopt xsaves xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local avx512_bf16 clzero irperf xsaverpr rdpru wboinvd amd_ppn cppc arat npt lbrv svmlock nrip_save tsc_scale vmcb_clean flushbasid decodeassists pausefilter pthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi umip pku ospke avx512_vbmi2 gfn vaes vpc1mulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq la57 rdpid overflow_recover succor smca fsrm flush_l1d</td>
</tr>
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<td>Virtualization:</td>
<td>AMD-V</td>
</tr>
<tr>
<td>L1d cache:</td>
<td>2 MiB (64 instances)</td>
</tr>
<tr>
<td>L1i cache:</td>
<td>2 MiB (64 instances)</td>
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<tr>
<td>L2 cache:</td>
<td>64 MiB (64 instances)</td>
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<tr>
<td>L3 cache:</td>
<td>512 MiB (16 instances)</td>
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<td>NUMA node(s):</td>
<td>16</td>
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<tr>
<td>NUMA node0 CPU(s):</td>
<td>0-3</td>
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<tr>
<td>NUMA node1 CPU(s):</td>
<td>16-19</td>
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<td>NUMA node2 CPU(s):</td>
<td>8-11</td>
</tr>
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<td>NUMA node3 CPU(s):</td>
<td>24-27</td>
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<tr>
<td>NUMA node4 CPU(s):</td>
<td>12-15</td>
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<td>NUMA node5 CPU(s):</td>
<td>28-31</td>
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<td>NUMA node6 CPU(s):</td>
<td>4-7</td>
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<td>NUMA node7 CPU(s):</td>
<td>20-23</td>
</tr>
<tr>
<td>NUMA node8 CPU(s):</td>
<td>32-35</td>
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</tbody>
</table>

(Continued on next page)
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Test Date: Jan-2023
Hardware Availability: Dec-2022
Software Availability: Nov-2022

Platform Notes (Continued)

NUMA node9 CPU(s):               48–51
NUMA node10 CPU(s):              40–43
NUMA node11 CPU(s):              56–59
NUMA node12 CPU(s):              44–47
NUMA node13 CPU(s):              60–63
NUMA node14 CPU(s):              36–39
NUMA node15 CPU(s):              52–55
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 sanitation
Vulnerability Spectre v2:        Mitigation; Retpolines, IBPB conditional, IBRS_FW,
STIBP disabled, RSB filling, PBRSE-IBRS 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       2M    8 Data            1    64        1             64
L1i  32K       2M    8 Instruction     1    64        1             64
L2   1M       64M    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
  node 0 size: 96456 MB
  node 0 free: 96310 MB
  node 1 cpus: 16 17 18 19
  node 1 size: 96766 MB
  node 1 free: 96590 MB
  node 2 cpus: 8 9 10 11
  node 2 size: 96766 MB
  node 2 free: 96587 MB
  node 3 cpus: 24 25 26 27
  node 3 size: 96766 MB
  node 3 free: 96650 MB

(Continued on next page)
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SPECspeed®2017_fp_base = 319  
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Platform Notes (Continued)

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<thead>
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<tbody>
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SPEC CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL365 Gen11
(3.25 GHz, AMD EPYC 9354)

SPECspeed®2017_fp_base = 319
SPECspeed®2017_fp_peak = 324

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

Platform Notes (Continued)


From /proc/meminfo
MemTotal: 1585025516 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)
## Platform Notes (Continued)

Bypass disabled via prctl and seccomp

Mitigation: usercopy/swapsgs barriers and __user pointer sanitization

Mitigation: Retpolines, IBPB: conditional, IBRS_FW, STIBP: disabled, RSB filling, PBRSB-eIBRS: Not affected

Not affected

Not affected

---

### Compiler Version Notes

```
C       619.lbm_s(base, peak) 638.imagick_s(base, peak)
        644.nab_s(base, peak)
```

(Continued on next page)
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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
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

==============================================================================
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)
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)
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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 -W1, -mlllvm -W1, -align-all-nofallthru-blocks=6
-W1, -mlllvm -W1, -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)
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 -W1,-mlllvm -W1,-align-all-nofallthru-blocks=6
- -W1,-mlllvm -W1,-reduce-array-computations=3
- -W1,-mlllvm -W1,-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 -W1,-mlllvm -W1,-align-all-nofallthru-blocks=6
- -W1,-mlllvm -W1,-reduce-array-computations=3
- -W1,-mlllvm -W1,-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 -W1,-mlllvm -W1,-align-all-nofallthru-blocks=6
- -W1,-mlllvm -W1,-reduce-array-computations=3
- -W1,-mlllvm -W1,-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

(Continued on next page)
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### 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: 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
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

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

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: basepeak = yes

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 -lslr-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
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Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-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

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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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