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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL365 Gen10 Plus v2
(2.80 GHz, AMD EPYC 7573X)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base = 235</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak = 243</td>
</tr>
</tbody>
</table>

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

| Threads | 0 | 40 | 80 | 120 | 160 | 200 | 240 | 280 | 320 | 360 | 400 | 440 | 480 | 520 | 560 | 600 | 640 | 680 | 720 | 760 | 800 | 840 | 880 | 920 | 960 |
|---------|---|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 603.bwaves_s | 64 |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 607.cactuBSSN_s | 64 |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 619.ibm_s | 64 | 131 |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 621.wrf_s | 64 | 161 |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 627.cam4_s | 64 | 174 |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 628.pop2_s | 64 |    |    | 64.8 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 638.imagick_s | 64 |    |    |     | 332 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 644.nab_s | 64 |    |    |     |     | 333 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 649.fotonik3d_s | 64 |    |    | 126 |     |     | 453 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 654.roms_s | 64 |    |    |     |     |     |     | 347 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

---

**Hardware**

CPU Name: AMD EPYC 7573X  
Max MHz: 3600  
Nominal: 2800  
Enabled: 64 cores, 2 chips  
Orderable: 1, 2 chip(s)  
Cache L1: 32 KB I + 32 KB D on chip per core  
L2: 512 KB I+D on chip per core  
L3: 768 MB I+D on chip per chip, 96 MB shared / 4 cores  
Other: None  
Memory: 2 TB (16 x 128 GB 4Rx4 PC4-3200AA-L)  
Storage: 1 x 480 GB SATA SSD, RAID 0  
Other: None

**Software**

OS: Ubuntu 20.04.3 LTS (x86_64)  
Kernel: 5.13.0-28-generic  
Compiler: C/C++/Fortran: Version 3.2.0 of AOCC  
Parallel: Yes  
Firmware: HPE BIOS Version A42 v2.56 02/10/2022 released Feb-2022  
File System: ext4  
System State: Run level 5 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: 64-bit  
Other: jemalloc: jemalloc memory allocator library v5.1.0  
Power Management: BIOS set to prefer performance at the cost of additional power usage
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## Results Table

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<th>Benchmark</th>
<th>Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Base Seconds</th>
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<th>Peak Ratio</th>
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</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td><strong>65.8</strong></td>
<td><strong>896</strong></td>
<td>65.4</td>
<td>903</td>
<td>65.9</td>
<td>895</td>
<td>64</td>
<td><strong>65.8</strong></td>
<td><strong>897</strong></td>
<td>65.8</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>44.8</td>
<td>372</td>
<td>45.5</td>
<td><strong>366</strong></td>
<td>47.0</td>
<td>355</td>
<td>64</td>
<td><strong>44.6</strong></td>
<td><strong>374</strong></td>
<td>44.4</td>
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<tr>
<td>619.ibm_s</td>
<td>64</td>
<td><strong>39.9</strong></td>
<td><strong>131</strong></td>
<td>40.1</td>
<td>131</td>
<td>39.2</td>
<td>134</td>
<td>64</td>
<td>34.4</td>
<td>152</td>
<td>36.1</td>
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<tr>
<td>621.wrf_s</td>
<td>64</td>
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<td><strong>81.9</strong></td>
<td><strong>161</strong></td>
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<td>159</td>
<td>64</td>
<td>77.1</td>
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<td><strong>78.3</strong></td>
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<tr>
<td>627.cam4_s</td>
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<td>175</td>
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<td><strong>64.8</strong></td>
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<td>64.4</td>
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<td>177</td>
<td>67.2</td>
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<td>43.5</td>
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<td><strong>43.5</strong></td>
<td><strong>332</strong></td>
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<td>43.2</td>
<td>334</td>
<td>43.5</td>
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<tr>
<td>644.nab_s</td>
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<td><strong>38.6</strong></td>
<td><strong>453</strong></td>
<td>38.6</td>
<td>453</td>
<td>38.4</td>
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<td><strong>38.5</strong></td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>654.roms_s</td>
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<td><strong>45.4</strong></td>
<td><strong>347</strong></td>
<td>45.0</td>
<td>350</td>
<td>64</td>
<td>39.2</td>
<td>401</td>
<td><strong>38.9</strong></td>
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**SPECspeed®2017_fp_base = 235**  
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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,
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<td>Mar-2021</td>
<td>Jan-2022</td>
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### Operating System Notes (Continued)

'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
To 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 = "0-63"`
- `LD_LIBRARY_PATH = "/home/cpu2017_speed/amd_speed_aocc320_milanx_A_lib/lib;/home/cpu2017_speed/amd_speed_aocc320_milanx_A_lib/lib32:"`
- `LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"
- `MALLOC_CONF = "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_AFFINITY = "0-63"`

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:

- `GOMP_CPU_AFFINITY = "0-63"`

Environment variables set by runcpu during the 619.lbm_s peak run:

- `GOMP_CPU_AFFINITY = "0-63"`

Environment variables set by runcpu during the 621.wrf_s peak run:

- `GOMP_CPU_AFFINITY = "0-63"`

Environment variables set by runcpu during the 638.imagick_s peak run:

- `GOMP_CPU_AFFINITY = "0-63"`

Environment variables set by runcpu during the 644.nab_s peak run:

- `GOMP_CPU_AFFINITY = "0-63"`

Environment variables set by runcpu during the 654.roms_s peak run:

- `GOMP_CPU_AFFINITY = "0-63"`
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**General Notes**

- Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 1TiB Memory using openSUSE 15.2
- 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.
- `jemalloc`: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)
- `jemalloc 5.1.0` is available here:  
  https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2

**Platform Notes**

- **BIOS Configuration**
  - Workload Profile set to General Peak Frequency Compute  
  - AMD SMT Option set to Disabled  
  - Determinism Control set to Manual  
    - Performance Determinism set to Power Deterministic  
  - Last-Level Cache (LLC) as NUMA Node set to Enabled  
  - NUMA memory domains per socket set to One memory domain per socket  
  - Thermal Configuration set to Maximum Cooling  
  - Infinity Fabric Power Management set to Disabled  
  - Infinity Fabric Performance State set to P0  
  - Workload Profile set to Custom  
    - Power Regulator set to OS Control Mode

- The system date and time as discovered by `sysinfo` is incorrect as the time was not updated prior to the run. The test_date field shows an accurate date for the result.

- The system ROM used for this result contains microcode version 0x 0A001227h for the AMD EPYC 7nn3X family of processors. The reference code/AGESA version used in this ROM is version MilanPI 1.0.0.8.

- `Sysinfo program /home/cpu2017_speed/bin/sysinfo`  
  Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d  
  running on admin1-ProLiant-DL365-Gen10-Plus Mon Jan 10 14:08:08 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 7573X 32-Core Processor

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Platform Notes (Continued)

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 2.34:

Architecture: x86_64  
CPU op-mode(s): 32-bit, 64-bit  
Byte Order: Little Endian  
Address sizes: 48 bits physical, 48 bits virtual  
CPU(s): 64  
On-line CPU(s) list: 0-63  
Thread(s) per core: 1  
Core(s) per socket: 32  
Socket(s): 2  
NUMA node(s): 16  
Vendor ID: AuthenticAMD  
CPU family: 25  
Model: 1  
Model name: AMD EPYC 7573X 32-Core Processor  
Stepping: 2  
Frequency boost: enabled  
CPU MHz: 2800.000  
CPU max MHz: 2800.0000  
CPU min MHz: 1500.0000  
BogoMIPS: 5589.12  
Virtualization: AMD-V  
L1d cache: 2 MiB  
L1i cache: 2 MiB  
L2 cache: 32 MiB  
L3 cache: 1.5 GiB  
NUMA node0 CPU(s): 0-3  
NUMA node1 CPU(s): 4-7  
NUMA node2 CPU(s): 8-11  
NUMA node3 CPU(s): 12-15  
NUMA node4 CPU(s): 16-19  
NUMA node5 CPU(s): 20-23  
NUMA node6 CPU(s): 24-27  
NUMA node7 CPU(s): 28-31  
NUMA node8 CPU(s): 32-35  
NUMA node9 CPU(s): 36-39

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**Platform Notes (Continued)**

- **NUMA node0 CPU(s):** 40-43
- **NUMA node1 CPU(s):** 44-47
- **NUMA node2 CPU(s):** 48-51
- **NUMA node3 CPU(s):** 52-55
- **NUMA node4 CPU(s):** 56-59
- **NUMA node5 CPU(s):** 60-63
- **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 and seccomp
- **Vulnerability Spectre v1:** Mitigation; usercopy/swapgs barriers and __user pointer sanitization
- **Vulnerability Spectre v2:** Mitigation; Full AMD retpoline, IBPB conditional, IBRS_FW, STIBP disabled, RSB filling
- **Vulnerability Srbds:** Not affected
- **Vulnerability Tsx async abort:** Not affected
- **Flags:**
  - fpu
  - vme
  - de
  - pse
  - 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
  - svm
  - extapic
  - cr8_legacy
  - abm
  - sse4a
  - misalignsse
  - 3dnowprefetch
  - osvw
  - ibs
  - skinit
  - wdt
  - tce
  - topoext
  - perfctr_core
  - perfctr_nb
  - bext
  - perfctr_l1c
  - mwaitx
  - cpb
  - cat_l3
  - cdp_l3
  - invpcid_single
  - hw_pstate
  - ssbd
  - mba
  - ibrs
  - ibpb
  - stibp
  - vmmcall
  - fsgsbase
  - bml1
  - avx2
  - smep
  - bmi2
  - invpcid
  - cqmp
  - rdt_a
  - rdseed
  - adx
  - smap
  - clflushopt
  - clwb
  - sha
  - sha2
  - sha3
  - xsaveopt
  - xsaves
  - cr4_legacy
  - abm
  - sse4a
  - misalignsse
  - 3dnowprefetch
  - osvw

From `lscpu --cache`:
- **NAME ONE-SIZE ALL-SIZE WAYS TYPE**
  - L1d 32K 2M 8 Data 1
  - L1i 32K 2M 8 Instruction 1
  - L2 512K 32M 8 Unified 2
  - L3 96M 1.5G 16 Unified 3

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:** 128711 MB

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Platform Notes (Continued)

node 0 free: 128143 MB
node 1 cpus: 4 5 6 7
node 1 size: 129022 MB
node 1 free: 128927 MB
node 2 cpus: 8 9 10 11
node 2 size: 129022 MB
node 2 free: 128759 MB
node 3 cpus: 12 13 14 15
node 3 size: 129022 MB
node 3 free: 128949 MB
node 4 cpus: 16 17 18 19
node 4 size: 129022 MB
node 4 free: 128831 MB
node 5 cpus: 20 21 22 23
node 5 size: 129022 MB
node 5 free: 128935 MB
node 6 cpus: 24 25 26 27
node 6 size: 129022 MB
node 6 free: 128923 MB
node 7 cpus: 28 29 30 31
node 7 size: 129022 MB
node 7 free: 128949 MB
node 8 cpus: 32 33 34 35
node 8 size: 129022 MB
node 8 free: 128958 MB
node 9 cpus: 36 37 38 39
node 9 size: 129022 MB
node 9 free: 128958 MB
node 10 cpus: 40 41 42 43
node 10 size: 129022 MB
node 10 free: 128973 MB
node 11 cpus: 44 45 46 47
node 11 size: 129022 MB
node 11 free: 128975 MB
node 12 cpus: 48 49 50 51
node 12 size: 129022 MB
node 12 free: 128977 MB
node 13 cpus: 52 53 54 55
node 13 size: 129022 MB
node 13 free: 128978 MB
node 14 cpus: 56 57 58 59
node 14 size: 129022 MB
node 14 free: 128855 MB
node 15 cpus: 60 61 62 63
node 15 size: 129015 MB
node 15 free: 128914 MB
node distances:

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Test Date: Feb-2022
Hardware Availability: Mar-2021
Software Availability: Jan-2022

SPECspeed®2017_fp_base = 235
SPECspeed®2017_fp_peak = 243

Platform Notes (Continued)

node 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
0: 10 11 11 11 11 11 11 32 32 32 32 32 32 32 32
1: 11 10 11 11 11 11 11 32 32 32 32 32 32 32 32
8: 32 32 32 32 32 32 32 32 32 10 11 11 11 11 11

From /proc/meminfo
MemTotal: 2101144604 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 20.04.3 LTS

From /etc/*release* /etc/*version*
debian_version: bullseye/sid
os-release:
NAME="Ubuntu"
VERSION="20.04.3 LTS (Focal Fossa)"
ID=ubuntu
ID_LIKE=debian
PRETTY_NAME="Ubuntu 20.04.3 LTS"
VERSION_ID="20.04"
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"

uname -a:
Linux admin1-ProLiant-DL365-Gen10-Plus 5.13.0-28-generic #31~20.04.1-UBUNTU SMP Wed Jan 19 14:08:10 UTC 2022 x86_64 x86_64 x86_64 GNU/Linux

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL365 Gen10 Plus v2
(2.80 GHz, AMD EPYC 7573X)

SPECspeed®2017_fp_base = 235
SPECspeed®2017_fp_peak = 243

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

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): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swapgs barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1): Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: disabled, RSB filling
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 Jan 10 10:27:
SPEC is set to: /home/cpu2017_speed
From /sys/devices/virtual/dmi/id
Vendor: HPE
Product: ProLiant DL365 Gen10 Plus
Product Family: ProLiant
Serial: CN70430NKR

Additional information from dmidecode 3.2 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:
9x Hynix HMABAGL7ABR4N-XN 128 GB 4 rank 3200
7x Samsung M386AAG40AM3-CWE 128 GB 4 rank 3200
16x UNKNOWN NOT AVAILABLE

BIOS:
BIOS Vendor: HPE
BIOS Version: A42
BIOS Date: 02/10/2022
BIOS Revision: 2.56
Firmware Revision: 2.50

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL365 Gen10 Plus v2
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SPECspeed®2017_fp_base = 235
SPECspeed®2017_fp_peak = 243

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

Platform Notes (Continued)

(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 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------
==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------
==============================================================================
Fortran         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
| 654.roms_s(base, peak)
------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------
(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL365 Gen10 Plus v2
(2.80 GHz, AMD EPYC 7573X)

SPECSpeed®2017_fp_base = 235
SPECSpeed®2017_fp_peak = 243

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

Compiler Version Notes (Continued)

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

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

Base Compiler Invocation

C benchmarks:
clang

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

Benchmarks using Fortran, C, and C++:
clang++ clang flang

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64
628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL365 Gen10 Plus v2
(2.80 GHz, AMD EPYC 7573X)

<table>
<thead>
<tr>
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<td>SPECspeed® 2017_fp_peak</td>
<td>243</td>
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</tbody>
</table>

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE
Test Date: Feb-2022
Hardware Availability: Mar-2021
Software Availability: Jan-2022

### Base Optimization Flags

**C benchmarks:**
- `-m64` `-Wl,-mlllvm -Wl,-region-vectorize`
- `-Wl,-mlllvm -Wl,-function-specialize`
- `-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6`
- `-Wl,-mlllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3`
- `-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=5`
- `-mlllvm -unroll-threshold=50 -mlllvm -inline-threshold=1000`
- `-fremap-arrays -mlllvm -function-specialize -flv-function-specialization`
- `-mlllvm -enable-gvn-hoist -mlllvm -global-vectorize-slp=true`
- `-mlllvm -enable-licm-vrp -mlllvm -reduce-array-computations=3 -z muldefs`
- `-DSPEC_OPENMP -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang`

**Fortran benchmarks:**
- `-m64` `-Wl,-mlllvm -Wl,-enable-X86-prefetching`
- `-Wl,-mlllvm -Wl,-enable-licm-vrp -Wl,-mlllvm -Wl,-region-vectorize`
- `-Wl,-mlllvm -Wl,-function-specialize`
- `-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6`
- `-Wl,-mlllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3`
- `-fveclib=AMDLIBM -ffast-math -fopenmp -Mrecursive`
- `-mlllvm -fuse-tile-inner-loop -funroll-loops`
- `-mlllvm -extra-vectorizer-passes -mlllvm -lrs-in-nested-loop`
- `-mlllvm -enable-licm-vrp -mlllvm -reduce-array-computations=3`
- `-mlllvm -global-vectorize-slp=true -mlllvm -enable-loopinterchange`
- `-mlllvm -compute-interchange-order -z muldefs -DSPEC_OPENMP`
- `-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang`

**Benchmarks using both Fortran and C:**
- `-m64` `-Wl,-mlllvm -Wl,-enable-X86-prefetching`
- `-Wl,-mlllvm -Wl,-enable-licm-vrp -Wl,-mlllvm -Wl,-region-vectorize`
- `-Wl,-mlllvm -Wl,-function-specialize`
- `-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6`
- `-Wl,-mlllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3`
- `-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=5`
- `-mlllvm -unroll-threshold=50 -mlllvm -inline-threshold=1000`
- `-fremap-arrays -mlllvm -function-specialize -flv-function-specialization`
- `-mlllvm -enable-gvn-hoist -mlllvm -global-vectorize-slp=true`
- `-mlllvm -enable-licm-vrp -mlllvm -reduce-array-computations=3 -Hz,1,0xl`
- `-Mrecursive -mlllvm -fuse-tile-inner-loop -funroll-loops`
- `-mlllvm -extra-vectorizer-passes -mlllvm -lrs-in-nested-loop`
- `-mlllvm -enable-loopinterchange -mlllvm -compute-interchange-order`
- `-z muldefs -DSPEC_OPENMP -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang`

**Benchmarks using Fortran, C, and C++:**
- `-m64` `-Wl,-mlllvm -Wl,-x86-use-vzeroupper=false`
- `-Wl,-mlllvm -Wl,-region-vectorize -Wl,-mlllvm -Wl,-function-specialize`

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL365 Gen10 Plus v2
(2.80 GHz, AMD EPYC 7573X)

SPECspeed®2017_fp_base = 235
SPECspeed®2017_fp_peak = 243

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-partial-unswitch -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -convert-pow-exp-to-int=false
-Hz,1,0x1 -Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -lsr-in-nested-loop -mllvm -enable-loopinterchange
-mllvm -compute-interchange-order -z muldefs -DSPEC_OPENMP
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

Base Other Flags

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

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

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

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

Peak Compiler Invocation

C benchmarks:
clang

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

(Continued on next page)
## Peak Compiler Invocation (Continued)

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,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -fopenmp
-ffast-math -fopenmp -flto
-flto -fstruct-layout=5 -mllvm -unroll-threshold=50
-fremap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP
-fopenmp=libomp -lomp -lamlplibm -ljemalloc -lflang

638.imagick_s: -m64 -Wl,-allow-multiple-definition
-Wl,-mllvm -Wl,-enable-licm-vrp
-Wl,-mllvm -Wl,-do-block-reorder=aggressive
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=5 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays
-mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -do-block-reorder=aggressive -DSPEC_OPENMP
-fopenmp=libomp -lomp -lamlplibm -ljemalloc -lflang

644.nab_s: Same as 638.imagick_s
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL365 Gen10 Plus v2
(2.80 GHz, AMD EPYC 7573X)

**SPECspeed**®2017_fp_base = 235
**SPECspeed**®2017_fp_peak = 243

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<td>Software Availability: Jan-2022</td>
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</tbody>
</table>

**Peak Optimization Flags (Continued)**

Fortran benchmarks:

603.bwaves_s: -m64 -Wl,-mlllvm -Wl,-enable-X86-prefetching
   -Wl,-mlllvm -Wl,-enable-licm-vrp
   -Wl,-mlllvm -Wl,-function-specialize
   -Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
   -Wl,-mlllvm -Wl,-reduce-array-computations=3 -Ofast
   -march=znver3 -fveclib=AMDLIBM -ffast-math -fopenmp
   -mrecursive -mlllvm -reduce-array-computations=3
   -mlllvm -global-vectorize-slp=true -mlllvm -enable-licm-vrp
   -DSPEC_OPENMP -fopenmp=libomp -lomp -lamdlibm -ljemalloc
   -flang

649.fotonik3d_s: basepeak = yes

654.roms_s: Same as 603.bwaves_s

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -Wl,-mlllvm -Wl,-enable-X86-prefetching
   -Wl,-mlllvm -Wl,-enable-licm-vrp
   -Wl,-mlllvm -Wl,-function-specialize
   -Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
   -Wl,-mlllvm -Wl,-reduce-array-computations=3 -Ofast
   -march=znver3 -fveclib=AMDLIBM -ffast-math -fopenmp
   -fio -fstruct-layout=5 -mlllvm -unroll-threshold=50
   -fremap-arrays -fly-function-specialization
   -mlllvm -inline-threshold=1000 -mlllvm -enable-gvn-hoist
   -mlllvm -global-vectorize-slp=true
   -mlllvm -global-specialize -mlllvm -enable-licm-vrp
   -mlllvm -reduce-array-computations=3 -Hz,1,0x1 -Mrecursive
   -mlllvm -fuse-tile-inner-loop -funroll-loops
   -mlllvm -extra-vectorizer-passes -mlllvm -lsl-in-nested-loop
   -mlllvm -enable-loopinterchange
   -mlllvm -compute-interchange-order -DSPEC_OPENMP
   -fopenmp=libomp -lomp -lamdlibm -ljemalloc -flang

627.cam4_s: basepeak = yes

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

- m64 -Wl,-mlllvm -Wl,-x86-use-vzeroupper=false
- Wl,-mlllvm -Wl,-enable-licm-vrp
- Wl,-mlllvm -Wl,-do-block-reorder=aggressive
- Wl,-mlllvm -Wl,-function-specialize

(Continued on next page)
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL365 Gen10 Plus v2  
(2.80 GHz, AMD EPYC 7573X)  

SPECspeed®2017_fp_base = 235  
SPECspeed®2017_fp_peak = 243

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

Test Date: Feb-2022  
Hardware Availability: Mar-2021  
Software Availability: Jan-2022

Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
- W1, -mlllvm -W1, -align-all-nofallthru-blocks=6
- W1, -mlllvm -W1, -reduce-array-computations=3 -O_fast -march=znver3
- fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=5
- mlllvm -unroll-threshold=50 -fremap-arrays -flv-function-specialization
- mlllvm -inline-threshold=1000 -mlllvm -enable-gvn-hoist
- mlllvm -global-vectorize-slp=true -mlllvm -function-specialize
- mlllvm -enable-licm-vrp -mlllvm -reduce-array-computations=3
- finline-aggressive -mlllvm -unroll-threshold=100 -mlllvm -reroll-loops
- mlllvm -aggressive-loop-unswitch -Mrecursive
- mlllvm -do-block-reorder=aggressive -DSPEC_OPENMP -fopenmp=libomp
- lomp -lamdlibm -ljemalloc -lflang

Peak Other Flags

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

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

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

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

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revR.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revR.xml

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

Tested with SPEC CPU®2017 v1.1.8 on 2022-01-10 03:38:08-0500.
Originally published on 2022-02-21.