SPEC CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

$SPECspeed^{®}2017\_fp\_base = 423$

ProLiant DL385 Gen11
(2.40 GHz, AMD EPYC 9654)

$SPECspeed^{®}2017\_fp\_peak = 433$

CPU2017 License: 3   **Test Date:** Oct-2022
Test Sponsor: HPE   **Hardware Availability:** Dec-2022
Tested by: HPE   **Software Availability:** Nov-2022

Benchmark	Threads	base	peak
603.bwaves_s	192	1370	1370
607.cactuBSSN_s	192	665	667
619.lbm_s	192	297	299
621.wrf_s	192	207	245
627.cam4_s	192	284	288
628.pop2_s	192	93.6	97.5
638.imagick_s	192	834	
644.nab_s	192	1030	
649.fotonik3d_s	192	200	
654.roms_s	192	716	

SPECspeed®2017_fp_base (423)   SPECspeed®2017_fp_peak (433)

Hardware

CPU Name: AMD EPYC 9654
 Max MHz: 3700
 Nominal: 2400
Enabled: 192 cores, 2 chips
Orderable: 1, 2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 384 MB I+D on chip per chip, 32 MB shared / 8 cores
 Other: None
Memory: 768 GB (24 x 32 GB 2Rx8 PC5-4800B-R)
Storage: 1 x 480 GB SATA SSD
Other: None

Software

OS: Ubuntu 22.04.1 LTS
   Kernel 5.15.0-52-generic
Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
Parallel: Yes
Firmware: HPE BIOS Version v1.10 10/06/2022 released Oct-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

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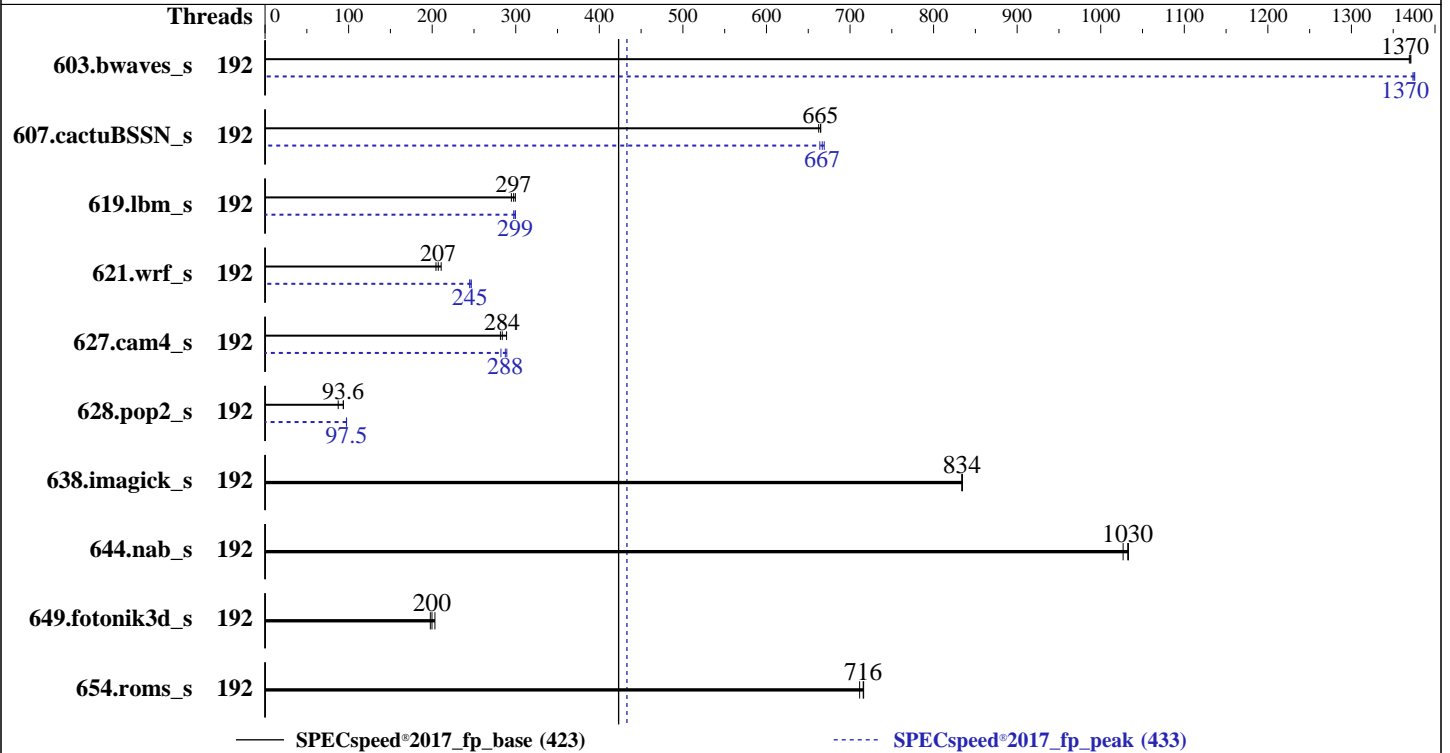(Test Sponsor: HPE)

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(2.40 GHz, AMD EPYC 9654)

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Results Table

Benchmark	Base						Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	192	43.1	1370	43.0	1370	**43.1**	**1370**	192	**42.9**	**1370**	43.0	1370	42.9	1380
607.cactuBSSN_s	192	25.1	665	25.2	662	**25.1**	**665**	192	25.1	664	24.9	669	**25.0**	**667**
619.lbm_s	192	17.8	295	17.5	300	**17.6**	**297**	192	17.5	300	**17.5**	**299**	17.6	298
621.wrf_s	192	**63.8**	**207**	64.7	205	62.8	211	192	53.6	247	**54.0**	**245**	54.0	245
627.cam4_s	192	30.7	289	**31.2**	**284**	31.5	282	192	31.4	282	**30.8**	**288**	30.6	289
628.pop2_s	192	**127**	**93.6**	127	93.7	136	87.5	192	122	97.4	122	97.6	**122**	**97.5**
638.imagick_s	192	17.3	834	**17.3**	**834**	17.3	834	192	17.3	834	**17.3**	**834**	17.3	834
644.nab_s	192	16.9	1030	17.0	1030	**16.9**	**1030**	192	16.9	1030	17.0	1030	**16.9**	**1030**
649.fotonik3d_s	192	**45.6**	**200**	44.8	203	46.1	198	192	**45.6**	**200**	44.8	203	46.1	198
654.roms_s	192	22.1	711	22.0	716	**22.0**	**716**	192	22.1	711	22.0	716	**22.0**	**716**
SPECspeed®2017_fp_base =		**423**											
SPECspeed®2017_fp_peak =		**433**											

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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Operating System Notes (Continued)

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

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-191"
LD_LIBRARY_PATH = "/home/cpu2017_B1a/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 = "192"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-191"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-191"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0-191"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-191"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0-191"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-191"
```

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Tested by:	HPE	**Software Availability:**	Nov-2022

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 0xa10110d for the
AMD EPYC 9nn4X family of processors. The reference code/AGESA version used in this
ROM is version GenoaPI 1.0.0.1-L2

 Sysinfo program /home/cpu2017_B1a/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on dl385gen11 Sat Oct 22 05:22:48 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 9654 96-Core Processor
       2  "physical id"s (chips)
       192 "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 : 96
       siblings  : 96
       physical 0: cores 0 1 2 3 4 5 6 7 16 17 18 19 20 21 22 23 32 33 34 35 36 37 38 39
          48 49 50 51 52 53 54 55 64 65 66 67 68 69 70 71 80 81 82 83 84 85 86 87 96 97 98 99
```

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Platform Notes (Continued)

```
     100 101 102 103 112 113 114 115 116 117 118 119 128 129 130 131 132 133 134 135 144
     145 146 147 148 149 150 151 160 161 162 163 164 165 166 167 176 177 178 179 180 181
     182 183
     physical 1: cores 0 1 2 3 4 5 6 7 16 17 18 19 20 21 22 23 32 33 34 35 36 37 38 39
     48 49 50 51 52 53 54 55 64 65 66 67 68 69 70 71 80 81 82 83 84 85 86 87 96 97 98 99
     100 101 102 103 112 113 114 115 116 117 118 119 128 129 130 131 132 133 134 135 144
     145 146 147 148 149 150 151 160 161 162 163 164 165 166 167 176 177 178 179 180 181
     182 183

  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):                  192
     On-line CPU(s) list:     0-191
     Vendor ID:               AuthenticAMD
     Model name:              AMD EPYC 9654 96-Core Processor
     CPU family:              25
     Model:                   17
     Thread(s) per core:      1
     Core(s) per socket:      96
     Socket(s):               2
     Stepping:                1
     Frequency boost:         enabled
     CPU max MHz:             3709.0000
     CPU min MHz:             400.0000
     BogoMIPS:                4792.48
     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 rapl 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 ibs 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 cqm rdt_a avx512f
     avx512dq rdseed adx smap avx512ifma clflushopt clwb avx512cd sha_ni avx512bw
     avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
     cqm_mbm_local avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin cppc arat
     npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists
     pausefilter pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi umip pku
     ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq
     la57 rdpid overflow_recov succor smca fsrm flush_l1d
     Virtualization:          AMD-V
     L1d cache:               6 MiB (192 instances)
     L1i cache:               6 MiB (192 instances)
     L2 cache:                192 MiB (192 instances)
```

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Platform Notes (Continued)

```
    L3 cache:                       768 MiB (24 instances)
    NUMA node(s):                   24
    NUMA node0 CPU(s):              0-7
    NUMA node1 CPU(s):              8-15
    NUMA node2 CPU(s):              16-23
    NUMA node3 CPU(s):              24-31
    NUMA node4 CPU(s):              32-39
    NUMA node5 CPU(s):              40-47
    NUMA node6 CPU(s):              48-55
    NUMA node7 CPU(s):              56-63
    NUMA node8 CPU(s):              64-71
    NUMA node9 CPU(s):              72-79
    NUMA node10 CPU(s):             80-87
    NUMA node11 CPU(s):             88-95
    NUMA node12 CPU(s):             96-103
    NUMA node13 CPU(s):             104-111
    NUMA node14 CPU(s):             112-119
    NUMA node15 CPU(s):             120-127
    NUMA node16 CPU(s):             128-135
    NUMA node17 CPU(s):             136-143
    NUMA node18 CPU(s):             144-151
    NUMA node19 CPU(s):             152-159
    NUMA node20 CPU(s):             160-167
    NUMA node21 CPU(s):             168-175
    NUMA node22 CPU(s):             176-183
    NUMA node23 CPU(s):             184-191
    Vulnerability Itlb multihit:    Not affected
    Vulnerability L1tf:             Not affected
    Vulnerability Mds:              Not affected
    Vulnerability Meltdown:         Not affected
    Vulnerability Mmio stale data:  Not affected
    Vulnerability Retbleed:         Not affected
    Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via
    prctl and seccomp
    Vulnerability Spectre v1:        Mitigation; usercopy/swapgs barriers and __user
    pointer sanitization
    Vulnerability Spectre v2:        Mitigation; Retpolines, IBPB conditional, IBRS_FW,
    STIBP disabled, RSB filling, PBRSB-eIBRS Not affected
    Vulnerability Srbds:            Not affected
    Vulnerability Tsx async abort:   Not affected

  From lscpu --cache:
    NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL   SETS PHY-LINE COHERENCY-SIZE
    L1d       32K        6M    8 Data          1     64       1             64
    L1i       32K        6M    8 Instruction   1     64       1             64
    L2         1M      192M    8 Unified       2   2048       1             64
    L3        32M      768M   16 Unified       3  32768       1             64
```

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Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

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Platform Notes (Continued)

```
  /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: 24 nodes (0-23)
    node 0 cpus: 0 1 2 3 4 5 6 7
    node 0 size: 31943 MB
    node 0 free: 31719 MB
    node 1 cpus: 8 9 10 11 12 13 14 15
    node 1 size: 32253 MB
    node 1 free: 32098 MB
    node 2 cpus: 16 17 18 19 20 21 22 23
    node 2 size: 32253 MB
    node 2 free: 32037 MB
    node 3 cpus: 24 25 26 27 28 29 30 31
    node 3 size: 32253 MB
    node 3 free: 31784 MB
    node 4 cpus: 32 33 34 35 36 37 38 39
    node 4 size: 32253 MB
    node 4 free: 31993 MB
    node 5 cpus: 40 41 42 43 44 45 46 47
    node 5 size: 32253 MB
    node 5 free: 32032 MB
    node 6 cpus: 48 49 50 51 52 53 54 55
    node 6 size: 32253 MB
    node 6 free: 32046 MB
    node 7 cpus: 56 57 58 59 60 61 62 63
    node 7 size: 32253 MB
    node 7 free: 31898 MB
    node 8 cpus: 64 65 66 67 68 69 70 71
    node 8 size: 32253 MB
    node 8 free: 31699 MB
    node 9 cpus: 72 73 74 75 76 77 78 79
    node 9 size: 32253 MB
    node 9 free: 31622 MB
    node 10 cpus: 80 81 82 83 84 85 86 87
    node 10 size: 32253 MB
    node 10 free: 31705 MB
    node 11 cpus: 88 89 90 91 92 93 94 95
    node 11 size: 32253 MB
    node 11 free: 31908 MB
    node 12 cpus: 96 97 98 99 100 101 102 103
    node 12 size: 32253 MB
    node 12 free: 32140 MB
    node 13 cpus: 104 105 106 107 108 109 110 111
```

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Platform Notes (Continued)

```
      node 13 size: 32253 MB
      node 13 free: 32140 MB
      node 14 cpus: 112 113 114 115 116 117 118 119
      node 14 size: 32253 MB
      node 14 free: 32141 MB
      node 15 cpus: 120 121 122 123 124 125 126 127
      node 15 size: 32253 MB
      node 15 free: 32150 MB
      node 16 cpus: 128 129 130 131 132 133 134 135
      node 16 size: 32253 MB
      node 16 free: 32136 MB
      node 17 cpus: 136 137 138 139 140 141 142 143
      node 17 size: 32253 MB
      node 17 free: 32139 MB
      node 18 cpus: 144 145 146 147 148 149 150 151
      node 18 size: 32253 MB
      node 18 free: 32134 MB
      node 19 cpus: 152 153 154 155 156 157 158 159
      node 19 size: 32218 MB
      node 19 free: 32088 MB
      node 20 cpus: 160 161 162 163 164 165 166 167
      node 20 size: 32253 MB
      node 20 free: 32112 MB
      node 21 cpus: 168 169 170 171 172 173 174 175
      node 21 size: 32253 MB
      node 21 free: 32115 MB
      node 22 cpus: 176 177 178 179 180 181 182 183
      node 22 size: 32253 MB
      node 22 free: 32122 MB
      node 23 cpus: 184 185 186 187 188 189 190 191
      node 23 size: 32200 MB
      node 23 free: 32074 MB
      node distances:
      node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19
        20  21  22  23
        0:  10  11  11  11  11  11  11  11  11  11  11  11  32  32  32  32  32  32  32  32
        32  32  32  32
        1:  11  10  11  11  11  11  11  11  11  11  11  11  32  32  32  32  32  32  32  32
        32  32  32  32
        2:  11  11  10  11  11  11  11  11  11  11  11  11  32  32  32  32  32  32  32  32
        32  32  32  32
        3:  11  11  11  10  11  11  11  11  11  11  11  11  32  32  32  32  32  32  32  32
        32  32  32  32
        4:  11  11  11  11  10  11  11  11  11  11  11  11  32  32  32  32  32  32  32  32
        32  32  32  32
        5:  11  11  11  11  11  10  11  11  11  11  11  11  32  32  32  32  32  32  32  32
        32  32  32  32
```

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Platform Notes (Continued)

```
    6:  11  11  11  11  11  11  10  11  11  11  11  11  32  32  32  32  32  32  32  32
       32  32  32  32
    7:  11  11  11  11  11  11  11  10  11  11  11  11  32  32  32  32  32  32  32  32
       32  32  32  32
    8:  11  11  11  11  11  11  11  11  10  11  11  11  32  32  32  32  32  32  32  32
       32  32  32  32
    9:  11  11  11  11  11  11  11  11  11  10  11  11  32  32  32  32  32  32  32  32
       32  32  32  32
   10:  11  11  11  11  11  11  11  11  11  11  10  11  32  32  32  32  32  32  32  32
       32  32  32  32
   11:  11  11  11  11  11  11  11  11  11  11  11  10  32  32  32  32  32  32  32  32
       32  32  32  32
   12:  32  32  32  32  32  32  32  32  32  32  32  32  10  11  11  11  11  11  11  11
       11  11  11  11
   13:  32  32  32  32  32  32  32  32  32  32  32  32  11  10  11  11  11  11  11  11
       11  11  11  11
   14:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  10  11  11  11  11  11
       11  11  11  11
   15:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  10  11  11  11  11
       11  11  11  11
   16:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  10  11  11  11
       11  11  11  11
   17:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  11  10  11  11
       11  11  11  11
   18:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  11  11  10  11
       11  11  11  11
   19:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  11  11  11  10
       11  11  11  11
   20:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  11  11  11  11
       10  11  11  11
   21:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  11  11  11  11
       11  10  11  11
   22:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  11  11  11  11
       11  11  10  11
   23:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  11  11  11  11
       11  11  11  10

 From /proc/meminfo
    MemTotal:       792263860 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

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

 /usr/bin/lsb_release -d
    Ubuntu 22.04.1 LTS
```

(Continued on next page)

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.40 GHz, AMD EPYC 9654)

SPECspeed®2017_fp_base = 423

SPECspeed®2017_fp_peak = 433

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

Test Date: Oct-2022
Hardware Availability: Dec-2022
Software Availability: Nov-2022

Platform Notes (Continued)

```
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 dl385gen11 5.15.0-52-generic #58-Ubuntu SMP Thu Oct 13 08:03:55 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
                                                 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 Oct 22 01:51

SPEC is set to: /home/cpu2017_B1a
   Filesystem                      Type  Size  Used Avail Use% Mounted on
   /dev/mapper/ubuntu--vg-ubuntu--lv ext4  437G  164G  255G  40% /

From /sys/devices/virtual/dmi/id
    Vendor:          HPE
    Product:         ProLiant DL385 Gen11
```

(Continued on next page)

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.40 GHz, AMD EPYC 9654)

$SPECspeed^{®}2017\_fp\_base = 423$

$SPECspeed^{®}2017\_fp\_peak = 433$

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Oct-2022

Hardware Availability: Dec-2022

Software Availability: Nov-2022

Platform Notes (Continued)

```
      Product Family: ProLiant
      Serial:         DL385G11-005

 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:
     24x Hynix HMCG88MEBRA113N 32 GB 2 rank 4800

 BIOS:
   BIOS Vendor:       HPE
   BIOS Version:      1.10
   BIOS Date:         10/06/2022
   BIOS Revision:     1.10
   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
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
```

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.40 GHz, AMD EPYC 9654)

$SPECspeed^{®}2017\_fp\_base = 423$

$SPECspeed^{®}2017\_fp\_peak = 433$

CPU2017 License: 3		**Test Date:**	Oct-2022
Test Sponsor:	HPE	**Hardware Availability:**	Dec-2022
Tested by:	HPE	**Software Availability:**	Nov-2022

Compiler Version Notes (Continued)

```
  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
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
```

SPEC CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.40 GHz, AMD EPYC 9654)

SPECspeed®2017_fp_base = 423

SPECspeed®2017_fp_peak = 433

CPU2017 License:	3	**Test Date:**	Oct-2022
Test Sponsor:	HPE	**Hardware Availability:**	Dec-2022
Tested by:	HPE	**Software Availability:**	Nov-2022

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,-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

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SPEC CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.40 GHz, AMD EPYC 9654)

SPECspeed®2017_fp_base = 423

SPECspeed®2017_fp_peak = 433

CPU2017 License:	3	**Test Date:**	Oct-2022
Test Sponsor:	HPE	**Hardware Availability:**	Dec-2022
Tested by:	HPE	**Software Availability:**	Nov-2022

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
```
-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-unswitch-threshold=200000 -Mrecursive -funroll-loops
-mllvm -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
```

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
```

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SPEC CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.40 GHz, AMD EPYC 9654)

$SPECspeed^{®}2017\_fp\_base = 423$

$SPECspeed^{®}2017\_fp\_peak = 433$

CPU2017 License: 3	**Test Date:** Oct-2022
Test Sponsor: HPE	**Hardware Availability:** Dec-2022
Tested by: HPE	**Software Availability:** Nov-2022

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
-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
```

```
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: 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 -lsr-in-nested-loop
```

(Continued on next page)

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.40 GHz, AMD EPYC 9654)

SPECspeed®2017_fp_base = 423

SPECspeed®2017_fp_peak = 433

CPU2017 License:	3	**Test Date:**	Oct-2022
Test Sponsor:	HPE	**Hardware Availability:**	Dec-2022
Tested by:	HPE	**Software Availability:**	Nov-2022

Peak Optimization Flags (Continued)

621.wrf_s (continued):
```
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

627.cam4_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 -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```

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
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -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 -finline-aggressive -mllvm -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
```

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.40 GHz, AMD EPYC 9654)

SPECspeed®2017_fp_base = 423

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CPU2017 License: 3		**Test Date:**	Oct-2022
Test Sponsor:	HPE	**Hardware Availability:**	Dec-2022
Tested by:	HPE	**Software Availability:**	Nov-2022

Peak 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`

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-rev2.0.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-rev2.0.xml
http://www.spec.org/cpu2017/flags/aocc400-flags.xml

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

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