SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

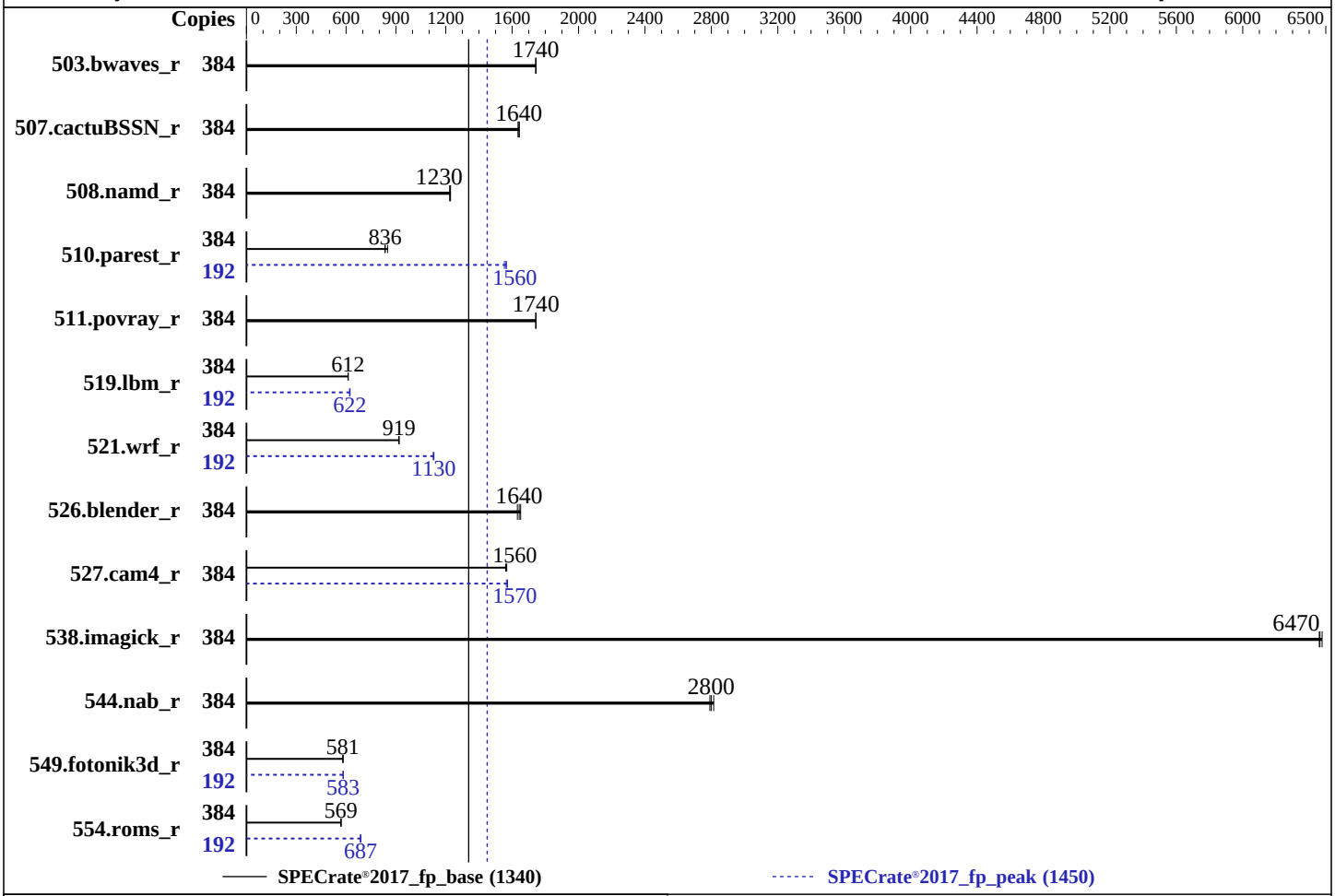
ProLiant DL365 Gen11
(2.40 GHz, AMD EPYC 9654)

SPECrate®2017_fp_base = 1340

SPECrate®2017_fp_peak = 1450

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

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



Hardware

CPU Name:	AMD EPYC 9654
Max MHz:	3700
Nominal:	2400
Enabled:	192 cores, 2 chips, 2 threads/core
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:	2 x 480 GB SATA SSD
Other:	None

Software

OS:	Ubuntu 22.04.1 LTS Kernel 5.15.0-43-generic
Compiler:	C/C++/Fortran: Version 4.0.0 of AOCC
Parallel:	No
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 set to prefer performance at the cost of additional power usage

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	384	**2209**	**1740**	2210	1740	2209	1740	384	**2209**	**1740**	2210	1740	2209	1740
507.cactuBSSN_r	384	296	1640	**296**	**1640**	297	1640	384	296	1640	**296**	**1640**	297	1640
508.namd_r	384	297	1230	298	1220	**298**	**1230**	384	297	1230	298	1220	**298**	**1230**
510.parest_r	384	1205	834	1182	850	**1202**	**836**	192	321	1570	**321**	**1560**	323	1550
511.povray_r	384	514	1740	**514**	**1740**	515	1740	384	514	1740	**514**	**1740**	515	1740
519.lbm_r	384	661	612	**661**	**612**	660	613	192	**325**	**622**	324	624	326	621
521.wrf_r	384	936	919	**936**	**919**	938	917	192	382	1120	**381**	**1130**	381	1130
526.blender_r	384	354	1650	**356**	**1640**	358	1630	384	354	1650	**356**	**1640**	358	1630
527.cam4_r	384	430	1560	**430**	**1560**	428	1570	384	429	1570	**427**	**1570**	427	1570
538.imagick_r	384	**148**	**6470**	148	6460	147	6480	384	**148**	**6470**	148	6460	147	6480
544.nab_r	384	232	2790	**231**	**2800**	230	2810	384	232	2790	**231**	**2800**	230	2810
549.fotonik3d_r	384	2573	582	2577	581	**2575**	**581**	192	**1284**	**583**	1284	583	1284	583
554.roms_r	384	1073	569	**1072**	**569**	1071	570	192	442	690	**444**	**687**	444	686

SPECrate®2017_fp_base = 1340

SPECrate®2017_fp_peak = 1450

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.
```

(Continued on next page)

Operating System Notes (Continued)

```
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,
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/home/cpu2017/amd_rate_aocc400_genoa_B_lib/lib:/home/cpu2017/amd_rate_a
     occ400_genoa_B_lib/lib32:"
MALLOC_CONF = "retain:true"
```

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 Throughput Compute
 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 Four memory domains  per socket
 ACPI CST C2 Latency set to 18 microseconds
 Thermal Configuration set to Maximum Cooling
 Workload Profile set to Custom
  L2 HW Prefetcher set to Disabled
  Power Regulator set to OS Control Mode

The system ROM used for this result contains microcode version 0xa10110d for the
```

(Continued on next page)

Platform Notes (Continued)

```
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/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on admin1 Wed Oct 12 20:01:15 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)
       384 "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  : 192
       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 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
       53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
       81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
       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 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
       53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
       81 82 83 84 85 86 87 88 89 90 91 92 93 94 95

 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):                          384
      On-line CPU(s) list:             0-383
      Vendor ID:                       AuthenticAMD
      Model name:                      AMD EPYC 9654 96-Core Processor
      CPU family:                      25
      Model:                           17
      Thread(s) per core:              2
      Core(s) per socket:              96
      Socket(s):                       2
      Stepping:                        1
      Frequency boost:                 enabled
      CPU max MHz:                     3709.0000
      CPU min MHz:                     400.0000
      BogoMIPS:                        4792.80
```

(Continued on next page)

Platform Notes (Continued)

```
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)
L3 cache:                        768 MiB (24 instances)
NUMA node(s):                    24
NUMA node0 CPU(s):               0-7,192-199
NUMA node1 CPU(s):               8-15,200-207
NUMA node2 CPU(s):               16-23,208-215
NUMA node3 CPU(s):               24-31,216-223
NUMA node4 CPU(s):               32-39,224-231
NUMA node5 CPU(s):               40-47,232-239
NUMA node6 CPU(s):               48-55,240-247
NUMA node7 CPU(s):               56-63,248-255
NUMA node8 CPU(s):               64-71,256-263
NUMA node9 CPU(s):               72-79,264-271
NUMA node10 CPU(s):              80-87,272-279
NUMA node11 CPU(s):              88-95,280-287
NUMA node12 CPU(s):              96-103,288-295
NUMA node13 CPU(s):              104-111,296-303
NUMA node14 CPU(s):              112-119,304-311
NUMA node15 CPU(s):              120-127,312-319
NUMA node16 CPU(s):              128-135,320-327
NUMA node17 CPU(s):              136-143,328-335
NUMA node18 CPU(s):              144-151,336-343
NUMA node19 CPU(s):              152-159,344-351
NUMA node20 CPU(s):              160-167,352-359
NUMA node21 CPU(s):              168-175,360-367
NUMA node22 CPU(s):              176-183,368-375
NUMA node23 CPU(s):              184-191,376-383
Vulnerability Itlb multihit:     Not affected
Vulnerability L1tf:              Not affected
```

(Continued on next page)

Platform Notes (Continued)

```
      Vulnerability Mds:                Not affected
      Vulnerability Meltdown:           Not affected
      Vulnerability Mmio stale data:    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 always-on, RSB filling
      Vulnerability Srbds:              Not affected
      Vulnerability Tsx async abort:    Not affected

From lscpu --cache:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL  SETS PHY-LINE COHERENCY-SIZE
      L1d       32K       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

/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 7 192 193 194 195 196 197 198 199
  node 0 size: 31941 MB
  node 0 free: 31540 MB
  node 1 cpus: 8 9 10 11 12 13 14 15 200 201 202 203 204 205 206 207
  node 1 size: 32252 MB
  node 1 free: 31949 MB
  node 2 cpus: 16 17 18 19 20 21 22 23 208 209 210 211 212 213 214 215
  node 2 size: 32252 MB
  node 2 free: 31825 MB
  node 3 cpus: 24 25 26 27 28 29 30 31 216 217 218 219 220 221 222 223
  node 3 size: 32252 MB
  node 3 free: 31967 MB
  node 4 cpus: 32 33 34 35 36 37 38 39 224 225 226 227 228 229 230 231
  node 4 size: 32252 MB
  node 4 free: 31865 MB
  node 5 cpus: 40 41 42 43 44 45 46 47 232 233 234 235 236 237 238 239
  node 5 size: 32252 MB
  node 5 free: 32012 MB
  node 6 cpus: 48 49 50 51 52 53 54 55 240 241 242 243 244 245 246 247
  node 6 size: 32252 MB
  node 6 free: 31878 MB
  node 7 cpus: 56 57 58 59 60 61 62 63 248 249 250 251 252 253 254 255
```

(Continued on next page)

Platform Notes (Continued)

```
node 7 size: 32252 MB
node 7 free: 32007 MB
node 8 cpus: 64 65 66 67 68 69 70 71 256 257 258 259 260 261 262 263
node 8 size: 32252 MB
node 8 free: 31827 MB
node 9 cpus: 72 73 74 75 76 77 78 79 264 265 266 267 268 269 270 271
node 9 size: 32252 MB
node 9 free: 31997 MB
node 10 cpus: 80 81 82 83 84 85 86 87 272 273 274 275 276 277 278 279
node 10 size: 32252 MB
node 10 free: 31869 MB
node 11 cpus: 88 89 90 91 92 93 94 95 280 281 282 283 284 285 286 287
node 11 size: 32218 MB
node 11 free: 31989 MB
node 12 cpus: 96 97 98 99 100 101 102 103 288 289 290 291 292 293 294 295
node 12 size: 32252 MB
node 12 free: 32040 MB
node 13 cpus: 104 105 106 107 108 109 110 111 296 297 298 299 300 301 302 303
node 13 size: 32252 MB
node 13 free: 32063 MB
node 14 cpus: 112 113 114 115 116 117 118 119 304 305 306 307 308 309 310 311
node 14 size: 32252 MB
node 14 free: 32064 MB
node 15 cpus: 120 121 122 123 124 125 126 127 312 313 314 315 316 317 318 319
node 15 size: 32252 MB
node 15 free: 32063 MB
node 16 cpus: 128 129 130 131 132 133 134 135 320 321 322 323 324 325 326 327
node 16 size: 32252 MB
node 16 free: 32043 MB
node 17 cpus: 136 137 138 139 140 141 142 143 328 329 330 331 332 333 334 335
node 17 size: 32252 MB
node 17 free: 32073 MB
node 18 cpus: 144 145 146 147 148 149 150 151 336 337 338 339 340 341 342 343
node 18 size: 32252 MB
node 18 free: 31985 MB
node 19 cpus: 152 153 154 155 156 157 158 159 344 345 346 347 348 349 350 351
node 19 size: 32252 MB
node 19 free: 32063 MB
node 20 cpus: 160 161 162 163 164 165 166 167 352 353 354 355 356 357 358 359
node 20 size: 32252 MB
node 20 free: 32073 MB
node 21 cpus: 168 169 170 171 172 173 174 175 360 361 362 363 364 365 366 367
node 21 size: 32193 MB
node 21 free: 32007 MB
node 22 cpus: 176 177 178 179 180 181 182 183 368 369 370 371 372 373 374 375
node 22 size: 32252 MB
node 22 free: 32060 MB
```

(Continued on next page)

Platform Notes (Continued)

```
node 23 cpus: 184 185 186 187 188 189 190 191 376 377 378 379 380 381 382 383
node 23 size: 32252 MB
node 23 free: 32031 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  12  12  12  11  12  12  12  11  12  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
  1:  12  10  12  12  12  11  12  12  12  11  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
  2:  12  12  10  12  12  12  11  12  12  12  11  12  32  32  32  32  32  32  32  32
  32  32  32  32
  3:  12  12  12  10  12  12  12  11  12  12  12  11  32  32  32  32  32  32  32  32
  32  32  32  32
  4:  11  12  12  12  10  12  12  12  11  12  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
  5:  12  11  12  12  12  10  12  12  12  11  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
  6:  12  12  11  12  12  12  10  12  12  12  11  12  32  32  32  32  32  32  32  32
  32  32  32  32
  7:  12  12  12  11  12  12  12  10  12  12  12  11  32  32  32  32  32  32  32  32
  32  32  32  32
  8:  11  12  12  12  11  12  12  12  10  12  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
  9:  12  11  12  12  12  11  12  12  12  10  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
 10:  12  12  11  12  12  12  11  12  12  12  10  12  32  32  32  32  32  32  32  32
 32  32  32  32
 11:  12  12  12  11  12  12  12  11  12  12  12  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  12  12  12  11  12  12  12
 11  12  12  12
 13:  32  32  32  32  32  32  32  32  32  32  32  32  12  10  12  12  12  11  12  12
 12  11  12  12
 14:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  10  12  12  12  11  12
 12  12  11  12
 15:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  10  12  12  12  11
 12  12  12  11
 16:  32  32  32  32  32  32  32  32  32  32  32  32  11  12  12  12  10  12  12  12
 11  12  12  12
 17:  32  32  32  32  32  32  32  32  32  32  32  32  12  11  12  12  12  10  12  12
 12  11  12  12
 18:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  11  12  12  12  10  12
 12  12  11  12
 19:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  11  12  12  12  10
 12  12  12  11
 20:  32  32  32  32  32  32  32  32  32  32  32  32  11  12  12  12  11  12  12  12
```

(Continued on next page)

Platform Notes (Continued)

```
    10  12  12  12
    21:  32  32  32  32  32  32  32  32  32  32  32  32  12  11  12  12  12  11  12  12
    12  10  12  12
    22:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  11  12  12  12  11  12
    12  12  10  12
    23:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  11  12  12  12  11
    12  12  12  10

  From /proc/meminfo
     MemTotal:       792214728 kB
     HugePages_Total:       0
     Hugepagesize:       2048 kB

  /sbin/tuned-adm active
      Current active profile: balanced

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

  /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 5.15.0-43-generic #46-Ubuntu SMP Tue Jul 12 10:30:17 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
  CVE-2018-3639 (Speculative Store Bypass):               Mitigation: Speculative Store
                                                          Bypass disabled via prctl and
```

(Continued on next page)

Platform Notes (Continued)

```
                                                      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:
                                                      always-on, RSB filling
 CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
 CVE-2019-11135 (TSX Asynchronous Abort):             Not affected

 run-level 5 Oct 12 19:57

 SPEC is set to: /home/cpu2017
    Filesystem                     Type  Size  Used Avail Use% Mounted on
    /dev/mapper/ubuntu--vg-ubuntu--lv ext4  437G   17G  401G   5% /

 From /sys/devices/virtual/dmi/id
     Vendor:         HPE
     Product:        ProLiant DL365 Gen11
     Product Family: ProLiant
     Serial:         DL365G11-001

 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               | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
                | 544.nab_r(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)
```

(Continued on next page)

Compiler Version Notes (Continued)

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

==============================================================================
C++             | 508.namd_r(base, peak) 510.parest_r(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          | 511.povray_r(base, peak) 526.blender_r(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
------------------------------------------------------------------------------

==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(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
```

(Continued on next page)

Compiler Version Notes (Continued)

```
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
------------------------------------------------------------------------------

==============================================================================
Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                | 554.roms_r(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      | 521.wrf_r(base, peak) 527.cam4_r(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`

C++ benchmarks:
`clang++`

Fortran benchmarks:
`flang`

Benchmarks using both Fortran and C:
`flang clang`

Benchmarks using both C and C++:
`clang++ clang`

(Continued on next page)

Base Compiler Invocation (Continued)

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

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
526.blender_r: -funsigned-char -DSPEC_LP64
527.cam4_r: -DSPEC_CASE_FLAG -DSPEC_LP64
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-ldist-scalar-expand -fenable-aggressive-gather -O3
-march=znver4 -fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -lamdlibm -lamdalloc -lflang

C++ benchmarks:
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lamdalloc
-lflang

Fortran benchmarks:
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3

(Continued on next page)

Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -Kieee -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -zopt -lamdlibm -lamdalloc
-lflang

Benchmarks using both Fortran and C:
-m64 -flto -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 -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -Kieee -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc -lflang

Benchmarks using both C and C++:
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -lamdlibm -lamdalloc -lflang

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

Base Other Flags

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

(Continued on next page)

Base Other Flags (Continued)

C++ benchmarks:
`-Wno-unused-command-line-argument`

Fortran benchmarks:
`-Wno-unused-command-line-argument`

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

Benchmarks using both C and C++:
`-Wno-unused-command-line-argument`

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

Peak Compiler Invocation

C benchmarks:
`clang`

C++ benchmarks:
`clang++`

Fortran benchmarks:
`flang`

Benchmarks using both Fortran and C:
`flang clang`

Benchmarks using both C and C++:
`clang++ clang`

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

Peak Portability Flags

`Same as Base Portability Flags`

Peak Optimization Flags

C benchmarks:

519.lbm_r: `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6 -Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast -march=znver4 -fveclib=AMDLIBM -ffast-math -fstruct-layout=7 -mllvm -unroll-threshold=50 -fremap-arrays -fstrip-mining -mllvm -inline-threshold=1000 -mllvm -reduce-array-computations=3 -zopt -lamdlibm -lamdalloc`

538.imagick_r: `basepeak = yes`

544.nab_r: `basepeak = yes`

C++ benchmarks:

508.namd_r: `basepeak = yes`

510.parest_r: `-m64 -flto -Wl,-mllvm -Wl,-suppress-fmas -Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast -march=znver4 -fveclib=AMDLIBM -ffast-math -finline-aggressive -mllvm -unroll-threshold=100 -mllvm -reduce-array-computations=3 -zopt -lamdlibm -lamdalloc`

Fortran benchmarks:

503.bwaves_r: `basepeak = yes`

549.fotonik3d_r: `-m64 -flto -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 -Kieee -Mrecursive -mllvm -reduce-array-computations=3 -fepilog-vectorization-of-inductions -fvector-transform -fscalar-transform -lamdlibm -lamdalloc -lflang`

554.roms_r: `-m64 -flto -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 -Mrecursive -mllvm -reduce-array-computations=3 -fepilog-vectorization-of-inductions -zopt -lamdlibm -lamdalloc -lflang`

(Continued on next page)

Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

521.wrf_r: -m64 -flto -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
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -Mrecursive
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-lflang

527.cam4_r: -m64 -flto -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 -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -reduce-array-computations=3 -zopt
-Kieee -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-lflang

Benchmarks using both C and C++:

511.povray_r: basepeak = yes

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: basepeak = yes

Peak Other Flags

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

C++ benchmarks:
-Wno-unused-command-line-argument

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

(Continued on next page)

Peak Other Flags (Continued)

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

Benchmarks using both C and C++:
`-Wno-unused-command-line-argument`

Benchmarks using Fortran, C, and C++:
`-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`

SPEC CPU and SPECrate are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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 2022-10-12 16:01:14-0400.
Report generated on 2022-11-10 14:45:05 by CPU2017 PS formatter v6442.
Originally published on 2022-11-10.