SPEC CPU®2017 Floating Point Speed Result

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Quanta Cloud Technology
(Test Sponsor: Quanta Computer Inc.)

QuantaGrid D43K-1U
(AMD EPYC 7763, 2.45 GHz)

$SPECspeed®2017\_fp\_base = 253$

$SPECspeed®2017\_fp\_peak = 260$

CPU2017 License: 9050

Test Sponsor: Quanta Computer Inc.

Tested by: Quanta Computer Inc.

Test Date: Feb-2021

Hardware Availability: Mar-2021

Software Availability: Mar-2021

Benchmark	Threads	base	peak
603.bwaves_s	128	774	778
607.cactuBSSN_s	128	418	
619.lbm_s	128	129	132
621.wrf_s	128	179	
627.cam4_s	128	182	183
628.pop2_s	128	80.6	81.2
638.imagick_s	128	455	
644.nab_s	128 / 256	609	617
649.fotonik3d_s	128	112	
654.roms_s	128	312	393

SPECspeed®2017_fp_base (253)   SPECspeed®2017_fp_peak (260)

Hardware

CPU Name: AMD EPYC 7763
  Max MHz: 3500
  Nominal: 2450
Enabled: 128 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
  L2: 512 KB I+D on chip per core
  L3: 256 MB I+D on chip per chip, 32 MB shared / 8 cores
  Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-L)
Storage: 1 x 480GB SATA M.2 SSD
Other: None

Software

OS: Ubuntu 20.04.1 LTS
    Kernel 5.4.0-42-generic
Compiler: C/C++/Fortran: Version 3.0.0 of AOCC
Parallel: Yes
Firmware: Version 3C01 released Feb-2021
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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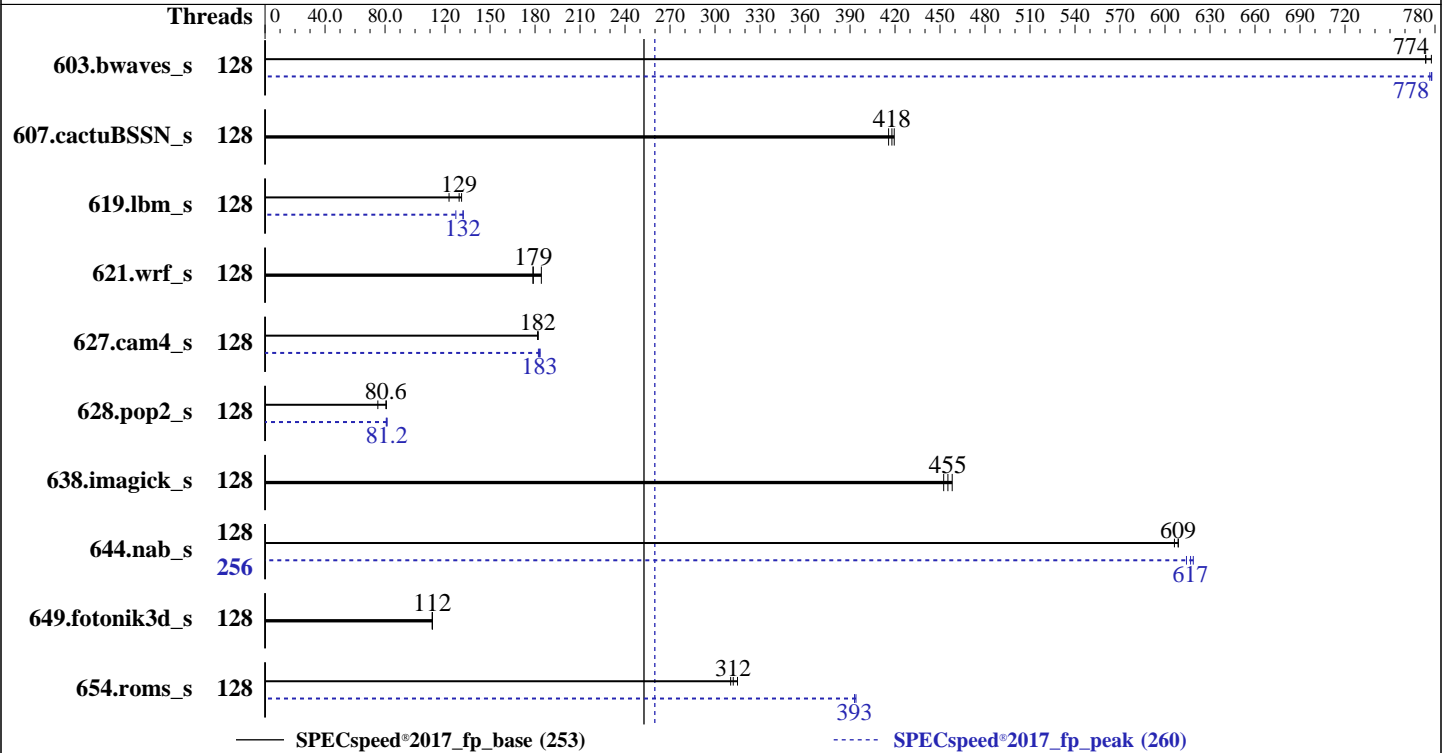
SPECspeed®2017_fp_peak = 260

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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	128	75.9	778	76.2	774	**76.2**	**774**	128	76.0	777	75.8	778	**75.9**	**778**
607.cactuBSSN_s	128	39.7	419	**39.9**	**418**	40.1	416	128	39.7	419	**39.9**	**418**	40.1	416
619.lbm_s	128	40.0	131	42.7	123	**40.5**	**129**	128	**39.7**	**132**	41.2	127	39.6	132
621.wrf_s	128	74.1	179	**73.9**	**179**	71.8	184	128	74.1	179	**73.9**	**179**	71.8	184
627.cam4_s	128	**48.7**	**182**	48.8	182	48.7	182	128	**48.4**	**183**	48.3	183	48.6	182
628.pop2_s	128	**147**	**80.6**	147	80.9	158	75.2	128	146	81.3	147	80.8	**146**	**81.2**
638.imagick_s	128	31.9	452	31.5	458	**31.7**	**455**	128	31.9	452	31.5	458	**31.7**	**455**
644.nab_s	128	28.7	609	**28.7**	**609**	28.8	606	256	28.2	619	28.4	614	**28.3**	**617**
649.fotonik3d_s	128	81.8	111	81.7	112	**81.7**	**112**	128	81.8	111	81.7	112	**81.7**	**112**
654.roms_s	128	50.7	310	50.0	315	**50.4**	**312**	128	40.0	394	**40.1**	**393**	40.1	393
SPECspeed®2017_fp_base =			**253**											
SPECspeed®2017_fp_peak =			**260**											

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
'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>

'echo 8 > /proc/sys/vm/dirty_ratio' run as root to limit dirty cache to 8% of
memory.
'echo 1 > /proc/sys/vm/swappiness' run as root to limit swap usage to minimum
necessary.
'echo 1 > /proc/sys/vm/zone_reclaim_mode' run as root to free node-local memory
and avoid remote memory usage.
'sync; echo 3 > /proc/sys/vm/drop_caches' run as root to reset filesystem caches.
'sysctl -w kernel.randomize_va_space=0' run as root to disable address space layout
randomization (ASLR) to reduce run-to-run variability.
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 enable THP only on request for peak runs of 628.pop2_s, and 638.imagick_s,
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root.
To disable THP for peak runs of 627.cam4_s, 644.nab_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 = "0-255"
LD_LIBRARY_PATH =
      "/home/cpu2017/amd_speed_aocc300_milan_B_lib/64;/home/cpu2017/amd_speed_
      aocc300_milan_B_lib/32:"
MALLOC_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "256"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0 128 1 129 2 130 3 131 4 132 5 133 6 134 7 135 8 136 9
      137 10 138 11 139 12 140 13 141 14 142 15 143 16 144 17 145 18 146 19
      147 20 148 21 149 22 150 23 151 24 152 25 153 26 154 27 155 28 156 29
      157 30 158 31 159 32 160 33 161 34 162 35 163 36 164 37 165 38 166 39
      167 40 168 41 169 42 170 43 171 44 172 45 173 46 174 47 175 48 176 49
      177 50 178 51 179 52 180 53 181 54 182 55 183 56 184 57 185 58 186 59
      187 60 188 61 189 62 190 63 191 64 192 65 193 66 194 67 195 68 196 69
      197 70 198 71 199 72 200 73 201 74 202 75 203 76 204 77 205 78 206 79
      207 80 208 81 209 82 210 83 211 84 212 85 213 86 214 87 215 88 216 89
      217 90 218 91 219 92 220 93 221 94 222 95 223 96 224 97 225 98 226 99
      227 100 228 101 229 102 230 103 231 104 232 105 233 106 234 107 235 108
      236 109 237 110 238 111 239 112 240 113 241 114 242 115 243 116 244 117
```

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Environment Variables Notes (Continued)

```
      245 118 246 119 247 120 248 121 249 122 250 123 251 124 252 125 253 126
      254 127 255"

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0-127"
```

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 settings:
 Pwr and Perf Profile set to Performance
 NUMA nodes per socket is NPS1
 Determinism Control is Manual
 Determinism Slider set to Power
 cTDP Control is Manual
 cTDP set to 280
 Package Power Limit Control is Manual
 Package Power Limit set to 280
 IOMMU is Enable

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
 running on 192-168-133-37 Fri Feb 26 09:48:24 2021

 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 7763 64-Core Processor
```

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Tested by: Quanta Computer Inc.　　　　　　　　　　　　**Software Availability:** Mar-2021

Platform Notes (Continued)

```
     2  "physical id"s (chips)
     256 "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 : 64
     siblings  : 128
     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
     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

  From lscpu:
     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):                  256
     On-line CPU(s) list:     0-255
     Thread(s) per core:      2
     Core(s) per socket:      64
     Socket(s):               2
     NUMA node(s):            2
     Vendor ID:               AuthenticAMD
     CPU family:              25
     Model:                   1
     Model name:              AMD EPYC 7763 64-Core Processor
     Stepping:                1
     Frequency boost:         enabled
     CPU MHz:                 1793.820
     CPU max MHz:             2450.0000
     CPU min MHz:             1500.0000
     BogoMIPS:                4890.90
     Virtualization:          AMD-V
     L1d cache:               4 MiB
     L1i cache:               4 MiB
     L2 cache:                64 MiB
     L3 cache:                512 MiB
     NUMA node0 CPU(s):       0-63,128-191
     NUMA node1 CPU(s):       64-127,192-255
     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
```

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Platform Notes (Continued)

```
     Vulnerability Spectre v1:          Mitigation; usercopy/swapgs barriers and __user
     pointer sanitization
     Vulnerability Spectre v2:          Mitigation; Full AMD retpoline, IBPB conditional,
     IBRS_FW, STIBP always-on, RSB filling
     Vulnerability Srbds:               Not affected
     Vulnerability Tsx async abort:     Not affected
     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 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 rdseed adx
     smap clflushopt clwb sha_ni xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc
     cqm_mbm_total cqm_mbm_local clzero irperf xsaveerptr wbnoinvd arat npt lbrv svm_lock
     nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold
     v_vmsave_vmload vgif umip pku ospke vaes vpclmulqdq rdpid overflow_recov succor smca

 /proc/cpuinfo cache data
    cache size : 512 KB

 From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
 physical chip.
   available: 2 nodes (0-1)
   node 0 cpus: 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 63 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143
   144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165
   166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187
   188 189 190 191
   node 0 size: 515906 MB
   node 0 free: 513885 MB
   node 1 cpus: 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 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112
   113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 192 193 194 195 196 197 198
   199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220
   221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242
   243 244 245 246 247 248 249 250 251 252 253 254 255
   node 1 size: 516062 MB
   node 1 free: 514037 MB
   node distances:
   node   0   1
     0:  10  32
     1:  32  10

 From /proc/meminfo
```

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Platform Notes (Continued)

```
    MemTotal:        1056735752 kB
    HugePages_Total:          0
    Hugepagesize:          2048 kB

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

  /usr/bin/lsb_release -d
     Ubuntu 20.04.1 LTS

  From /etc/*release* /etc/*version*
     debian_version: bullseye/sid
     os-release:
        NAME="Ubuntu"
        VERSION="20.04.1 LTS (Focal Fossa)"
        ID=ubuntu
        ID_LIKE=debian
        PRETTY_NAME="Ubuntu 20.04.1 LTS"
        VERSION_ID="20.04"
        HOME_URL="https://www.ubuntu.com/"
        SUPPORT_URL="https://help.ubuntu.com/"

  uname -a:
     Linux 192-168-133-37 5.4.0-42-generic #46-Ubuntu SMP Fri Jul 10 00:24:02 UTC 2020
     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
  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: Full AMD retpoline,
                                                     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 Feb 26 09:47

  SPEC is set to: /home/cpu2017
```

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Platform Notes (Continued)

```
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda2       ext4  407G   13G  374G   4% /

 From /sys/devices/virtual/dmi/id
    Vendor:          Quanta Cloud Technology Inc.
    Product:         QuantaGrid D43K-1U

 BIOS:
    BIOS Vendor:       American Megatrends International, LLC.
    BIOS Version:      3C01
    BIOS Date:         02/24/2021

 (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 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
------------------------------------------------------------------------------


==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
------------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
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Compiler Version Notes (Continued)

```
==============================================================================
Fortran          | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
                 | 654.roms_s(base, peak)
------------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
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Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
------------------------------------------------------------------------------


==============================================================================
Fortran, C       | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
                 | 628.pop2_s(base, peak)
------------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
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  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/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
```

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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 -mno-adx -mno-sse4a -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 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -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 -z muldefs
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang -lflangrti
```

Fortran benchmarks:
```
-m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -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 -Hz,1,0x1 -O3
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -z muldefs -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrti
```

Benchmarks using both Fortran and C:
```
-m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
```

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SPEC CPU®2017 Floating Point Speed Result

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Quanta Cloud Technology
(Test Sponsor: Quanta Computer Inc.)

QuantaGrid D43K-1U
(AMD EPYC 7763, 2.45 GHz)

SPECspeed®2017_fp_base = 253

SPECspeed®2017_fp_peak = 260

CPU2017 License: 9050		**Test Date:**	Feb-2021
Test Sponsor:	Quanta Computer Inc.	**Hardware Availability:**	Mar-2021
Tested by:	Quanta Computer Inc.	**Software Availability:**	Mar-2021

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
```
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -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 -Hz,1,0x1
-Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop -z muldefs
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang -lflangrti
```

Benchmarks using Fortran, C, and C++:
```
-m64 -mno-adx -mno-sse4a -std=c++98
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-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 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -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 -z muldefs -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrti
```

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
```

SPEC CPU®2017 Floating Point Speed Result

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Quanta Cloud Technology
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QuantaGrid D43K-1U
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SPECspeed®2017_fp_peak = 260

CPU2017 License:	9050	**Test Date:**	Feb-2021
Test Sponsor:	Quanta Computer Inc.	**Hardware Availability:**	Mar-2021
Tested by:	Quanta Computer Inc.	**Software Availability:**	Mar-2021

Peak Compiler Invocation

C benchmarks:
```
clang
```

Fortran benchmarks:
```
flang
```

Benchmarks using both Fortran and C:
```
flang clang
```

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

Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:

```
 619.lbm_s: -m64 -mno-adx -mno-sse4a
-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 -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
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
```

```
 638.imagick_s: basepeak = yes
```

```
 644.nab_s: -m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -ffast-math -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
```

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Standard Performance Evaluation Corporation (info@spec.org)
https://www.spec.org/

Quanta Cloud Technology
(Test Sponsor: Quanta Computer Inc.)

QuantaGrid D43K-1U
(AMD EPYC 7763, 2.45 GHz)

SPECspeed®2017_fp_base = 253

SPECspeed®2017_fp_peak = 260

CPU2017 License: 9050		**Test Date:**	Feb-2021
Test Sponsor:	Quanta Computer Inc.	**Hardware Availability:**	Mar-2021
Tested by:	Quanta Computer Inc.	**Software Availability:**	Mar-2021

Peak Optimization Flags (Continued)

644.nab_s (continued):
```
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
```

Fortran benchmarks:

603.bwaves_s: `-m64 -mno-adx -mno-sse4a`
```
-Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp
-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 -Mrecursive
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm
-ljemalloc -lflang
```

649.fotonik3d_s: `basepeak = yes`

654.roms_s: `Same as 603.bwaves_s`

Benchmarks using both Fortran and C:

621.wrf_s: `basepeak = yes`

627.cam4_s: `-m64 -mno-adx -mno-sse4a`
```
-Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp
-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 -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 -Mrecursive
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm
-ljemalloc -lflang
```

628.pop2_s: `Same as 627.cam4_s`

Benchmarks using Fortran, C, and C++:

(Continued on next page)

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SPECspeed®2017_fp_base = 253

SPECspeed®2017_fp_peak = 260

CPU2017 License: 9050   **Test Date:** Feb-2021
Test Sponsor: Quanta Computer Inc.   **Hardware Availability:** Mar-2021
Tested by: Quanta Computer Inc.   **Software Availability:** Mar-2021

Peak Optimization Flags (Continued)

607.cactuBSSN_s: basepeak = yes

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/aocc300-flags-A1.html
http://www.spec.org/cpu2017/flags/Quanta-Computer-Inc-amd-speccpu-setting-v3_AMD_MILAN.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/aocc300-flags-A1.xml
http://www.spec.org/cpu2017/flags/Quanta-Computer-Inc-amd-speccpu-setting-v3_AMD_MILAN.xml

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

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