## SPEC CPU®2017 Floating Point Speed Result

### GIGA-BYTE TECHNOLOGY CO., LTD.
**R282-Z90**  
(AMD EPYC 72F3, 3.70GHz)

**SPECspeed®2017_fp_base = 125**  
**SPECspeed®2017_fp_peak = 133**

<table>
<thead>
<tr>
<th>Threads</th>
<th>603.bwaves_s</th>
<th>607.cactuBSSN_s</th>
<th>619.lbm_s</th>
<th>621.wrf_s</th>
<th>627.cam4_s</th>
<th>628.pop2_s</th>
<th>638.imagick_s</th>
<th>644.nab_s</th>
<th>649.fotonik3d_s</th>
<th>654.roms_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>30.0</td>
<td>60.0</td>
<td>90.0</td>
<td>120</td>
<td>150</td>
<td>180</td>
<td>210</td>
<td>240</td>
<td>270</td>
<td>300</td>
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<tr>
<td>671</td>
<td>149</td>
<td>102</td>
<td>123</td>
<td>63.5</td>
<td>104</td>
<td>156</td>
<td>112</td>
<td>164</td>
<td>184</td>
<td></td>
</tr>
</tbody>
</table>

### CPU2017 License: 9082  
**Test Date:** Feb-2021  
**Test Sponsor:** GIGA-BYTE TECHNOLOGY CO., LTD.  
**Hardware Availability:** Mar-2021  
**Tested by:** GIGA-BYTE TECHNOLOGY CO., LTD.  
**Test Date:** Feb-2021  
**Software Availability:** Mar-2021

### Hardware

- **CPU Name:** AMD EPYC 72F3
- **Max MHz:** 4100
- **Nominal:** 3700
- **Enabled:** 16 cores, 2 chips
- **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 per core
- **Memory:** 1 TB (16 x 64 GB 4DRx16 PC4-3200AA-L)
- **Storage:** 1 x 1.92 TB SATA SSD
- **Other:** None

### Software

- **OS:** Ubuntu 20.04.1 LTS
- **Compiler:** C/C++/Fortran: Version 3.0.0 of AOCC
- **Parallel:** Yes
- **Firmware:** Version M02 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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---

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#### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>16</td>
<td>88.0</td>
<td>671</td>
<td>88.1</td>
<td>670</td>
<td>87.9</td>
<td>671</td>
<td>88.1</td>
<td>670</td>
<td>87.9</td>
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<tr>
<td>607.cactubssn_s</td>
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<td>112</td>
<td>149</td>
<td>112</td>
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<td>63.5</td>
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<td>621.wrf_s</td>
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<td>121</td>
<td>107</td>
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<td>109</td>
<td>121</td>
<td>107</td>
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<tr>
<td>627.cam4_s</td>
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<td>65.0</td>
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<td>65.3</td>
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<td>65.1</td>
<td>16</td>
<td>136</td>
<td>65.0</td>
<td>136</td>
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<tr>
<td>628.pop2_s</td>
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<td>62.6</td>
<td>16</td>
<td>190</td>
<td>62.4</td>
<td>192</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>16</td>
<td>139</td>
<td>104</td>
<td>138</td>
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<td>138</td>
<td>104</td>
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</tr>
<tr>
<td>649.fotonik3d_s</td>
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<tr>
<td>654.roms_s</td>
<td>16</td>
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<td>95.8</td>
<td>164</td>
<td>16</td>
<td>85.5</td>
<td>184</td>
<td>85.5</td>
</tr>
</tbody>
</table>

**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.  
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and  
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root to enable Transparent Hugepages (THP) for this run.  
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root for peak runs of 628.pop2_s and 638.imagick_s to enable THP only on request.
Environment Variables Notes

Environment variables set by runcpu before the start of the run:
- GOMP_CPU_AFFINITY = "0-15"
- LD_LIBRARY_PATH = "/cpu2017/amd_speed_aocc300_milan_B_lib/64;/cpu2017/amd_speed_aocc300_milan_B_lib/32:"
- MALLOC_CONF = "retain:true"
- OMP_DYNAMIC = "false"
- OMP_SCHEDULE = "static"
- OMP_STACKSIZE = "128M"
- OMP_THREAD_LIMIT = "16"

Environment variables set by runcpu during the 619.lbm_s peak run:
- GOMP_CPU_AFFINITY = "0 8 1 9 2 10 3 11 4 12 5 13 6 14 7 15"

Environment variables set by runcpu during the 654.roms_s peak run:
- GOMP_CPU_AFFINITY = "0-15"

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.

The AMD64 AOCC Compiler Suite is available at http://developer.amd.com/amd-aocc/
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:
- cTDP = 280
- Determinism Slider set to Power
- SMT set to disable
- IOMMU set to enable
- Package Power Limit set to 280
- NUMA nodes per socket set to NPS1

(Continued on next page)
Platform Notes (Continued)

Sysinfo program /cpu2017/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa9d4b38e2f1c
running on test Sat Feb 27 14:00:48 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 72F3 8-Core Processor
  2 "physical id"s (chips)
  16 "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 : 8
siblings : 8
  physical 0: cores 0 1 2 3 4 5 6 7
  physical 1: cores 0 1 2 3 4 5 6 7

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):                 16
On-line CPU(s) list:    0-15
Thread(s) per core:     1
Core(s) per socket:     8
Socket(s):              2
NUMA node(s):           16
Vendor ID:              AuthenticAMD
CPU family:             25
Model:                  1
Model name:             AMD EPYC 72F3 8-Core Processor
Stepping:               1
Frequency boost:        enabled
CPU MHz:                1497.189
CPU max MHz:            3700.0000
CPU min MHz:            1500.0000
BogoMIPS:               7399.90
Virtualization:         AMD-V
L1d cache:              512 KiB
L1i cache:              512 KiB
L2 cache:               8 MiB
L3 cache:               512 MiB
NUMA node0 CPU(s):      0

(Continued on next page)
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Software Availability: Mar-2021

Platform Notes (Continued)

NUMA node1 CPU(s):               1
NUMA node2 CPU(s):               2
NUMA node3 CPU(s):               3
NUMA node4 CPU(s):               4
NUMA node5 CPU(s):               5
NUMA node6 CPU(s):               6
NUMA node7 CPU(s):               7
NUMA node8 CPU(s):               8
NUMA node9 CPU(s):               9
NUMA node10 CPU(s):              10
NUMA node11 CPU(s):              11
NUMA node12 CPU(s):              12
NUMA node13 CPU(s):              13
NUMA node14 CPU(s):              14
NUMA node15 CPU(s):              15
Vulnerability Itlb multihit:     Not affected
Vulnerability L1tf:              Not affected
Vulnerability Mds:               Not affected
Vulnerability Meltdown:          Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1:       Mitigation; usercopy/swapgs barriers and __user pointer sanitation
Vulnerability Spectre v2:       Mitigation; Full AMD retpoline, IBPB conditional, IBRS_FW, STIBF disabled, RSB filling
Vulnerability Srbsds:            Not affected
Vulnerability Txn 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 movbe popcnt aes
                                 xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a
                                 misalignsse 3nowprefetch osvw ibr iis kinit wdt tce topoext perfctr_core perfctr_nb
                                 bpext perfctr_l1c mwaitx cpb cat_l3 cdr_l3 invpcid_single hw_pstate ssbd mba ibrs
                                 ibpb stibp vmmcall fsqgbase bml1 avx2 smep bmi2 erms invpcid cqm rdt_a rseed adx
                                 smap clflushopt clwb sha_ni xsaveopt xsavex xgetbxv1 xsaves cqm_llc cqm_occup_llc
                                 cqm_mbm_total cqm_mbm_local clzero irperf xsavesrtr wboiavd arat npt lbrv svm_lock
                                 nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold
                                 v_vmsave_vmload vgfl umip pkv ospka vpe vpclmulqdq rdpid overflow_recov succor smca
                                 
From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 16 nodes (0-15)
           node 0 cpus: 0

(Continued on next page)
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Software Availability: Mar-2021

Platform Notes (Continued)

node 0 size: 64328 MB
node 0 free: 64244 MB
node 1 cpus: 1
node 1 size: 64511 MB
node 1 free: 64463 MB
node 2 cpus: 2
node 2 size: 64511 MB
node 2 free: 64431 MB
node 3 cpus: 3
node 3 size: 64487 MB
node 3 free: 64442 MB
node 4 cpus: 4
node 4 size: 64511 MB
node 4 free: 64463 MB
node 5 cpus: 5
node 5 size: 64511 MB
node 5 free: 64450 MB
node 6 cpus: 6
node 6 size: 64511 MB
node 6 free: 64445 MB
node 7 cpus: 7
node 7 size: 64494 MB
node 7 free: 64444 MB
node 8 cpus: 8
node 8 size: 64511 MB
node 8 free: 64463 MB
node 9 cpus: 9
node 9 size: 64511 MB
node 9 free: 64465 MB
node 10 cpus: 10
node 10 size: 64511 MB
node 10 free: 64455 MB
node 11 cpus: 11
node 11 size: 64511 MB
node 11 free: 64439 MB
node 12 cpus: 12
node 12 size: 64511 MB
node 12 free: 64359 MB
node 13 cpus: 13
node 13 size: 64511 MB
node 13 free: 64468 MB
node 14 cpus: 14
node 14 size: 64511 MB
node 14 free: 64389 MB
node 15 cpus: 15
node 15 size: 64507 MB
node 15 free: 64458 MB

(Continued on next page)
Platform Notes (Continued)

node distances:

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

From /proc/meminfo
- MemTotal: 1056723220 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

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

/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 test 5.4.0-66-generic #74-Ubuntu SMP Wed Jan 27 22:54:38 UTC 2021 x86_64 x86_64
  x86_64 GNU/Linux

Kernel self-reported vulnerability status:

(Continued on next page)
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Platform Notes (Continued)

CVE-2018-12207 (iTLB Multihit): Not affected
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swapgs barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1): Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: disabled, RSB filling
CVE-2017-5715 (Spectre variant 2):
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 5 Feb 27 13:56
SPEC is set to: /cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 ext4 1.8T 18G 1.7T 2% /

From /sys/devices/virtual/dmi/id
Vendor: GIGABYTE
Product: R282-290-00
Product Family: Server
Serial: 1234567890abcdefghijkl

Additional information from dmidecode 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:
16x Samsung M386A8K40DM2-CWE 64 GB 4 rank 3200
16x Unknown Unknown

BIOS:
BIOS Vendor: GIGABYTE
BIOS Version: M02
BIOS Date: 02/01/2021
BIOS Revision: 5.21

(End of data from sysinfo program)
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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
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
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
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
------------------------------------------------------------------------------
==============================================================================
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
LLVM Mirror.Version.12.0.0)
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
LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

(Continued on next page)
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Compiler Version Notes (Continued)

LLVM Mirror.Version.12.0.0
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
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

Base Compiler Invocation

C benchmarks:
clang

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

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

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64
628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64
GIGA-BYTE TECHNOLOGY CO., LTD.
R282-Z90 (AMD EPYC 72F3, 3.70GHz)

SPECspeed®2017_fp_base = 125
SPECspeed®2017_fp_peak = 133

CPU2017 License: 9082
Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.
Test Date: Feb-2021
Tested by: GIGA-BYTE TECHNOLOGY CO., LTD.
Hardware Availability: Mar-2021
Software Availability: Mar-2021

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 -fvecclib=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
- 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
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GIGA-BYTE TECHNOLOGY CO., LTD.
R282-Z90
(AMD EPYC 72F3 , 3.70GHz)

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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
- `-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
- `-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3`
- `-fveclib=AMDLIBM -ffast-math -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-lcm-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`

Peak Compiler Invocation

C benchmarks:
`clang`

Fortran benchmarks:
`flang`

Benchmarks using both Fortran and C:
`flang clang`

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

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

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

619.lbm_s: -m64 -mno-adx -mno-sse4a  
-Wl,-mlibvm -Wl,-function-specialize  
-Wl,-mlibvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mlibvm -Wl,-reduce-array-computations=3 -Ofast  
-march=znver3 -fveclib=AMDLIBM -ffast-math -fno-math  
-fstruct-layout=5 -mlibvm -unroll-threshold=50  
-fremap-arrays -flv-function-specialization  
-mlibvm -inline-threshold=1000 -mlibvm -enable-gvn-hoist  
-mlibvm -global-vectorize-slp=true  
-mlibvm -function-specialize -mlibvm -enable-licm-vrp  
-mlibvm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp  
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

638.imagick_s: basepeak = yes
644.nab_s: basepeak = yes

Fortran benchmarks:

603.bwaves_s: basepeak = yes
649.fotonik3d_s: basepeak = yes

654.roms_s: -m64 -mno-adx -mno-sse4a  
-Wl,-mlibvm -Wl,-enable-X86-prefetching  
-Wl,-mlibvm -Wl,-enable-licm-vrp  
-Wl,-mlibvm -Wl,-function-specialize  
-Wl,-mlibvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mlibvm -Wl,-reduce-array-computations=3 -Ofast  
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive  
-mlibvm -reduce-array-computations=3

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

654.roms_s (continued):
-mlllvm -global-vectorize-slp=true -mlllvm -enable-llicm-vrp
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm
-ljemalloc -lflang

Benchmarks using both Fortran and C:
621.wrf_s: basepeak = yes
627.cam4_s: basepeak = yes
628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:
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

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/GIGA-BYTE-Platform-SPECcpu2017-Flags-V1.2-Milan.xml
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