### Dell Inc.

**PowerEdge C6525 (AMD EPYC 7713 64-Core Processor)**

**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Feb-2021  
**Hardware Availability:** Mar-2021  
**Software Availability:** Mar-2021

#### SPECspeed®2017 fp results

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<th>SPECspeed®2017 fp_base</th>
<th>SPECspeed®2017 fp_peak</th>
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</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>128</td>
<td>729</td>
<td>730</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>128</td>
<td>398</td>
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<td>619.lbm_s</td>
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<tr>
<td>621.wrf_s</td>
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<td>628.pop2_s</td>
<td>128</td>
<td>65.7</td>
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<tr>
<td>638.imagick_s</td>
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<td>644.nab_s</td>
<td>128</td>
<td>110</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>128</td>
<td>314</td>
<td>381</td>
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<tr>
<td>654.roms_s</td>
<td>128</td>
<td>SPECspeed®2017_fp_base (234)</td>
<td>SPECspeed®2017_fp_peak (238)</td>
</tr>
</tbody>
</table>

#### Hardware

- **CPU Name:** AMD EPYC 7713  
- **Max MHz:** 3675  
- **Nominal:** 2000  
- **Enabled:** 128 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 shared / 8 cores  
- **Other:** None  
- **Memory:** 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R)  
- **Storage:** 504 GB on tmpfs  
- **Other:** None

#### Software

- **OS:** Red Hat Enterprise Linux 8.3 (Ootpa)  
- **Compiler:** C/C++/Fortran: Version 3.0.0 of AOCC  
- **Parallel:** Yes  
- **Firmware:** Version 2.1.4 released Feb-2021  
- **File System:** tmpfs  
- **System State:** Run level 3 (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
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>128</td>
<td>80.9</td>
<td>729</td>
<td>80.8</td>
<td>731</td>
<td>80.9</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>128</td>
<td>41.7</td>
<td>400</td>
<td>41.9</td>
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<tr>
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<td>78.4</td>
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<tr>
<td>627.cam4_s</td>
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<td>55.2</td>
<td>161</td>
<td>55.2</td>
<td>160</td>
<td>55.6</td>
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<td>55.8</td>
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<tr>
<td>628.pop2_s</td>
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<td>128</td>
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<td>426</td>
<td>34.3</td>
<td>421</td>
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<tr>
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<td>128</td>
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<td>541</td>
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<td>649.fotonik3d_s</td>
<td>128</td>
<td>82.5</td>
<td>110</td>
<td>81.8</td>
<td>112</td>
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<td>314</td>
<td>41.2</td>
<td>382</td>
<td>41.4</td>
<td>381</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 234  
SPECspeed®2017_fp_peak = 238

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.  
'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.

(Continued on next page)
## 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
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 = "0-127"
- **LD_LIBRARY_PATH =
  - "/dev/shm/cpu2017-1.1.5/amd_speed_aocc300_milan_B_lib/64;/dev/shm/cpu201
  7-1.1.5/amd_speed_aocc300_milan_B_lib/32:"
- **MALLOCONF = "retain:true"
- **OMP_DYNAMIC = "false"
- **OMP_SCHEDULE = "static"
- **OMP_STACKSIZE = "128M"
- **OMP_THREAD_LIMIT = "128"

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

Environment variables set by runcpu during the 607.cactubssn_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 621.wrf_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 638.imagick_s peak run:
- **GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 644.nab_s peak run:
- **GOMP_CPU_AFFINITY = "0 64 1 65 2 66 3 67 4 68 5 69 6 70 7 71 8 72 9 73 10 74
  11 75 12 76 13 77 14 78 15 79 16 80 17 81 18 82 19 83 20 84 21 85 22 86
  23 87 24 88 25 89 26 90 27 91 28 92 29 93 30 94 31 95 32 96 33 97 34 98
  35 99 36 100 37 101 38 102 39 103 40 104 41 105 42 106 43 107 44 108 45
  109 46 110 47 111 48 112 49 113 50 114 51 115 52 116 53 117 54 118 55"
Environment Variables Notes (Continued)

Environment variables set by runcpu during the 649.fotonik3d_s peak run:
GOMP_CPU_AFFINITY = "0-127"
PGLPF_ZMEM = "yes"

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:
Logical processor : Disabled
L3 Cache as NUMA Domain : Enabled
Virtualization Technology : Disabled
DRAM Refresh Delay : Performance
System Profile : Custom
  CPU Power Management : Maximum Performance
  Memory Patrol Scrub : Disabled
  PCI ASPM L1 Link
  Power Management : Disabled

Sysinfo program /dev/shm/cpu2017-1.1.5/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c running on localhost.localdomain Thu Feb 25 17:35:38 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 7713 64-Core Processor
Dell Inc.

PowerEdge C6525 (AMD EPYC 7713 64-Core Processor)

SPECspeed©2017_fp_base = 234
SPECspeed©2017_fp_peak = 238

CPU2017 License: 55
Test Sponsor: Dell Inc.
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Platform Notes (Continued)

2 "physical id"s (chips)
128 "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 : 64
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
CPU(s): 128
On-line CPU(s) list: 0-127
Thread(s) per core: 1
Core(s) per socket: 64
Socket(s): 2
NUMA node(s): 16
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7713 64-Core Processor
Stepping: 1
CPU MHz: 1711.581
BogoMIPS: 3992.70
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 32768K
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

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SPEC CPU®2017 Floating Point Speed Result

Dell Inc.

PowerEdge C6525 (AMD EPYC 7713 64-Core Processor)

SPECspeed®2017_fp_base = 234
SPECspeed®2017_fp_peak = 238

CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Feb-2021
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Hardware Availability: Mar-2021
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Platform Notes (Continued)

NUMA node12 CPU(s): 96–103
NUMA node13 CPU(s): 104–111
NUMA node14 CPU(s): 112–119
NUMA node15 CPU(s): 120–127

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 rdtsscp lm
constant_tsc rep_good nop1 nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq
monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c
rdseed lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch
osvw ibs kinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb
cat_l3 cdp_l3 invpcid_single hw_pstate sme ssbd mba sev ibrs ibpb stibp vmcall
fsgsbse bml1 avx2 smep bni2 invpcid cmp_pkgid rdtr_a rdseed advx clflushopt clwb
sha_ni xsaveopt xsave xgetbv1 xsavec qcm_llc qcm Occup_llc qcm_mbm_total
qcm_mbm_local clzero irperf xsaving xsaveerrr wbnoinvd amd_ppin arat npt lbrv svm_lock
nrip_save tsc_scale vmcb_clean flushbyasid decodeassist pausefilter pfthreshold
v_vmsave_vmlsb vgif ump pkv ospka vaes vpclmulqdq rdrd overflow_recore 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: 16 nodes (0-15)
    node 0 cpus: 0 1 2 3 4 5 6 7
    node 0 size: 64074 MB
    node 0 free: 63952 MB
    node 1 cpus: 8 9 10 11 12 13 14 15
    node 1 size: 64507 MB
    node 1 free: 64376 MB
    node 2 cpus: 16 17 18 19 20 21 22 23
    node 2 size: 64507 MB
    node 2 free: 61834 MB
    node 3 cpus: 24 25 26 27 28 29 30 31
    node 3 size: 64509 MB
    node 3 free: 63420 MB
    node 4 cpus: 32 33 34 35 36 37 38 39
    node 4 size: 64507 MB
    node 4 free: 63206 MB
    node 5 cpus: 40 41 42 43 44 45 46 47
    node 5 size: 64509 MB
    node 5 free: 63090 MB
    node 6 cpus: 48 49 50 51 52 53 54 55
    node 6 size: 64503 MB
    node 6 free: 64398 MB
    node 7 cpus: 56 57 58 59 60 61 62 63
    node 7 size: 64491 MB
    node 7 free: 64406 MB

(Continued on next page)
Dell Inc.  
PowerEdge C6525 (AMD EPYC 7713 64-Core Processor)  

SPEC CPU®2017 Floating Point Speed Result  
Copyright 2017-2021 Standard Performance Evaluation Corporation  

SPECspeed®2017_fp_base = 234  
SPECspeed®2017_fp_peak = 238  

CPU2017 License: 55  
Test Sponsor: Dell Inc.  
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Platform Notes (Continued)  

node 8 cpus: 64 65 66 67 68 69 70 71  
node 8 size: 64509 MB  
node 8 free: 64342 MB  
node 9 cpus: 72 73 74 75 76 77 78 79  
node 9 size: 64507 MB  
node 9 free: 64434 MB  
node 10 cpus: 80 81 82 83 84 85 86 87  
node 10 size: 64462 MB  
node 10 free: 64396 MB  
node 11 cpus: 88 89 90 91 92 93 94 95  
node 11 size: 64503 MB  
node 11 free: 64442 MB  
node 12 cpus: 96 97 98 99 100 101 102 103  
node 12 size: 64509 MB  
node 12 free: 64447 MB  
node 13 cpus: 104 105 106 107 108 109 110 111  
node 13 size: 64507 MB  
node 13 free: 64452 MB  
node 14 cpus: 112 113 114 115 116 117 118 119  
node 14 size: 64509 MB  
node 14 free: 64388 MB  
node 15 cpus: 120 121 122 123 124 125 126 127  
node 15 size: 64503 MB  
node 15 free: 64438 MB  

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: 1056423112 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB  

(Continued on next page)
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PowerEdge C6525 (AMD EPYC 7713 64-Core Processor)  

**SPECspeed®2017_fp_base = 234**  
**SPECspeed®2017_fp_peak = 238**

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**Platform Notes (Continued)**

/sbin/tuned-adm active  
Current active profile: throughput-performance  

From /etc/*release*/etc/*version*  
  os-release:  
    NAME="Red Hat Enterprise Linux"  
    VERSION="8.3 (Ootpa)"  
    ID="rhel"  
    ID_LIKE="fedora"  
    VERSION_ID="8.3"  
    PLATFORM_ID="platform:el8"  
    PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"  
    ANSI_COLOR="0;31"  
  redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)  
  system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)  
  system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga  

uname -a:  
Linux localhost.localdomain 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 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 sanitation  
- **CVE-2017-5715 (Spectre variant 2):** Mitigation: Full AMD retpoline, IBFB: conditional, IBRS_FW, STIBP: disabled, RSB filling  
- **CVE-2020-0543 (Special Register Buffer Data Sampling):** Not affected  
- **CVE-2019-11135 (TSX Asynchronous Abort):** Not affected  

run-level 3 Jan 8 09:48  

SPEC is set to: /dev/shm/cpu2017-1.1.5  
  Filesystem Type Size Used Avail Use% Mounted on  
  tmpfs tmpfs 504G 5.7G 499G 2% /dev/shm  

From /sys/devices/virtual/dmi/id  

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SPECspeed\textsuperscript{®}2017.fp\_base = 234
SPECspeed\textsuperscript{®}2017.fp\_peak = 238

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Platform Notes (Continued)

Vendor: Dell Inc.
Product: PowerEdge C6525
Product Family: PowerEdge

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:
11x 802C8632802C 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200
5x 802C869D802C 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 2.1.4
BIOS Date: 02/17/2021
BIOS Revision: 2.1

(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
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

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SPECspeak®2017_fp_base = 234
SPECspeak®2017_fp_peak = 238

CPU2017 License: 55
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Compiler Version Notes (Continued)

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

Base Compiler Invocation

C benchmarks:
clang

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

(Continued on next page)
Dell Inc.

PowerEdge C6525 (AMD EPYC 7713 64-Core Processor)

SPECspeed®2017_fp_base = 234
SPECspeed®2017_fp_peak = 238

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Base Compiler Invocation (Continued)

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

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 -mlvm -function-specialize -flv-function-specialization
-mlvm -enable-gvn-hoist -mlvm -global-vectorize-slp=true
-mlvm -enable-licm-vrp -mlvm -reduce-array-computations=3 -z muldefs
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-llang -llangrti

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
-mlvm -fuse-tile-inner-loop -funroll-loops
-mlvm -extra-vectorizer-passes -mlvm -lsm-in-nested-loop
-mlvm -enable-licm-vrp -mlvm -reduce-array-computations=3
-mlvm -global-vectorize-slp=true -z muldefs -DSPEC_OPENMP -fopenmp

(Continued on next page)
### Base Optimization Flags (Continued)

For Fortran benchmarks:
- `fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrti`

Benchmarks using both Fortran and C:
- `m64 -mno-adx -mno-sse4a -W1,-mlllvm -W1,-enable-X86-prefetching`
- `W1,-mlllvm -W1,-enable-limc-transport -W1,-mlllvm -W1,-region-vectorize`
- `W1,-mlllvm -W1,-function-specialize`
- `W1,-mlllvm -W1,-align-all-toallthru-blocks=6`
- `W1,-mlllvm -W1,-reduce-array-computations=3 -O3 -march=znver3`
- `fveclib=AMDLIBM `ffast-math `f1to `fstruct-layout=5`
- `mlllvm -unroll-threshold=50 -mlllvm -inline-threshold=1000`
- `fremap-arrays -mlllvm -function-specialize -f1v-function-specialization`
- `mlllvm -enable-gvn-hoist -mlllvm -global-vectorize-slp=true`
- `mlllvm -enable-limc-transport -mlllvm -reduce-array-computations=3 -Hz,1,0x1`
- `Mrecursive -mlllvm -fuse-tile-inner-loop -funroll-loops`
- `mlllvm -extra-vectorizer-passes -mlllvm -lsr-in-nested-loop -z muldefs`
- `D SPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc`
- `-lflang -lflangrti`

Benchmarks using Fortran, C, and C++:
- `m64 -mno-adx -mno-sse4a -std=c++98`
- `-W1,-mlllvm -W1,-x86-use-vzeroupper=false`
- `-W1,-mlllvm -W1,-region-vectorize -W1,-mlllvm -W1,-function-specialize`
- `-W1,-mlllvm -W1,-align-all-toallthru-blocks=6`
- `-W1,-mlllvm -W1,-reduce-array-computations=3 -O3 -march=znver3`
- `fveclib=AMDLIBM `ffast-math `f1to `fstruct-layout=5`
- `mlllvm -unroll-threshold=50 -mlllvm -inline-threshold=1000`
- `fremap-arrays -mlllvm -function-specialize -f1v-function-specialization`
- `mlllvm -enable-gvn-hoist -mlllvm -global-vectorize-slp=true`
- `mlllvm -enable-limc-transport -mlllvm -reduce-array-computations=3`
- `mlllvm -enable-partial-unswitch -mlllvm -unroll-threshold=100`
- `finline-aggressive -mlllvm -loop-unswitch-threshold=200000`
- `mlllvm -reroll-loops -mlllvm -aggressive-loop-unswitch`
- `mlllvm -extra-vectorizer-passes -mlllvm -convert-pow-exp-to-int=false`
- `Hz,1,0x1 -Mrecursive -mlllvm -fuse-tile-inner-loop -funroll-loops`
- `-mlllvm -lsr-in-nested-loop -z muldefs -D SPEC_OPENMP -fopenmp`
- `fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrti`

### Base Other Flags

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

(Continued on next page)
Dell Inc. PowerEdge C6525 (AMD EPYC 7713 64-Core Processor)

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

CPU2017 License: 55  
Test Sponsor: Dell Inc.  
Tested by: Dell Inc.

SPECspeed®2017_fp_base = 234  
SPECspeed®2017_fp_peak = 238

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

### Base Other Flags (Continued)

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

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

(Continued on next page)
Dell Inc. 

PowerEdge C6525 (AMD EPYC 7713 64-Core Processor) 

SPEC®2017 Floating Point Speed Result 

SPECspeed®2017_fp_base = 234 
SPECspeed®2017_fp_peak = 238 

CPU2017 License: 55 
Test Sponsor: Dell Inc. 
Tested by: Dell Inc. 
Test Date: Feb-2021 
Hardware Availability: Mar-2021 
Software Availability: Mar-2021 

Peak Optimization Flags (Continued) 

619.lbm_s (continued): 
-mlivm -function-specialize -mlivm -enable-licm-VRP 
-mlivm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp 
-fopenmp=libomp -lomp -lamlb -ljemalloc -lflang 

638.imagick_s: Same as 619.lbm_s 

644.nab_s: -m64 -mno-adx -mno-sse4a -Wl,-mlivm -Wl,-region-vectorize 
-Wl,-mlivm -Wl,-function-specialize -Ofast -march=znver3 
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5 
-mlivm -unroll-threshold=50 -fremap-arrays 
-fly-function-specialization -mlivm -inline-threshold=1000 
-mlivm -enable-gvn-hoist -mlivm -global-vectorize-slp=true 
-mlivm -function-specialize -mlivm -enable-licm-VRP 
-mlivm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp 
-fopenmp=libomp -lomp -lamlb -ljemalloc -lflang 

Fortran benchmarks: 

603.bwaves_s: -m64 -mno-adx -mno-sse4a 
-Wl,-mlivm -Wl,-enable-X86-prefetching 
-Wl,-mlivm -Wl,-enable-licm-VRP 
-Wl,-mlivm -Wl,-function-specialize 
-Wl,-mlivm -Wl,-align-all-nofallthru-blocks=6 
-Wl,-mlivm -Wl,-reduce-array-computations=3 -Ofast 
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive 
-mlivm -reduce-array-computations=3 
-mlivm -global-vectorize-slp=true -mlivm -enable-licm-VRP 
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamlb 
-ljemalloc -lflang 

649.fotonik3d_s: -m64 -mno-adx -mno-sse4a 
-Wl,-mlivm -Wl,-enable-X86-prefetching 
-Wl,-mlivm -Wl,-enable-licm-VRP 
-Wl,-mlivm -Wl,-function-specialize 
-Wl,-mlivm -Wl,-align-all-nofallthru-blocks=6 
-Wl,-mlivm -Wl,-reduce-array-computations=3 -Ofast 
-march=znver3 -fveclib=AMDLIBM -ffast-math -flto 
-Mrecursive -mlivm -reduce-array-computations=3 
-mlivm -global-vectorize-slp=true -mlivm -enable-licm-VRP 
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamlb 
-ljemalloc -lflang 

654.roms_s: Same as 603.bwaves_s 

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Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -mno-adx -mno-sse4a
- W1, -mlivm -W1, -enable-X86-prefetching
- W1, -mlivm -W1, -enable-licm-vrp
- W1, -mlivm -W1, -function-specialize
- W1, -mlivm -W1, -align-all-nofallthru-blocks=6
- W1, -mlivm -W1, -reduce-array-computations=3 -Ofast
- march=znver3 -fveclib=AMDLIBM -ffast-math -flto
- fstruct-layout=5 -mlivm -unroll-threshold=50
- fremap-arrays -flv-function-specialization
- mlivm -inline-threshold=1000 -mlivm -enable-gvn-hoist
- mlivm -global-vectorize-slp=true
- mlivm -function-specialize -mlivm -enable-licm-vrp
- mlivm -reduce-array-computations=3 -Hz,1,0x1 -O3
- Mrecursive -mlivm -fuse-tile-inner-loop -funroll-loops
- mlivm -extra-vectorizer-passes -mlivm -lsr-in-nested-loop
- DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm
- ljemalloc -lflang

627.cam4_s: -m64 -mno-adx -mno-sse4a
- W1, -mlivm -W1, -enable-X86-prefetching
- W1, -mlivm -W1, -enable-licm-vrp
- W1, -mlivm -W1, -function-specialize
- W1, -mlivm -W1, -align-all-nofallthru-blocks=6
- W1, -mlivm -W1, -reduce-array-computations=3 -Ofast
- march=znver3 -fveclib=AMDLIBM -ffast-math -flto
- fstruct-layout=5 -mlivm -unroll-threshold=50
- fremap-arrays -flv-function-specialization
- mlivm -inline-threshold=1000 -mlivm -enable-gvn-hoist
- mlivm -global-vectorize-slp=true
- mlivm -function-specialize -mlivm -enable-licm-vrp
- mlivm -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++:

- m64 -mno-adx -mno-sse4a -std=c++98
- W1, -mlivm -W1, -x86-use-vzeroupper=false -W1, -mlivm -W1, -enable-licm-vrp
- W1, -mlivm -W1, -function-specialize
- W1, -mlivm -W1, -align-all-nofallthru-blocks=6
- W1, -mlivm -W1, -reduce-array-computations=3 -Ofast -march=znver3
- fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
- mlivm -unroll-threshold=50 -fremap-arrays -flv-function-specialization

(Continued on next page)
Dell Inc.

PowerEdge C6525 (AMD EPYC 7713 64-Core Processor)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base = 234</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak = 238</td>
</tr>
</tbody>
</table>

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.
Test Date: Feb-2021
Hardware Availability: Mar-2021
Software Availability: Mar-2021

Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-mlir -inline-threshold=1000 -mlir -enable-gvn-hoist
-mlir -global-vectorize-slp=true -mlir -function-specialize
-mlir -enable-licm-vrp -mlir -reduce-array-computations=3
-finline-aggressive -mlir -unroll-threshold=100 -mlir -reroll-loops
-mlir -aggressive-loop-unswitch -Mrecursive -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

Peak Other Flags

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

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

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

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

The flags files that were used to format this result can be browsed at

You can also download the XML flags sources by saving the following links:

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