# SPEC CPU®2017 Floating Point Speed Result

## Cisco Systems

Cisco UCS C225 M6 (AMD EPYC 7713 64-Core, Processor)

<table>
<thead>
<tr>
<th>Test Sponsor:</th>
<th>Cisco Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested by:</td>
<td>Cisco Systems</td>
</tr>
<tr>
<td>CPU2017 License:</td>
<td>9019</td>
</tr>
<tr>
<td>Test Date:</td>
<td>Aug-2021</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Jun-2021</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Jun-2021</td>
</tr>
</tbody>
</table>

### SPECspeed®2017 fp_base = 247

### SPECspeed®2017 fp_peak = 255

<table>
<thead>
<tr>
<th>Thread</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>247</td>
<td>255</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>128</td>
<td>410</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>128</td>
<td>123</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>128</td>
<td>166</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>128</td>
<td>183</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>128</td>
<td>81.0</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>128</td>
<td>420</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>128</td>
<td>551</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>128</td>
<td>118</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>128</td>
<td>322</td>
</tr>
</tbody>
</table>

### Software

- **OS:** SUSE Linux Enterprise Server 15 SP3 (x86_64) kernel version 5.3.18-57-default
- **Compiler:** C/C++/Fortran: Version 3.0.0 of AOCC
- **Parallel:** Yes
- **Firmware:** Version 4.2.0.271 released Jul-2021
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage

### Hardware

- **CPU Name:** AMD EPYC 7713
- **Max MHz:** 3675
- **Nominal:** 2000
- **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:** 2 TB (16 x 128 GB 4Rx4 PC4-3200V-L)
- **Storage:** 1 x 1.6 TB M.2 SSD SATA
- **Other:** None

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---

<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>
<th>Ratio</th>
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<td>75.3</td>
<td>784</td>
<td>75.3</td>
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<td>128</td>
<td>75.3</td>
<td>784</td>
<td>75.2</td>
<td>784</td>
<td></td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>128</td>
<td>40.8</td>
<td>408</td>
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<td>414</td>
<td>40.7</td>
<td>410</td>
<td>40.6</td>
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<tr>
<td>619.lbm_s</td>
<td>128</td>
<td>39.8</td>
<td>132</td>
<td>42.7</td>
<td>123</td>
<td>44.7</td>
<td>117</td>
<td>128</td>
<td>45.6</td>
<td>115</td>
<td>41.4</td>
<td>127</td>
<td>40.1</td>
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<td>621.wrf_s</td>
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<td>80.1</td>
<td>165</td>
<td>79.7</td>
<td>166</td>
<td>77.9</td>
<td>170</td>
<td>128</td>
<td>80.1</td>
<td>165</td>
<td>79.7</td>
<td>166</td>
<td>77.9</td>
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<tr>
<td>627.cam4_s_</td>
<td>128</td>
<td>48.4</td>
<td>183</td>
<td>48.1</td>
<td>184</td>
<td>48.7</td>
<td>182</td>
<td>128</td>
<td>48.4</td>
<td>183</td>
<td>48.1</td>
<td>184</td>
<td>48.7</td>
</tr>
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<td>628.pop2_s_</td>
<td>128</td>
<td>147</td>
<td>81.0</td>
<td>154</td>
<td>77.3</td>
<td>147</td>
<td>81.0</td>
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<td>81.0</td>
<td>154</td>
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<td>77.5</td>
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<td>311</td>
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<td>128</td>
<td>37.7</td>
<td>418</td>
<td>37.5</td>
<td>420</td>
<td>37.4</td>
</tr>
</tbody>
</table>

### Results Table

**SPECspeed®2017_fp_base = 247**

**SPECspeed®2017_fp_peak = 255**

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>

Set dirty_ratio=8 to limit dirty cache to 8% of memory
Set swappiness=1 to swap only if necessary
Set zone_reclaim_mode=1 to free local node memory and avoid remote memory
sync then drop_caches=3 to reset caches before invoking runcpu
ASLR is disabled to reduce run-to-run issues.

dirty_ratio, swappiness, zone_reclaim_mode, drop_caches and ASLR were all set using privileged echo (e.g. echo 1 > /proc/sys/vm/swappiness).

(Continued on next page)
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<table>
<thead>
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**CPU2017 License:** 9019  
**Test Sponsor:** Cisco Systems  
**Tested by:** Cisco Systems

**Operating System Notes (Continued)**
Transparent huge pages set to 'always' for this run (OS default)

**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 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 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 Configuration
- SMT Mode set to Auto
- NUMA nodes per socket set to NPS2

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**Platform Notes (Continued)**

ACPI SRAT L3 Cache As NUMA Domain set to Enabled
DRAM Scrub Time set to Disabled
Determinism Slider set to Power
cTDP Control set to Manual
cTDP set to 280
EDC Control set to Manual
EDC set to 300
L2 Stream HW Prefetcher set to Disabled
Memory Interleaving set to Disabled
APBDIS set to 1
xGMI Link config set to 4

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost Sun Aug 15 17:46:47 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
  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 from util-linux 2.36.2:

```
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):          16
Vendor ID:             AuthenticAMD
```

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Platform Notes (Continued)

CPU family: 25
Model: 1
Model name: AMD EPYC 7713 64-Core Processor
Stepping: 1
Frequency boost: enabled
CPU MHz: 1796.281
CPU max MHz: 2000.0000
CPU min MHz: 1500.0000
BogoMIPS: 3992.40
Virtualization: AMD-V
L1d cache: 4 MiB
L1i cache: 4 MiB
L2 cache: 64 MiB
L3 cache: 512 MiB
NUMA node0 CPU(s): 0-7,128-135
NUMA node1 CPU(s): 8-15,136-143
NUMA node2 CPU(s): 16-23,144-151
NUMA node3 CPU(s): 24-31,152-159
NUMA node4 CPU(s): 32-39,160-167
NUMA node5 CPU(s): 40-47,168-175
NUMA node6 CPU(s): 48-55,176-183
NUMA node7 CPU(s): 56-63,184-191
NUMA node8 CPU(s): 64-71,192-199
NUMA node9 CPU(s): 72-79,200-207
NUMA node10 CPU(s): 80-87,208-215
NUMA node11 CPU(s): 88-95,216-223
NUMA node12 CPU(s): 96-103,224-231
NUMA node13 CPU(s): 104-111,232-239
NUMA node14 CPU(s): 112-119,240-247
NUMA node15 CPU(s): 120-127,248-255
Vulnerability Itlb multihit: Not affected
Vulnerability Lttf: 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 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 tsc tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdtpeblgm rdtsscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq monitor sse3 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

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Platform Notes (Continued)

misalignsse 3dnowprefetch osvw ibs skinit wdt topoext perfctr_core perfctr_nb
bpext perfctr_llc mwaitx cpb cat_l3 cdpl_l3 invpcid_single hw_pstate ssbd mba ibrs
ibpb stibp vmcall fsqgssbase bmi1 avx2 smep bmi2 erms invpcid cqm rdt_a rdseed adx
smap clflushopt clwb sha_ni xsaveopt xsavex xgetbv1 xsavec qm llc qm_occup_llc
qm_mbm_total qm_mbm_local clzero irperf xsaveerpr wbnoinvd amd_ppin arat npt lbrv
svm_lock nrip_save tsc_scale vmcb_clean flushbyaid decodeassists pausefilter
pfthreshold v_vmsave_vmlload vgif umip pk oske vaes vpclmulqdq rdpid overflow_recov
suncor smca ffs

From lscpu --cache:

<table>
<thead>
<tr>
<th>NAME</th>
<th>ONE-SIZE</th>
<th>ALL-SIZE</th>
<th>WAYS</th>
<th>TYPE</th>
<th>LEVEL</th>
<th>SETS</th>
<th>PHY-LINE</th>
<th>COHERENCY-SIZE</th>
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<tbody>
<tr>
<td>L1d</td>
<td>32K</td>
<td>4M</td>
<td>8</td>
<td>Data</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L1i</td>
<td>32K</td>
<td>4M</td>
<td>8</td>
<td>Instruction</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
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<tr>
<td>L2</td>
<td>512K</td>
<td>64M</td>
<td>8</td>
<td>Unified</td>
<td>2</td>
<td>1024</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L3</td>
<td>32M</td>
<td>512M</td>
<td>16</td>
<td>Unified</td>
<td>3</td>
<td>32768</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

/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 7 128 129 130 131 132 133 134 135
node 0 size: 128832 MB
node 0 free: 128586 MB
node 1 cpus: 8 9 10 11 12 13 14 15 136 137 138 139 140 141 142 143
node 1 size: 129020 MB
node 1 free: 128559 MB
node 2 cpus: 16 17 18 19 20 21 22 23 144 145 146 147 148 149 150 151
node 2 size: 129020 MB
node 2 free: 128849 MB
node 3 cpus: 24 25 26 27 28 29 30 31 152 153 154 155 156 157 158 159
node 3 size: 129020 MB
node 3 free: 128809 MB
node 4 cpus: 32 33 34 35 36 37 38 39 160 161 162 163 164 165 166 167
node 4 size: 129020 MB
node 4 free: 128761 MB
node 5 cpus: 40 41 42 43 44 45 46 47 168 169 170 171 172 173 174 175
node 5 size: 129020 MB
node 5 free: 128810 MB
node 6 cpus: 48 49 50 51 52 53 54 55 176 177 178 179 180 181 182 183
node 6 size: 129020 MB
node 6 free: 128826 MB
node 7 cpus: 56 57 58 59 60 61 62 63 184 185 186 187 188 189 190 191
node 7 size: 116907 MB
node 7 free: 116720 MB
node 8 cpus: 64 65 66 67 68 69 70 71 192 193 194 195 196 197 198 199

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Platform Notes (Continued)

node 8 size: 129020 MB
node 8 free: 128771 MB
node 9 cpus: 72 73 74 75 76 77 78 79 200 201 202 203 204 205 206 207
node 9 size: 129020 MB
node 9 free: 128852 MB
node 10 cpus: 80 81 82 83 84 85 86 87 208 209 210 211 212 213 214 215
node 10 size: 129020 MB
node 10 free: 128866 MB
node 11 cpus: 88 89 90 91 92 93 94 95 216 217 218 219 220 221 222 223
node 11 size: 129020 MB
node 11 free: 128849 MB
node 12 cpus: 96 97 98 99 100 101 102 103 224 225 226 227 228 229 230 231
node 12 size: 128986 MB
node 12 free: 128827 MB
node 13 cpus: 104 105 106 107 108 109 110 111 232 233 234 235 236 237 238 239
node 13 size: 129020 MB
node 13 free: 128771 MB
node 14 cpus: 112 113 114 115 116 117 118 119 240 241 242 243 244 245 246 247
node 14 size: 129020 MB
node 14 free: 128866 MB
node 15 cpus: 120 121 122 123 124 125 126 127 248 249 250 251 252 253 254 255
node 15 size: 129020 MB
node 15 free: 128827 MB
node distances:

From /proc/meminfo
MemTotal: 2101227176 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

(Continued on next page)
Platform Notes (Continued)

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

From /etc/*release* /etc/*version*

os-release:
NAME="SLES"
VERSION="15-SP3"
VERSION_ID="15.3"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP3"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp3"

uname -a:
Linux localhost 5.3.18-57-default #1 SMP Wed Apr 28 10:54:41 UTC 2021 (ba3c2e9) 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): 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, IBFP: conditional, IBRS_FW, STIBP: always-on, 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 3 Aug 15 04:28
SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/nvme0n1p3 xfs 1.5T 11G 1.5T 1% /

From /sys/devices/virtual/dmi/id
Vendor: Cisco Systems Inc
Product: UCSC-C225-M6N
Serial: WZP25230TMY

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Cisco UCS C225 M6 (AMD EPYC 7713 64-Core, Processor)

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

**Specifications:**
- **SPECspeed®2017_fp_base = 247**
- **SPECspeed®2017_fp_peak = 255**

**Test Details:**
- **CPU2017 License:** 9019
- **Test Sponsor:** Cisco Systems
- **Test Date:** Aug-2021
- **Tested by:** Cisco Systems
- **Hardware Availability:** Jun-2021
- **Software Availability:** Jun-2021

**Platform Notes (Continued)**

Additional information from dmidecode 3.2 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 0xCE00 M386AAG40AM3-CWE 128 GB 4 rank 3200

BIOS:
- **BIOS Vendor:** Cisco Systems, Inc.
- **BIOS Version:** C225M6.4.2.0.271.0716210621
- **BIOS Date:** 07/16/2021
- **BIOS Revision:** 5.22

(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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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
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
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
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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-nofallback-thru-blocks=6`  
- `-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3`  
- `-fveclib=AMDLIBM -ffast-math -fno-struct-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-vec -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-vec -Wl,-mllvm -Wl,-region-vectorize`  
- `-Wl,-mllvm -Wl,-function-specialize`  
- `-Wl,-mllvm -Wl,-align-all-nofallback-thru-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-vec -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-vec -Wl,-mllvm -Wl,-region-vectorize`  
- `-Wl,-mllvm -Wl,-function-specialize`  
- `-Wl,-mllvm -Wl,-align-all-nofallback-thru-blocks=6`

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<td>Jun-2021</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Jun-2021</td>
</tr>
</tbody>
</table>

**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`
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| SPECspeed®2017_fp_base = 247 |
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| Tested by: Cisco Systems | Software Availability: Jun-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
-W1,-mllvm -W1,-function-specialize
-W1,-mllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mllvm -W1,-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 -ljemalloc -lflang

638.imagick_s: basepeak = yes

644.nab_s: basepeak = yes

Fortran benchmarks:

603.bwaves_s: basepeak = yes

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Peak Optimization Flags (Continued)

649.fotonik3d_s: basepeak = yes
654.roms_s: -m64 -mno-adx -mno-sse4a
-W1,-mllv -W1,-enable-X86-prefetching
-W1,-mllv -W1,-enable-licm-vrp
-W1,-mllv -W1,-function-specialize
-W1,-mllv -W1,-align-all-nofallthru-blocks=6
-W1,-mllv -W1,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mllv -reduce-array-computations=3
-mllv -global-vectorize-slp=true -mllv -enable-licm-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++:
-m64 -mno-adx -mno-sse4a -std=c++98
-W1,-mllv -W1,-X86-use-vzeroupper=false -W1,-mllv -W1,-enable-licm-vrp
-W1,-mllv -W1,-function-specialize
-W1,-mllv -W1,-align-all-nofallthru-blocks=6
-W1,-mllv -W1,-reduce-array-computations=3 -Ofast -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mllv -unroll-threshold=50 -fremap-arrays -flv-function-specialization
-mllv -inline-threshold=1000 -mllv -enable-gvn-hoist
-mllv -global-vectorize-slp=true -mllv -function-specialize
-mllv -enable-licm-vrp -mllv -reduce-array-computations=3
-finline-aggressive -mllv -unroll-threshold=100 -mllv -reroll-loops
-mllv -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
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Peak Other Flags (Continued)

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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