



# SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

## Dell Inc.

SPECspeed®2017\_fp\_base = 84.7

PowerEdge R7515 (AMD EPYC 7F52, 3.50 GHz)

SPECspeed®2017\_fp\_peak = 88.1

CPU2017 License: 55

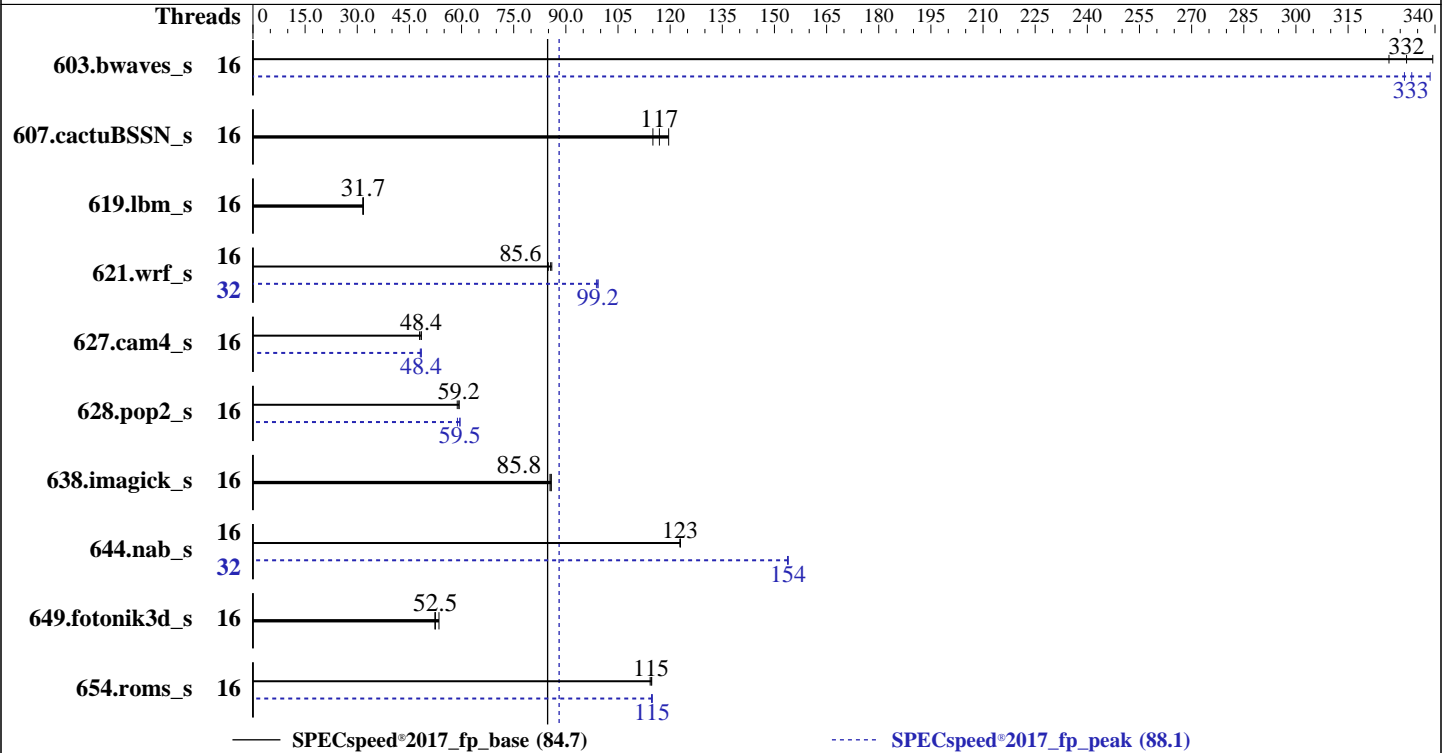
Test Date: Jan-2020

Test Sponsor: Dell Inc.

Hardware Availability: Apr-2020

Tested by: Dell Inc.

Software Availability: Aug-2019



### Hardware

CPU Name: AMD EPYC 7F52  
 Max MHz: 3900  
 Nominal: 3500  
 Enabled: 16 cores, 1 chip, 2 threads/core  
 Orderable: 1 chip  
 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, 16 MB per core  
 Other: None  
 Memory: 256 GB (8 x 32 GB 2Rx4 PC4-3200AA-R)  
 Storage: 1 x 960 GB SATA SSD  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 15 SP1  
 kernel 4.12.14-195-default  
 Compiler: C/C++/Fortran: Version 2.0.0 of AOCC  
 Parallel: Yes  
 Firmware: Version 1.3.0 released Jan-2020  
 File System: xfs  
 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.



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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	16	174	339	181	327	<b>178</b>	<b>332</b>	16	174	339	178	331	<b>177</b>	<b>333</b>
607.cactuBSSN_s	16	139	120	<b>143</b>	<b>117</b>	145	115	16	139	120	<b>143</b>	<b>117</b>	145	115
619.lbm_s	16	<b>165</b>	<b>31.7</b>	165	31.8	166	31.6	16	<b>165</b>	<b>31.7</b>	165	31.8	166	31.6
621.wrf_s	16	154	86.0	156	85.0	<b>154</b>	<b>85.6</b>	32	134	98.8	<b>133</b>	<b>99.2</b>	133	99.3
627.cam4_s	16	183	48.4	<b>183</b>	<b>48.4</b>	185	47.9	16	184	48.1	<b>183</b>	<b>48.4</b>	183	48.4
628.pop2_s	16	202	58.8	200	59.3	<b>200</b>	<b>59.2</b>	16	<b>199</b>	<b>59.5</b>	199	59.5	202	58.8
638.imagick_s	16	<b>168</b>	<b>85.8</b>	169	85.4	168	85.8	16	<b>168</b>	<b>85.8</b>	169	85.4	168	85.8
644.nab_s	16	<b>142</b>	<b>123</b>	142	123	142	123	32	114	154	114	154	<b>114</b>	<b>154</b>
649.fotonik3d_s	16	174	52.3	<b>174</b>	<b>52.5</b>	170	53.5	16	174	52.3	<b>174</b>	<b>52.5</b>	170	53.5
654.roms_s	16	137	115	<b>137</b>	<b>115</b>	138	114	16	137	115	137	115	<b>137</b>	<b>115</b>

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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

dirty\_ratio, swappiness, zone\_reclaim\_mode and drop\_caches were  
all set using privileged echo (e.g. echo 1 > /proc/sys/vm/swappiness).

Transparent huge pages set to 'always' for this run (OS default)



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## Environment Variables Notes

Environment variables set by runcpu before the start of the run:

GOMP\_CPU\_AFFINITY = "0-31"

LD\_LIBRARY\_PATH =

"/root/cpu2017-1.1.0/amd\_speed\_aocc200\_rome\_C\_lib/64;/root/cpu2017-1.1.0/amd\_speed\_aocc200\_rome\_C\_lib/32:"

MALLOC\_CONF = "retain:true"

OMP\_DYNAMIC = "false"

OMP\_SCHEDULE = "static"

OMP\_STACKSIZE = "128M"

OMP\_THREAD\_LIMIT = "32"

Environment variables set by runcpu during the 603.bwaves\_s peak run:

GOMP\_CPU\_AFFINITY = "0-15"

Environment variables set by runcpu during the 621.wrf\_s peak run:

GOMP\_CPU\_AFFINITY = "0 16 1 17 2 18 3 19 4 20 5 21 6 22 7 23 8 24 9 25 10 26  
11 27 12 28 13 29 14 30 15 31"

Environment variables set by runcpu during the 627.cam4\_s peak run:

GOMP\_CPU\_AFFINITY = "0-15"

Environment variables set by runcpu during the 628.pop2\_s peak run:

GOMP\_CPU\_AFFINITY = "0-15"

Environment variables set by runcpu during the 644.nab\_s peak run:

GOMP\_CPU\_AFFINITY = "0 16 1 17 2 18 3 19 4 20 5 21 6 22 7 23 8 24 9 25 10 26  
11 27 12 28 13 29 14 30 15 31"

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 7601 CPU + 512GB Memory using Fedora 26

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 v9.1.0 in Ubuntu 19.04 with -O3 -znver2 -flto  
jemalloc 5.1.0 is available here:

<https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2>



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## Platform Notes

BIOS settings:

NUMA Nodes Per Socket set to 4  
 CCX as NUMA Domain set to Enabled  
 System Profile set to Custom  
 CPU Power Management set to Maximum Performance  
 Memory Frequency set to Maximum Performance  
 Turbo Boost Enabled  
 Cstates set to Enabled  
 Memory Patrol Scrub Disabled  
 Memory Refresh Rate set to 1x  
 PCI ASPM L1 Link Power Management Disabled  
 Determinism Slider set to Power Determinism  
 Efficiency Optimized Mode Disabled  
 Memory Interleaving set to Disabled  
 Memory Freq set to 3200  
 Fan Speed = Maximum

Sysinfo program /root/cpu2017-1.1.0/bin/sysinfo  
 Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011  
 running on linux-g3ob Sun Jan 19 05:20:36 2020

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 7F52 16-Core Processor
 1 "physical id"s (chips)
 32 "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 : 16
siblings  : 32
physical 0: cores 0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60
  
```

From lscpu:

```

Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 43 bits physical, 48 bits virtual
CPU(s): 32
On-line CPU(s) list: 0-31
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s): 1
NUMA node(s): 16
Vendor ID: AuthenticAMD
  
```

(Continued on next page)



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## Platform Notes (Continued)

```

CPU family:      23
Model:          49
Model name:     AMD EPYC 7F52 16-Core Processor
Stepping:      0
CPU MHz:       3493.102
BogoMIPS:      6986.20
Virtualization: AMD-V
L1d cache:     32K
L1i cache:     32K
L2 cache:      512K
L3 cache:      16384K
NUMA node0 CPU(s): 0,16
NUMA node1 CPU(s): 1,17
NUMA node2 CPU(s): 2,18
NUMA node3 CPU(s): 3,19
NUMA node4 CPU(s): 4,20
NUMA node5 CPU(s): 5,21
NUMA node6 CPU(s): 6,22
NUMA node7 CPU(s): 7,23
NUMA node8 CPU(s): 8,24
NUMA node9 CPU(s): 9,25
NUMA node10 CPU(s): 10,26
NUMA node11 CPU(s): 11,27
NUMA node12 CPU(s): 12,28
NUMA node13 CPU(s): 13,29
NUMA node14 CPU(s): 14,30
NUMA node15 CPU(s): 15,31

```

```

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 xtopology nonstop_tsc cpuid extd_apicid aperfmperf pri
pclmulqdq monitor ssse3 fma cx16 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_l2 mwaitx cpb cat_l3 cdp_l3 hw_pstate sme ssbd sev ibrs ibpb stibp vmmcall
fsgsbase bmi1 avx2 smep bmi2 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 arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean
flushbyasid decodeassists pausefilter pfthreshold avic v_vmsave_vmload vgif umip
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: 16 nodes (0-15)
node 0 cpus: 0 16

```

(Continued on next page)



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## Platform Notes (Continued)

```

node 0 size: 15549 MB
node 0 free: 15490 MB
node 1 cpus: 1 17
node 1 size: 16098 MB
node 1 free: 16062 MB
node 2 cpus: 2 18
node 2 size: 16127 MB
node 2 free: 16104 MB
node 3 cpus: 3 19
node 3 size: 16126 MB
node 3 free: 16091 MB
node 4 cpus: 4 20
node 4 size: 16127 MB
node 4 free: 16091 MB
node 5 cpus: 5 21
node 5 size: 16127 MB
node 5 free: 16094 MB
node 6 cpus: 6 22
node 6 size: 16127 MB
node 6 free: 16098 MB
node 7 cpus: 7 23
node 7 size: 16126 MB
node 7 free: 16092 MB
node 8 cpus: 8 24
node 8 size: 16127 MB
node 8 free: 16081 MB
node 9 cpus: 9 25
node 9 size: 16127 MB
node 9 free: 16103 MB
node 10 cpus: 10 26
node 10 size: 16127 MB
node 10 free: 16093 MB
node 11 cpus: 11 27
node 11 size: 16126 MB
node 11 free: 16094 MB
node 12 cpus: 12 28
node 12 size: 16127 MB
node 12 free: 16046 MB
node 13 cpus: 13 29
node 13 size: 16127 MB
node 13 free: 16009 MB
node 14 cpus: 14 30
node 14 size: 16127 MB
node 14 free: 16034 MB
node 15 cpus: 15 31
node 15 size: 16113 MB
node 15 free: 16054 MB

```

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## 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	12	12	12	12	12	12	12	12	12	12	12	12
1:	11	10	11	11	12	12	12	12	12	12	12	12	12	12	12	12
2:	11	11	10	11	12	12	12	12	12	12	12	12	12	12	12	12
3:	11	11	11	10	12	12	12	12	12	12	12	12	12	12	12	12
4:	12	12	12	12	10	11	11	11	12	12	12	12	12	12	12	12
5:	12	12	12	12	11	10	11	11	12	12	12	12	12	12	12	12
6:	12	12	12	12	11	11	10	11	12	12	12	12	12	12	12	12
7:	12	12	12	12	11	11	11	10	12	12	12	12	12	12	12	12
8:	12	12	12	12	12	12	12	12	10	11	11	11	12	12	12	12
9:	12	12	12	12	12	12	12	12	11	10	11	11	12	12	12	12
10:	12	12	12	12	12	12	12	12	11	11	10	11	12	12	12	12
11:	12	12	12	12	12	12	12	12	11	11	11	10	12	12	12	12
12:	12	12	12	12	12	12	12	12	12	12	12	12	10	11	11	11
13:	12	12	12	12	12	12	12	12	12	12	12	12	11	10	11	11
14:	12	12	12	12	12	12	12	12	12	12	12	12	11	11	10	11
15:	12	12	12	12	12	12	12	12	12	12	12	12	11	11	11	10

From /proc/meminfo

MemTotal: 263593204 kB  
HugePages\_Total: 0  
Hugepagesize: 2048 kB

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

os-release:  
NAME="SLES"  
VERSION="15-SP1"  
VERSION\_ID="15.1"  
PRETTY\_NAME="SUSE Linux Enterprise Server 15 SP1"  
ID="sles"  
ID\_LIKE="suse"  
ANSI\_COLOR="0;32"  
CPE\_NAME="cpe:/o:suse:sles:15:sp1"

uname -a:

Linux linux-g3ob 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)  
x86\_64 x86\_64 x86\_64 GNU/Linux

Kernel self-reported vulnerability status:

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: \_\_user pointer sanitization

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## Platform Notes (Continued)

CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline, IBPB: conditional, IBRS\_FW, STIBP: conditional, RSB filling

run-level 3 Jan 18 08:54 last=5

SPEC is set to: /root/cpu2017-1.1.0

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda2	xf	440G	36G	405G	9%	/

```

From /sys/devices/virtual/dmi/id
  BIOS:      Dell Inc. 1.3.0 01/14/2020
  Vendor:    Dell Inc.
  Product:   PowerEdge R7515
  Product Family: PowerEdge
  Serial:    5MGPH13

```

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:
  8x 80AD80B380AD HMA84GR7CJR4N-XN 32 GB 2 rank 3200
  8x Not Specified Not Specified

```

(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)
=====

```

```

AOCCLLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
  AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
=====

```

```

=====
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
=====

```

```

AOCCLLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
  AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
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```

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## Compiler Version Notes (Continued)

```
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
  AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
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Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
```

```
-----
Fortran          | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
                  | 654.roms_s(base, peak)
```

```
-----
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
  AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
```

```
-----
Fortran, C       | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
                  | 628.pop2_s(base, peak)
```

```
-----
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
  AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
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```

## Base Compiler Invocation

C benchmarks:  
clang

(Continued on next page)



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## Base Compiler Invocation (Continued)

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
```

## Base Optimization Flags

C benchmarks:

```
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver2 -fstruct-layout=3 -mllvm -unroll-threshold=50
-freemap-arrays -mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp
-mllvm -vector-library=LIBMVEC -mllvm -inline-threshold=1000
-flv-function-specialization -z muldefs -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc
-lflang
```

Fortran benchmarks:

```
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver2
-funroll-loops -Mrecursive -mllvm -vector-library=LIBMVEC -z muldefs
-Kieee -fno-finite-math-only -DSPEC_OPENMP -fopenmp -fopenmp=libomp
```

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PowerEdge R7515 (AMD EPYC 7F52, 3.50 GHz)

SPECspeed®2017\_fp\_peak = 88.1

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Jan-2020

Hardware Availability: Apr-2020

Software Availability: Aug-2019

## Base Optimization Flags (Continued)

Fortran benchmarks (continued):

-lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc -lflang

Benchmarks using both Fortran and C:

-flto -Wl,-mllvm -Wl,-function-specialize  
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC  
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math  
-march=znver2 -fstruct-layout=3 -mllvm -unroll-threshold=50  
-fremap-arrays -mllvm -function-specialize -mllvm -enable-gvn-hoist  
-mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp  
-mllvm -vector-library=LIBMVEC -mllvm -inline-threshold=1000  
-flv-function-specialization -funroll-loops -Mrecursive -z muldefs  
-Kieee -fno-finite-math-only -DSPEC\_OPENMP -fopenmp -fopenmp=libomp  
-lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc -lflang

Benchmarks using Fortran, C, and C++:

-std=c++98 -flto -Wl,-mllvm -Wl,-function-specialize  
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-suppress-fmas -O3 -ffast-math -march=znver2  
-fstruct-layout=3 -mllvm -unroll-threshold=50 -fremap-arrays  
-mllvm -function-specialize -mllvm -enable-gvn-hoist  
-mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp  
-mllvm -vector-library=LIBMVEC -mllvm -inline-threshold=1000  
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000  
-mllvm -unroll-threshold=100 -mllvm -enable-partial-unswitch  
-funroll-loops -Mrecursive -z muldefs -Kieee -fno-finite-math-only  
-DSPEC\_OPENMP -fopenmp -fopenmp=libomp -lomp -lpthread -ldl -lmvec  
-lamdlibm -ljemalloc -lflang

## Base Other Flags

C benchmarks:

-Wno-return-type

Fortran benchmarks:

-Wno-return-type

Benchmarks using both Fortran and C:

-Wno-return-type

Benchmarks using Fortran, C, and C++:

-Wno-return-type



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## 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: basepeak = yes

638.imagick\_s: basepeak = yes

```

644.nab_s: -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver2 -mno-sse4a -fstruct-layout=5
-mllvm -vectorize-memory-aggressively
-mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -unroll-threshold=50 -fremap-arrays
-mllvm -vector-library=LIBMVEC
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp -mllvm -inline-threshold=1000
-flv-function-specialization -DSPEC_OPENMP -fopenmp
-lmvec -lamdlibm -fopenmp=libomp -lomp -lpthread -ldl
-ljemalloc -lflang

```

Fortran benchmarks:

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## Peak Optimization Flags (Continued)

```
603.bwaves_s: -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3
-march=znver2 -funroll-loops -Mrecursive
-mllvm -vector-library=LIBMVEC -Kieee
-fno-finite-math-only -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm
-ljemalloc -lflang
```

649.fotonik3d\_s: basepeak = yes

```
654.roms_s: -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver2
-funroll-loops -Mrecursive -mllvm -vector-library=LIBMVEC
-Kieee -fno-finite-math-only -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm
-ljemalloc -lflang
```

Benchmarks using both Fortran and C:

```
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast -march=znver2
-mno-sse4a -fstruct-layout=5 -mllvm -vectorize-memory-aggressively
-mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -unroll-threshold=50 -fremap-arrays
-mllvm -vector-library=LIBMVEC -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp -mllvm -inline-threshold=1000
-flv-function-specialization -O3 -funroll-loops -Mrecursive -Kieee
-fno-finite-math-only -DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp
-lpthread -ldl -lmvec -lamdlibm -ljemalloc -lflang
```

Benchmarks using Fortran, C, and C++:

607.cactuBSSN\_s: basepeak = yes

## Peak Other Flags

C benchmarks:

-Wno-return-type

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## Peak Other Flags (Continued)

Fortran benchmarks:

-Wno-return-type

Benchmarks using both Fortran and C:

-Wno-return-type

Benchmarks using Fortran, C, and C++:

-Wno-return-type

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

<http://www.spec.org/cpu2017/flags/aocc200-flags-C3.html>

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-revE9.html>

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

<http://www.spec.org/cpu2017/flags/aocc200-flags-C3.xml>

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-revE9.xml>

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