



# SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

## Altos Computing Inc.

SPECrate®2017\_fp\_base = 53.2

### BrainSphere R369 F4 (Intel Xeon Bronze 3204)

SPECrate®2017\_fp\_peak = 54.5

CPU2017 License: 97

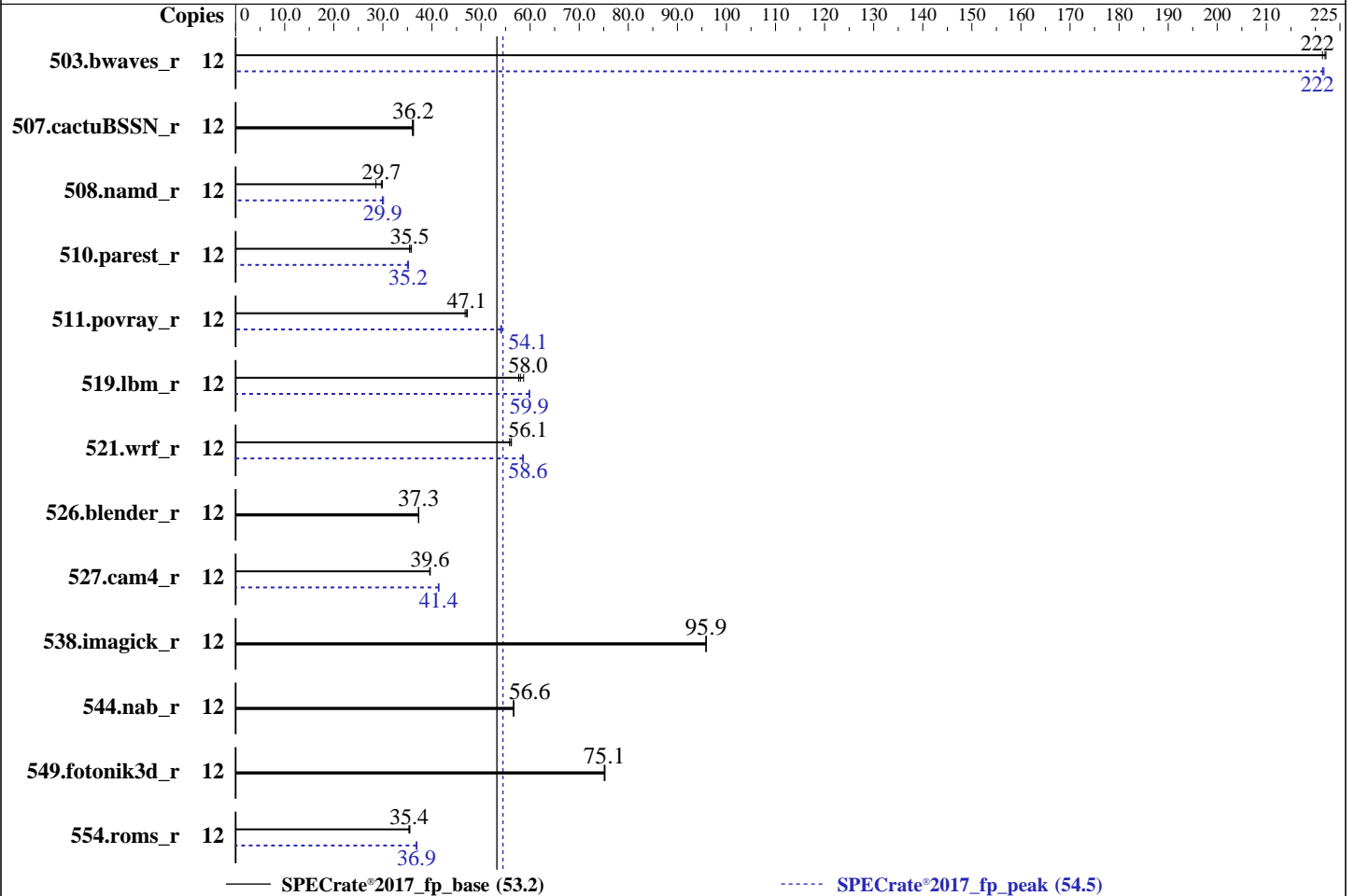
Test Date: Mar-2020

Test Sponsor: Altos Computing Inc.

Hardware Availability: Nov-2019

Tested by: Altos Computing Inc.

Software Availability: Jan-2020



### Hardware

CPU Name: Intel Xeon Bronze 3204  
 Max MHz: 1900  
 Nominal: 1900  
 Enabled: 12 cores, 2 chips  
 Orderable: 1,2 chips  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 8.25 MB I+D on chip per chip  
 Other: None  
 Memory: 384 GB (24 x 16 GB 1Rx4 PC4-2933V-R, running at 2133)  
 Storage: 1 x 240 GB SATA SSD  
 Other: None

### Software

OS: Ubuntu 19.10  
 Kernel 5.3.0-40-generic  
 Compiler: C/C++: Version 19.0.5.281 of Intel C/C++ Compiler Build 20190815 for Linux;  
 Fortran: Version 19.0.5.281 of Intel Fortran Compiler Build 20190815 for Linux  
 Parallel: No  
 Firmware: Version R11 released Feb-2020  
 File System: ext4  
 System State: Run level 5 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 Other: None  
 Power Management: BIOS set to prefer performance at the cost of additional power usag



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## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	12	542	222	<b>542</b>	<b>222</b>	543	221	12	543	222	543	221	<b>543</b>	<b>222</b>
507.cactuBSSN_r	12	<b>420</b>	<b>36.2</b>	422	36.0	419	36.2	12	<b>420</b>	<b>36.2</b>	422	36.0	419	36.2
508.namd_r	12	399	28.6	<b>384</b>	<b>29.7</b>	381	29.9	12	381	29.9	<b>381</b>	<b>29.9</b>	378	30.1
510.parest_r	12	876	35.8	885	35.5	<b>885</b>	<b>35.5</b>	12	891	35.2	<b>893</b>	<b>35.2</b>	897	35.0
511.povray_r	12	599	46.8	<b>595</b>	<b>47.1</b>	593	47.2	12	517	54.2	<b>518</b>	<b>54.1</b>	519	54.0
519.lbm_r	12	216	58.7	<b>218</b>	<b>58.0</b>	219	57.7	12	211	59.9	<b>211</b>	<b>59.9</b>	211	59.8
521.wrf_r	12	478	56.2	<b>479</b>	<b>56.1</b>	482	55.8	12	459	58.5	<b>459</b>	<b>58.6</b>	459	58.6
526.blender_r	12	<b>490</b>	<b>37.3</b>	490	37.3	490	37.3	12	<b>490</b>	<b>37.3</b>	490	37.3	490	37.3
527.cam4_r	12	529	39.7	531	39.6	<b>530</b>	<b>39.6</b>	12	508	41.3	<b>507</b>	<b>41.4</b>	507	41.4
538.imagick_r	12	<b>311</b>	<b>95.9</b>	312	95.8	311	95.9	12	<b>311</b>	<b>95.9</b>	312	95.8	311	95.9
544.nab_r	12	<b>357</b>	<b>56.6</b>	357	56.6	356	56.7	12	<b>357</b>	<b>56.6</b>	357	56.6	356	56.7
549.fotonik3d_r	12	<b>622</b>	<b>75.1</b>	622	75.1	621	75.3	12	<b>622</b>	<b>75.1</b>	622	75.1	621	75.3
554.roms_r	12	<b>539</b>	<b>35.4</b>	539	35.3	537	35.5	12	<b>517</b>	<b>36.9</b>	518	36.8	516	36.9

SPECrate®2017\_fp\_base = **53.2**

SPECrate®2017\_fp\_peak = **54.5**

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

## Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH = "/home/cpu2017/lib/intel64"

## General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0  
Transparent Huge Pages enabled by default  
Prior to runcpu invocation  
Filesystem page cache synced and cleared with:  
sync; echo 3> /proc/sys/vm/drop\_caches  
runcpu command invoked through numactl i.e.:

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## General Notes (Continued)

numactl --interleave=all runcpu <etc>

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.

## Platform Notes

BIOS Configuration:

Power Policy Quick Settings set to Performance

IMC set to 1-way interleaving

Sub\_NUMA Cluster set to enabled

Sysinfo program /home/cpu2017/bin/sysinfo

Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011

running on r389f4 Wed Mar 11 13:06:17 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 : Intel(R) Xeon(R) Bronze 3204 CPU @ 1.90GHz

2 "physical id"s (chips)

12 "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 : 6

siblings : 6

physical 0: cores 0 1 2 3 4 5

physical 1: cores 0 1 2 3 4 5

From lscpu:

Architecture: x86\_64

CPU op-mode(s): 32-bit, 64-bit

Byte Order: Little Endian

Address sizes: 46 bits physical, 48 bits virtual

CPU(s): 12

On-line CPU(s) list: 0-11

Thread(s) per core: 1

Core(s) per socket: 6

Socket(s): 2

NUMA node(s): 2

Vendor ID: GenuineIntel

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## Platform Notes (Continued)

```

CPU family:                6
Model:                     85
Model name:                Intel(R) Xeon(R) Bronze 3204 CPU @ 1.90GHz
Stepping:                  6
CPU MHz:                   800.013
CPU max MHz:               1900.0000
CPU min MHz:               800.0000
BogoMIPS:                  3800.00
Virtualization:            VT-x
L1d cache:                 384 KiB
L1i cache:                 384 KiB
L2 cache:                  12 MiB
L3 cache:                  16.5 MiB
NUMA node0 CPU(s):        0-5
NUMA node1 CPU(s):        6-11
Vulnerability Itlb multihit: KVM: Mitigation: Split huge pages
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 sanitization
Vulnerability Spectre v2:   Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Tsx async abort: Mitigation; TSX disabled
Flags:                     fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsaveavx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bml hle avx2 smep bmi2 erms invpcid cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku ospke avx512_vnni md_clear flush_lld arch_capabilities

```

```

/proc/cpuinfo cache data
cache size : 8448 KB

```

```

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 2 nodes (0-1)
node 0 cpus: 0 1 2 3 4 5
node 0 size: 192118 MB

```

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## Platform Notes (Continued)

```
node 0 free: 187237 MB
node 1 cpus: 6 7 8 9 10 11
node 1 size: 193509 MB
node 1 free: 190878 MB
node distances:
node    0    1
  0:   10   21
  1:   21   10
```

```
From /proc/meminfo
MemTotal:          394882912 kB
HugePages_Total:      0
Hugepagesize:       2048 kB
```

```
/usr/bin/lsb_release -d
Ubuntu 19.10
```

```
From /etc/*release* /etc/*version*
debian_version: buster/sid
os-release:
NAME="Ubuntu"
VERSION="19.10 (Eoan Ermine)"
ID=ubuntu
ID_LIKE=debian
PRETTY_NAME="Ubuntu 19.10"
VERSION_ID="19.10"
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"
```

```
uname -a:
Linux r389f4 5.3.0-40-generic #32-Ubuntu SMP Fri Jan 31 20:24:34 UTC 2020 x86_64
x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

```
itlb_multihit:          KVM: Mitigation: Split huge pages
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/swaps barriers and __user
pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional,
RSB filling
tsx_async_abort:       Mitigation: TSX disabled
```

(Continued on next page)



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## Platform Notes (Continued)

run-level 5 Mar 11 08:54

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda2	ext4	219G	27G	182G	13%	/

```

From /sys/devices/virtual/dmi/id
BIOS: GIGABYTE R11 02/25/2020
Vendor: ALTOS
Product: BrainSphere R389 F4
Product Family: Server
Serial: GIGBN8521A0007

```

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:
  24x Samsung M393A2K40CB2-CVF 16 GB 1 rank 2933

```

(End of data from sysinfo program)

## Compiler Version Notes

```

=====
C | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
  | 544.nab_r(base, peak)
=====

```

```

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
=====

```

```

=====
C++ | 508.namd_r(base, peak) 510.parest_r(base, peak)
=====

```

```

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
=====

```

```

=====
C++, C | 511.povray_r(base, peak) 526.blender_r(base, peak)
=====

```

```

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815

```

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## Compiler Version Notes (Continued)

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
 Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
 Version 19.0.5.281 Build 20190815  
 Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

=====  
 C++, C, Fortran | 507.cactuBSSN\_r(base, peak)  
 =====

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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 Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
 Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
 Version 19.0.5.281 Build 20190815  
 Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
 Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
 64, Version 19.0.5.281 Build 20190815  
 Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

=====  
 Fortran | 503.bwaves\_r(base, peak) 549.fotonik3d\_r(base, peak)  
 | 554.roms\_r(base, peak)  
 =====

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
 64, Version 19.0.5.281 Build 20190815  
 Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

=====  
 Fortran, C | 521.wrf\_r(base, peak) 527.cam4\_r(base, peak)  
 =====

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
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 Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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## Base Compiler Invocation

C benchmarks:  
icc

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## Base Compiler Invocation (Continued)

C++ benchmarks:

icpc

Fortran benchmarks:

ifort

Benchmarks using both Fortran and C:

ifort icc

Benchmarks using both C and C++:

icpc icc

Benchmarks using Fortran, C, and C++:

icpc icc ifort

## Base Portability Flags

```
503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64
```

## Base Optimization Flags

C benchmarks:

```
-m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4
```

C++ benchmarks:

```
-m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4
```

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## Base Optimization Flags (Continued)

Fortran benchmarks:

```
-m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -auto  
-nostandard-realloc-lhs
```

Benchmarks using both Fortran and C:

```
-m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -auto  
-nostandard-realloc-lhs
```

Benchmarks using both C and C++:

```
-m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4
```

Benchmarks using Fortran, C, and C++:

```
-m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -auto  
-nostandard-realloc-lhs
```

## Peak Compiler Invocation

C benchmarks:

```
icc
```

C++ benchmarks:

```
icpc
```

Fortran benchmarks:

```
ifort
```

Benchmarks using both Fortran and C:

```
ifort icc
```

Benchmarks using both C and C++:

```
icpc icc
```

Benchmarks using Fortran, C, and C++:

```
icpc icc ifort
```



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## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

```
519.lbm_r: -m64 -std=c11 -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4
```

```
538.imagick_r: basepeak = yes
```

```
544.nab_r: basepeak = yes
```

C++ benchmarks:

```
508.namd_r: -m64 -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4
```

```
510.parest_r: -m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4
```

Fortran benchmarks:

```
503.bwaves_r: -m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -auto  
-nostandard-realloc-lhs
```

```
549.fotonik3d_r: basepeak = yes
```

```
554.roms_r: -m64 -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -auto  
-nostandard-realloc-lhs
```

Benchmarks using both Fortran and C:

```
-m64 -std=c11 -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2  
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
```

Benchmarks using both C and C++:

(Continued on next page)



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## Peak Optimization Flags (Continued)

```
511.povray_r: -m64 -std=c11 -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4
```

526.blender\_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactuBSSN\_r: basepeak = yes

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

[http://www.spec.org/cpu2017/flags/Intel-ic19.0u5-official-linux64\\_revD.html](http://www.spec.org/cpu2017/flags/Intel-ic19.0u5-official-linux64_revD.html)

<http://www.spec.org/cpu2017/flags/Altos-Platform-Settings-V1.0-revA.html>

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

[http://www.spec.org/cpu2017/flags/Intel-ic19.0u5-official-linux64\\_revD.xml](http://www.spec.org/cpu2017/flags/Intel-ic19.0u5-official-linux64_revD.xml)

<http://www.spec.org/cpu2017/flags/Altos-Platform-Settings-V1.0-revA.xml>

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