



# SPEC CPU®2017 Floating Point Rate Result

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## ASUSTeK Computer Inc.

ASUS ESC8000 G4(Z11PG-D24) Server System  
(1.90 GHz, Intel Xeon Bronze 3206R)

SPECrate®2017\_fp\_base = 77.8

SPECrate®2017\_fp\_peak = 79.5

CPU2017 License: 9016

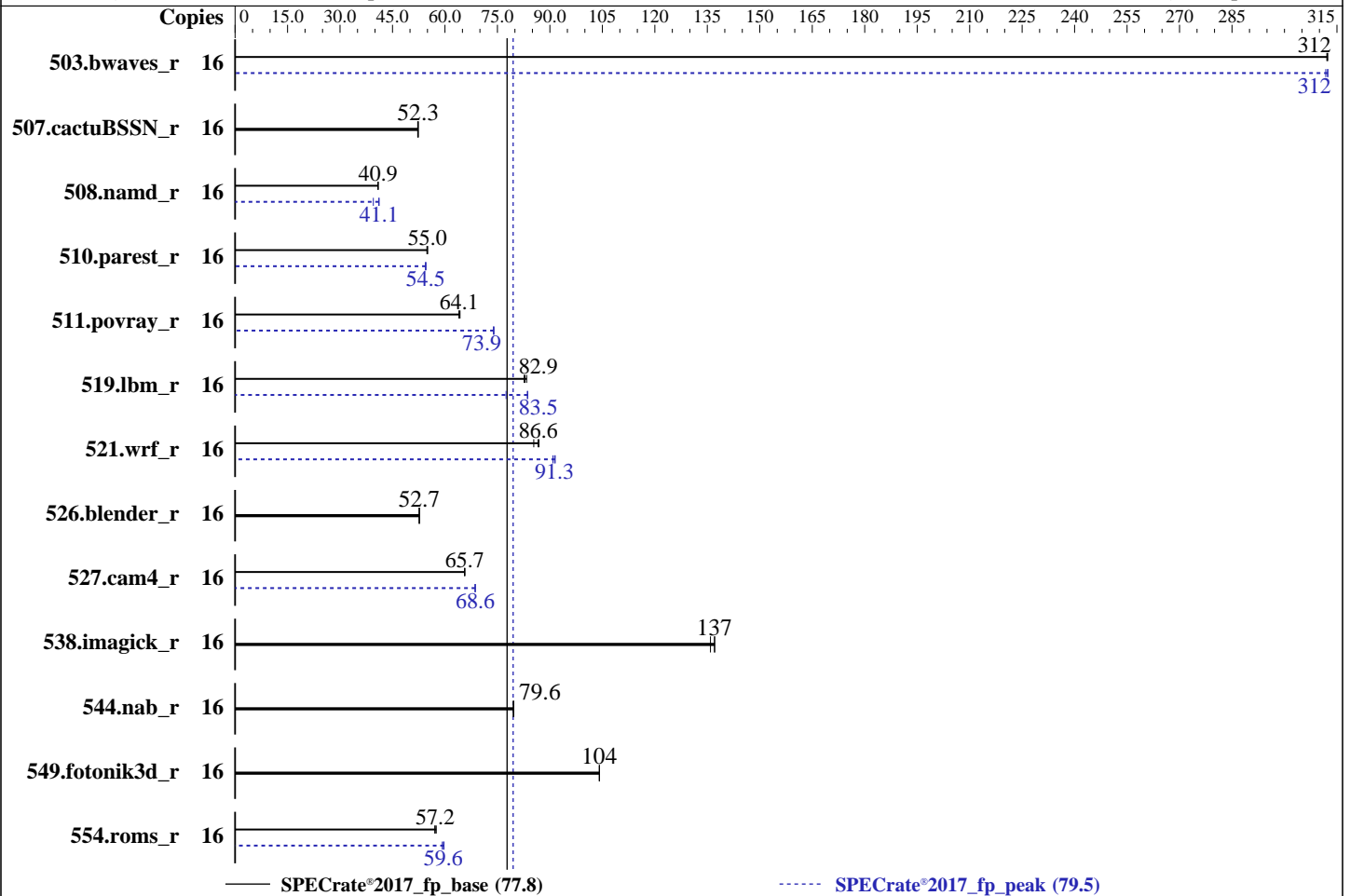
Test Sponsor: ASUSTeK Computer Inc.

Tested by: ASUSTeK Computer Inc.

Test Date: May-2020

Hardware Availability: Feb-2020

Software Availability: Sep-2019



### Hardware

CPU Name: Intel Xeon Bronze 3206R  
 Max MHz: 1900  
 Nominal: 1900  
 Enabled: 16 cores, 2 chips  
 Orderable: 1, 2 chip(s)  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 11 MB I+D on chip per chip  
 Other: None  
 Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R, running at 2133)  
 Storage: 1 x 1 TB SATA SSD  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 15 SP1  
 Kernel 4.12.14-195-default  
 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 6102 released Dec-2019  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 Other: None  
 Power Management: BIOS and OS set to prefer performance at the cost of additional power usage



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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	16	514	312	514	312	<b>514</b>	<b>312</b>	16	<b>514</b>	<b>312</b>	514	312	515	312
507.cactuBSSN_r	16	387	52.4	388	52.2	<b>387</b>	<b>52.3</b>	16	387	52.4	388	52.2	<b>387</b>	<b>52.3</b>
508.namd_r	16	<b>372</b>	<b>40.9</b>	372	40.9	372	40.9	16	369	41.2	385	39.5	<b>370</b>	<b>41.1</b>
510.parest_r	16	761	55.0	763	54.8	<b>761</b>	<b>55.0</b>	16	<b>768</b>	<b>54.5</b>	768	54.5	769	54.4
511.povray_r	16	581	64.3	<b>583</b>	<b>64.1</b>	584	64.0	16	506	73.9	505	74.0	<b>505</b>	<b>73.9</b>
519.lbm_r	16	202	83.4	204	82.6	<b>204</b>	<b>82.9</b>	16	202	83.7	<b>202</b>	<b>83.5</b>	218	77.5
521.wrf_r	16	<b>414</b>	<b>86.6</b>	420	85.4	413	86.9	16	395	90.8	392	91.5	<b>392</b>	<b>91.3</b>
526.blender_r	16	<b>463</b>	<b>52.7</b>	463	52.7	463	52.6	16	<b>463</b>	<b>52.7</b>	463	52.7	463	52.6
527.cam4_r	16	<b>426</b>	<b>65.7</b>	426	65.7	427	65.6	16	408	68.7	408	68.6	<b>408</b>	<b>68.6</b>
538.imagick_r	16	290	137	293	136	<b>290</b>	<b>137</b>	16	290	137	293	136	<b>290</b>	<b>137</b>
544.nab_r	16	<b>338</b>	<b>79.6</b>	338	79.6	338	79.6	16	<b>338</b>	<b>79.6</b>	338	79.6	338	79.6
549.fotonik3d_r	16	<b>599</b>	<b>104</b>	599	104	599	104	16	<b>599</b>	<b>104</b>	599	104	599	104
554.roms_r	16	<b>444</b>	<b>57.2</b>	442	57.5	445	57.1	16	<b>427</b>	<b>59.6</b>	426	59.7	429	59.2

SPECrate®2017\_fp\_base = **77.8**

SPECrate®2017\_fp\_peak = **79.5**

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"  
OS set to performance mode via cpupower frequency-set -g performance

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH = "/spec2017\_19u5/lib/intel64"  
MALLOC\_CONF = "retain:true"

## General Notes

Binaries compiled on a system with 1x Intel Core i9-9900K 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:

(Continued on next page)



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### General Notes (Continued)

```
sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
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:

VT-d = Disabled

Patrol Scrub = Disabled

ENERGY\_PERF\_BIAS\_CFG mode = performance

SR-IOV Support = Disabled

CSM Support = Disabled

Engine Boost = Level3(Max)

LLC dead line allc = Disabled

```
Sysinfo program /spec2017_19u5/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011
running on linux-628j Sun May 17 00:30:30 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 3206R CPU @ 1.90GHz

2 "physical id"s (chips)

16 "processors"

cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)

cpu cores : 8

siblings : 8

physical 0: cores 0 1 2 3 4 5 6 7

physical 1: cores 0 1 2 3 4 5 6 7

From lscpu:

Architecture: x86\_64

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

Byte Order: Little Endian

Address sizes: 46 bits physical, 48 bits virtual

(Continued on next page)



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### Platform Notes (Continued)

```

CPU(s): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 1
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Bronze 3206R CPU @ 1.90GHz
Stepping: 7
CPU MHz: 1900.000
CPU max MHz: 1900.0000
CPU min MHz: 1000.0000
BogoMIPS: 3800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0-7
NUMA node1 CPU(s): 8-15
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
aperfmpperf 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 xsave
avx 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 fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
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 : 11264 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 6 7
node 0 size: 385616 MB
node 0 free: 384302 MB
node 1 cpus: 8 9 10 11 12 13 14 15
node 1 size: 387040 MB
node 1 free: 385828 MB

```

(Continued on next page)



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### Platform Notes (Continued)

node distances:

```
node  0  1
  0: 10 21
  1: 21 10
```

From /proc/meminfo

```
MemTotal:      791201008 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-628j 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
CVE-2017-5715 (Spectre variant 2):      Mitigation: Enhanced IBRS, IBPB: conditional,
RSB filling
```

run-level 3 May 15 22:52

SPEC is set to: /spec2017\_19u5

```
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda4        xfs   932G   19G  913G   3% /
```

From /sys/devices/virtual/dmi/id

```
BIOS:      American Megatrends Inc. 6102 12/19/2019
Vendor:    ASUSTeK COMPUTER INC.
Product:   Z11PG-D24 Series
Product Family: Server
```

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### Platform Notes (Continued)

Serial: System Serial Number

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 M393A4K40CB2-CVF 32 GB 2 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  
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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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

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

-----  
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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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### Base 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

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## Base Compiler Invocation (Continued)

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
```

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
```

(Continued on next page)





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## Base Optimization Flags (Continued)

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
```

## 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
```

(Continued on next page)



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## Peak Optimization Flags (Continued)

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++:

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



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**Software Availability:** Sep-2019

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/ASUSTekPlatform-Settings-z11-V2.0-revH.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/ASUSTekPlatform-Settings-z11-V2.0-revH.xml>

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