



# SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

## Tyrone Systems

(Test Sponsor: Netweb Pte Ltd)

### DS400TR-54/R

(2.20 GHz, Intel Xeon Silver 4210)

## SPECrate®2017\_fp\_base = 115

## SPECrate®2017\_fp\_peak = 116

**CPU2017 License:** 006042

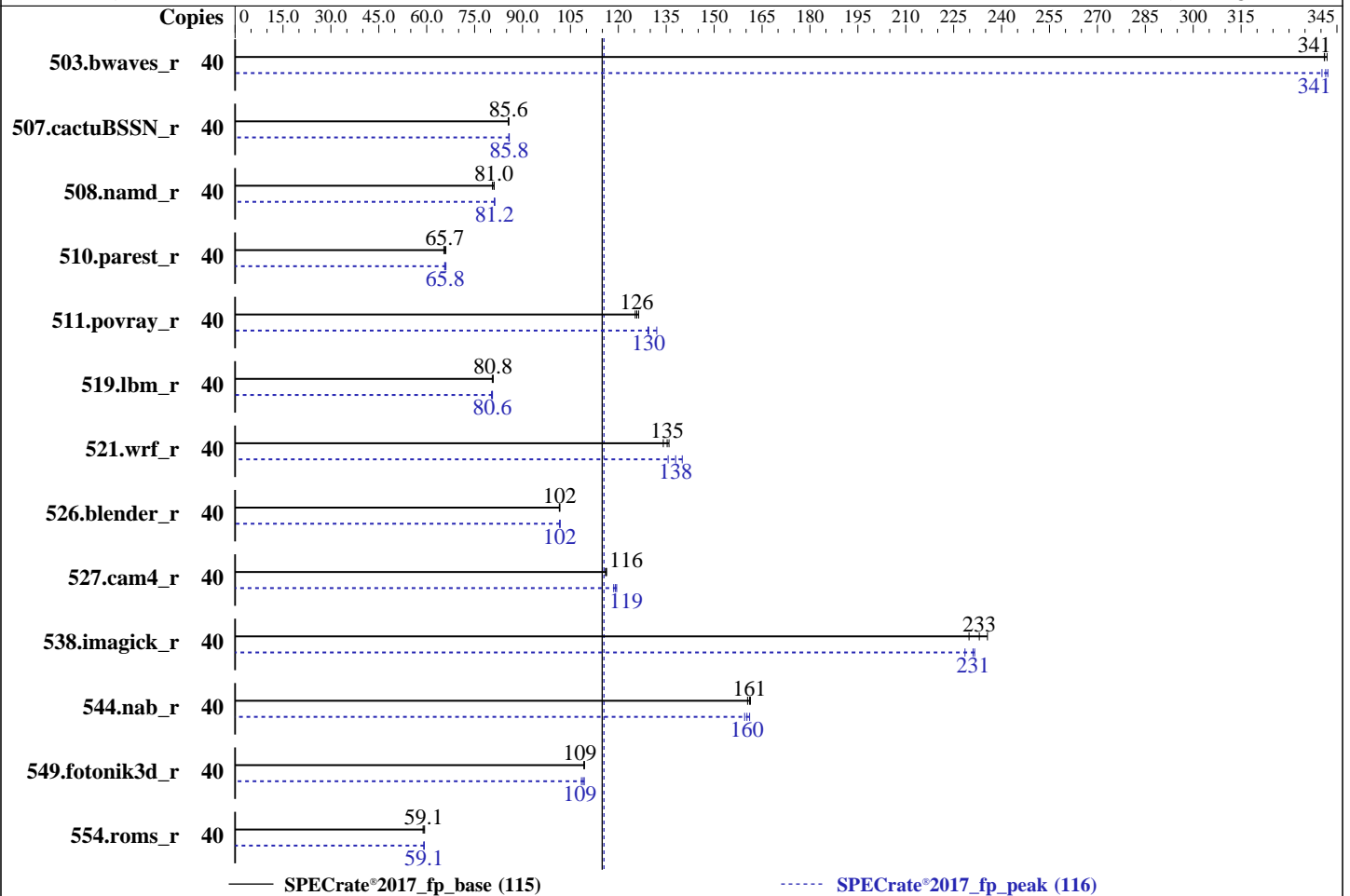
**Test Sponsor:** Netweb Pte Ltd

**Tested by:** Netweb

**Test Date:** Nov-2019

**Hardware Availability:** Sep-2019

**Software Availability:** Aug-2019



### Hardware

CPU Name: Intel Xeon Silver 4210  
 Max MHz: 3200  
 Nominal: 2200  
 Enabled: 20 cores, 2 chips, 2 threads/core  
 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: 13.75 MB I+D on chip per chip  
 Other: None  
 Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2933P-R, running at 2400)  
 Storage: 1 x 480 GB SSD  
 Other: None

### Software

OS: CentOS Linux release 7.7.1908 (Core)  
 3.10.0-1062.el7.x86\_64  
 Compiler: C/C++: Version 19.0.4.243 of Intel C/C++ Compiler Build 20190416 for Linux;  
 Fortran: Version 19.0.4.243 of Intel Fortran Compiler Build 20190416 for Linux  
 Parallel: No  
 Firmware: Version 3.1a released Jun-2019  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 Other: None  
 Power Management: None



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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	40	<b>1176</b>	<b>341</b>	1173	342	1176	341	40	1172	342	<b>1175</b>	<b>341</b>	1179	340
507.cactuBSSN_r	40	591	85.7	<b>591</b>	<b>85.6</b>	592	85.5	40	590	85.9	<b>590</b>	<b>85.8</b>	591	85.7
508.namd_r	40	468	81.1	<b>469</b>	<b>81.0</b>	472	80.6	40	467	81.3	<b>468</b>	<b>81.2</b>	468	81.2
510.parest_r	40	1601	65.4	1586	66.0	<b>1594</b>	<b>65.7</b>	40	1585	66.0	1595	65.6	<b>1591</b>	<b>65.8</b>
511.povray_r	40	745	125	739	126	<b>743</b>	<b>126</b>	40	<b>721</b>	<b>130</b>	707	132	722	129
519.lbm_r	40	524	80.5	522	80.8	<b>522</b>	<b>80.8</b>	40	<b>523</b>	<b>80.6</b>	523	80.6	525	80.3
521.wrf_r	40	668	134	659	136	<b>662</b>	<b>135</b>	40	<b>650</b>	<b>138</b>	661	136	640	140
526.blender_r	40	599	102	600	102	<b>599</b>	<b>102</b>	40	<b>599</b>	<b>102</b>	599	102	599	102
527.cam4_r	40	603	116	<b>602</b>	<b>116</b>	601	116	40	590	119	<b>587</b>	<b>119</b>	586	119
538.imagick_r	40	433	230	422	236	<b>427</b>	<b>233</b>	40	<b>431</b>	<b>231</b>	435	229	430	232
544.nab_r	40	<b>418</b>	<b>161</b>	417	161	420	160	40	422	160	418	161	<b>420</b>	<b>160</b>
549.fotonik3d_r	40	<b>1426</b>	<b>109</b>	1427	109	1425	109	40	1426	109	<b>1430</b>	<b>109</b>	1437	108
554.roms_r	40	<b>1076</b>	<b>59.1</b>	1080	58.9	1071	59.3	40	<b>1075</b>	<b>59.1</b>	1073	59.2	1075	59.1

SPECrate®2017\_fp\_base = **115**

SPECrate®2017\_fp\_peak = **116**

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

## Compiler Notes

SPEC has learned that this result, which used an evaluation compiler, was submitted contrary to the compiler license terms.

Intel has granted a one-time waiver for this result.

## 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/ia32:/home/cpu2017/lib/intel64"



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## General Notes

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5

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.:

```
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

Sysinfo program /home/cpu2017/bin/sysinfo

Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011

running on NODE2 Sat Nov 2 18:48:28 2019

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) Silver 4210 CPU @ 2.20GHz
```

```
2 "physical id"s (chips)
```

```
40 "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 : 10
```

```
siblings : 20
```

```
physical 0: cores 0 1 2 3 4 8 9 10 11 12
```

```
physical 1: cores 0 1 2 3 4 8 9 10 11 12
```

From lscpu:

```
Architecture: x86_64
```

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

```
Byte Order: Little Endian
```

```
CPU(s): 40
```

```
On-line CPU(s) list: 0-39
```

```
Thread(s) per core: 2
```

```
Core(s) per socket: 10
```

```
Socket(s): 2
```

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## Platform Notes (Continued)

```

NUMA node(s):          2
Vendor ID:             GenuineIntel
CPU family:           6
Model:                85
Model name:           Intel(R) Xeon(R) Silver 4210 CPU @ 2.20GHz
Stepping:             7
CPU MHz:              999.963
CPU max MHz:          3200.0000
CPU min MHz:          1000.0000
BogoMIPS:             4400.00
Virtualization:       VT-x
L1d cache:            32K
L1i cache:            32K
L2 cache:             1024K
L3 cache:             14080K
NUMA node0 CPU(s):   0-9,20-29
NUMA node1 CPU(s):   10-19,30-39
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
aperfperf eagerfpu 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 epb cat_l3 cdp_l3 intel_ppin
intel_pt 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 avx512cd avx512bw avx512vl xsaveopt
xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln
pts pku ospke avx512_vnni md_clear spec_ctrl intel_stibp flush_l1d arch_capabilities

```

```
/proc/cpuinfo cache data
cache size : 14080 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 8 9 20 21 22 23 24 25 26 27 28 29
node 0 size: 195239 MB
node 0 free: 178773 MB
node 1 cpus: 10 11 12 13 14 15 16 17 18 19 30 31 32 33 34 35 36 37 38 39
node 1 size: 196608 MB
node 1 free: 182236 MB
node distances:
node  0  1
 0:  10  21
 1:  21  10

```

From /proc/meminfo

(Continued on next page)



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## Platform Notes (Continued)

MemTotal: 394874552 kB  
HugePages\_Total: 0  
Hugepagesize: 2048 kB

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

```
centos-release: CentOS Linux release 7.7.1908 (Core)
centos-release-upstream: Derived from Red Hat Enterprise Linux 7.7 (Source)
os-release:
  NAME="CentOS Linux"
  VERSION="7 (Core)"
  ID="centos"
  ID_LIKE="rhel fedora"
  VERSION_ID="7"
  PRETTY_NAME="CentOS Linux 7 (Core)"
  ANSI_COLOR="0;31"
  CPE_NAME="cpe:/o:centos:centos:7"
redhat-release: CentOS Linux release 7.7.1908 (Core)
system-release: CentOS Linux release 7.7.1908 (Core)
system-release-cpe: cpe:/o:centos:centos:7
```

uname -a:

```
Linux NODE2 3.10.0-1062.el7.x86_64 #1 SMP Wed Aug 7 18:08:02 UTC 2019 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: Load fences, __user pointer
sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Full retpoline, IBPB
```

run-level 3 Nov 2 09:21

SPEC is set to: /home/cpu2017

```
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/mapper/centos-home xfs   392G  134G  259G  35% /home
```

From /sys/devices/virtual/dmi/id

```
BIOS: American Megatrends Inc. 3.1a 06/11/2019
Vendor: Tyrone Systems
Product: X11DAi-N
Serial: 123456789
```

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## Platform Notes (Continued)

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:

4x NO DIMM NO DIMM

12x 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 19.0.4.243 Build 20190416

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.

```
=====
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 19.0.4.243 Build 20190416

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

icpc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.

```
=====
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 19.0.4.243 Build 20190416

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icpc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,

Version 19.0.4.243 Build 20190416

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.

```
=====
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
=====
```

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## Compiler Version Notes (Continued)

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icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.  
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.0.4.243 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
ifort: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.

-----

=====

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 19.0.4.243 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
ifort: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.

-----

=====

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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icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.

-----

## Base Compiler Invocation

C benchmarks:  
icc -m64 -std=c11

C++ benchmarks:  
icpc -m64

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## Base Compiler Invocation (Continued)

Fortran benchmarks:

```
ifort -m64
```

Benchmarks using both Fortran and C:

```
ifort -m64 icc -m64 -std=c11
```

Benchmarks using both C and C++:

```
icpc -m64 icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:

```
icpc -m64 icc -m64 -std=c11 ifort -m64
```

## 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:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
```

```
-ffinite-math-only -qopt-mem-layout-trans=4
```

C++ benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
```

```
-ffinite-math-only -qopt-mem-layout-trans=4
```

Fortran benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
```

```
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
```

```
-nonstandard-realloc-lhs -align array32byte
```

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## Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte
```

Benchmarks using both C and C++:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4
```

Benchmarks using Fortran, C, and C++:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte
```

## Peak Compiler Invocation

C benchmarks:

```
icc -m64 -std=c11
```

C++ benchmarks:

```
icpc -m64
```

Fortran benchmarks:

```
ifort -m64
```

Benchmarks using both Fortran and C:

```
ifort -m64 icc -m64 -std=c11
```

Benchmarks using both C and C++:

```
icpc -m64 icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:

```
icpc -m64 icc -m64 -std=c11 ifort -m64
```

## Peak Portability Flags

Same as Base Portability Flags



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## Peak Optimization Flags

C benchmarks:

```
519.lbm_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4
```

```
538.imagick_r: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4
```

544.nab\_r: Same as 538.imagick\_r

C++ benchmarks:

```
508.namd_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4
```

```
510.parest_r: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4
```

Fortran benchmarks:

```
503.bwaves_r: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte
```

549.fotonik3d\_r: Same as 503.bwaves\_r

```
554.roms_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte
```

Benchmarks using both Fortran and C:

```
-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte
```

Benchmarks using both C and C++:

```
511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4
```

(Continued on next page)



# SPEC CPU®2017 Floating Point Rate Result

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**Tyrone Systems**

(Test Sponsor: Netweb Pte Ltd)

DS400TR-54/R

(2.20 GHz, Intel Xeon Silver 4210)

SPECrate®2017\_fp\_base = 115

SPECrate®2017\_fp\_peak = 116

**CPU2017 License:** 006042

**Test Sponsor:** Netweb Pte Ltd

**Tested by:** Netweb

**Test Date:** Nov-2019

**Hardware Availability:** Sep-2019

**Software Availability:** Aug-2019

## Peak Optimization Flags (Continued)

```
526.blender_r: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4
```

Benchmarks using Fortran, C, and C++:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte
```

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

<http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-15.html>

<http://www.spec.org/cpu2017/flags/Default-Platform-Flags.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-15.xml>

<http://www.spec.org/cpu2017/flags/Default-Platform-Flags.xml>

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Tested with SPEC CPU®2017 v1.1.0 on 2019-11-02 18:48:27-0400.

Report generated on 2020-10-29 14:57:42 by CPU2017 PDF formatter v6255.

Originally published on 2019-11-26.