



# SPEC CPU®2017 Floating Point Rate Result

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## Tyrone Systems

(Test Sponsor: Netweb)

DIT400TR-28RL

(2.60Ghz, Intel Xeon Gold 6240)

SPECrate®2017\_fp\_base = 205

SPECrate®2017\_fp\_peak = 208

CPU2017 License: 006042

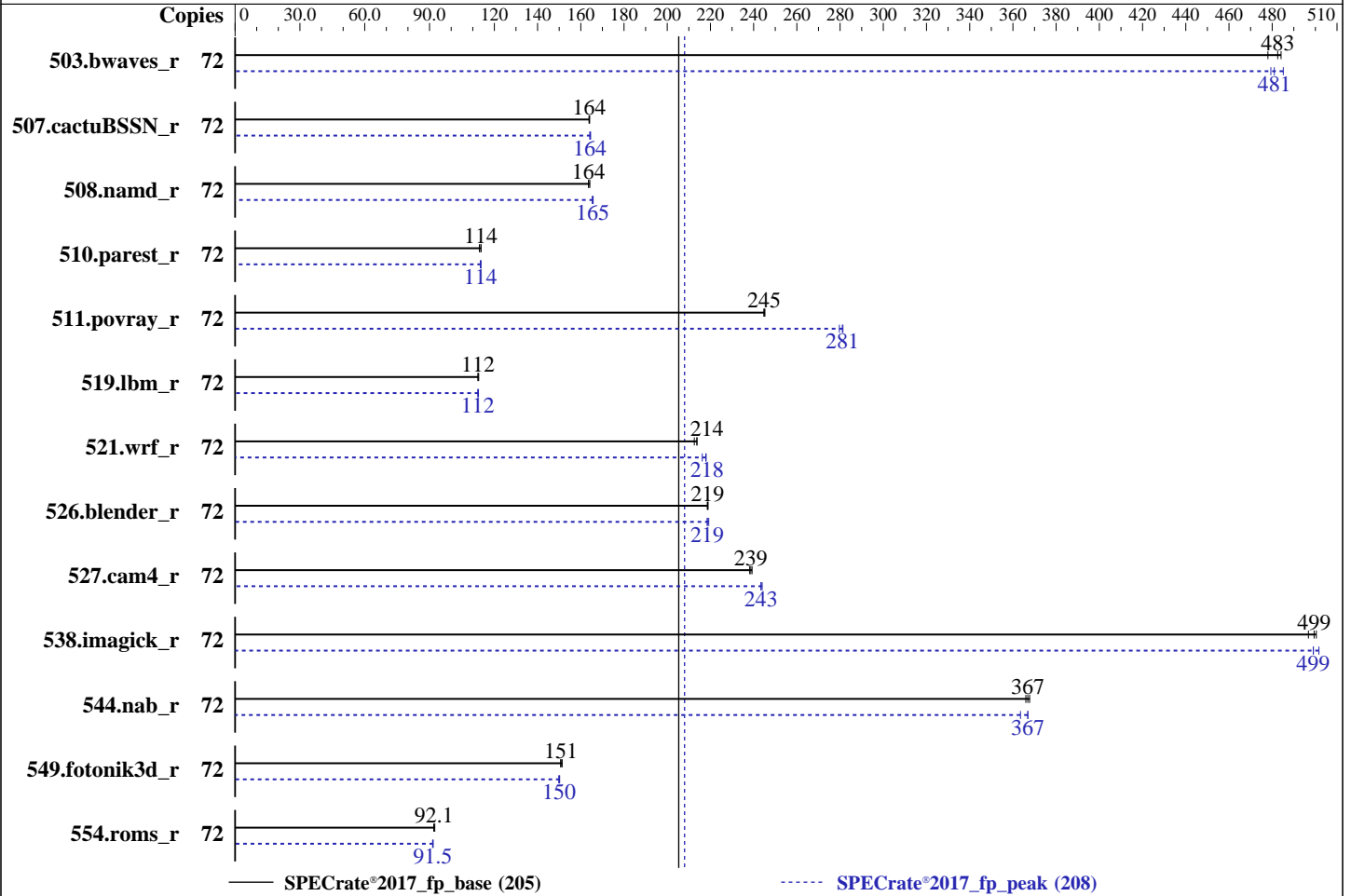
Test Sponsor: Netweb

Tested by: Netweb

Test Date: Oct-2019

Hardware Availability: Sep-2019

Software Availability: Aug-2019



### Hardware

CPU Name: Intel Xeon Gold 6240  
 Max MHz: 3900  
 Nominal: 2600  
 Enabled: 36 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: 24.75 MB I+D on chip per chip  
 Other: None  
 Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2933P-R)  
 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 V8.101 released Aug-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	72	1491	484	<b><u>1496</u></b>	<b><u>483</u></b>	1510	478	72	1488	485	<b><u>1501</u></b>	<b><u>481</u></b>	1506	479
507.cactuBSSN_r	72	555	164	<b><u>556</u></b>	<b><u>164</u></b>	557	164	72	554	165	<b><u>555</u></b>	<b><u>164</u></b>	555	164
508.namd_r	72	418	164	417	164	<b><u>418</u></b>	<b><u>164</u></b>	72	413	166	414	165	<b><u>413</u></b>	<b><u>165</u></b>
510.parest_r	72	1655	114	<b><u>1655</u></b>	<b><u>114</u></b>	1666	113	72	<b><u>1658</u></b>	<b><u>114</u></b>	1655	114	1660	113
511.povray_r	72	687	245	686	245	<b><u>687</u></b>	<b><u>245</u></b>	72	601	280	598	281	<b><u>598</u></b>	<b><u>281</u></b>
519.lbm_r	72	673	113	675	112	<b><u>675</u></b>	<b><u>112</u></b>	72	674	113	<b><u>675</u></b>	<b><u>112</u></b>	675	112
521.wrf_r	72	<b><u>755</u></b>	<b><u>214</u></b>	759	213	754	214	72	740	218	746	216	<b><u>740</u></b>	<b><u>218</u></b>
526.blender_r	72	501	219	502	219	<b><u>501</u></b>	<b><u>219</u></b>	72	500	219	502	219	<b><u>502</u></b>	<b><u>219</u></b>
527.cam4_r	72	529	238	<b><u>528</u></b>	<b><u>239</u></b>	526	239	72	516	244	<b><u>517</u></b>	<b><u>243</u></b>	517	243
538.imagick_r	72	360	497	358	500	<b><u>359</u></b>	<b><u>499</u></b>	72	357	502	359	499	<b><u>359</u></b>	<b><u>499</u></b>
544.nab_r	72	331	366	<b><u>330</u></b>	<b><u>367</u></b>	330	368	72	330	367	<b><u>330</u></b>	<b><u>367</u></b>	333	364
549.fotonik3d_r	72	<b><u>1859</u></b>	<b><u>151</u></b>	1863	151	1853	151	72	<b><u>1870</u></b>	<b><u>150</u></b>	1868	150	1873	150
554.roms_r	72	<b><u>1242</u></b>	<b><u>92.1</u></b>	1244	91.9	1238	92.4	72	<b><u>1251</u></b>	<b><u>91.5</u></b>	1248	91.7	1251	91.4

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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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**CPU2017 License:** 006042

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**Tested by:** Netweb

**Test Date:** Oct-2019

**Hardware Availability:** Sep-2019

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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 NODE1 Tue Oct 8 14:24:04 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) Gold 6240 CPU @ 2.60GHz

2 "physical id"s (chips)

72 "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 : 18

siblings : 36

physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

From lscpu:

Architecture: x86\_64

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

Byte Order: Little Endian

CPU(s): 72

On-line CPU(s) list: 0-71

Thread(s) per core: 2

Core(s) per socket: 18

Socket(s): 2

(Continued on next page)



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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) Gold 6240 CPU @ 2.60GHz
Stepping:             7
CPU MHz:              999.914
CPU max MHz:          3900.0000
CPU min MHz:          1000.0000
BogoMIPS:             5200.00
Virtualization:       VT-x
L1d cache:            32K
L1i cache:            32K
L2 cache:             1024K
L3 cache:             25344K
NUMA node0 CPU(s):   0-17,36-53
NUMA node1 CPU(s):   18-35,54-71

```

```

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 hwp hwp_act_window hwp_epp hwp_pkg_req pku ospke avx512_vnni md_clear spec_ctrl
intel_stibp flush_lld arch_capabilities

```

```

/proc/cpuinfo cache data
cache size : 25344 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 10 11 12 13 14 15 16 17 36 37 38 39 40 41 42 43 44 45
46 47 48 49 50 51 52 53
node 0 size: 195228 MB
node 0 free: 169871 MB
node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 54 55 56 57 58 59 60
61 62 63 64 65 66 67 68 69 70 71
node 1 size: 196608 MB
node 1 free: 172863 MB
node distances:
node  0  1
0:    10  21

```

(Continued on next page)



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## Platform Notes (Continued)

1: 21 10

From /proc/meminfo

MemTotal: 394858828 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 NODE1 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 Oct 8 04:59

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/centos-home	xfs	392G	150G	243G	39%	/home

From /sys/devices/virtual/dmi/id

BIOS: American Megatrends Inc. V8.101 08/02/2019

Vendor: Tyrone Systems

(Continued on next page)



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## Platform Notes (Continued)

Product: TP12XH-L2I

Serial: empty

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:

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
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
icpc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
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icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
-----
```

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## Compiler Version Notes (Continued)

=====  
C++, C, Fortran | 507.cactuBSSN\_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

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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)  
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.

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

## Base Compiler Invocation

C benchmarks:

icc -m64 -std=c11

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## Base Compiler Invocation (Continued)

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

## 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

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## Base Optimization Flags (Continued)

Fortran benchmarks:

```
-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 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
```



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## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

```
519.lbm_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512
-03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4
```

```
538.imagick_r: -xCORE-AVX512 -ipo -03 -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
-03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4
```

```
510.parest_r: -xCORE-AVX512 -ipo -03 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4
```

Fortran benchmarks:

```
503.bwaves_r: -xCORE-AVX512 -ipo -03 -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
-03 -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 -03
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte
```

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# SPEC CPU®2017 Floating Point Rate Result

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**Tyrone Systems**

(Test Sponsor: Netweb)

DIT400TR-28RL

(2.60Ghz, Intel Xeon Gold 6240)

SPECrate®2017\_fp\_base = 205

SPECrate®2017\_fp\_peak = 208

**CPU2017 License:** 006042

**Test Sponsor:** Netweb

**Tested by:** Netweb

**Test Date:** Oct-2019

**Hardware Availability:** Sep-2019

**Software Availability:** Aug-2019

## Peak Optimization Flags (Continued)

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
```

```
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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