



# SPEC® CPU2017 Floating Point Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

Epsilon Sp. z o.o. Sp. Komandytowa

SPECrate2017\_fp\_base = 77.4

eterio 210 RA1 (Intel Xeon Silver 4108, 1.80 GHz)

SPECrate2017\_fp\_peak = 78.5

CPU2017 License: 9081

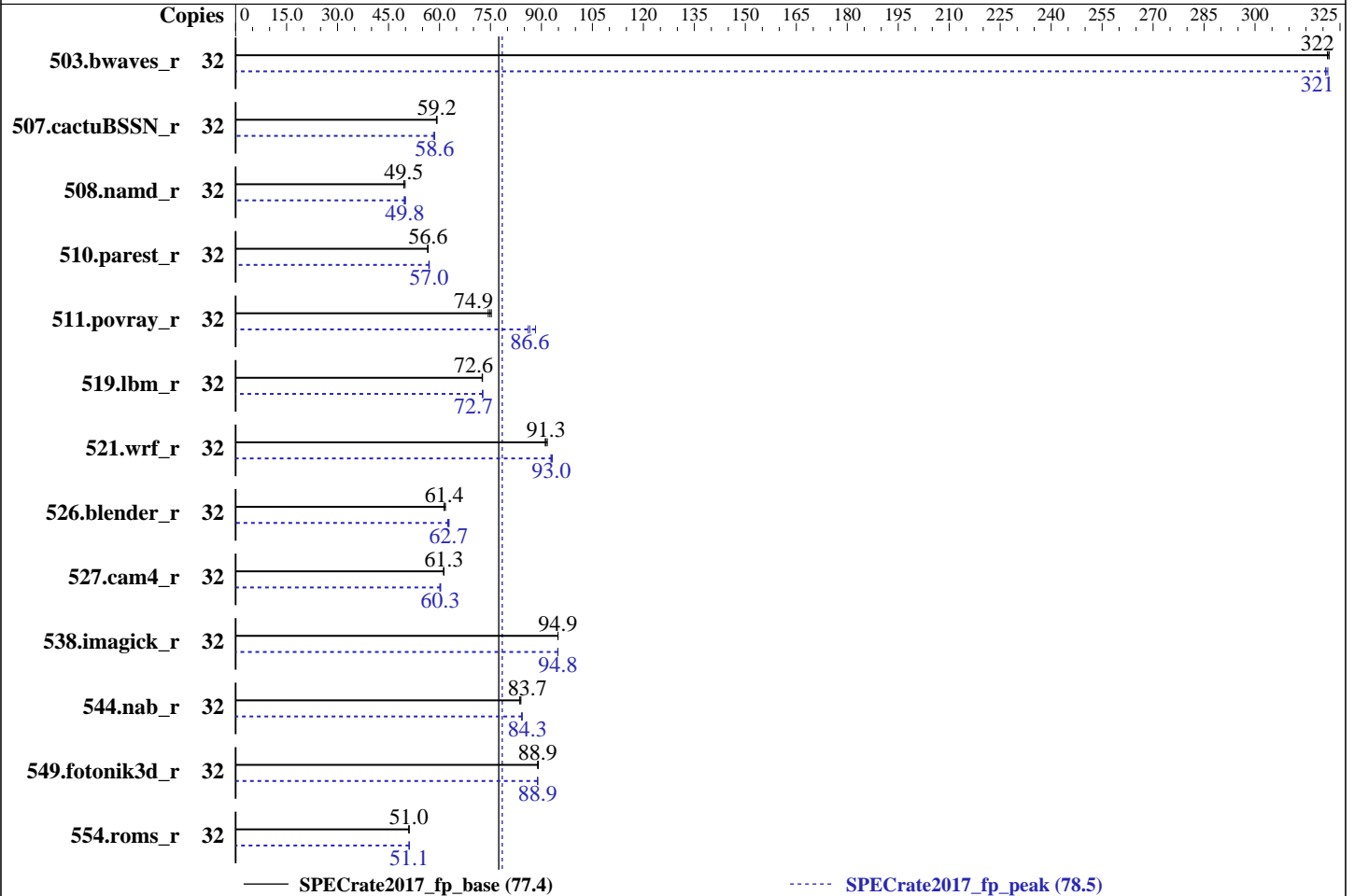
Test Date: Apr-2018

Test Sponsor: Epsilon Sp. z o.o. Sp. Komandytowa

Hardware Availability: Sep-2017

Tested by: Epsilon Sp. z o.o. Sp. Komandytowa

Software Availability: Mar-2018



### Hardware

CPU Name: Intel Xeon Silver 4108  
 Max MHz.: 3000  
 Nominal: 1800  
 Enabled: 16 cores, 2 chips, 2 threads/core  
 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: 11 MB I+D on chip per chip  
 Other: None  
 Memory: 384 GB (24 x 16 GB 2Rx4 PC4-2666V-R, running at 2400)  
 Storage: 1 x 960 GB SSD SATA III  
 Other: None

### Software

OS: Red Hat Enterprise Linux Server release 7.4 (Maipo)  
 3.10.0-693.21.1.el7.x86\_64  
 Compiler: C/C++: Version 18.0.0.128 of Intel C/C++ Compiler for Linux;  
 Fortran: Version 18.0.0.128 of Intel Fortran Compiler for Linux  
 Parallel: No  
 Firmware: Version BIOSR0013 released Mar-2018  
 File System: ext4  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 Other: 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	32	999	321	<b>997</b>	<b>322</b>	997	322	32	<b>1000</b>	<b>321</b>	1000	321	998	321
507.cactuBSSN_r	32	<b>684</b>	<b>59.2</b>	684	59.2	685	59.1	32	696	58.2	<b>692</b>	<b>58.6</b>	691	58.6
508.namd_r	32	614	49.5	609	49.9	<b>614</b>	<b>49.5</b>	32	<b>611</b>	<b>49.8</b>	613	49.6	608	50.0
510.parest_r	32	<b>1478</b>	<b>56.6</b>	1477	56.7	1482	56.5	32	<b>1470</b>	<b>57.0</b>	1469	57.0	1472	56.9
511.povray_r	32	993	75.3	1005	74.3	<b>998</b>	<b>74.9</b>	32	868	86.1	847	88.3	<b>863</b>	<b>86.6</b>
519.lbm_r	32	465	72.5	464	72.6	<b>464</b>	<b>72.6</b>	32	464	72.6	<b>464</b>	<b>72.7</b>	464	72.7
521.wrf_r	32	781	91.7	<b>785</b>	<b>91.3</b>	787	91.1	32	769	93.2	772	92.8	<b>771</b>	<b>93.0</b>
526.blender_r	32	794	61.4	<b>793</b>	<b>61.4</b>	789	61.8	32	<b>777</b>	<b>62.7</b>	776	62.8	781	62.4
527.cam4_r	32	913	61.3	<b>913</b>	<b>61.3</b>	915	61.2	32	931	60.1	<b>929</b>	<b>60.3</b>	928	60.3
538.imagick_r	32	<b>839</b>	<b>94.9</b>	839	94.9	839	94.9	32	839	94.9	<b>839</b>	<b>94.8</b>	839	94.8
544.nab_r	32	641	84.0	644	83.7	<b>644</b>	<b>83.7</b>	32	<b>639</b>	<b>84.3</b>	639	84.3	640	84.2
549.fotonik3d_r	32	1403	88.9	1400	89.1	<b>1402</b>	<b>88.9</b>	32	1403	88.9	1403	88.9	<b>1403</b>	<b>88.9</b>
554.roms_r	32	997	51.0	<b>997</b>	<b>51.0</b>	996	51.1	32	<b>995</b>	<b>51.1</b>	996	51.1	995	51.1

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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"

## General Notes

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

LD\_LIBRARY\_PATH = "/cpu2017.1.0/lib/ia32:/cpu2017.1.0/lib/intel64:/cpu2017.1.0/je5.0.1-32:/cpu2017.1.0/je5.0.1-64"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32 GB RAM  
memory using Redhat Enterprise Linux 7.4

Yes: 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.

(Continued on next page)



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## General Notes (Continued)

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>

## Platform Notes

BIOS Settings:

Intel(R) Hyper-Threading Tech = Enabled  
 CPU Power and Performance Policy = Performance  
 Intel(R) Turbo Boost Technology = Enabled  
 ClE = Disabled  
 Processor C6 = Disabled  
 IMC Interleaving = Auto  
 Sub\_NUMA Cluster = Disabled  
 Set FAN Profile = Performance  
 Patrol Scrub = Disabled

Sysinfo program /cpu2017.1.0/bin/sysinfo

Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f

running on SUT Fri Apr 6 01:30:51 2018

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 4108 CPU @ 1.80GHz

2 "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 : 8

siblings : 16

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

CPU(s): 32

On-line CPU(s) list: 0-31

(Continued on next page)



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## Platform Notes (Continued)

```

Thread(s) per core:      2
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) Silver 4108 CPU @ 1.80GHz
Stepping:               4
CPU MHz:                1556.015
CPU max MHz:            3000.0000
CPU min MHz:            800.0000
BogoMIPS:               3600.00
Virtualization:         VT-x
L1d cache:              32K
L1i cache:              32K
L2 cache:               1024K
L3 cache:               11264K
NUMA node0 CPU(s):     0-7,16-23
NUMA node1 CPU(s):     8-15,24-31
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
aperfmpperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 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 invpcid_single
intel_pt spec_ctrl ibpb_support 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

```

```

/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 16 17 18 19 20 21 22 23
node 0 size: 195276 MB
node 0 free: 190430 MB
node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
node 1 size: 196608 MB
node 1 free: 191914 MB
node distances:
node  0  1
0:  10  21

```

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## Platform Notes (Continued)

1: 21 10

From /proc/meminfo

MemTotal: 394686428 kB  
HugePages\_Total: 0  
Hugepagesize: 2048 kB

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

os-release:  
NAME="Red Hat Enterprise Linux Server"  
VERSION="7.4 (Maipo)"  
ID="rhel"  
ID\_LIKE="fedora"  
VARIANT="Server"  
VARIANT\_ID="server"  
VERSION\_ID="7.4"  
PRETTY\_NAME="Red Hat Enterprise Linux"  
redhat-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)  
system-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)  
system-release-cpe: cpe:/o:redhat:enterprise\_linux:7.4:ga:server

uname -a:

Linux SUT 3.10.0-693.21.1.el7.x86\_64 #1 SMP Fri Feb 23 18:54:16 UTC 2018 x86\_64 x86\_64 x86\_64 GNU/Linux

run-level 3 Apr 3 17:26

SPEC is set to: /cpu2017.1.0

Filesystem Type Size Used Avail Use% Mounted on  
/dev/sda1 ext4 825G 84G 700G 11% /

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.

BIOS Intel Corporation SE5C620.86B.00.01.0013.030920180427 03/09/2018

Memory:

24x Samsung M393A2G40EB2-CTD 16 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

## Compiler Version Notes

=====  
CC 519.lbm\_r(base) 538.imagick\_r(base, peak) 544.nab\_r(base)  
=====

(Continued on next page)



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## Compiler Version Notes (Continued)

icc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====  
CC 519.lbm\_r(peak) 544.nab\_r(peak)

icc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====  
CXXC 508.namd\_r(base) 510.parest\_r(base)

icpc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====  
CXXC 508.namd\_r(peak) 510.parest\_r(peak)

icpc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====  
CC 511.povray\_r(base) 526.blender\_r(base)

icpc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

icc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====  
CC 511.povray\_r(peak) 526.blender\_r(peak)

icpc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

icc (ICC) 18.0.0 20170811

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=====  
FC 507.cactuBSSN\_r(base)

icpc (ICC) 18.0.0 20170811

(Continued on next page)



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Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
 icc (ICC) 18.0.0 20170811  
 Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
 ifort (IFORT) 18.0.0 20170811  
 Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====

FC 507.cactuBSSN\_r(peak)

-----

icpc (ICC) 18.0.0 20170811  
 Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
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 ifort (IFORT) 18.0.0 20170811  
 Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====

FC 503.bwaves\_r(base, peak) 549.fotonik3d\_r(base, peak) 554.roms\_r(base)

-----

ifort (IFORT) 18.0.0 20170811  
 Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====

FC 554.roms\_r(peak)

-----

ifort (IFORT) 18.0.0 20170811  
 Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====

CC 521.wrf\_r(base) 527.cam4\_r(base)

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 icc (ICC) 18.0.0 20170811  
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CC 521.wrf\_r(peak) 527.cam4\_r(peak)

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## Compiler Version Notes (Continued)

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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

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





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## Base Optimization Flags

C benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3
```

C++ benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3
```

Fortran benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3 -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=3 -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=3
```

Benchmarks using Fortran, C, and C++:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs  
-align array32byte
```

## Base Other Flags

C benchmarks:

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

C++ benchmarks:

```
-m64
```

Fortran benchmarks:

```
-m64
```

Benchmarks using both Fortran and C:

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

Benchmarks using both C and C++:

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

(Continued on next page)



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## Base Other Flags (Continued)

Benchmarks using Fortran, C, and C++:

-m64 -std=c11

## 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: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512  
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3

538.imagick\_r: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3

544.nab\_r: Same as 519.lbm\_r

(Continued on next page)



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## Peak Optimization Flags (Continued)

C++ benchmarks:

```
-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3
```

Fortran benchmarks:

```
503.bwaves_r: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3
-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=3 -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=3 -nostandard-realloc-lhs -align array32byte
```

Benchmarks using both C 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=3
```

Benchmarks using Fortran, C, 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=3 -nostandard-realloc-lhs -align array32byte
```

## Peak Other Flags

C benchmarks:

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

C++ benchmarks:

```
-m64
```

Fortran benchmarks:

```
-m64
```

(Continued on next page)



# SPEC CPU2017 Floating Point Rate Result

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Epsilon Sp. z o.o. Sp. Komandytowa

SPECrate2017\_fp\_base = 77.4

eterio 210 RA1 (Intel Xeon Silver 4108, 1.80 GHz)

SPECrate2017\_fp\_peak = 78.5

CPU2017 License: 9081

Test Date: Apr-2018

Test Sponsor: Epsilon Sp. z o.o. Sp. Komandytowa

Hardware Availability: Sep-2017

Tested by: Epsilon Sp. z o.o. Sp. Komandytowa

Software Availability: Mar-2018

## Peak Other Flags (Continued)

Benchmarks using both Fortran and C:

-m64 -std=c11

Benchmarks using both C and C++:

-m64 -std=c11

Benchmarks using Fortran, C, and C++:

-m64 -std=c11

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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.html>

<http://www.spec.org/cpu2017/flags/Epsilon-Platform-Flags-RevA-Feb-2018-For-Intel-Platform.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.xml>

<http://www.spec.org/cpu2017/flags/Epsilon-Platform-Flags-RevA-Feb-2018-For-Intel-Platform.xml>

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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

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