



# SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

## Dell Inc.

PowerEdge R650 (Intel Xeon Platinum 8360Y, 2.40 GHz)

SPECrate®2017\_fp\_base = 428

SPECrate®2017\_fp\_peak = 454

CPU2017 License: 55

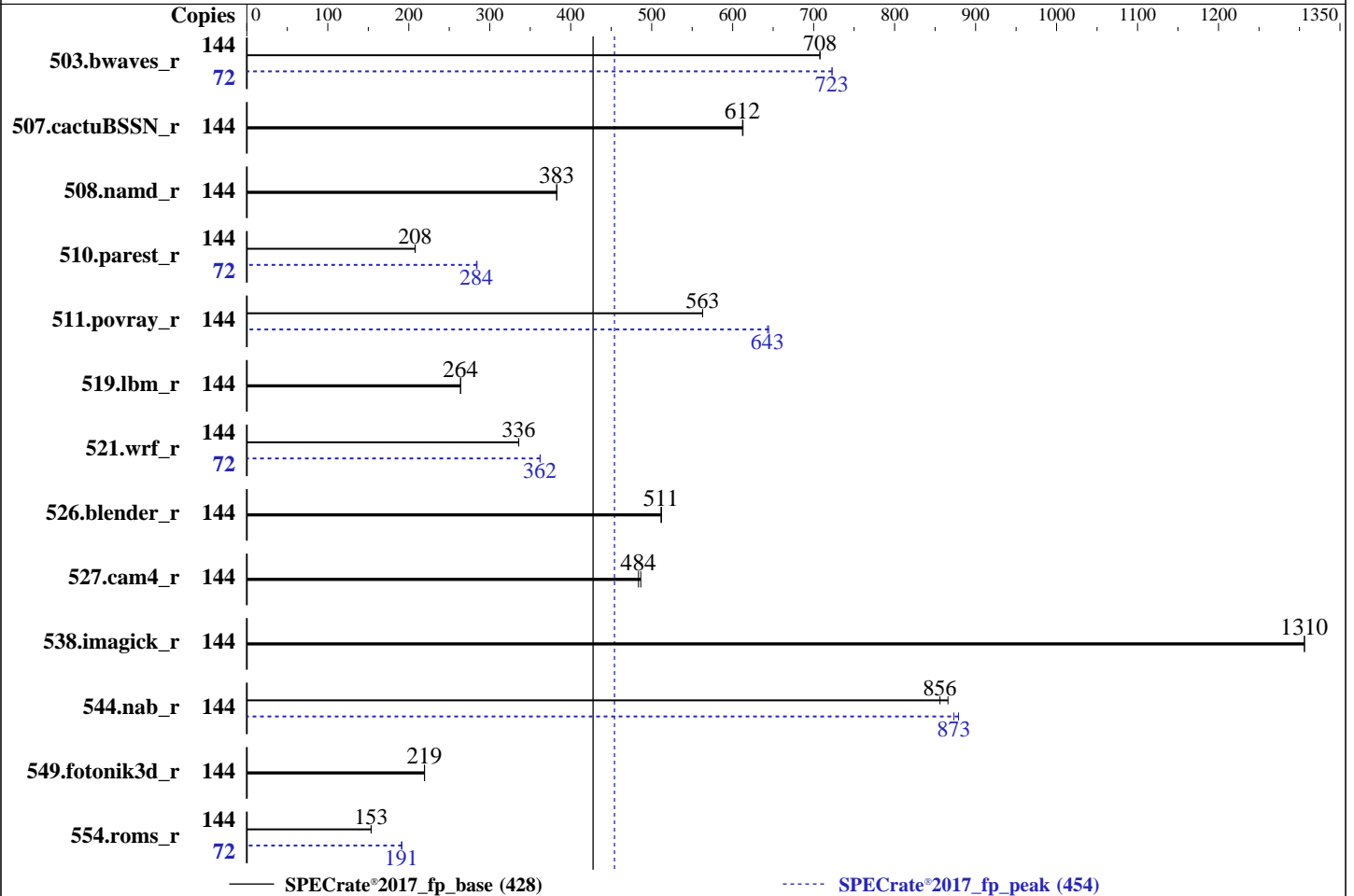
Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Apr-2021

Hardware Availability: May-2021

Software Availability: Feb-2021



### Hardware

CPU Name: Intel Xeon Platinum 8360Y  
 Max MHz: 3500  
 Nominal: 2400  
 Enabled: 72 cores, 2 chips, 2 threads/core  
 Orderable: 1,2 chips  
 Cache L1: 32 KB I + 48 KB D on chip per core  
 L2: 1.25 MB I+D on chip per core  
 L3: 54 MB I+D on chip per chip  
 Other: None  
 Memory: 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R)  
 Storage: 225 GB on tmpfs  
 Other: None

### Software

OS: Red Hat Enterprise Linux 8.3 (Ootpa)  
 4.18.0-240.15.1.el8\_3.x86\_64  
 Compiler: C/C++: Version 2021.1 of Intel oneAPI DPC++/C++  
 Compiler Build 20201113 for Linux;  
 Fortran: Version 2021.1 of Intel Fortran Compiler  
 Classic Build 20201112 for Linux;  
 C/C++: Version 2021.1 of Intel C/C++ Compiler  
 Classic Build 20201112 for Linux  
 Parallel: No  
 Firmware: Version 1.1.2 released Apr-2021  
 File System: tmpfs  
 System State: Run level 5 (graphical multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 Other: None  
 jemalloc memory allocator V5.0.1  
 (Continued on next page)



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### Software (Continued)

Power Management: BIOS and OS set to prefer performance at the cost of additional power usage.

## Results Table

Benchmark	Base						Peak							
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	144	<b>2040</b>	<b>708</b>	2040	708			72	<b>999</b>	<b>723</b>	999	723		
507.cactuBSSN_r	144	<b>298</b>	<b>612</b>	297	613			144	<b>298</b>	<b>612</b>	297	613		
508.namd_r	144	357	383	<b>357</b>	<b>383</b>			144	357	383	<b>357</b>	<b>383</b>		
510.parest_r	144	1811	208	<b>1813</b>	<b>208</b>			72	<b>664</b>	<b>284</b>	663	284		
511.povray_r	144	<b>597</b>	<b>563</b>	597	563			144	522	644	<b>523</b>	<b>643</b>		
519.lbm_r	144	<b>575</b>	<b>264</b>	575	264			144	<b>575</b>	<b>264</b>	575	264		
521.wrf_r	144	960	336	<b>961</b>	<b>336</b>			72	445	362	<b>445</b>	<b>362</b>		
526.blender_r	144	428	512	<b>429</b>	<b>511</b>			144	428	512	<b>429</b>	<b>511</b>		
527.cam4_r	144	<b>521</b>	<b>484</b>	518	486			144	<b>521</b>	<b>484</b>	518	486		
538.imagick_r	144	<b>274</b>	<b>1310</b>	274	1310			144	<b>274</b>	<b>1310</b>	274	1310		
544.nab_r	144	<b>283</b>	<b>856</b>	280	866			144	276	879	<b>278</b>	<b>873</b>		
549.fotonik3d_r	144	<b>2559</b>	<b>219</b>	2556	220			144	<b>2559</b>	<b>219</b>	2556	220		
554.roms_r	144	<b>1491</b>	<b>153</b>	1489	154			72	597	192	<b>599</b>	<b>191</b>		

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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"

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH =  
"/mnt/ramdisk/cpu2017-1.1.5-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.5-ic2021.1/je5.0.1-64"  
MALLOC\_CONF = "retain:true"



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## General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM  
 memory using Red Hat Enterprise Linux 8.1  
 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>`  
 jemalloc, a general purpose malloc implementation  
 built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5  
 sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>

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.

Benchmark run from a 225 GB ramdisk created with the cmd: "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"

## Platform Notes

BIOS Settings:

Sub NUMA Cluster : 2-Way Clustering  
 Virtualization Technology : Disabled

System Profile : Custom  
 CPU Power Management : Maximum Performance  
 C1E : Disabled

C States : Autonomous  
 Memory Patrol Scrub : Disabled

Energy Efficiency Policy : Performance  
 CPU Interconnect Bus Link  
 Power Management : Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.5-ic2021.1/bin/sysinfo  
 Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c  
 running on localhost.localdomain Fri Apr 23 10:03:45 2021

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>

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## Platform Notes (Continued)

From /proc/cpuinfo

model name : Intel(R) Xeon(R) Platinum 8360Y CPU @ 2.40GHz

2 "physical id"s (chips)

144 "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 : 36

siblings : 72

physical 0: cores 0 1 2 3 4 5 6 7 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25  
26 27 28 29 30 31 32 33 34 35

physical 1: cores 0 1 2 3 4 5 6 7 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25  
26 27 28 29 30 31 32 33 34 35

From lscpu:

Architecture: x86\_64

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

Byte Order: Little Endian

CPU(s): 144

On-line CPU(s) list: 0-143

Thread(s) per core: 2

Core(s) per socket: 36

Socket(s): 2

NUMA node(s): 4

Vendor ID: GenuineIntel

CPU family: 6

Model: 106

Model name: Intel(R) Xeon(R) Platinum 8360Y CPU @ 2.40GHz

Stepping: 6

CPU MHz: 3100.000

BogoMIPS: 4800.00

Virtualization: VT-x

L1d cache: 48K

L1i cache: 32K

L2 cache: 1280K

L3 cache: 55296K

NUMA node0 CPU(s):

0, 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80, 84, 88, 92, 96, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140

NUMA node1 CPU(s):

2, 6, 10, 14, 18, 22, 26, 30, 34, 38, 42, 46, 50, 54, 58, 62, 66, 70, 74, 78, 82, 86, 90, 94, 98, 102, 106, 110, 114, 118, 122, 126, 130, 134, 138, 142

NUMA node2 CPU(s):

1, 5, 9, 13, 17, 21, 25, 29, 33, 37, 41, 45, 49, 53, 57, 61, 65, 69, 73, 77, 81, 85, 89, 93, 97, 101, 105, 109, 113, 117, 121, 125, 129, 133, 137, 141

NUMA node3 CPU(s):

3, 7, 11, 15, 19, 23, 27, 31, 35, 39, 43, 47, 51, 55, 59, 63, 67, 71, 75, 79, 83, 87, 91, 95, 99, 103, 107, 111

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## Platform Notes (Continued)

,115,119,123,127,131,135,139,143

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 aperfperf 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 fl6c rdrand lahf\_lm abm 3dnowprefetch cpuid\_fault epb cat\_l3 invpcid\_single intel\_ppin ssbd mba ibrs ibpb stibp ibrs\_enhanced fsgsbase tsc\_adjust bmi1 hle avx2 smep bmi2 erms invpcid cqm rdt\_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel\_pt avx512cd sha\_ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm\_llc cqm\_occup\_llc cqm\_mbm\_total cqm\_mbm\_local split\_lock\_detect wbnoinvd dtherm ida arat pln pts avx512vbmi umip pku ospke avx512\_vbmi2 gfni vaes vpclmulqdq avx512\_vnni avx512\_bitalg tme avx512\_vpopcntdq la57 rdpid md\_clear pconfig flush\_l1d arch\_capabilities

/proc/cpuinfo cache data  
cache size : 55296 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

```
available: 4 nodes (0-3)
node 0 cpus: 0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96
100 104 108 112 116 120 124 128 132 136 140
node 0 size: 124548 MB
node 0 free: 127185 MB
node 1 cpus: 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62 66 70 74 78 82 86 90 94 98
102 106 110 114 118 122 126 130 134 138 142
node 1 size: 125730 MB
node 1 free: 127743 MB
node 2 cpus: 1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69 73 77 81 85 89 93 97
101 105 109 113 117 121 125 129 133 137 141
node 2 size: 125601 MB
node 2 free: 119728 MB
node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 63 67 71 75 79 83 87 91 95 99
103 107 111 115 119 123 127 131 135 139 143
node 3 size: 125519 MB
node 3 free: 122207 MB
node distances:
node  0  1  2  3
  0:  10  11  20  20
  1:  11  10  20  20
  2:  20  20  10  11
  3:  20  20  11  10
```

From /proc/meminfo  
MemTotal: 527788616 kB  
HugePages\_Total: 0

(Continued on next page)



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### Platform Notes (Continued)

Hugepagesize: 2048 kB

/sbin/tuned-adm active  
Current active profile: throughput-performance

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

```
os-release:
NAME="Red Hat Enterprise Linux"
VERSION="8.3 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="8.3"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
ANSI_COLOR="0;31"
```

```
redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga
```

```
uname -a:
Linux localhost.localdomain 4.18.0-240.15.1.el8_3.x86_64 #1 SMP Wed Feb 3 03:12:15 EST
2021 x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):	Not affected
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
CVE-2020-0543 (Special Register Buffer Data Sampling):	Not affected
CVE-2019-11135 (TSX Asynchronous Abort):	Not affected

run-level 5 Apr 23 04:39

```
SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5-ic2021.1
Filesystem      Type      Size  Used Avail Use% Mounted on
tmpfs           tmpfs    225G   6.9G  219G   4% /mnt/ramdisk
```

From /sys/devices/virtual/dmi/id

(Continued on next page)



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### Platform Notes (Continued)

Vendor: Dell Inc.  
Product: PowerEdge R650  
Product Family: PowerEdge  
Serial: 1234567

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:

7x 00AD00B300AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200  
9x 00AD063200AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200  
16x Not Specified Not Specified

BIOS:

BIOS Vendor: Dell Inc.  
BIOS Version: 1.1.2  
BIOS Date: 04/09/2021  
BIOS Revision: 1.1

(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) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
=====

=====  
C++ | 508.namd\_r(base, peak) 510.parest\_r(base, peak)  
=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
=====

=====  
C++, C | 511.povray\_r(peak)  
=====

Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on  
Intel(R) 64, Version 2021.1 Build 20201112\_000000  
=====

(Continued on next page)



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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112\_000000

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

=====  
C++, C | 511.povray\_r(base) 526.blender\_r(base, peak)  
=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113

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=====  
C++, C | 511.povray\_r(peak)  
=====

Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112\_000000

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Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112\_000000

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=====  
C++, C | 511.povray\_r(base) 526.blender\_r(base, peak)  
=====

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

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113

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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
 Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
 Intel(R) 64, Version 2021.1 Build 20201112\_000000  
 Copyright (C) 1985-2020 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 Classic for applications running on  
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-----  
 Fortran, C | 521.wrf\_r(peak)  
 -----

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
 Intel(R) 64, Version 2021.1 Build 20201112\_000000  
 Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
 Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)  
 64, Version 2021.1 Build 20201112\_000000  
 Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
 Intel(R) 64, Version 2021.1 Build 20201112\_000000  
 Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
 Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
 Version 2021.1 Build 20201113  
 Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

-----  
 Fortran, C | 521.wrf\_r(peak)  
 -----

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
 Intel(R) 64, Version 2021.1 Build 20201112\_000000  
 Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
 Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)  
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## Compiler Version Notes (Continued)

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

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
Intel(R) 64, Version 2021.1 Build 20201112\_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
=====

## Base Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifort

Benchmarks using both Fortran and C:

ifort icx

Benchmarks using both C and C++:

icpx icx

Benchmarks using Fortran, C, and C++:

icpx icx 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

(Continued on next page)



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## Base Portability Flags (Continued)

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:

```
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

### C++ benchmarks:

```
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

### Fortran benchmarks:

```
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

### Benchmarks using both Fortran and C:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

### Benchmarks using both C and C++:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

### Benchmarks using Fortran, C, and C++:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3
```

(Continued on next page)



# SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

**Dell Inc.**

PowerEdge R650 (Intel Xeon Platinum 8360Y, 2.40 GHz)

SPECrate®2017\_fp\_base = 428

SPECrate®2017\_fp\_peak = 454

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Apr-2021

Hardware Availability: May-2021

Software Availability: Feb-2021

## Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):

```
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

## Peak Compiler Invocation

C benchmarks:

```
icx
```

C++ benchmarks:

```
icpx
```

Fortran benchmarks:

```
ifort
```

Benchmarks using both Fortran and C:

```
521.wrf_r: ifort icc
```

```
527.cam4_r: ifort icx
```

Benchmarks using both C and C++:

```
511.povray_r: icpc icc
```

```
526.blender_r: icpx icx
```

Benchmarks using Fortran, C, and C++:

```
icpx icx ifort
```

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

(Continued on next page)



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## Peak Optimization Flags (Continued)

519.lbm\_r: basepeak = yes

538.imagick\_r: basepeak = yes

```
544.nab_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto
-Ofast -qopt-mem-layout-trans=4
-fimf-accuracy-bits=14:sqrt
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

C++ benchmarks:

508.namd\_r: basepeak = yes

```
510.parest_r: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

Fortran benchmarks:

```
503.bwaves_r: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

549.fotonik3d\_r: basepeak = yes

554.roms\_r: Same as 503.bwaves\_r

Benchmarks using both Fortran and C:

```
521.wrf_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
-ipo -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

527.cam4\_r: basepeak = yes

Benchmarks using both C and C++:

(Continued on next page)



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**Hardware Availability:** May-2021

**Software Availability:** Feb-2021

## Peak Optimization Flags (Continued)

```
511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
-ipo -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

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-ic2021-official-linux64\\_revA.html](http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.html)

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-ICX-rev1.0.2021-05-18.html>

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

[http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64\\_revA.xml](http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml)

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-ICX-rev1.0.2021-05-18.xml>

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