



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

## Dell Inc.

PowerEdge MX840c (Intel Xeon Platinum 8253, 2.20GHz)

SPECrate®2017\_int\_base = 337

SPECrate®2017\_int\_peak = 349

CPU2017 License: 55

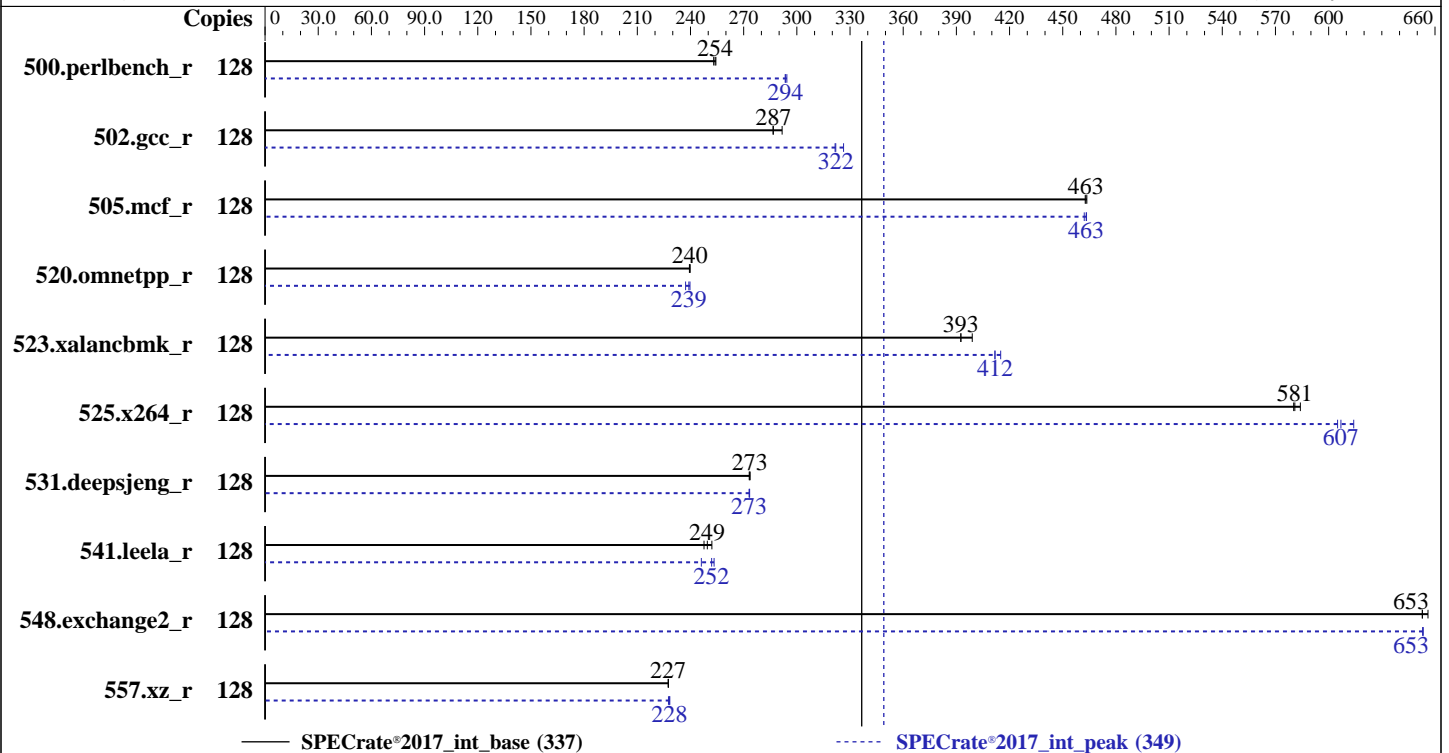
Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Jun-2019

Hardware Availability: Apr-2019

Software Availability: May-2019



### Hardware

CPU Name: Intel Xeon Platinum 8253  
 Max MHz: 3000  
 Nominal: 2200  
 Enabled: 64 cores, 4 chips, 2 threads/core  
 Orderable: 2,4 chips  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 22 MB I+D on chip per chip  
 Other: None  
 Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)  
 Storage: 1 x 480 GB SATA SSD  
 Other: None

### Software

OS: Ubuntu 18.04.2 LTS  
 kernel 4.15.0-45-generic  
 Compiler: C/C++: Version 19.0.4.227 of Intel C/C++ Compiler Build 20190416 for Linux;  
 Fortran: Version 19.0.4.227 of Intel Fortran Compiler Build 20190416 for Linux  
 Parallel: No  
 Firmware: Version 2.2.9 released May-2019  
 File System: ext4  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 32/64-bit  
 Other: jemalloc memory allocator V5.0.1  
 Power Management: --



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## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	128	805	253	801	254	<b>803</b>	<b>254</b>	128	694	293	692	294	<b>694</b>	<b>294</b>
502.gcc_r	128	633	287	<b>632</b>	<b>287</b>	621	292	128	564	322	555	326	<b>563</b>	<b>322</b>
505.mcf_r	128	446	464	<b>447</b>	<b>463</b>	447	463	128	446	463	<b>447</b>	<b>463</b>	448	462
520.omnetpp_r	128	<b>701</b>	<b>240</b>	700	240	702	239	128	708	237	701	240	<b>702</b>	<b>239</b>
523.xalancbmk_r	128	<b>344</b>	<b>393</b>	344	392	339	399	128	326	415	328	412	<b>328</b>	<b>412</b>
525.x264_r	128	<b>386</b>	<b>581</b>	384	584	386	580	128	370	605	<b>369</b>	<b>607</b>	365	614
531.deepsjeng_r	128	536	274	537	273	<b>536</b>	<b>273</b>	128	<b>537</b>	<b>273</b>	537	273	537	273
541.leela_r	128	841	252	856	248	<b>850</b>	<b>249</b>	128	837	253	861	246	<b>841</b>	<b>252</b>
548.exchange2_r	128	511	656	514	653	<b>514</b>	<b>653</b>	128	513	653	<b>513</b>	<b>653</b>	513	653
557.xz_r	128	<b>608</b>	<b>227</b>	608	228	608	227	128	606	228	607	228	<b>606</b>	<b>228</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.

## General Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/lib/ia32:/home/cpu2017/je5.0.1-32"

Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM  
memory using Redhat Enterprise Linux 7.5

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.

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>



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## Platform Notes

BIOS settings:

```

ADDDC setting disabled
Sub NUMA Cluster disabled
Virtualization Technology disabled
DCU Streamer Prefetcher disabled
System Profile set to Custom
CPU Performance set to Maximum Performance
C States set to Autonomous
ClE disabled
Uncore Frequency set to Dynamic
Energy Efficiency Policy set to Performance
Memory Patrol Scrub disabled
Logical Processor enabled
CPU Interconnect Bus Link Power Management disabled
PCI ASPM L1 Link Power Management disabled
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on intel-sut Wed Nov 6 16:33:54 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) Platinum 8253 CPU @ 2.20GHz
 4 "physical id"s (chips)
 128 "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 : 16
  siblings  : 32
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 2: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 3: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

```

From lscpu:

```

Architecture:      x86_64
CPU op-mode(s):   32-bit, 64-bit
Byte Order:       Little Endian
CPU(s):           128
On-line CPU(s) list: 0-127
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s):        4
NUMA node(s):    8
Vendor ID:       GenuineIntel

```

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## Platform Notes (Continued)

```

CPU family:           6
Model:                85
Model name:           Intel(R) Xeon(R) Platinum 8253 CPU @ 2.20GHz
Stepping:             6
CPU MHz:              1166.742
BogoMIPS:             4400.00
Virtualization:      VT-x
L1d cache:           32K
L1i cache:           32K
L2 cache:            1024K
L3 cache:            22528K
NUMA node0 CPU(s):   0,8,16,24,32,40,48,56,64,72,80,88,96,104,112,120
NUMA node1 CPU(s):   1,9,17,25,33,41,49,57,65,73,81,89,97,105,113,121
NUMA node2 CPU(s):   2,10,18,26,34,42,50,58,66,74,82,90,98,106,114,122
NUMA node3 CPU(s):   3,11,19,27,35,43,51,59,67,75,83,91,99,107,115,123
NUMA node4 CPU(s):   4,12,20,28,36,44,52,60,68,76,84,92,100,108,116,124
NUMA node5 CPU(s):   5,13,21,29,37,45,53,61,69,77,85,93,101,109,117,125
NUMA node6 CPU(s):   6,14,22,30,38,46,54,62,70,78,86,94,102,110,118,126
NUMA node7 CPU(s):   7,15,23,31,39,47,55,63,71,79,87,95,103,111,119,127
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 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 ida arat pln pts pku ospke avx512_vnni flush_lld arch_capabilities

```

```
/proc/cpuinfo cache data
cache size : 22528 KB
```

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

```

available: 8 nodes (0-7)
node 0 cpus: 0 8 16 24 32 40 48 56 64 72 80 88 96 104 112 120
node 0 size: 95147 MB
node 0 free: 94915 MB
node 1 cpus: 1 9 17 25 33 41 49 57 65 73 81 89 97 105 113 121
node 1 size: 96764 MB
node 1 free: 96590 MB
node 2 cpus: 2 10 18 26 34 42 50 58 66 74 82 90 98 106 114 122
node 2 size: 96743 MB
node 2 free: 96560 MB
node 3 cpus: 3 11 19 27 35 43 51 59 67 75 83 91 99 107 115 123

```

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## Platform Notes (Continued)

```

node 3 size: 96764 MB
node 3 free: 96597 MB
node 4 cpus: 4 12 20 28 36 44 52 60 68 76 84 92 100 108 116 124
node 4 size: 96764 MB
node 4 free: 96565 MB
node 5 cpus: 5 13 21 29 37 45 53 61 69 77 85 93 101 109 117 125
node 5 size: 96764 MB
node 5 free: 96498 MB
node 6 cpus: 6 14 22 30 38 46 54 62 70 78 86 94 102 110 118 126
node 6 size: 96764 MB
node 6 free: 96505 MB
node 7 cpus: 7 15 23 31 39 47 55 63 71 79 87 95 103 111 119 127
node 7 size: 96763 MB
node 7 free: 96576 MB
node distances:
node  0  1  2  3  4  5  6  7
  0:  10  21  21  21  11  21  21  21
  1:  21  10  21  21  21  11  21  21
  2:  21  21  10  21  21  21  11  21
  3:  21  21  21  10  21  21  21  11
  4:  11  21  21  21  10  21  21  21
  5:  21  11  21  21  21  10  21  21
  6:  21  21  11  21  21  21  10  21
  7:  21  21  21  11  21  21  21  10

```

```

From /proc/meminfo
MemTotal:      791018980 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

/usr/bin/lsb_release -d
Ubuntu 18.04.2 LTS

```

```

From /etc/*release* /etc/*version*
debian_version: buster/sid
os-release:
NAME="Ubuntu"
VERSION="18.04.2 LTS (Bionic Beaver)"
ID=ubuntu
ID_LIKE=debian
PRETTY_NAME="Ubuntu 18.04.2 LTS"
VERSION_ID="18.04"
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"

```

```

uname -a:
Linux intel-sut 4.15.0-45-generic #48-Ubuntu SMP Tue Jan 29 16:28:13 UTC 2019 x86_64

```

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## Platform Notes (Continued)

x86\_64 x86\_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown): Not affected  
CVE-2017-5753 (Spectre variant 1): Mitigation: \_\_user pointer sanitization  
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB

run-level 3 Nov 6 16:18

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda2	ext4	439G	31G	386G	8%	/

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 Dell Inc. 2.2.9 05/08/2019

Memory:

16x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933  
8x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933  
24x Not Specified Not Specified

(End of data from sysinfo program)

## Compiler Version Notes

=====  
C | 502.gcc\_r(peak)  
-----

Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version  
19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
-----

=====  
C | 500.perlbench\_r(base, peak) 502.gcc\_r(base) 505.mcf\_r(base, peak)  
525.x264\_r(base, peak) 557.xz\_r(base, peak)

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
-----  
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C | 502.gcc\_r(peak)

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C | 500.perlbench\_r(base, peak) 502.gcc\_r(base) 505.mcf\_r(base, peak)  
525.x264\_r(base, peak) 557.xz\_r(base, peak)

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
-----

=====  
C++ | 523.xalanbmk\_r(peak)

-----  
Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version  
19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
-----

=====  
C++ | 520.omnetpp\_r(base, peak) 523.xalanbmk\_r(base)  
531.deepsjeng\_r(base, peak) 541.leela\_r(base, peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
-----

=====  
C++ | 523.xalanbmk\_r(peak)

-----  
Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version  
19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
-----

=====  
C++ | 520.omnetpp\_r(base, peak) 523.xalanbmk\_r(base)  
531.deepsjeng\_r(base, peak) 541.leela\_r(base, peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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## Compiler Version Notes (Continued)

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-----  
Fortran | 548.exchange2\_r(base, peak)  
-----

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416

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

## Base Compiler Invocation

C benchmarks:

icc -m64 -std=c11

C++ benchmarks:

icpc -m64

Fortran benchmarks:

ifort -m64

## Base Portability Flags

500.perlbench\_r: -DSPEC\_LP64 -DSPEC\_LINUX\_X64  
502.gcc\_r: -DSPEC\_LP64  
505.mcf\_r: -DSPEC\_LP64  
520.omnetpp\_r: -DSPEC\_LP64  
523.xalancbmk\_r: -DSPEC\_LP64 -DSPEC\_LINUX  
525.x264\_r: -DSPEC\_LP64  
531.deepsjeng\_r: -DSPEC\_LP64  
541.leela\_r: -DSPEC\_LP64  
548.exchange2\_r: -DSPEC\_LP64  
557.xz\_r: -DSPEC\_LP64

## Base Optimization Flags

C benchmarks:

-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4  
-L/usr/local/IntelCompiler19/compilers\_and\_libraries\_2019.4.227/linux/compiler/lib/intel64

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## Base Optimization Flags (Continued)

C benchmarks (continued):

-lqkmalloc

C++ benchmarks:

-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div

-qopt-mem-layout-trans=4

-L/usr/local/IntelCompiler19/compilers\_and\_libraries\_2019.4.227/linux/compiler/lib/intel64

-lqkmalloc

Fortran benchmarks:

-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div

-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte

-L/usr/local/IntelCompiler19/compilers\_and\_libraries\_2019.4.227/linux/compiler/lib/intel64

-lqkmalloc

## Peak Compiler Invocation

C benchmarks (except as noted below):

icc -m64 -std=c11

502.gcc\_r: icc -m32 -std=c11 -L/usr/local/IntelCompiler19/compilers\_and\_libraries\_2019.4.227/linux/compiler/lib/ia32\_lin

C++ benchmarks (except as noted below):

icpc -m64

523.xalancbmk\_r: icpc -m32 -L/usr/local/IntelCompiler19/compilers\_and\_libraries\_2019.4.227/linux/compiler/lib/ia32\_lin

Fortran benchmarks:

ifort -m64

## Peak Portability Flags

500.perlbench\_r: -DSPEC\_LP64 -DSPEC\_LINUX\_X64

502.gcc\_r: -D\_FILE\_OFFSET\_BITS=64

505.mcf\_r: -DSPEC\_LP64

520.omnetpp\_r: -DSPEC\_LP64

523.xalancbmk\_r: -D\_FILE\_OFFSET\_BITS=64 -DSPEC\_LINUX

525.x264\_r: -DSPEC\_LP64

531.deepsjeng\_r: -DSPEC\_LP64

541.leela\_r: -DSPEC\_LP64

548.exchange2\_r: -DSPEC\_LP64

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## Peak Portability Flags (Continued)

557.xz\_r: -DSPEC\_LP64

## Peak Optimization Flags

C benchmarks:

```
500.perlbench_r: -w1,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=4
-fno-strict-overflow
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc
```

```
502.gcc_r: -w1,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=4
-L/usr/local/je5.0.1-32/lib -ljemalloc
```

```
505.mcf_r: -w1,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc
```

```
525.x264_r: -w1,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc
```

557.xz\_r: Same as 505.mcf\_r

C++ benchmarks:

```
520.omnetpp_r: -w1,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc
```

```
523.xalancbmk_r: -w1,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=4
-L/usr/local/je5.0.1-32/lib -ljemalloc
```

531.deepsjeng\_r: Same as 520.omnetpp\_r

541.leela\_r: Same as 520.omnetpp\_r

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PowerEdge MX840c (Intel Xeon Platinum 8253,  
2.20GHz)

SPECrate®2017\_int\_base = 337

SPECrate®2017\_int\_peak = 349

**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Tested by:** Dell Inc.

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**Hardware Availability:** Apr-2019

**Software Availability:** May-2019

## Peak Optimization Flags (Continued)

Fortran benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64  
-lqkmalloc
```

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

<http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-09.html>

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-revE6.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-09.xml>

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-revE6.xml>

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