



# SPEC® CPU2017 Integer Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

## NEC Corporation

Express5800/A2040e  
(2.10 GHz, Intel Xeon Platinum 8176M)

**SPECrate2017\_int\_base = 479**

**SPECrate2017\_int\_peak = 514**

CPU2017 License: 9006

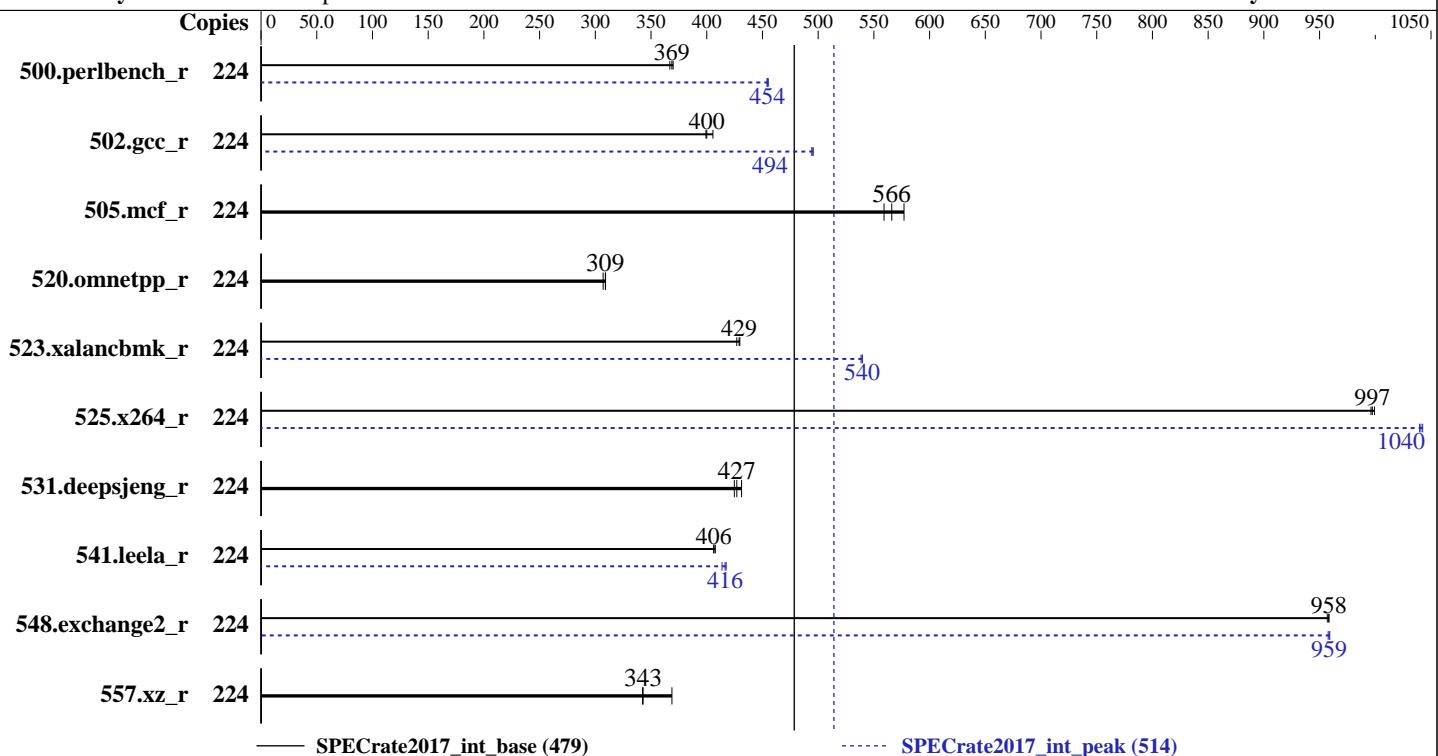
Test Date: Jun-2018

Test Sponsor: NEC Corporation

Hardware Availability: Jun-2018

Tested by: NEC Corporation

Software Availability: Mar-2018



### Hardware

CPU Name: Intel Xeon Platinum 8176M  
Max MHz.: 3800  
Nominal: 2100  
Enabled: 112 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: 38.5 MB I+D on chip per chip  
Other: None  
Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R)  
Storage: 800 GB tmpfs  
Other: None

### Software

OS: SUSE Linux Enterprise Server 12 SP3 (x86\_64)  
Compiler: kernel 4.4.120-94.17-default  
Compiler: C/C++: Version 18.0.0.128 of Intel C/C++  
Compiler for Linux;  
Compiler: Fortran: Version 18.0.0.128 of Intel Fortran  
Compiler for Linux  
Parallel: No  
Firmware: Version 5.7.0115 04/17/2018 released Jun-2018  
File System: tmpfs  
System State: Run level 3 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: 32/64-bit  
Other: jemalloc memory allocator library V5.0.1



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## Results Table

Benchmark	Base								Peak							
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	224	<b>967</b>	<b>369</b>	964	370	972	367	224	783	455	<b>785</b>	<b>454</b>	785	454	785	454
502.gcc_r	224	<b>793</b>	<b>400</b>	794	399	782	406	224	642	494	640	496	<b>642</b>	<b>494</b>	642	494
505.mcf_r	224	627	577	<b>639</b>	<b>566</b>	647	559	224	627	577	<b>639</b>	<b>566</b>	647	559	647	559
520.omnetpp_r	224	<b>951</b>	<b>309</b>	957	307	951	309	224	<b>951</b>	<b>309</b>	957	307	951	309	951	309
523.xalancbmk_r	224	554	427	<b>551</b>	<b>429</b>	550	430	224	439	538	438	540	<b>438</b>	<b>540</b>	438	540
525.x264_r	224	<b>393</b>	<b>997</b>	394	996	393	999	224	<b>377</b>	<b>1040</b>	376	1040	377	1040	377	1040
531.deepsjeng_r	224	595	431	<b>601</b>	<b>427</b>	604	425	224	595	431	<b>601</b>	<b>427</b>	604	425	604	425
541.leela_r	224	<b>913</b>	<b>406</b>	910	408	913	406	224	897	414	<b>891</b>	<b>416</b>	889	417	889	417
548.exchange2_r	224	613	957	<b>612</b>	<b>958</b>	612	958	224	<b>612</b>	<b>959</b>	613	958	612	959	612	959
557.xz_r	224	656	369	<b>705</b>	<b>343</b>	707	342	224	656	369	<b>705</b>	<b>343</b>	707	342	707	342

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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"

Tmpfs filesystem can be set with:

```
mount -t tmpfs -o size=800g tmpfs /home
```

## General Notes

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

```
LD_LIBRARY_PATH = "/home/SPEC/lib/ia32:/home/SPEC/lib/intel64:/home/SPEC/je5.0.1-32:/home/SPEC/je5.0.1-64"
```

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM

memory using Redhat Enterprise Linux 7.4

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: configured and built at default for 32bit (i686) and 64bit (x86\_64) targets;  
jemalloc: built with the RedHat Enterprise 7.4, and the system compiler gcc 4.8.5;

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## General Notes (Continued)

jemalloc: sources available from [jemalloc.net](http://jemalloc.net) or <https://github.com/jemalloc/jemalloc/releases>

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.

## Platform Notes

BIOS Settings:

Memory RAS Mode: SDDC mode

VT-x : Disabled

Processor C6 Report : Disabled

OS Performance Tuning : Disabled

Energy Performance : Performance

Patrol Scrub : Disabled

DCU Streamer Prefetcher : Disabled

Memory P.E. Retry : Disabled

Sub NUMA Clustering : Enabled

Dead Line LLC Allocation : Disabled

Sysinfo program /home/SPEC/bin/sysinfo

Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f

running on linux-37c1 Tue Jun 19 03:41:05 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) Platinum 8176M CPU @ 2.10GHz

4 "physical id"s (chips)

224 "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 : 28

siblings : 56

physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27  
28 29 30

physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27  
28 29 30

physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27  
28 29 30

physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27  
28 29 30

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## Platform Notes (Continued)

From lscpu:

```
Architecture:           x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                224
On-line CPU(s) list:  0-223
Thread(s) per core:   2
Core(s) per socket:   28
Socket(s):             4
NUMA node(s):          8
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 85
Model name:            Intel(R) Xeon(R) Platinum 8176M CPU @ 2.10GHz
Stepping:               4
CPU MHz:               2101.000
CPU max MHz:           2101.0000
CPU min MHz:           1000.0000
BogoMIPS:              4189.98
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              39424K
NUMA node0 CPU(s):    0-3,7-9,14-17,21-23,112-115,119-121,126-129,133-135
NUMA node1 CPU(s):    4-6,10-13,18-20,24-27,116-118,122-125,130-132,136-139
NUMA node2 CPU(s):    28-31,35-37,42-45,49-51,140-143,147-149,154-157,161-163
NUMA node3 CPU(s):    32-34,38-41,46-48,52-55,144-146,150-153,158-160,164-167
NUMA node4 CPU(s):    56-59,63-65,70-73,77-79,168-171,175-177,182-185,189-191
NUMA node5 CPU(s):    60-62,66-69,74-76,80-83,172-174,178-181,186-188,192-195
NUMA node6 CPU(s):    84-87,91-93,98-101,105-107,196-199,203-205,210-213,217-219
NUMA node7 CPU(s):    88-90,94-97,102-104,108-111,200-202,206-209,214-216,220-223
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
                      aperfmpfperf 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 ida arat epb invpcid_single pln pts
                      dtherm intel_pt rsb_ctxsw spec_ctrl stibp retpoline kaiser tpr_shadow vnmi
                      flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
                      cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl
                      xsaveopt xsavec xgetbv1 cq_m_llc cq_m_occu_llc pku ospke
```

/proc/cpuinfo cache data  
cache size : 39424 KB

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## Platform Notes (Continued)

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 1 2 3 7 8 9 14 15 16 17 21 22 23 112 113 114 115 119 120 121 126 127 128
129 133 134 135
node 0 size: 192002 MB
node 0 free: 191410 MB
node 1 cpus: 4 5 6 10 11 12 13 18 19 20 24 25 26 27 116 117 118 122 123 124 125 130 131
132 136 137 138 139
node 1 size: 193532 MB
node 1 free: 187145 MB
node 2 cpus: 28 29 30 31 35 36 37 42 43 44 45 49 50 51 140 141 142 143 147 148 149 154
155 156 157 161 162 163
node 2 size: 193532 MB
node 2 free: 193040 MB
node 3 cpus: 32 33 34 38 39 40 41 46 47 48 52 53 54 55 144 145 146 150 151 152 153 158
159 160 164 165 166 167
node 3 size: 193532 MB
node 3 free: 192261 MB
node 4 cpus: 56 57 58 59 63 64 65 70 71 72 73 77 78 79 168 169 170 171 175 176 177 182
183 184 185 189 190 191
node 4 size: 193532 MB
node 4 free: 192852 MB
node 5 cpus: 60 61 62 66 67 68 69 74 75 76 80 81 82 83 172 173 174 178 179 180 181 186
187 188 192 193 194 195
node 5 size: 193532 MB
node 5 free: 193217 MB
node 6 cpus: 84 85 86 87 91 92 93 98 99 100 101 105 106 107 196 197 198 199 203 204 205
210 211 212 213 217 218 219
node 6 size: 193532 MB
node 6 free: 192844 MB
node 7 cpus: 88 89 90 94 95 96 97 102 103 104 108 109 110 111 200 201 202 206 207 208
209 214 215 216 220 221 222 223
node 7 size: 193385 MB
node 7 free: 193106 MB
node distances:
node 0 1 2 3 4 5 6 7
0: 10 11 15 15 15 15 15 15
1: 11 10 15 15 15 15 15 15
2: 15 15 10 11 15 15 15 15
3: 15 15 11 10 15 15 15 15
4: 15 15 15 10 11 15 15 15
5: 15 15 15 11 10 15 15 15
6: 15 15 15 15 15 10 11 15
7: 15 15 15 15 15 15 11 10
```

From /proc/meminfo

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## Platform Notes (Continued)

```
MemTotal: 1583698972 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
```

```
/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP3
```

```
From /etc/*release* /etc/*version*
SuSE-release:
  SUSE Linux Enterprise Server 12 (x86_64)
  VERSION = 12
  PATCHLEVEL = 3
  # This file is deprecated and will be removed in a future service pack or release.
  # Please check /etc/os-release for details about this release.
os-release:
  NAME="SLES"
  VERSION="12-SP3"
  VERSION_ID="12.3"
  PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
  ID="sles"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:12:sp3"
```

```
uname -a:
Linux linux-37c1 4.4.120-94.17-default #1 SMP Wed Mar 14 17:23:00 UTC 2018 (cf3a7bb)
x86_64 x86_64 x86_64 GNU/Linux
```

```
run-level 3 Jun 19 03:29
```

```
SPEC is set to: /home/SPEC
Filesystem      Type   Size  Used Avail Use% Mounted on
tmpfs          tmpfs  800G  9.1G  791G   2% /home
```

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 American Megatrends Inc. 5.7.0115 04/17/2018

Memory:

48x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666

(End of data from sysinfo program)



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## Compiler Version Notes

```
=====
CC 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
    525.x264_r(base, peak) 557.xz_r(base, peak)
=====
```

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

```
=====
CC 500.perlbench_r(peak) 502.gcc_r(peak)
=====
```

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

```
=====
CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
    541.leela_r(base)
=====
```

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

```
=====
CXXC 520.omnetpp_r(peak) 523.xalancbmk_r(peak) 531.deepsjeng_r(peak)
    541.leela_r(peak)
=====
```

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

```
=====
FC 548.exchange2_r(base, peak)
=====
```

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

## Base Compiler Invocation

C benchmarks:

icc

C++ benchmarks:

icpc

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## Base Compiler Invocation (Continued)

Fortran benchmarks:

ifort

## 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  
-fopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:

-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-fopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc

Fortran benchmarks:

-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-fopt-mem-layout-trans=3 -fno-standard-realloc-lhs -falign array32byte  
-L/usr/local/je5.0.1-64/lib -ljemalloc

## Base Other Flags

C benchmarks:

-m64 -std=c11

C++ benchmarks:

-m64

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## Base Other Flags (Continued)

Fortran benchmarks:

-m64

## Peak Compiler Invocation

C benchmarks:

icc

C++ benchmarks:

icpc

Fortran benchmarks:

ifort

## 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  
557.xz\_r: -DSPEC\_LP64

## Peak Optimization Flags

C benchmarks:

500.perlbench\_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3  
-fno-strict-overflow -L/usr/local/je5.0.1-64/lib  
-ljemalloc

502.gcc\_r: -L/opt/intel/compilers\_and\_libraries\_2018/linux/lib/ia32  
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3  
-L/usr/local/je5.0.1-32/lib -ljemalloc

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## Peak Optimization Flags (Continued)

505.mcf\_r: basepeak = yes

```
525.x264_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -fno-alias
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

557.xz\_r: basepeak = yes

C++ benchmarks:

520.omnetpp\_r: basepeak = yes

```
523.xalancbmk_r: -L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-L/usr/local/je5.0.1-32/lib -ljemalloc
```

531.deepsjeng\_r: basepeak = yes

```
541.leela_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

Fortran benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

## Peak Other Flags

C benchmarks (except as noted below):

-m64 -std=c11

502.gcc\_r: -m32 -std=c11

C++ benchmarks (except as noted below):

-m64

523.xalancbmk\_r: -m32

Fortran benchmarks:

-m64



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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/NEC-Platform-Settings-SPECCpu2017-Flags-V1.2-SKL-A2040e-RevA.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/NEC-Platform-Settings-SPECCpu2017-Flags-V1.2-SKL-A2040e-RevA.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).

Tested with SPEC CPU2017 v1.0.2 on 2018-06-18 14:41:04-0400.

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