



SPEC® CPU2017 Integer Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate2017_int_base = 601

PowerEdge R940 (Intel Xeon Platinum 8268, 2.90GHz)

SPECrate2017_int_peak = 627

CPU2017 License: 55

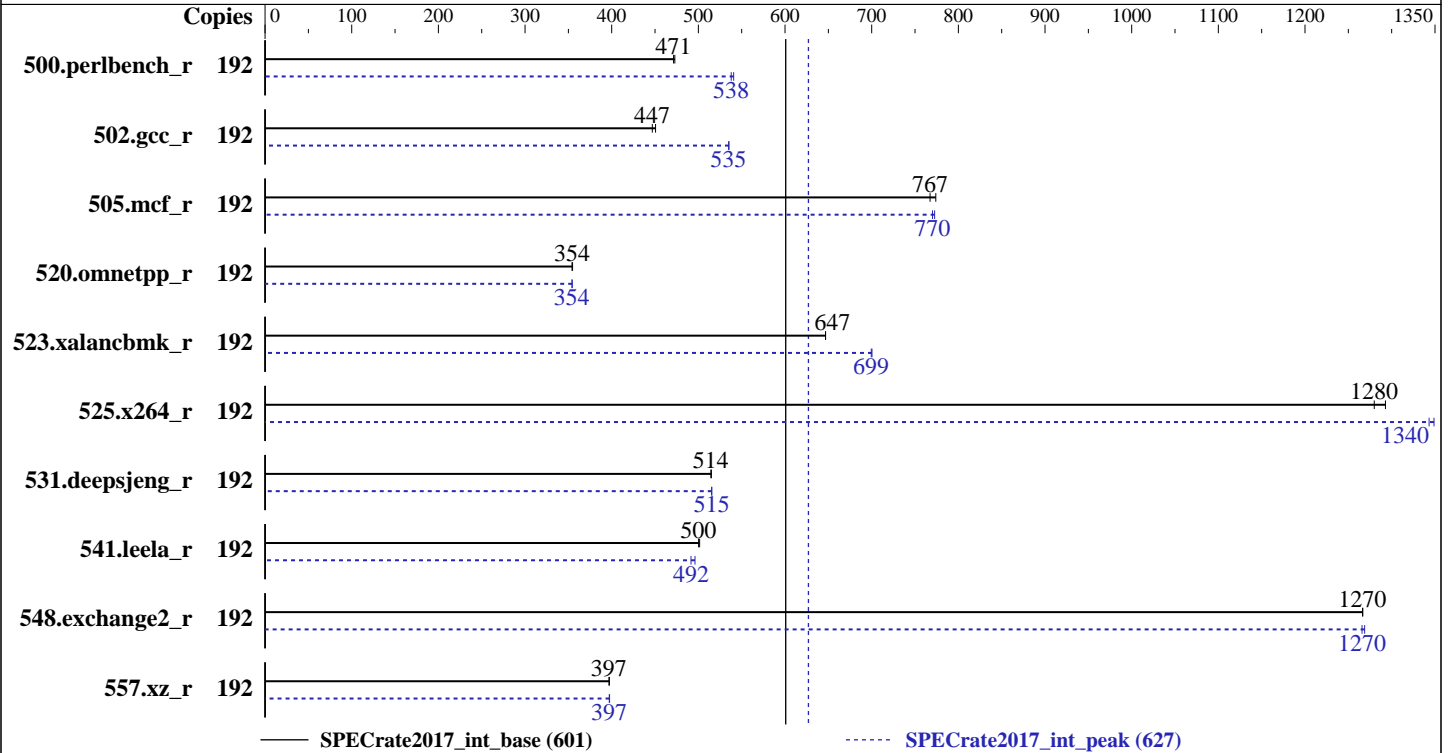
Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Jul-2019

Hardware Availability: Apr-2019

Software Availability: May-2019



Hardware

CPU Name: Intel Xeon Platinum 8268
 Max MHz.: 3900
 Nominal: 2900
 Enabled: 96 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: 35.75 MB I+D on chip per chip
 Other: None
 Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)
 Storage: 1 x 960 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 2.1.8 released Apr-2019
 File System: ext4
 System State: Run level 5 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: 32/64-bit
 Other: jemalloc memory allocator 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
500.perlbench_r	192	648	471	646	473			192	568	538	565	541		
502.gcc_r	192	608	447	603	451			192	508	535	508	535		
505.mcf_r	192	404	767	401	774			192	403	770	402	773		
520.omnetpp_r	192	711	354	710	355			192	711	354	711	354		
523.xalancbmk_r	192	314	647	313	647			192	290	699	290	700		
525.x264_r	192	260	1290	263	1280			192	250	1340	249	1350		
531.deepsjeng_r	192	428	514	427	515			192	427	515	427	515		
541.leela_r	192	634	501	636	500			192	647	492	641	496		
548.exchange2_r	192	397	1270	397	1270			192	396	1270	397	1270		
557.xz_r	192	522	397	523	397			192	522	398	522	397		

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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 i9-7900X 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 Jul 3 11:47:47 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 8268 CPU @ 2.90GHz
 4 "physical id"s (chips)
 192 "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 : 24
siblings : 48
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 25 26 27 29
physical 2: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 24 26 27 28 29

```

From lscpu:

```

Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 192
On-line CPU(s) list: 0-191
Thread(s) per core: 2
Core(s) per socket: 24
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 8268 CPU @ 2.90GHz
Stepping:             6
CPU MHz:              1694.536
BogoMIPS:             5800.00
Virtualization:      VT-x
L1d cache:           32K
L1i cache:           32K
L2 cache:            1024K
L3 cache:            36608K
NUMA node0 CPU(s):   0, 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, 120, 128, 136, 144, 152, 160, 168, 176, 184
NUMA node1 CPU(s):   1, 9, 17, 25, 33, 41, 49, 57, 65, 73, 81, 89, 97, 105, 113, 121, 129, 137, 145, 153, 161, 169, 177, 185
NUMA node2 CPU(s):   2, 10, 18, 26, 34, 42, 50, 58, 66, 74, 82, 90, 98, 106, 114, 122, 130, 138, 146, 154, 162, 170, 178, 186
NUMA node3 CPU(s):   3, 11, 19, 27, 35, 43, 51, 59, 67, 75, 83, 91, 99, 107, 115, 123, 131, 139, 147, 155, 163, 171, 179, 187
NUMA node4 CPU(s):   4, 12, 20, 28, 36, 44, 52, 60, 68, 76, 84, 92, 100, 108, 116, 124, 132, 140, 148, 156, 164, 172, 180, 188
NUMA node5 CPU(s):   5, 13, 21, 29, 37, 45, 53, 61, 69, 77, 85, 93, 101, 109, 117, 125, 133, 141, 149, 157, 165, 173, 181, 189
NUMA node6 CPU(s):   6, 14, 22, 30, 38, 46, 54, 62, 70, 78, 86, 94, 102, 110, 118, 126, 134, 142, 150, 158, 166, 174, 182, 190
NUMA node7 CPU(s):   7, 15, 23, 31, 39, 47, 55, 63, 71, 79, 87, 95, 103, 111, 119, 127, 135, 143, 151, 159, 167, 175, 183, 191
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 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 : 36608 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 96 104 112 120 128 136 144 152 160 168
176 184
```

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Platform Notes (Continued)

```

node 0 size: 95167 MB
node 0 free: 94869 MB
node 1 cpus: 1 9 17 25 33 41 49 57 65 73 81 89 97 105 113 121 129 137 145 153 161 169
177 185
node 1 size: 96763 MB
node 1 free: 96527 MB
node 2 cpus: 2 10 18 26 34 42 50 58 66 74 82 90 98 106 114 122 130 138 146 154 162 170
178 186
node 2 size: 96763 MB
node 2 free: 96531 MB
node 3 cpus: 3 11 19 27 35 43 51 59 67 75 83 91 99 107 115 123 131 139 147 155 163 171
179 187
node 3 size: 96763 MB
node 3 free: 94657 MB
node 4 cpus: 4 12 20 28 36 44 52 60 68 76 84 92 100 108 116 124 132 140 148 156 164 172
180 188
node 4 size: 96742 MB
node 4 free: 96485 MB
node 5 cpus: 5 13 21 29 37 45 53 61 69 77 85 93 101 109 117 125 133 141 149 157 165 173
181 189
node 5 size: 96763 MB
node 5 free: 96534 MB
node 6 cpus: 6 14 22 30 38 46 54 62 70 78 86 94 102 110 118 126 134 142 150 158 166 174
182 190
node 6 size: 96763 MB
node 6 free: 94661 MB
node 7 cpus: 7 15 23 31 39 47 55 63 71 79 87 95 103 111 119 127 135 143 151 159 167 175
183 191
node 7 size: 96761 MB
node 7 free: 96486 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:      791028572 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

/usr/bin/lsb_release -d

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Platform Notes (Continued)

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 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 5 Jul 3 11:45

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda2	ext4	439G	115G	302G	28%	/

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. 2.1.8 04/30/2019

Memory:

12x 002C069D002C 36ASF4G72PZ-2G9E2 32 GB 2 rank 2933

12x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933

24x Not Specified Not Specified

(End of data from sysinfo program)

Compiler Version Notes

=====
CC 502.gcc_r(peak)

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Compiler Version Notes (Continued)

Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version
19.0.4.227 Build 20190416

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=====
CC 500.perlbench_r(base) 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.

=====
CC 500.perlbench_r(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.

=====
CXXC 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.

=====
CXXC 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,
Version 19.0.4.227 Build 20190416

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

=====
FC 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

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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
-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
```




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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
```

```
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
```

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Peak Optimization Flags (Continued)

505.mcf_r (continued):

```
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmallo
```

525.x264_r: -Wl,-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
-lqkmallo
```

557.xz_r: Same as 505.mcf_r

C++ benchmarks:

520.omnetpp_r: -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
-lqkmallo
```

523.xalancbmk_r: -Wl,-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 -ljemallo
```

531.deepsjeng_r: Same as 520.omnetpp_r

541.leela_r: Same as 520.omnetpp_r

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
-lqkmallo
```

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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-02.html>

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge14G-revE3.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-02.xml>

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge14G-revE3.xml>



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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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