



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

**Nokia**

OE19 (Intel Xeon Gold 6210U, 2.50GHz)

**SPECrate®2017\_int\_base = 118**

**SPECrate®2017\_int\_peak = 123**

CPU2017 License: 6037

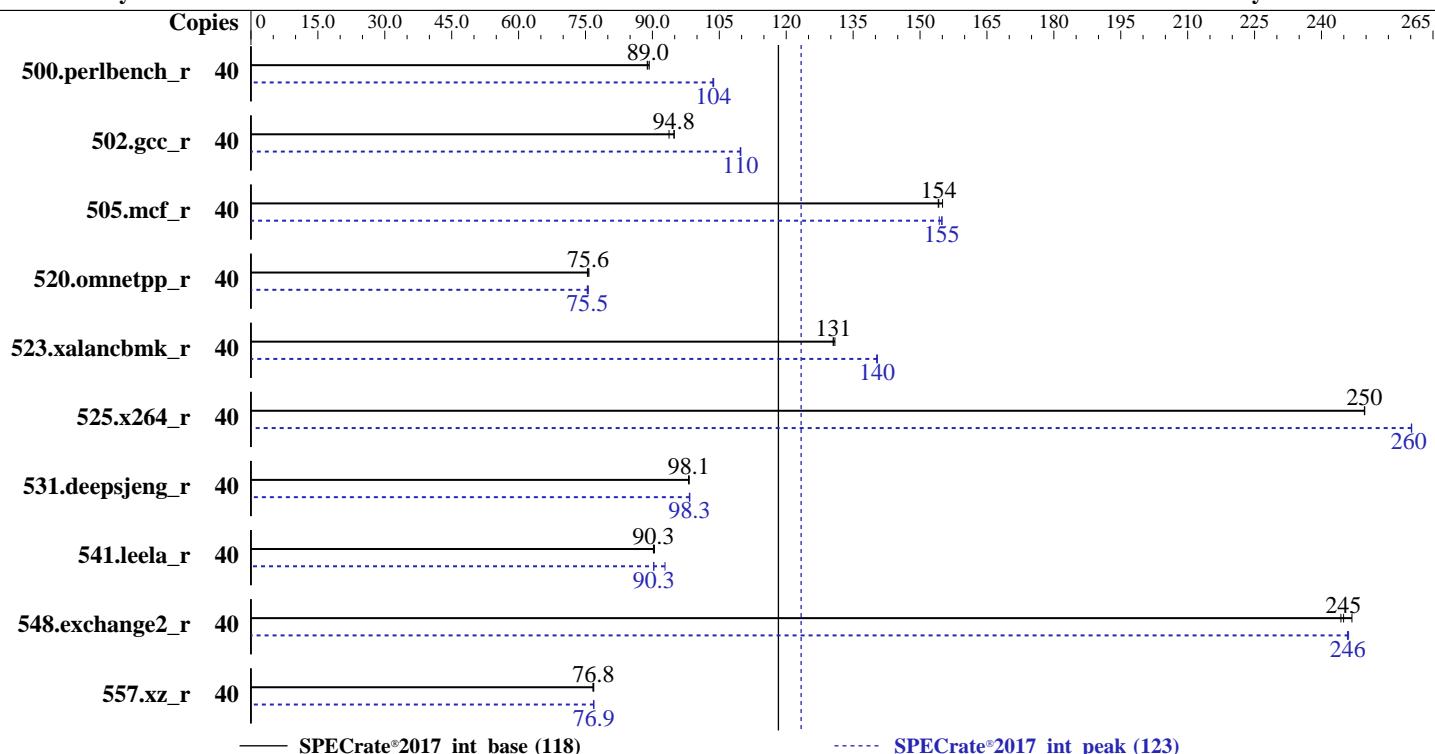
Test Date: Dec-2019

Test Sponsor: Nokia

Hardware Availability: Apr-2019

Tested by: Nokia

Software Availability: Dec-2019



Hardware		Software	
CPU Name:	Intel Xeon Gold 6210U	OS:	SUSE Linux Enterprise Server 12 SP4
Max MHz:	3900	Compiler:	4.12.14-94.41-default
Nominal:	2500	Parallel:	C/C++: Version 19.1.0.166 of Intel C/C++ Compiler for Linux;
Enabled:	20 cores, 1 chip, 2 threads/core	Firmware:	Fortran: Version 19.1.0.166 of Intel Fortran Compiler for Linux
Orderable:	1 chip	File System:	No
Cache L1:	32 KB I + 32 KB D on chip per core	System State:	Version 3B17 released Dec-2019
L2:	1 MB I+D on chip per core	Base Pointers:	xfs
L3:	27.5 MB I+D on chip per chip	Peak Pointers:	Run level 5 (multi-user with network and display manager)
Other:	None	Other:	64-bit
Memory:	192 GB (6 x 32 GB 2Rx4 PC4-2933Y-R)	Power Management:	32/64-bit
Storage:	1 x 480 GB SATA SSD		jemalloc memory allocator V5.2.1
Other:	None		BIOS set to prefer performance at the cost of additional power usage



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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	40	717	88.8	<b>716</b>	<b>89.0</b>	713	89.3	40	<b>614</b>	<b>104</b>	614	104	615	104
502.gcc_r	40	597	94.9	<b>597</b>	<b>94.8</b>	604	93.7	40	<b>516</b>	<b>110</b>	516	110	516	110
505.mcf_r	40	<b>419</b>	<b>154</b>	417	155	420	154	40	419	154	417	155	<b>417</b>	<b>155</b>
520.omnetpp_r	40	<b>694</b>	<b>75.6</b>	696	75.4	693	75.8	40	694	75.6	696	75.4	<b>695</b>	<b>75.5</b>
523.xalancbmk_r	40	324	131	<b>323</b>	<b>131</b>	323	131	40	301	140	<b>301</b>	<b>140</b>	301	140
525.x264_r	40	<b>281</b>	<b>250</b>	280	250	281	250	40	269	260	269	260	<b>269</b>	<b>260</b>
531.deepsjeng_r	40	467	98.3	<b>467</b>	<b>98.1</b>	467	98.1	40	<b>466</b>	<b>98.3</b>	466	98.3	466	98.4
541.leela_r	40	<b>734</b>	<b>90.3</b>	734	90.2	732	90.5	40	<b>733</b>	<b>90.3</b>	734	90.3	714	92.8
548.exchange2_r	40	429	244	425	247	<b>428</b>	<b>245</b>	40	426	246	<b>426</b>	<b>246</b>	426	246
557.xz_r	40	562	76.8	564	76.7	<b>562</b>	<b>76.8</b>	40	563	76.8	<b>562</b>	<b>76.9</b>	562	76.9

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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Compiler Notes

SPEC has learned that this result, which used an evaluation compiler, was submitted contrary to the compiler license terms.

Intel has granted a one-time waiver for this result.

## 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 =

```
" /home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.2.1-
32:/home/cpu2017/je5.2.1-64"
```



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## General Notes

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

```
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.2.1-32:/home/cpu2017/je5.2.1-64"  
OMP_STACKSIZE = "192M"
```

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  
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>

## 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

C1E disabled

Uncore Frequency set to Dynamic

Energy Efficiency Policy set to Performance

Memory Patrol Scrub disabled

Logical Processor enabled

Sysinfo program /home/cpu2017/bin/sysinfo

Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011

running on linux-2yq5 Mon Dec 23 15:36:38 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) Gold 6210U CPU @ 2.50GHz  
1 "physical id"s (chips)
```

(Continued on next page)



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## Platform Notes (Continued)

```
40 "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 : 20
siblings : 40
physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
```

From lscpu:

```
Architecture:           x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                40
On-line CPU(s) list:  0-39
Thread(s) per core:   2
Core(s) per socket:   20
Socket(s):             1
NUMA node(s):          1
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 85
Model name:            Intel(R) Xeon(R) Gold 6210U CPU @ 2.50GHz
Stepping:               6
CPU MHz:               2500.000
CPU max MHz:          3900.0000
CPU min MHz:          1000.0000
BogoMIPS:              5000.00
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              28160K
NUMA node0 CPU(s):    0-39
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
aperfmperf 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 cpuid_fault epb cat_l3 cdp_l3
invpcid_single intel_ppin ssbd mba ibrs ibpb stibp 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_l1d arch_capabilities
```

/proc/cpuinfo cache data  
cache size : 28160 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: 1 nodes (0)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 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 36 37 38 39
node 0 size: 192481 MB
node 0 free: 191052 MB
node distances:
node 0
 0: 10
```

From /proc/meminfo

```
MemTotal:       197100800 kB
HugePages_Total:       0
Hugepagesize:        2048 kB
```

/usr/bin/lsb\_release -d  
SUSE Linux Enterprise Server 12 SP4

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

```
SuSE-release:
  SUSE Linux Enterprise Server 12 (x86_64)
  VERSION = 12
  PATCHLEVEL = 4
  # 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-SP4"
  VERSION_ID="12.4"
  PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
  ID="sles"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:12:sp4"

uname -a:
```

```
Linux linux-2yq5 4.12.14-94.41-default #1 SMP Wed Oct 31 12:25:04 UTC 2018 (3090901)
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault):	Not affected
Microarchitectural Data Sampling:	No status reported
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: __user pointer sanitization

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## Platform Notes (Continued)

CVE-2017-5715 (Spectre variant 2):

Mitigation: Indirect Branch Restricted Speculation, IBPB, IBRS\_FW

run-level 5 Dec 23 15:34

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/vg00-lv_root	xfs	436G	184G	253G	43%	/

From /sys/devices/virtual/dmi/id

BIOS: American Megatrends Inc. 3B17 10/09/2019

Vendor: Nokia Solutions and Networks

Product: AE-SER1U-B/AF1802.01

Product Family: AirFrame

Serial: QTFCWN8460001

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:

2x NO DIMM NO DIMM

6x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(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  
19.1.0.166 Build 20191121

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

icc: NOTE: The evaluation period for this product ends on 21-jan-2020 UTC.

=====

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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## Compiler Version Notes (Continued)

=====

C | 502.gcc\_r(peak)

=====

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Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
icc: NOTE: The evaluation period for this product ends on 21-jan-2020 UTC.

=====

=====

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 19.1.0.166 Build 20191121  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
icc: NOTE: The evaluation period for this product ends on 21-jan-2020 UTC.

=====

=====

C++ | 523.xalancbmk\_r(peak)

=====

Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version  
19.1.0.166 Build 20191121  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
icpc: NOTE: The evaluation period for this product ends on 21-jan-2020 UTC.

=====

=====

C++ | 520.omnetpp\_r(base, peak) 523.xalancbmk\_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 19.1.0.166 Build 20191121  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
icpc: NOTE: The evaluation period for this product ends on 21-jan-2020 UTC.

=====

=====

C++ | 523.xalancbmk\_r(peak)

=====

Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version  
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icpc: NOTE: The evaluation period for this product ends on 21-jan-2020 UTC.

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## Compiler Version Notes (Continued)

```
=====
C++      | 520.omnetpp_r(base, peak) 523.xalancbmk_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 19.1.0.166 Build 20191121
```

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

```
icpc: NOTE: The evaluation period for this product ends on 21-jan-2020 UTC.
```

```
=====
Fortran | 548.exchange2_r(base, peak)
-----
```

```
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.1.0.166 Build 20191121
```

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

```
ifort: NOTE: The evaluation period for this product ends on 21-jan-2020 UTC.
```

## 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
```



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## Base Optimization Flags

C benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-fno-opt-mem-layout-trans=4  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.0.166/linux/compiler/lib/intel64  
-lgkmalloc
```

C++ benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-fno-opt-mem-layout-trans=4  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.0.166/linux/compiler/lib/intel64  
-lgkmalloc
```

Fortran benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-fno-opt-mem-layout-trans=4 -fno-standard-realloc-lhs -falign array32byte  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.0.166/linux/compiler/lib/intel64  
-lgkmalloc
```

## 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\_2020.0.166/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\_2020.0.166/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

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## Peak Portability Flags (Continued)

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=4  
-fno-strict-overflow  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.0.166/linux/compiler/lib/intel64  
-lqkmalloc
```

```
502.gcc_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/je5.2.1-32/lib -ljemalloc
```

```
505.mcf_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.0.166/linux/compiler/lib/intel64  
-lqkmalloc
```

```
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_2020.0.166/linux/compiler/lib/intel64  
-lqkmalloc
```

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_2020.0.166/linux/compiler/lib/intel64  
-lqkmalloc
```

```
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/je5.2.1-32/lib -ljemalloc
```

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

(Continued on next page)



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## Peak Optimization Flags (Continued)

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_2020.0.166/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-ic19.0ul-official-linux64.html>  
<http://www.spec.org/cpu2017/flags/Nokia-Platform-Flags-OE19.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic19.0ul-official-linux64.xml>  
<http://www.spec.org/cpu2017/flags/Nokia-Platform-Flags-OE19.xml>

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