# SPEC CPU®2017 Integer Rate Result

## ASUSTeK Computer Inc.

ASUS ESC8000 G4(Z11PG-D24) Server System
(2.40 GHz, Intel Xeon Silver 4214R)

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>ASUSTeK Computer Inc.</td>
</tr>
<tr>
<td>Tested by:</td>
<td>ASUSTeK Computer Inc.</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Feb-2020</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Sep-2019</td>
</tr>
</tbody>
</table>

### SPECrate®2017_int_base = 154

### SPECrate®2017_int_peak = 160

<table>
<thead>
<tr>
<th>Software</th>
<th>CPU Name: Intel Xeon Silver 4214R</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS:</td>
<td>SUSE Linux Enterprise Server 15 SP1</td>
</tr>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 19.0.5.281 of Intel C/C++ Compiler Build 20190815 for Linux: Fortran: Version 19.0.5.281 of Intel Fortran Compiler Build 20190815 for Linux</td>
</tr>
<tr>
<td>Parallel:</td>
<td>No</td>
</tr>
<tr>
<td>Firmware:</td>
<td>Version 6102 released Dec-2019</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other:</td>
<td>jemalloc: jemalloc memory allocator library V5.0.1</td>
</tr>
<tr>
<td>Power Management:</td>
<td>BIOS and OS set to prefer performance at the cost of additional power usage</td>
</tr>
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<table>
<thead>
<tr>
<th>Hardware</th>
<th>Max MHz: 3500</th>
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</thead>
<tbody>
<tr>
<td>Nominal:</td>
<td>2400</td>
</tr>
<tr>
<td>Enabled:</td>
<td>24 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1, 2 chip(s)</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1 MB I+D on chip per core</td>
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<tr>
<td>L3:</td>
<td>16.5 MB I+D on chip per chip</td>
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<tr>
<td>Other:</td>
<td>None</td>
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<tr>
<td>Memory:</td>
<td>768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 1 TB SATA SSD</td>
</tr>
<tr>
<td>Other:</td>
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<table>
<thead>
<tr>
<th>Copies</th>
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<tbody>
<tr>
<td>500.perlbench_r</td>
</tr>
<tr>
<td>502.gcc_r</td>
</tr>
<tr>
<td>505.mcf_r</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
</tr>
<tr>
<td>525.x264_r</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
</tr>
<tr>
<td>541.leela_r</td>
</tr>
<tr>
<td>548.exchange2_r</td>
</tr>
<tr>
<td>557.xz_r</td>
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### SPECrate®2017_int_base (154)

<table>
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<th>SPECrate®2017_int_peak (160)</th>
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<tr>
<td>124</td>
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<td>130</td>
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<td>150</td>
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<tr>
<td>193</td>
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<td>327</td>
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<td>95.7</td>
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<td>97.9</td>
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Page 1
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ASUSTeK Computer Inc.

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(2.40 GHz, Intel Xeon Silver 4214R)

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SPECrate®2017_int_base = 154
SPECrate®2017_int_peak = 160

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Test Date: May-2020
Hardware Availability: Feb-2020
Tested by: ASUSTeK Computer Inc.
Software Availability: Sep-2019

Results Table

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<td>531.deepsjeng_r</td>
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<tr>
<td>541.leela_r</td>
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<td>731</td>
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<td>557.xz_r</td>
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<td>96.3</td>
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<td>529</td>
<td>97.9</td>
<td>528</td>
<td>98.2</td>
</tr>
</tbody>
</table>

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

Compiler Notes
The build date 20190815 in sw_compiler is correct for the IC compiler.
The build_date in Compiler Version Notes is incorrect.

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"
OS set to performance mode via cpupower frequency-set -g performance

Environment Variables Notes
Environment variables set by runcpu before the start of the run:
MALLOC_CONF = "retain:true"
# SPEC CPU®2017 Integer Rate Result

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ASUS ESC8000 G4(Z11PG-D24) Server System  
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<td>SPECrate®2017_int_peak = 160</td>
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<td>Feb-2020</td>
</tr>
<tr>
<td></td>
<td>Software Availability:</td>
<td>Sep-2019</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9016  
**Test Sponsor:** ASUSTeK Computer Inc.  
**Tested by:** ASUSTeK Computer Inc.  

## General Notes

Binaries compiled on a system with 1x Intel Core i9-9900K CPU + 64GB RAM  
memory using Redhat Enterprise Linux 8.0  
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>`

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.

The jemalloc library was  
configured and built at default for  
32bit (i686) and 64bit (x86_64) targets;  
built with the RedHat Enterprise 7.5,  
and the system compiler gcc 4.8.5;  
sources available from jemalloc.net or  

## Platform Notes

BIOS Configuration:  
VT-d = Disabled  
Patrol Scrub = Disabled  
ENERGY_PERF_BIAS_CFG mode = performance  
SNC = Enabled  
IMC interleaving = 1-way  
Engine Boost = Level3(Max)  
SR-IOV Support = Disabled  
CSM Support = Disabled  
LLC dead line allc = Disabled

Sysinfo program /spec2017_19u5/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7edbl6e46a485a0011  
running on linux-628j Fri May 8 16:59:17 2020

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

(Continued on next page)
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Platform Notes (Continued)

model name : Intel(R) Xeon(R) Silver 4214R CPU @ 2.40GHz  
2 "physical id"s (chips)  
48 "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 : 12  
siblings : 24  
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13  
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13

From lscpu:

Architecture: x86_64  
CPU op-mode(s): 32-bit, 64-bit  
Byte Order: Little Endian  
Address sizes: 46 bits physical, 48 bits virtual  
CPU(s): 48  
On-line CPU(s) list: 0-47  
Thread(s) per core: 2  
Core(s) per socket: 12  
Socket(s): 2  
NUMA node(s): 4  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 85  
Model name: Intel(R) Xeon(R) Silver 4214R CPU @ 2.40GHz  
Stepping: 7  
CPU MHz: 2400.000  
CPU max MHz: 3500.0000  
CPU min MHz: 1000.0000  
BogoMIPS: 4800.00  
Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 1024K  
L3 cache: 16896K  
NUMA node0 CPU(s): 0-2, 6-8, 24-26, 30-32  
NUMA node1 CPU(s): 3-5, 9-11, 27-29, 33-35  
NUMA node2 CPU(s): 12-14, 18-20, 36-38, 42-44  
NUMA node3 CPU(s): 15-17, 21-23, 39-41, 45-47  
Flags:

(Continued on next page)
### Platform Notes (Continued)

cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaveopt xsavec xgetbv1 xsave avx512_llc avx512_occproc avx512_mbm_total
avx512_mbm_local dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku
ospke avx512_vnni md_clear flush_lld arch_capabilities

/proc/cpuinfo cache data
cache size : 16896 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 1 2 6 7 8 24 25 26 30 31 32
node 0 size: 192080 MB
node 0 free: 191741 MB
node 1 cpus: 3 4 5 9 10 11 27 28 29 33 34 35
node 1 size: 193533 MB
node 1 free: 193297 MB
node 2 cpus: 12 13 14 18 19 20 36 37 38 42 43 44
node 2 size: 193504 MB
node 2 free: 193279 MB
node 3 cpus: 15 16 17 21 22 23 39 40 41 45 46 47
node 3 size: 193532 MB
node 3 free: 193222 MB
node distances:
node 0 1 2 3
0: 10 11 21 21
1: 11 10 21 21
2: 21 21 10 11
3: 21 21 11 10

From /proc/meminfo
MemTotal: 791193996 kB
MemFree: 160699216 kB
MemAvailable: 630494780 kB
MemUsed: 1665320048 kB
Buffers: 1798544 kB
Cached: 4494100 kB
SwapTotal: 0 kB
SwapFree: 0 kB

From /etc/*release*/etc/*version*/
NAME="SLES"
VERSION="15-SP1"
VERSION_ID="15.1"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp1"

uname -a:

(Continued on next page)
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Platform Notes (Continued)

Linux linux-628j 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

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: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

run-level 3 May 8 16:58

SPEC is set to: /spec2017_19u5

From /sys/devices/virtual/dmi/id
BIOS: American Megatrends Inc. 6102 12/19/2019
Vendor: ASUSTeK COMPUTER INC.
Product: Z11PG-D24 Series
Product Family: Server
Serial: System Serial Number

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:
24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
<table>
<thead>
<tr>
<th>C</th>
<th>502.gcc_r(peak)</th>
</tr>
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<tbody>
<tr>
<td>Intel(R) C Compiler for applications running on IA-32, Version 19.0.5 NextGen Technology Build 20190729</td>
<td></td>
</tr>
<tr>
<td>Copyright (C) 1985-2019 Intel Corporation. All rights reserved.</td>
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Compiler Version Notes (Continued)

==============================================================================
| C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)  
|         | 525.x264_r(base, peak) 557.xz_r(base) |
------------------------------------------------------------------------------
Intel(R) C Compiler for applications running on Intel(R) 64, Version 19.0.5 NextGen Technology Build 20190729  
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==============================================================================
| C       | 500.perlbench_r(peak) 557.xz_r(peak) |
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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       | 502.gcc_r(peak) |
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Intel(R) C Compiler for applications running on IA-32, Version 19.0.5 NextGen Technology Build 20190729  
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==============================================================================
| C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)  
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| C       | 502.gcc_r(peak) |
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SPECrates®

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Compiler Version Notes (Continued)

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Base Compiler Invocation

C benchmarks:  
  icc

C++ benchmarks:  
icpc

(Continued on next page)
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(2.40 GHz, Intel Xeon Silver 4214R)

SPECrate®2017_int_base = 154  
SPECrate®2017_int_peak = 160

CPU2017 License: 9016  
Test Date: May-2020  
Test Sponsor: ASUSTeK Computer Inc.  
Hardware Availability: Feb-2020  
Tested by: ASUSTeK Computer Inc.  
Software Availability: Sep-2019

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:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -flto  
-mfpmath=sse -funroll-loops -qnxtgen -fuse-ld=gold  
-qopt-mem-layout-trans=4  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin  
-lqkmalloc

C++ benchmarks:
-m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -flto -mfpmath=sse  
-funroll-loops -qnxtgen -fuse-ld=gold -qopt-mem-layout-trans=4  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin  
-lqkmalloc

Fortran benchmarks:
-m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div  
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin  
-lqkmalloc
**SPEC CPU®2017 Integer Rate Result**

ASUSTeK Computer Inc.

ASUS ESC8000 G4(Z11PG-D24) Server System

(2.40 GHz, Intel Xeon Silver 4214R)

SPECrate®2017_int_base = 154

SPECrate®2017_int_peak = 160

---

**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: -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

---

**Peak Optimization Flags**

C benchmarks:

500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
-ljemalloc

502.gcc_r: -m32
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/ia32_lin
-std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -qnextgen -fuse-ld=gold
-qopt-mem-layout-trans=4 -L/usr/local/je5.0.1-32/lib
-ljemalloc

505.mcf_r: basepeak = yes

---

(Continued on next page)
### SPEC CPU®2017 Integer Rate Result

**ASUSTeK Computer Inc.**  
ASUS ESC8000 G4(Z11PG-D24) Server System  
(2.40 GHz, Intel Xeon Silver 4214R)

<table>
<thead>
<tr>
<th><strong>CPU2017 License:</strong></th>
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</tr>
</tbody>
</table>

**SPECrate®2017_int_base = 154**  
**SPECrate®2017_int_peak = 160**

**Test Date:** May-2020  
**Hardware Availability:** Feb-2020  
**Software Availability:** Sep-2019

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### Peak Optimization Flags (Continued)

**525.x264_r:**  
- `-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -flto -O3`  
- `-ffast-math -qnextgen -fuse-ld=gold`  
- `-qopt-mem-layout-trans=4 -fno-alias`  
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin -lqkmalloc`

**557.xz_r:**  
- `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`  
- `-qopt-mem-layout-trans=4`  
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin -lqkmalloc`

**C++ benchmarks:**

**520.omnetpp_r:**  
basepeak = yes

**523.xalancbmk_r:**  
basepeak = yes

**531.deepsjeng_r:**  
- `-m64 -Wl,-z,muldefs -fprofile-generate(pass 1)`  
- `-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto`  
- `-Ofast(pass 1) -O3 -ffast-math -qnextgen -fuse-ld=gold`  
- `-qopt-mem-layout-trans=4`  
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin -lqkmalloc`

**541.leela_r:**  
basepeak = yes

**Fortran benchmarks:**

**548.exchange2_r:**  
basepeak = yes

---

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


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

- [http://www.spec.org/cpu2017/flags/Intel-ic19.0u5-official-linux64_rev0.xml](http://www.spec.org/cpu2017/flags/Intel-ic19.0u5-official-linux64_rev0.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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