SPEC CPU®2017 Integer Rate Result

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Tyrone Systems

(Test Sponsor: Netweb Pte Ltd)

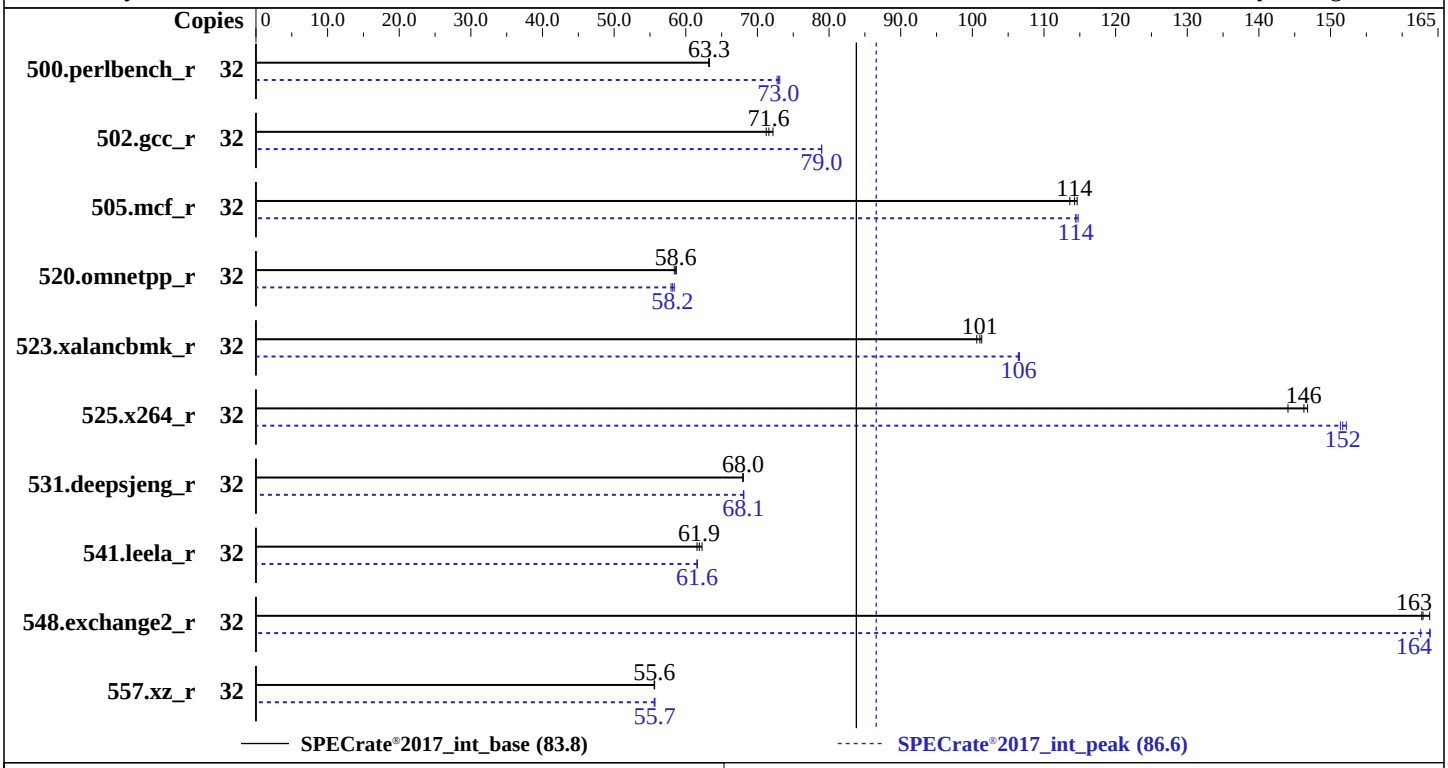
DIT400TR-28RL
(2.10 GHz,Intel Xeon Silver 4208)

SPECrate®2017_int_base = 83.8

SPECrate®2017_int_peak = 86.6

CPU2017 License: 006042
Test Sponsor: Netweb Pte Ltd
Tested by: Netweb

Test Date: Oct-2019
Hardware Availability: Sep-2019
Software Availability: Aug-2019



Hardware

CPU Name:	Intel Xeon Silver 4208
Max MHz:	3200
Nominal:	2100
Enabled:	16 cores, 2 chips, 2 threads/core
Orderable:	1, 2 (chip)s
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	1 MB I+D on chip per core
L3:	11 MB I+D on chip per chip
Other:	None
Memory:	384 GB (12 x 32 GB 2Rx4 PC4-2933P-R, running at 2400)
Storage:	1 x 480 GB SSD
Other:	None

Software

OS:	CentOS Linux release 7.7.1908 (Core) 3.10.0-1062.el7.x86_64
Compiler:	C/C++: Version 19.0.4.243 of Intel C/C++ Compiler Build 20190416 for Linux; Fortran: Version 19.0.4.243 of Intel Fortran Compiler Build 20190416 for Linux
Parallel:	No
Firmware:	Version V8.101 released Aug-2019
File System:	xfs
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:	None

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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	32	806	63.2	**805**	**63.3**	805	63.3	32	700	72.7	697	73.1	**698**	**73.0**
502.gcc_r	32	628	72.2	**633**	**71.6**	636	71.2	32	**574**	**79.0**	574	79.0	574	78.9
505.mcf_r	32	455	114	**453**	**114**	451	115	32	**452**	**114**	451	115	452	114
520.omnetpp_r	32	716	58.7	**716**	**58.6**	719	58.4	32	**722**	**58.2**	719	58.4	725	57.9
523.xalancbmk_r	32	336	101	334	101	**334**	**101**	32	318	106	317	107	**317**	**106**
525.x264_r	32	382	147	**383**	**146**	389	144	32	370	151	**369**	**152**	368	152
531.deepsjeng_r	32	**539**	**68.0**	539	68.0	539	68.0	32	538	68.1	539	68.0	**539**	**68.1**
541.leela_r	32	861	61.6	**856**	**61.9**	851	62.3	32	**860**	**61.6**	861	61.6	860	61.6
548.exchange2_r	32	**515**	**163**	515	163	512	164	32	516	163	511	164	**512**	**164**
557.xz_r	32	621	55.7	622	55.6	**621**	**55.6**	32	**621**	**55.7**	622	55.6	621	55.7

SPECrate®2017_int_base = 83.8

SPECrate®2017_int_peak = 86.6

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/je5.0.1-32:/home/cpu2017/je5.0.1-64"

General Notes

```
Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5
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.
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

```
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on NODE5 Tue Oct  8 20:37:30 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) Silver 4208 CPU @ 2.10GHz
      2  "physical id"s (chips)
      32 "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 : 8
      siblings  : 16
      physical 0: cores 0 1 2 3 4 5 6 7
      physical 1: cores 0 1 2 3 4 5 6 7

From lscpu:
     Architecture:          x86_64
     CPU op-mode(s):        32-bit, 64-bit
     Byte Order:            Little Endian
     CPU(s):                32
     On-line CPU(s) list:   0-31
```

(Continued on next page)

Platform Notes (Continued)

```
      Thread(s) per core:    2
      Core(s) per socket:    8
      Socket(s):             2
      NUMA node(s):          2
      Vendor ID:             GenuineIntel
      CPU family:            6
      Model:                 85
      Model name:            Intel(R) Xeon(R) Silver 4208 CPU @ 2.10GHz
      Stepping:              7
      CPU MHz:               800.061
      CPU max MHz:           3200.0000
      CPU min MHz:           800.0000
      BogoMIPS:              4200.00
      Virtualization:        VT-x
      L1d cache:             32K
      L1i cache:             32K
      L2 cache:              1024K
      L3 cache:              11264K
      NUMA node0 CPU(s):     0-7,16-23
      NUMA node1 CPU(s):     8-15,24-31
      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
      aperfmperf 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 epb cat_l3 cdp_l3 intel_ppin
      intel_pt 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 avx512cd avx512bw avx512vl xsaveopt
      xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln
      pts hwp hwp_act_window hwp_epp hwp_pkg_req pku ospke avx512_vnni md_clear spec_ctrl
      intel_stibp flush_l1d arch_capabilities

  /proc/cpuinfo cache data
     cache size : 11264 KB

  From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
  physical chip.
    available: 2 nodes (0-1)
    node 0 cpus: 0 1 2 3 4 5 6 7 16 17 18 19 20 21 22 23
    node 0 size: 195229 MB
    node 0 free: 167002 MB
    node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
    node 1 size: 196608 MB
    node 1 free: 165969 MB
    node distances:
    node   0   1
```

(Continued on next page)

Platform Notes (Continued)

```
     0:  10  21
     1:  21  10

  From /proc/meminfo
     MemTotal:       394677656 kB
     HugePages_Total:       0
     Hugepagesize:       2048 kB

  From /etc/*release* /etc/*version*
     centos-release: CentOS Linux release 7.7.1908 (Core)
     centos-release-upstream: Derived from Red Hat Enterprise Linux 7.7 (Source)
     os-release:
        NAME="CentOS Linux"
        VERSION="7 (Core)"
        ID="centos"
        ID_LIKE="rhel fedora"
        VERSION_ID="7"
        PRETTY_NAME="CentOS Linux 7 (Core)"
        ANSI_COLOR="0;31"
        CPE_NAME="cpe:/o:centos:centos:7"
     redhat-release: CentOS Linux release 7.7.1908 (Core)
     system-release: CentOS Linux release 7.7.1908 (Core)
     system-release-cpe: cpe:/o:centos:centos:7

  uname -a:
     Linux NODE5 3.10.0-1062.el7.x86_64 #1 SMP Wed Aug 7 18:08:02 UTC 2019 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: Load fences, __user pointer
                                            sanitization
  CVE-2017-5715 (Spectre variant 2):        Mitigation: Full retpoline, IBPB

  run-level 3 Oct 7 11:40

  SPEC is set to: /home/cpu2017
     Filesystem              Type  Size  Used Avail Use% Mounted on
     /dev/mapper/centos-home xfs   392G   71G  322G  18% /home

  From /sys/devices/virtual/dmi/id
      BIOS:    American Megatrends Inc. V8.101 08/02/2019
```

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Platform Notes (Continued)

```
     Vendor:  Tyrone Systems
     Product: TP12XH-L2I
     Serial:  empty

  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:
      12x 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
  19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
icc: NOTE: The evaluation period for this product ends on 2-nov-2019 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 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
------------------------------------------------------------------------------

==============================================================================
C       | 502.gcc_r(peak)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version
  19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
icc: NOTE: The evaluation period for this product ends on 2-nov-2019 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)
```

(Continued on next page)

Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
------------------------------------------------------------------------------

==============================================================================
C++     | 523.xalancbmk_r(peak)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version
  19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
icpc: NOTE: The evaluation period for this product ends on 2-nov-2019 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 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
icpc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
------------------------------------------------------------------------------

==============================================================================
C++     | 523.xalancbmk_r(peak)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version
  19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
icpc: NOTE: The evaluation period for this product ends on 2-nov-2019 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 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
icpc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
------------------------------------------------------------------------------

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

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Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
ifort: NOTE: The evaluation period for this product ends on 2-nov-2019 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`

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_2019.4.243/linux/compiler/lib/intel64`
`-lqkmalloc`

C++ benchmarks:
`-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`

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Base Optimization Flags (Continued)

C++ benchmarks (continued):
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.243/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_2019.4.243/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_2019.4.243/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_2019.4.243/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: `-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_2019.4.243/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/je5.0.1-32/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_2019.4.243/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_2019.4.243/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_2019.4.243/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/je5.0.1-32/lib -ljemalloc`

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_2019.4.243/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-linux64.2019-07-15.html
http://www.spec.org/cpu2017/flags/Default-Platform-Flags.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-15.xml
http://www.spec.org/cpu2017/flags/Default-Platform-Flags.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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