



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

## Fujitsu

PRIMERGY RX4770 M5, Intel Xeon Gold 5222, 3.80GHz

SPECrate®2017\_int\_base = 127

SPECrate®2017\_int\_peak = Not Run

CPU2017 License: 19

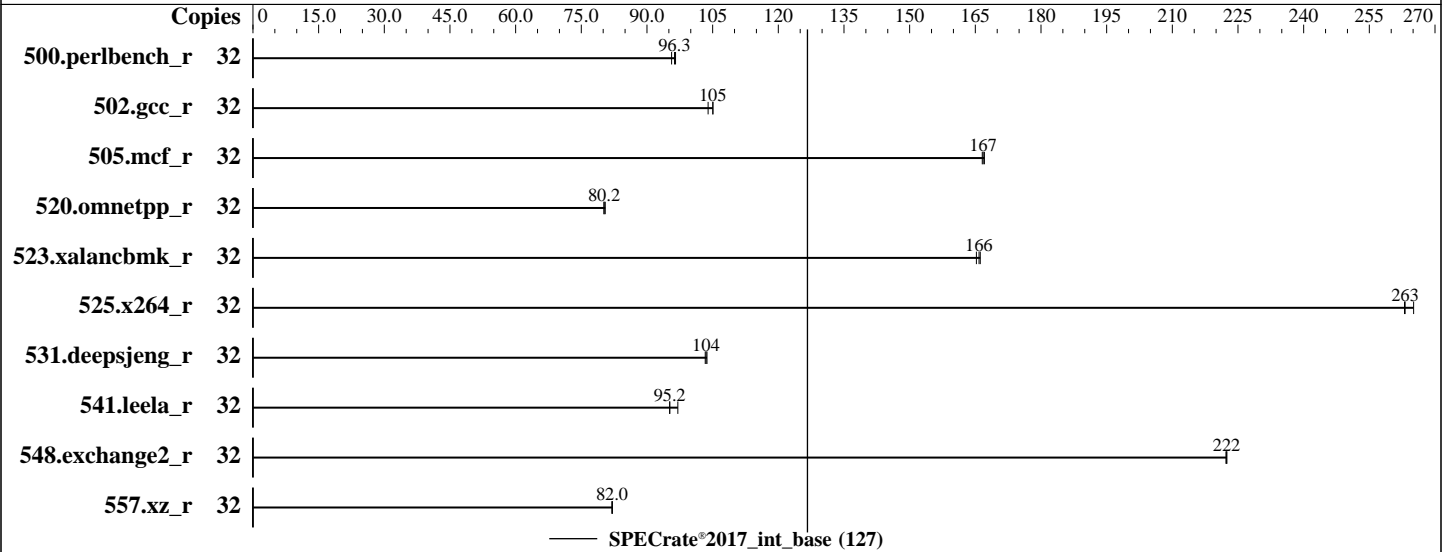
Test Sponsor: Fujitsu

Tested by: Fujitsu

Test Date: Jul-2019

Hardware Availability: Apr-2019

Software Availability: Feb-2019



### Hardware

CPU Name: Intel Xeon Gold 5222  
 Max MHz: 3900  
 Nominal: 3800  
 Enabled: 16 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: 16.5 MB I+D on chip per chip  
 Other: None  
 Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-2933Y-R)  
 Storage: 1 x SATA M.2 SSD, 480 GB  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 15 4.12.14-25.28-default  
 Compiler: C/C++: Version 19.0.1.144 of Intel C/C++ Compiler for Linux;  
 Fortran: Version 19.0.1.144 of Intel Fortran Compiler for Linux  
 Parallel: No  
 Firmware: Fujitsu BIOS for D3753-C1x Version V5.0.0.14 R1.8.0 released Jun-2019  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: Not Applicable  
 Other: None  
 Power Management: --



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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	528	96.5	533	95.6	<u>529</u>	<u>96.3</u>							
502.gcc_r	32	431	105	436	104	<u>431</u>	<u>105</u>							
505.mcf_r	32	310	167	<u>310</u>	<u>167</u>	310	167							
520.omnetpp_r	32	522	80.5	<u>523</u>	<u>80.2</u>	524	80.2							
523.xalancbmk_r	32	203	166	204	165	<u>204</u>	<u>166</u>							
525.x264_r	32	211	265	<u>213</u>	<u>263</u>	213	263							
531.deepsjeng_r	32	354	104	<u>354</u>	<u>104</u>	355	103							
541.leela_r	32	557	95.2	<u>557</u>	<u>95.2</u>	546	97.0							
548.exchange2_r	32	377	222	<u>377</u>	<u>222</u>	377	222							
557.xz_r	32	421	82.0	421	82.1	<u>421</u>	<u>82.0</u>							

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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"  
Kernel Boot Parameter set with : nohz\_full=1-31  
Process tuning settings:  
echo 10000000 > /proc/sys/kernel/sched\_min\_granularity\_ns

## General Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH = "/home/Benchmark/speccpu2017-int/lib/intel64"

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.

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## General Notes (Continued)

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 configuration:

DCU Streamer Prefetcher = Disabled

Fan Control = Full

Energy Performance = Performance

HWPM = Native Mode with no legacy

LLC Prefetcher = Disable

Override OS Energy Performance = Enable

Patrol Scrub = Disabled

WR CRC feature Control = Disabled

XPT Prefetch = Enable

Sysinfo program /home/Benchmark/speccpu2017-int/bin/sysinfo

Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9

running on SLES15-BMT Tue Jul 30 00:24:00 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 5222 CPU @ 3.80GHz

4 "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 : 4

siblings : 8

physical 0: cores 5 8 9 13

physical 1: cores 5 8 9 12

physical 2: cores 2 5 9 13

physical 3: cores 2 5 9 13

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

Thread(s) per core: 2

Core(s) per socket: 4

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### Platform Notes (Continued)

```

Socket(s): 4
NUMA node(s): 8
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5222 CPU @ 3.80GHz
Stepping: 7
CPU MHz: 3800.000
CPU max MHz: 3900.0000
CPU min MHz: 1200.0000
BogoMIPS: 7600.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0,2,17,18
NUMA node1 CPU(s): 1,3,16,19
NUMA node2 CPU(s): 4,7,20,23
NUMA node3 CPU(s): 5,6,21,22
NUMA node4 CPU(s): 8,10,24,26
NUMA node5 CPU(s): 9,11,25,27
NUMA node6 CPU(s): 12,14,28,30
NUMA node7 CPU(s): 13,15,29,31
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 cpuid
aperfperf 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 ibrs_enhanced tpr_shadow vnmi
flexpriority ept vpid fsgsbase tsc_adjust bmil 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 hwp hwp_act_window hwp_epp hwp_pkg_req pku
ospke avx512_vnni flush_l1d 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: 8 nodes (0-7)
node 0 cpus: 0 2 17 18
node 0 size: 191886 MB
node 0 free: 185909 MB
node 1 cpus: 1 3 16 19

```

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### Platform Notes (Continued)

```

node 1 size: 193534 MB
node 1 free: 193272 MB
node 2 cpus: 4 7 20 23
node 2 size: 193534 MB
node 2 free: 193407 MB
node 3 cpus: 5 6 21 22
node 3 size: 193505 MB
node 3 free: 193318 MB
node 4 cpus: 8 10 24 26
node 4 size: 193534 MB
node 4 free: 193417 MB
node 5 cpus: 9 11 25 27
node 5 size: 193534 MB
node 5 free: 193429 MB
node 6 cpus: 12 14 28 30
node 6 size: 193534 MB
node 6 free: 193320 MB
node 7 cpus: 13 15 29 31
node 7 size: 193363 MB
node 7 free: 193258 MB
node distances:
node  0  1  2  3  4  5  6  7
 0:  10 11 21 21 31 31 21 21
 1:  11 10 21 21 31 31 21 21
 2:  21 21 10 11 21 21 31 31
 3:  21 21 11 10 21 21 31 31
 4:  31 31 21 21 10 11 21 21
 5:  31 31 21 21 11 10 21 21
 6:  21 21 31 31 21 21 10 11
 7:  21 21 31 31 21 21 11 10

```

From /proc/meminfo

MemTotal: 1583544776 kB

HugePages\_Total: 0

Hugepagesize: 2048 kB

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

os-release:

NAME="SLES"

VERSION="15"

VERSION\_ID="15"

PRETTY\_NAME="SUSE Linux Enterprise Server 15"

ID="sles"

ID\_LIKE="suse"

ANSI\_COLOR="0;32"

CPE\_NAME="cpe:/o:suse:sles:15"

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### Platform Notes (Continued)

```
uname -a:
Linux SLES15-BMT 4.12.14-25.28-default #1 SMP Wed Jan 16 20:00:47 UTC 2019 (dd6077c)
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: conditional, RSB
filling
```

```
run-level 3 Jul 30 00:20
```

```
SPEC is set to: /home/Benchmark/speccpu2017-int
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda5       xfs   343G   30G  314G   9% /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 FUJITSU // American Megatrends Inc. V5.0.0.14 R1.8.0 for D3753-C1x
06/06/2019
```

```
Memory:
48x Micron 36ASF4G72PZ-2G9E2 32 GB 2 rank 2933, configured at 2934
```

(End of data from sysinfo program)

### Compiler Version Notes

```
=====  
C      | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base)  
      | 525.x264_r(base) 557.xz_r(base)  
=====
```

```
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
=====
```

```
=====  
C++   | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)  
     | 541.leela_r(base)  
=====
```

```
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

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## Compiler Version Notes (Continued)

-----  
=====  
Fortran | 548.exchange2\_r(base)  
-----

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
-----

## 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\_2019.1.144/linux/compiler/lib/intel64  
-lqkmalloc

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## Base Optimization Flags (Continued)

C++ benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/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_2019.1.144/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-ic18.0-official-linux64.2019-04-02.html>

<http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0-CSL-RevE.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/Fujitsu-Platform-Settings-V1.0-CSL-RevE.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 CPU®2017 v1.0.5 on 2019-07-29 11:23:59-0400.

Report generated on 2019-10-01 14:30:56 by CPU2017 PDF formatter v6255.

Originally published on 2019-10-01.