



# SPEC® CPU2017 Integer Rate Result

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Dell Inc. PowerEdge R740xd (Intel Xeon Gold 6252, 2.10GHz)		SPECrate2017_int_base = 265
		SPECrate2017_int_peak = 275
<b>CPU2017 License:</b> 55		<b>Test Date:</b> May-2019
<b>Test Sponsor:</b> Dell Inc.		<b>Hardware Availability:</b> Apr-2019
<b>Tested by:</b> Dell Inc.		<b>Software Availability:</b> Feb-2019

Benchmark result graphs are available in the [PDF report](#).

Hardware		Software	
<b>CPU Name:</b>	Intel Xeon Gold 6252	<b>OS:</b>	Ubuntu 18.04.2 LTS kernel 4.15.0-45-generic
<b>Max MHz:</b>	3700	<b>Compiler:</b>	C/C++: Version 19.0.1.144 of Intel C/C++ Compiler Build 20181018 for Linux; Fortran: Version 19.0.1.144 of Intel Fortran Compiler Build 20181018 for Linux
<b>Nominal:</b>	2100	<b>Parallel:</b>	No
<b>Enabled:</b>	48 cores, 2 chips, 2 threads/core	<b>Firmware:</b>	Version 2.1.8 released Apr-2019
<b>Orderable:</b>	1,2 chips	<b>File System:</b>	ext4
<b>Cache L1:</b>	32 KB I + 32 KB D on chip per core	<b>System State:</b>	Run level 5 (multi-user)
<b>L2:</b>	1 MB I+D on chip per core	<b>Base Pointers:</b>	64-bit
<b>L3:</b>	35.75 MB I+D on chip per chip	<b>Peak Pointers:</b>	32/64-bit
<b>Other:</b>	None	<b>Other:</b>	jemalloc memory allocator V5.0.1
<b>Memory:</b>	384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R)		
<b>Storage:</b>	2 x 960 GB SATA SSD		
<b>Other:</b>	None		

## Results Table

Benchmark	Base						Peak							
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	96	<b>732</b>	<b>209</b>	732	209			96	637	240	<b>638</b>	<b>240</b>		
502.gcc_r	96	<b>623</b>	<b>218</b>	622	219			96	<b>539</b>	<b>252</b>	539	252		
505.mcf_r	96	<b>447</b>	<b>347</b>	446	348			96	<b>447</b>	<b>347</b>	444	349		
520.omnetpp_r	96	<b>732</b>	<b>172</b>	730	173			96	730	172	<b>731</b>	<b>172</b>		
523.xalancbmk_r	96	342	296	<b>345</b>	<b>294</b>			96	320	317	<b>320</b>	<b>317</b>		
525.x264_r	96	<b>319</b>	<b>526</b>	318	528			96	<b>308</b>	<b>545</b>	307	547		
531.deepsjeng_r	96	489	225	<b>490</b>	<b>225</b>			96	<b>489</b>	<b>225</b>	489	225		
541.leela_r	96	<b>761</b>	<b>209</b>	760	209			96	743	214	<b>766</b>	<b>208</b>		
548.exchange2_r	96	527	477	<b>528</b>	<b>476</b>			96	528	476	<b>529</b>	<b>476</b>		
557.xz_r	96	574	181	<b>574</b>	<b>181</b>			96	573	181	<b>574</b>	<b>181</b>		
SPECrate2017_int_base		265												
SPECrate2017_int_peak		275												

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"

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

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

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>

## Platform Notes

BIOS settings:  
 ADDDC setting disabled  
 Sub NUMA Cluster enabled  
 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  
 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 Fri May 17 23:53:57 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 6252 CPU @ 2.10GHz
 2 "physical id"s (chips)
 96 "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 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 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 25 26 27 28 29
```

From lscpu:

```
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                96
On-line CPU(s) list:   0-95
Thread(s) per core:    2
Core(s) per socket:    24
Socket(s):             2
NUMA node(s):         4
Vendor ID:             GenuineIntel
CPU family:            6
Model:                85
Model name:            Intel(R) Xeon(R) Gold 6252 CPU @ 2.10GHz
Stepping:              6
CPU MHz:               3247.212
BogoMIPS:              4200.00
Virtualization:       VT-x
L1d cache:            32K
L1i cache:            32K
L2 cache:              1024K
L3 cache:              36608K
NUMA node0 CPU(s):    0,4,8,10,12,16,20,24,28,32,40,44,48,52,56,58,60,64,68,72,76,80,88,92
NUMA node1 CPU(s):    1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61,65,69,73,77,81,85,89,93
NUMA node2 CPU(s):    2,6,14,18,22,26,30,34,36,38,42,46,50,54,62,66,70,74,78,82,84,86,90,94
NUMA node3 CPU(s):    3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63,67,71,75,79,83,87,91,95
```

```
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_l1d 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: 4 nodes (0-3)
node 0 cpus: 0 4 8 10 12 16 20 24 28 32 40 44 48 52 56 58 60 64 68 72 76 80 88 92
node 0 size: 95167 MB
node 0 free: 94837 MB
node 1 cpus: 1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69 73 77 81 85 89 93
node 1 size: 96742 MB
node 1 free: 96486 MB
node 2 cpus: 2 6 14 18 22 26 30 34 36 38 42 46 50 54 62 66 70 74 78 82 84 86 90 94
node 2 size: 96763 MB
node 2 free: 96006 MB
node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 63 67 71 75 79 83 87 91 95
node 3 size: 96762 MB
node 3 free: 96500 MB
node distances:
node  0  1  2  3
 0:  10  21  11  21
 1:  21  10  21  11
 2:  11  21  10  21
 3:  21  11  21  10
```

```
From /proc/meminfo
MemTotal:      394685396 kB
HugePages_Total:      0
Hugepagesize:    2048 kB
```

```
/usr/bin/lsb_release -d
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 May 17 23:52
```

```
SPEC is set to: /home/cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda2       ext4  439G  19G  398G   5% /
```

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 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
12x Not Specified Not Specified
```

(End of data from sysinfo program)

## Compiler Version Notes

=====  
 CC 502.gcc\_r(peak)  
 -----

Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version  
 19.0.1.144 Build 20181018  
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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 19.0.1.144 Build 20181018  
 Copyright (C) 1985-2018 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 19.0.1.144 Build 20181018  
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 -----

=====  
 CXXC 523.xalancbmk\_r(peak)  
 -----

Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version  
 19.0.1.144 Build 20181018  
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 -----

=====  
 CXXC 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 19.0.1.144 Build 20181018  
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 -----

=====  
 FC 548.exchange2\_r(base, peak)  
 -----

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
 64, Version 19.0.1.144 Build 20181018  
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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 2019.1.144/linux/compiler/lib/intel64 -lqkmallo

### 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 -lqkmallo

### 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 -lqkmallo

## 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 2019.1.144/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 2019.1.144/linux/compiler/lib/ia32 lin

### Fortran benchmarks:

ifort -m64

## Peak Portability Flags

500.perlbenc\_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.perlbenc\_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 2019.1.144/linux/compiler/lib/intel64 -lqkmallo

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 2019.1.144/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 2019.1.144/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_2019.1.144/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_2019.1.144/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/Dell-Platform-Flags-PowerEdge14G-revE2.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-revE2.xml>.

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