SPEC CPU®2017 Integer Rate Result

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Dell Inc.

(Test Sponsor: Dell Inc)

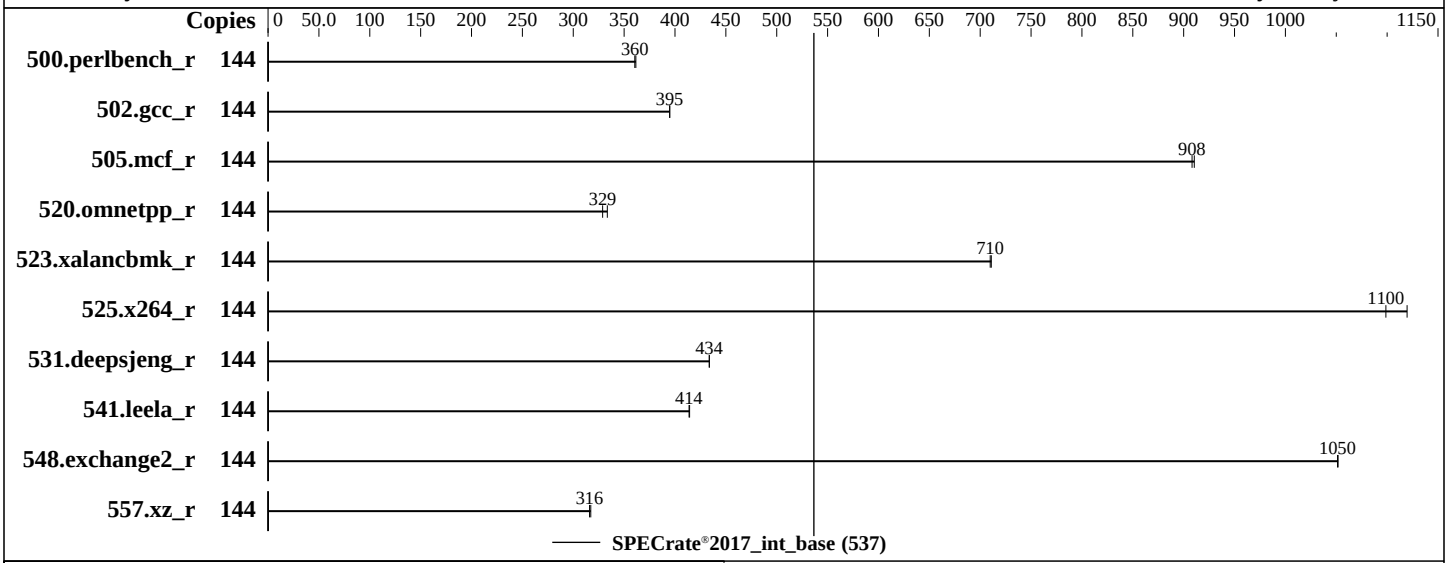
PowerEdge R840 (Intel Xeon Gold 6254, 3.10 GHz)

SPECrate®2017_int_base = 537

SPECrate®2017_int_peak = Not Run

CPU2017 License: 55
Test Sponsor: Dell Inc
Tested by: Dell Inc.

Test Date: Jul-2020
Hardware Availability: Apr-2019
Software Availability: May-2020



Hardware

CPU Name:	Intel Xeon Gold 6254
Max MHz:	4000
Nominal:	3100
Enabled:	72 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:	24.75 MB I+D on chip per chip
Other:	None
Memory:	1536 GB (24 x 32 GB 2Rx4 PC4-3200AA-R; 24 x 32 GB 2Rx4 PC4-2933Y-R, running at 2933)
Storage:	1 x 1.6 TB SATA SSD
Other:	None

Software

OS:	Red Hat Enterprise Linux 8.2 kernel 4.18.0-193.1.2.el8_2.x86_64
Compiler:	C/C++: Version 19.1.1.217 of Intel C/C++ Compiler for Linux; Fortran: Version 19.1.1.217 of Intel Fortran Compiler for Linux
Parallel:	No
Firmware:	Version 2.8.1 released Jun-2020
File System:	tmpfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	Not Applicable
Other:	None
Power Management:	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	144	634	362	**636**	**360**									
502.gcc_r	144	**517**	**395**	516	395									
505.mcf_r	144	**256**	**908**	256	910									
520.omnetpp_r	144	**574**	**329**	567	333									
523.xalancbmk_r	144	**214**	**710**	214	711									
525.x264_r	144	**229**	**1100**	225	1120									
531.deepsjeng_r	144	380	434	**381**	**434**									
541.leela_r	144	**576**	**414**	575	414									
548.exchange2_r	144	**359**	**1050**	359	1050									
557.xz_r	144	490	317	**492**	**316**									

SPECrate®2017_int_base = 537

SPECrate®2017_int_peak = Not Run

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

Compiler Notes

```
The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler.
The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux
The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux
```

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 =
     "/mnt/ramdisk/cpu2017-ic19.1u1/lib/intel64:/mnt/ramdisk/cpu2017-ic19.1u1
     /lib/ia32:/mnt/ramdisk/cpu2017-ic19.1u1/je5.0.1-32"
MALLOC_CONF = "retain:true"
```

General Notes

```
Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Redhat Enterprise Linux 8.0
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
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
Benchmark run from a 225 GB ramdisk created with the cmd; "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"
```

Platform Notes

```
BIOS settings:
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 set to standard
Logical Processor enabled
CPU Interconnect Bus Link Power Management disabled
PCI ASPM L1 Link Power Management disabled
UPI Prefetch enabled
LLC Prefetch disabled
Dead Line LLC Alloc enabled
Directory AtoS disabled

Sysinfo program /mnt/ramdisk/cpu2017-ic19.1u1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on poweredge-sut-rhel8-1 Wed Jul 29 14:28:35 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)

Platform Notes (Continued)

```
    model name : Intel(R) Xeon(R) Gold 6254 CPU @ 3.10GHz
       4  "physical id"s (chips)
       144 "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 : 18
       siblings  : 36
       physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
       physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
       physical 2: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
       physical 3: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

  From lscpu:
       Architecture:        x86_64
       CPU op-mode(s):      32-bit, 64-bit
       Byte Order:          Little Endian
       CPU(s):              144
       On-line CPU(s) list: 0-143
       Thread(s) per core:  2
       Core(s) per socket:  18
       Socket(s):           4
       NUMA node(s):        8
       Vendor ID:           GenuineIntel
       CPU family:          6
       Model:               85
       Model name:          Intel(R) Xeon(R) Gold 6254 CPU @ 3.10GHz
       Stepping:            6
       CPU MHz:             3595.071
       CPU max MHz:         4000.0000
       CPU min MHz:         1200.0000
       BogoMIPS:            6200.00
       Virtualization:      VT-x
       L1d cache:           32K
       L1i cache:           32K
       L2 cache:            1024K
       L3 cache:            25344K
       NUMA node0 CPU(s):   0,8,16,24,32,40,48,56,64,72,80,88,96,104,112,120,128,136
       NUMA node1 CPU(s):   1,9,17,25,33,41,49,57,65,73,81,89,97,105,113,121,129,137
       NUMA node2 CPU(s):   2,10,18,26,34,42,50,58,66,74,82,90,98,106,114,122,130,138
       NUMA node3 CPU(s):   3,11,19,27,35,43,51,59,67,75,83,91,99,107,115,123,131,139
       NUMA node4 CPU(s):   4,12,20,28,36,44,52,60,68,76,84,92,100,108,116,124,132,140
       NUMA node5 CPU(s):   5,13,21,29,37,45,53,61,69,77,85,93,101,109,117,125,133,141
       NUMA node6 CPU(s):   6,14,22,30,38,46,54,62,70,78,86,94,102,110,118,126,134,142
       NUMA node7 CPU(s):   7,15,23,31,39,47,55,63,71,79,87,95,103,111,119,127,135,143
       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
```

(Continued on next page)

Platform Notes (Continued)

```
      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 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 md_clear flush_l1d
      arch_capabilities

 /proc/cpuinfo cache data
    cache size : 25344 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 8 16 24 32 40 48 56 64 72 80 88 96 104 112 120 128 136
   node 0 size: 191909 MB
   node 0 free: 191518 MB
   node 1 cpus: 1 9 17 25 33 41 49 57 65 73 81 89 97 105 113 121 129 137
   node 1 size: 193531 MB
   node 1 free: 193391 MB
   node 2 cpus: 2 10 18 26 34 42 50 58 66 74 82 90 98 106 114 122 130 138
   node 2 size: 193531 MB
   node 2 free: 184114 MB
   node 3 cpus: 3 11 19 27 35 43 51 59 67 75 83 91 99 107 115 123 131 139
   node 3 size: 193504 MB
   node 3 free: 193367 MB
   node 4 cpus: 4 12 20 28 36 44 52 60 68 76 84 92 100 108 116 124 132 140
   node 4 size: 193531 MB
   node 4 free: 193228 MB
   node 5 cpus: 5 13 21 29 37 45 53 61 69 77 85 93 101 109 117 125 133 141
   node 5 size: 193531 MB
   node 5 free: 193408 MB
   node 6 cpus: 6 14 22 30 38 46 54 62 70 78 86 94 102 110 118 126 134 142
   node 6 size: 193531 MB
   node 6 free: 193064 MB
   node 7 cpus: 7 15 23 31 39 47 55 63 71 79 87 95 103 111 119 127 135 143
   node 7 size: 193529 MB
   node 7 free: 193367 MB
   node distances:
   node   0   1   2   3   4   5   6   7
     0:  10  21  21  21  11  21  21  21
     1:  21  10  21  21  21  11  21  21
     2:  21  21  10  21  21  21  11  21
     3:  21  21  21  10  21  21  21  11
     4:  11  21  21  21  10  21  21  21
```

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Platform Notes (Continued)

```
     5:  21  11  21  21  21  10  21  21
     6:  21  21  11  21  21  21  10  21
     7:  21  21  21  11  21  21  21  10

  From /proc/meminfo
     MemTotal:       1583720292 kB
     HugePages_Total:       0
     Hugepagesize:       2048 kB

  From /etc/*release* /etc/*version*
     os-release:
        NAME="Red Hat Enterprise Linux"
        VERSION="8.2 (Ootpa)"
        ID="rhel"
        ID_LIKE="fedora"
        VERSION_ID="8.2"
        PLATFORM_ID="platform:el8"
        PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
        ANSI_COLOR="0;31"
     redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
     system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
     system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga

  uname -a:
     Linux poweredge-sut-rhel8-1 4.18.0-193.1.2.el8_2.x86_64 #1 SMP Thu May 7 16:37:54 UTC
     2020 x86_64 x86_64 x86_64 GNU/Linux

  Kernel self-reported vulnerability status:

  itlb_multihit:                           KVM: Vulnerable
  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: usercopy/swapgs barriers and __user
                                           pointer sanitization
  CVE-2017-5715 (Spectre variant 2):       Mitigation: Enhanced IBRS, IBPB: conditional,
                                           RSB filling
  tsx_async_abort:                         Mitigation: Clear CPU buffers; SMT vulnerable

  run-level 3 Jul 29 09:24 last=5

  SPEC is set to: /mnt/ramdisk/cpu2017-ic19.1u1
     Filesystem     Type   Size  Used Avail Use% Mounted on
     tmpfs          tmpfs  225G  4.3G  221G   2% /mnt/ramdisk
```

(Continued on next page)

Platform Notes (Continued)

```
 From /sys/devices/virtual/dmi/id
      BIOS:    Dell Inc. 2.8.1 06/29/2020
      Vendor:  Dell Inc.
      Product: PowerEdge R840
      Product Family: PowerEdge
      Serial:  H8BMXM2

 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:
      8x 002C00B3002C 36ASF4G72PZ-3G2E7 32 GB 2 rank 3200
      5x 002C069D002C 36ASF4G72PZ-3G2E7 32 GB 2 rank 3200
      18x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
      11x 00AD063200AD HMA84GR7CJR4N-XN 32 GB 2 rank 3200
      6x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933

 (End of data from sysinfo program)
```

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The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux

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 Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 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++ Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

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

(Continued on next page)

Compiler Version Notes (Continued)

```
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

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 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-fuse-ld=gold -qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries

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Base Optimization Flags (Continued)

C++ benchmarks (continued):
-Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse
-funroll-loops -fuse-ld=gold -qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.html
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-revE12.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-revE12.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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