# SPEC CPU®2017 Integer Rate Result

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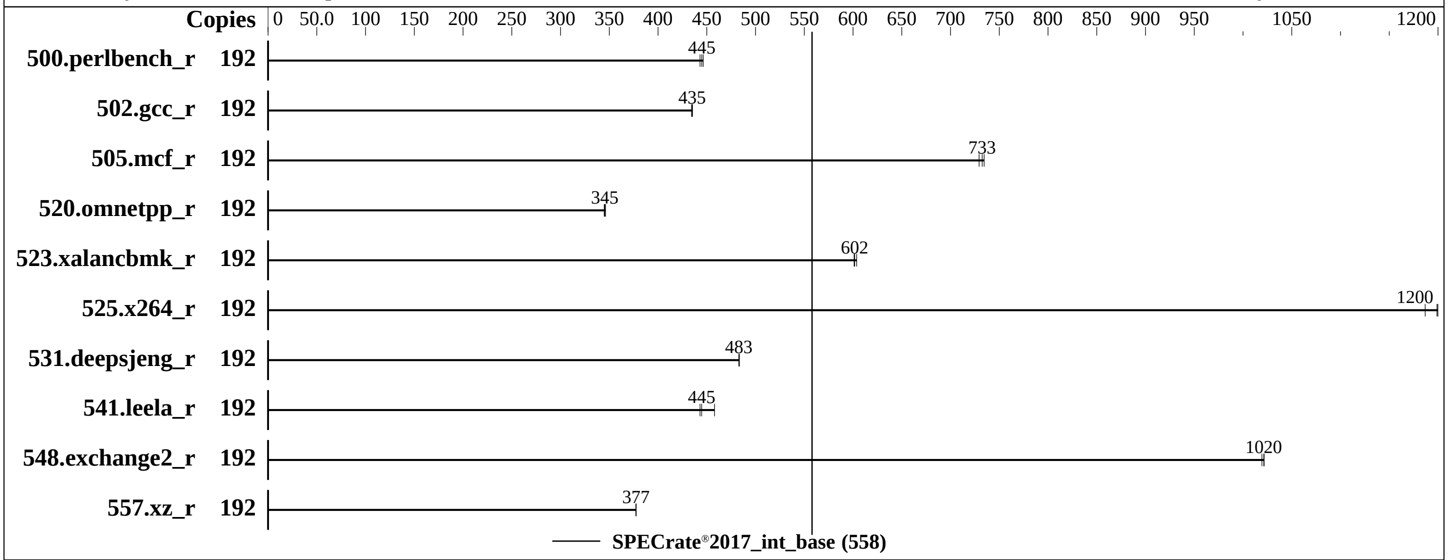
## Intel Corporation
## Intel S9248WK1HLC

SPECrate®2017_int_base = 558

SPECrate®2017_int_peak = Not Run

**CPU2017 License:** 13
**Test Sponsor:** Intel Corporation
**Tested by:** Intel Corporation
**Test Date:** Feb-2019
**Hardware Availability:** Jun-2019
**Software Availability:** Feb-2019




### Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon Platinum 9242 |
| Max MHz: | 3800 |
| Nominal: | 2300 |
| Enabled: | 96 cores, 2 chips, 2 threads/core |
| Orderable: | 2 chips |
| Cache L1: | 32 KB I + 32 KB D on chip per core |
| L2: | 1 MB I+D on chip per core |
| L3: | 71.5 MB I+D on chip per chip |
| Other: | None |
| Memory: | 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R, configured at 2934) |
| Storage: | Toshiba XG5 NVMe SSD 512GB, M.2 PCIe |
| Other: | None |

### Software

| | |
|---|---|
| OS: | CentOS Linux release 7.6.1810 (Core) 4.20.0+ |
| Compiler: | 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 |
| Parallel: | No |
| Firmware: | Version SE5C620.86B.0D.01.0403.022020190327 Released Feb-2019 |
| File System: | xfs |
| System State: | Run level 5 (multi-user graphical) |
| 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 | 192 | 690 | 443 | **687** | **445** | 685 | 446 | | | | | | | |
| 502.gcc_r | 192 | **625** | **435** | 624 | 435 | 626 | 434 | | | | | | | |
| 505.mcf_r | 192 | **424** | **733** | 422 | 734 | 425 | 729 | | | | | | | |
| 520.omnetpp_r | 192 | 728 | 346 | 731 | 345 | **729** | **345** | | | | | | | |
| 523.xalancbmk_r | 192 | 336 | 604 | 337 | 601 | **337** | **602** | | | | | | | |
| 525.x264_r | 192 | 280 | 1200 | **280** | **1200** | 283 | 1190 | | | | | | | |
| 531.deepsjeng_r | 192 | **456** | **483** | 456 | 483 | 455 | 483 | | | | | | | |
| 541.leela_r | 192 | 694 | 458 | 718 | 443 | **715** | **445** | | | | | | | |
| 548.exchange2_r | 192 | 493 | 1020 | **493** | **1020** | 492 | 1020 | | | | | | | |
| 557.xz_r | 192 | 550 | 377 | 549 | 378 | **549** | **377** | | | | | | | |

SPECrate®2017_int_base = **558**

SPECrate®2017_int_peak = **Not Run**

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/DCPerfKit/src/cpu2017/lib/ia32:/home/DCPerfKit/src/cpu2017/lib/intel64:\
/home/DCPerfKit/src/cpu2017/je5.0.1-32:/home/DCPerfKit/src/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
 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>
 Yes: 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)
```

**(Continued on next page)**

## General Notes (Continued)

```
 is mitigated in the system as tested and documented.
```

## Platform Notes

```
BIOS Configuration:
CPU Power and Performance Policy set to Performance
Advanced -> Power & Performance -> CPU Power and Performance Policy -> Performance
IMC Interleaving set to 1-way Interleave
Advanced -> Memory Configuration -> IMC Interleaving -> 1-way Interleave
Sub_NUMA Cluster set to Enabled
Advanced -> Memory Configuration -> Memory RAS and Performance Configuration -> Sub_NUMA Cluster -> Enabled
 Sysinfo program /home/DCPerfKit/src/cpu2017/bin/sysinfo
 Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
 running on localhost.localdomain Mon Feb 25 19:24:07 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 : Genuine Intel(R) CPU 0000%@
       2  "physical id"s (chips)
       192 "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 : 48
       siblings  : 96
       physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
       physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

 From lscpu:
      Architecture:          x86_64
      CPU op-mode(s):        32-bit, 64-bit
      Byte Order:            Little Endian
      CPU(s):                192
      On-line CPU(s) list:   0-191
      Thread(s) per core:    2
      Core(s) per socket:    48
      Socket(s):             2
      NUMA node(s):          8
      Vendor ID:             GenuineIntel
      CPU family:            6
      Model:                 85
      Model name:            Genuine Intel(R) CPU 0000%@
      Stepping:              6
      CPU MHz:               3360.784
```

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## Platform Notes (Continued)

```
     CPU max MHz:           3800.0000
     CPU min MHz:           1000.0000
     BogoMIPS:              4400.00
     Virtualization:        VT-x
     L1d cache:             32K
     L1i cache:             32K
     L2 cache:              1024K
     L3 cache:              33792K
     NUMA node0 CPU(s):     0-2,6-8,12-14,18-20,96-98,102-104,108-110,114-116
     NUMA node1 CPU(s):     3-5,9-11,15-17,21-23,99-101,105-107,111-113,117-119
     NUMA node2 CPU(s):     24-26,30-32,36-38,42-44,120-122,126-128,132-134,138-140
     NUMA node3 CPU(s):     27-29,33-35,39-41,45-47,123-125,129-131,135-137,141-143
     NUMA node4 CPU(s):     48-50,54-56,60-62,66-68,144-146,150-152,156-158,162-164
     NUMA node5 CPU(s):     51-53,57-59,63-65,69-71,147-149,153-155,159-161,165-167
     NUMA node6 CPU(s):     72-74,78-80,84-86,90-92,168-170,174-176,180-182,186-188
     NUMA node7 CPU(s):     75-77,81-83,87-89,93-95,171-173,177-179,183-185,189-191
     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
     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 ept_ad 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 hwp hwp_act_window hwp_epp
     hwp_pkg_req pku ospke avx512_vnni flush_l1d arch_capabilities

 /proc/cpuinfo cache data
    cache size : 33792 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 1 2 6 7 8 12 13 14 18 19 20 96 97 98 102 103 104 108 109 110 114 115 116
   node 0 size: 95383 MB
   node 0 free: 95060 MB
   node 1 cpus: 3 4 5 9 10 11 15 16 17 21 22 23 99 100 101 105 106 107 111 112 113 117 118
   119
   node 1 size: 96763 MB
   node 1 free: 96325 MB
   node 2 cpus: 24 25 26 30 31 32 36 37 38 42 43 44 120 121 122 126 127 128 132 133 134
   138 139 140
   node 2 size: 96763 MB
   node 2 free: 96496 MB
   node 3 cpus: 27 28 29 33 34 35 39 40 41 45 46 47 123 124 125 129 130 131 135 136 137
```

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## Platform Notes (Continued)

```
    141 142 143
    node 3 size: 96763 MB
    node 3 free: 95470 MB
    node 4 cpus: 48 49 50 54 55 56 60 61 62 66 67 68 144 145 146 150 151 152 156 157 158
    162 163 164
    node 4 size: 96763 MB
    node 4 free: 96554 MB
    node 5 cpus: 51 52 53 57 58 59 63 64 65 69 70 71 147 148 149 153 154 155 159 160 161
    165 166 167
    node 5 size: 96738 MB
    node 5 free: 96554 MB
    node 6 cpus: 72 73 74 78 79 80 84 85 86 90 91 92 168 169 170 174 175 176 180 181 182
    186 187 188
    node 6 size: 96763 MB
    node 6 free: 96570 MB
    node 7 cpus: 75 76 77 81 82 83 87 88 89 93 94 95 171 172 173 177 178 179 183 184 185
    189 190 191
    node 7 size: 96761 MB
    node 7 free: 96519 MB
    node distances:
    node   0   1   2   3   4   5   6   7
      0:  10  11  21  21  21  21  21  21
      1:  11  10  21  21  21  21  21  21
      2:  21  21  10  11  21  21  21  21
      3:  21  21  11  10  21  21  21  21
      4:  21  21  21  21  10  11  21  21
      5:  21  21  21  21  11  10  21  21
      6:  21  21  21  21  21  21  10  11
      7:  21  21  21  21  21  21  11  10

  From /proc/meminfo
     MemTotal:       791245064 kB
     HugePages_Total:       0
     Hugepagesize:       2048 kB

  From /etc/*release* /etc/*version*
     centos-release: CentOS Linux release 7.6.1810 (Core)
     centos-release-upstream: Derived from Red Hat Enterprise Linux 7.6 (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"
```

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## Platform Notes (Continued)

```
    redhat-release: CentOS Linux release 7.6.1810 (Core)
    system-release: CentOS Linux release 7.6.1810 (Core)
    system-release-cpe: cpe:/o:centos:centos:7

 uname -a:
    Linux localhost.localdomain 4.20.0+ #2 SMP Fri Feb 22 13:13:14 PST 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: conditional, RSB
 filling

 run-level 5 Feb 25 13:00

 SPEC is set to: /home/DCPerfKit/src/cpu2017
    Filesystem              Type  Size  Used Avail Use% Mounted on
    /dev/mapper/centos-home xfs   418G   33G  386G   8% /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 Intel Corporation SE5C620.86B.0D.01.0403.022020190327 02/20/2019
   Memory:
    24x 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)
------------------------------------------------------------------------------
```

(Continued on next page)

## Compiler Version Notes (Continued)

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

==============================================================================
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`

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## Base Optimization Flags (Continued)

C benchmarks (continued):
```
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
-lqkmalloc
```

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-Platform-Settings-V1.1.html
http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-Platform-Settings-V1.1.xml
http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.xml



Tested with SPEC CPU®2017 v1.0.5 on 2019-02-25 19:24:06-0500.
Report generated on 2020-10-30 15:38:11 by CPU2017 PS formatter v6255.
Originally published on 2019-04-02.