SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

$SPECrate^{®}2017\_int\_base = \quad 233$

ProLiant DL380 Gen10
(2.90 GHz, Intel Xeon Gold 6226R)

$SPECrate^{®}2017\_int\_peak = Not\ Run$

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Apr-2021

Hardware Availability: Mar-2021

Software Availability: Dec-2020

Benchmark	Copies	Result
500.perlbench_r	64	161
502.gcc_r	64	177
505.mcf_r	64	388
520.omnetpp_r	64	137
523.xalancbmk_r	64	303
525.x264_r	64	482
531.deepsjeng_r	64	189
541.leela_r	64	182
548.exchange2_r	64	451
557.xz_r	64	139

SPECrate®2017_int_base (233)

Hardware

CPU Name: Intel Xeon Gold 6226R

Max MHz: 3900

Nominal: 2900

Enabled: 32 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: 22 MB I+D on chip per chip

Other: None

Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)

Storage: 2 x 600 GB SAS HDD, 15K RPM, RAID 1

Other: None

Software

OS: Red Hat Enterprise Linux 8.2
Kernel 4.18.0-193.el8.x86_64

Compiler: C/C++: Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux;
Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux;
C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux

Parallel: No

Firmware: HPE BIOS Version U30 2.50 (03/12/2021) released Mar-2021

File System: xfs

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

Standard Performance Evaluation Corporation (info@spec.org)
https://www.spec.org/

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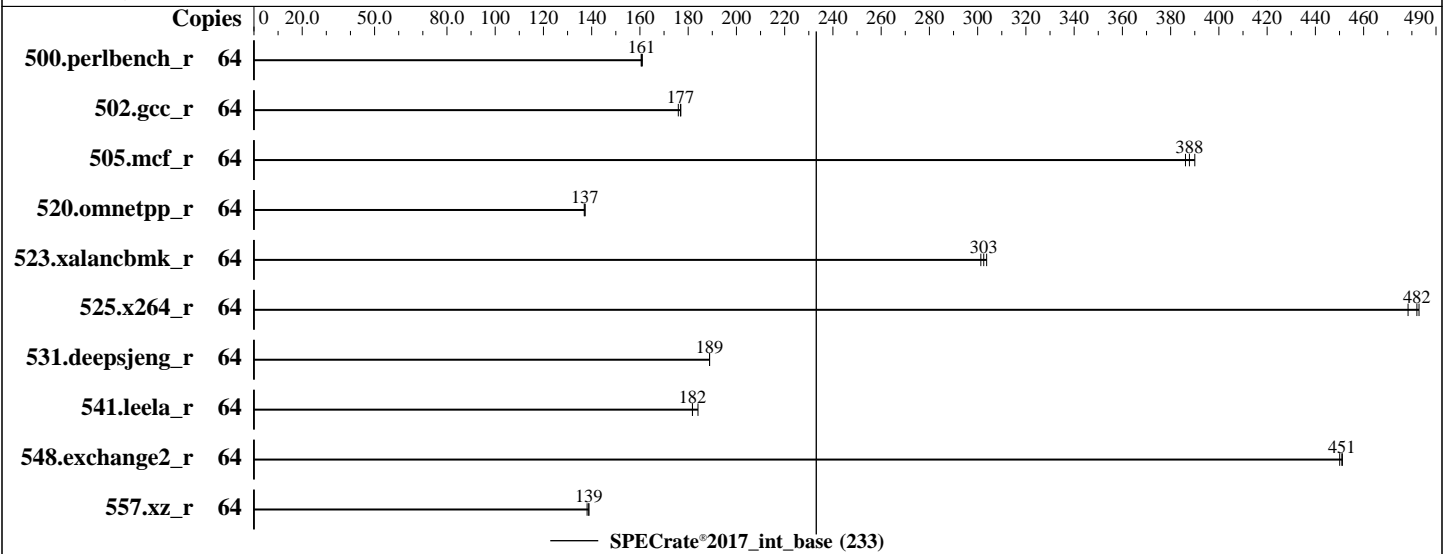|	
CPU2017 License: 3	**Test Date:** Apr-2021
Test Sponsor: HPE	**Hardware Availability:** Mar-2021
Tested by: HPE	**Software Availability:** Dec-2020

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	64	633	161	**634**	**161**	635	161							
502.gcc_r	64	515	176	**513**	**177**	512	177							
505.mcf_r	64	**267**	**388**	265	390	268	386							
520.omnetpp_r	64	613	137	612	137	**612**	**137**							
523.xalancbmk_r	64	224	301	**223**	**303**	223	304							
525.x264_r	64	232	483	**232**	**482**	234	478							
531.deepsjeng_r	64	388	189	388	189	**388**	**189**							
541.leela_r	64	**583**	**182**	583	182	576	184							
548.exchange2_r	64	372	451	**372**	**451**	373	450							
557.xz_r	64	501	138	**498**	**139**	498	139							
SPECrate®2017_int_base =	**233**													
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"
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

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/home/SPEC-CPU2017/lib/intel64:/home/SPEC-CPU2017/lib/ia32:/home/SPEC-C
     PU2017/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

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CPU2017 License: 3		**Test Date:**	Apr-2021
Test Sponsor:	HPE	**Hardware Availability:**	Mar-2021
Tested by:	HPE	**Software Availability:**	Dec-2020

General Notes (Continued)

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.

Platform Notes

```
BIOS Configuration:
Thermal Configuration set to Maximum Cooling
Memory Patrol Scrubbing set to Disabled
LLC Prefetch set to Enabled
LLC Dead Line Allocation set to Disabled
Enhanced Processor Performance set to Enabled
Workload Profile set to General Throughput Compute
Workload Profile set to Custom
Energy/Performance Bias set to Balanced Power

 Sysinfo program /home/SPEC-CPU2017/bin/sysinfo
 Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
 running on localhost.localdomain Wed Apr 14 01:15:32 2021

 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 6226R CPU @ 2.90GHz
       2  "physical id"s (chips)
       64 "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 : 16
       siblings  : 32
       physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
       physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

 From lscpu:
    Architecture:        x86_64
    CPU op-mode(s):      32-bit, 64-bit
    Byte Order:          Little Endian
    CPU(s):              64
    On-line CPU(s) list: 0-63
    Thread(s) per core:  2
    Core(s) per socket:  16
```

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CPU2017 License: 3

Test Sponsor: HPE

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Test Date: Apr-2021

Hardware Availability: Mar-2021

Software Availability: Dec-2020

Platform Notes (Continued)

```
        Socket(s):            2
        NUMA node(s):         4
        Vendor ID:            GenuineIntel
        CPU family:           6
        Model:                85
        Model name:           Intel(R) Xeon(R) Gold 6226R CPU @ 2.90GHz
        Stepping:             7
        CPU MHz:              1268.663
        BogoMIPS:             5800.00
        Virtualization:       VT-x
        L1d cache:            32K
        L1i cache:            32K
        L2 cache:             1024K
        L3 cache:             22528K
        NUMA node0 CPU(s):    0-7,32-39
        NUMA node1 CPU(s):    8-15,40-47
        NUMA node2 CPU(s):    16-23,48-55
        NUMA node3 CPU(s):    24-31,56-63
        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 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 : 22528 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 1 2 3 4 5 6 7 32 33 34 35 36 37 38 39
   node 0 size: 193126 MB
   node 0 free: 192683 MB
   node 1 cpus: 8 9 10 11 12 13 14 15 40 41 42 43 44 45 46 47
   node 1 size: 193504 MB
   node 1 free: 193014 MB
   node 2 cpus: 16 17 18 19 20 21 22 23 48 49 50 51 52 53 54 55
   node 2 size: 193532 MB
   node 2 free: 192955 MB
   node 3 cpus: 24 25 26 27 28 29 30 31 56 57 58 59 60 61 62 63
```

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Hardware Availability: Mar-2021
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Platform Notes (Continued)

```
   node 3 size: 193531 MB
   node 3 free: 193227 MB
   node distances:
   node   0   1   2   3
     0:  10  21  31  31
     1:  21  10  31  31
     2:  31  31  10  21
     3:  31  31  21  10

 From /proc/meminfo
    MemTotal:       792263780 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

 /sbin/tuned-adm active
    Current active profile: throughput-performance

 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 localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020
    x86_64 x86_64 x86_64 GNU/Linux

 Kernel self-reported vulnerability status:

 CVE-2018-12207 (iTLB Multihit):               KVM: Mitigation: Split huge pages
 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
```

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Platform Notes (Continued)

```
 CVE-2017-5715 (Spectre variant 2):                    Mitigation: Enhanced IBRS, IBPB:
                                                        conditional, RSB filling
 CVE-2020-0543 (Special Register Buffer Data Sampling): No status reported
 CVE-2019-11135 (TSX Asynchronous Abort):              Mitigation: Clear CPU buffers; SMT
                                                        vulnerable


 run-level 3 Apr 14 01:10


 SPEC is set to: /home/SPEC-CPU2017
    Filesystem              Type  Size  Used Avail Use% Mounted on
    /dev/mapper/rhel-home xfs   504G  227G  277G  45% /home


 From /sys/devices/virtual/dmi/id
    Vendor:         HPE
    Product:        ProLiant DL380 Gen10
    Product Family: ProLiant
    Serial:         2M2726078X


 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:
     24x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933


 BIOS:
    BIOS Vendor:       HPE
    BIOS Version:      U30
    BIOS Date:         03/12/2021
    BIOS Revision:     2.50
    Firmware Revision: 2.14


 (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) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


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

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Compiler Version Notes (Continued)

```
C++     | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
        | 541.leela_r(base)
------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------


========================================================================
Fortran | 548.exchange2_r(base)
------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
  Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`icx`

C++ benchmarks:
`icpx`

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`

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Base Optimization Flags

C benchmarks:
```
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc
```

C++ benchmarks:
```
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc
```

Fortran benchmarks:
```
-w -m64 -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/opt/intel/oneapi/compiler/2021.1.1/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-ic2021-official-linux64_revA.html
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.3-CLX-revC.html

You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.3-CLX-revC.xml

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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