SPEC CPU®2017 Integer Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc.

PowerEdge M640 (Intel Xeon Silver 4215R, 3.20 GHz)

$SPECspeed^{®}2017\_int\_base = 10.3$

$SPECspeed^{®}2017\_int\_peak = 10.5$

CPU2017 License: 55　　　　　　　　　　　　　　　　　　**Test Date:** Nov-2021
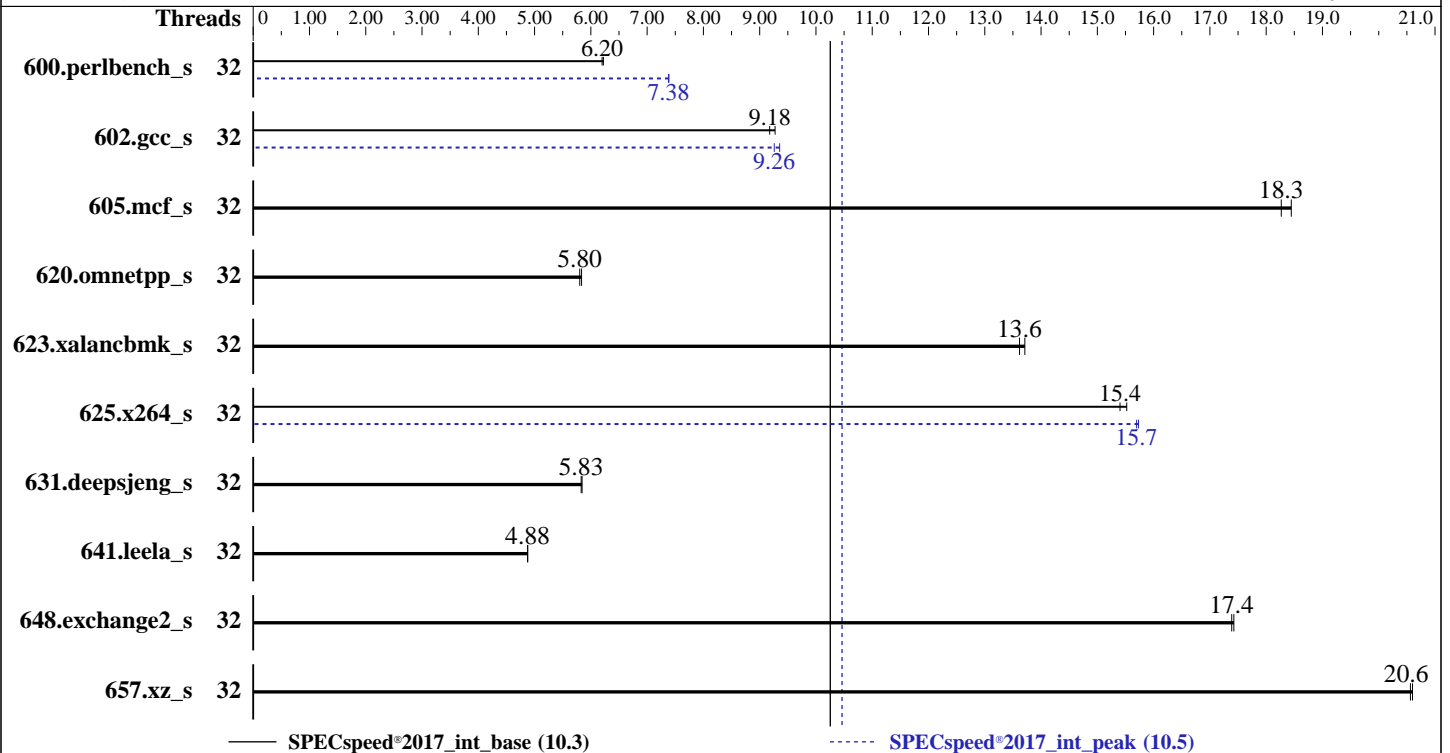**Test Sponsor:** Dell Inc.　　　　　　　　　　　　　　　　**Hardware Availability:** Apr-2019
Tested by: Dell Inc.　　　　　　　　　　　　　　　　　**Software Availability:** May-2021

Threads

Benchmark	Threads	base	peak
600.perlbench_s	32	6.20	7.38
602.gcc_s	32	9.18	9.26
605.mcf_s	32	18.3	
620.omnetpp_s	32	5.80	
623.xalancbmk_s	32	13.6	
625.x264_s	32	15.4	15.7
631.deepsjeng_s	32	5.83	
641.leela_s	32	4.88	
648.exchange2_s	32	17.4	
657.xz_s	32	20.6	

SPECspeed®2017_int_base (10.3)　　　　　　SPECspeed®2017_int_peak (10.5)

Hardware

CPU Name: Intel Xeon Silver 4215R
　Max MHz: 4000
　Nominal: 3200
Enabled: 16 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
　L2: 1 MB I+D on chip per core
　L3: 11 MB I+D on chip per chip
　Other: None
Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)
Storage: 125 GB on tmpfs
Other: None

Software

OS: Red Hat Enterprise Linux 8.4 (Ootpa)
　　　　4.18.0-305.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: Yes
Firmware: Version 2.12.2 released Jul-2021
File System: tmpfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage.

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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	32	285	6.22	**286**	**6.20**			32	240	7.39	**241**	**7.38**		
602.gcc_s	32	429	9.27	**434**	**9.18**			32	426	9.35	**430**	**9.26**		
605.mcf_s	32	256	18.4	**258**	**18.3**			32	256	18.4	**258**	**18.3**		
620.omnetpp_s	32	**281**	**5.80**	280	5.83			32	**281**	**5.80**	280	5.83		
623.xalancbmk_s	32	103	13.7	**104**	**13.6**			32	103	13.7	**104**	**13.6**		
625.x264_s	32	**115**	**15.4**	114	15.5			32	**112**	**15.7**	112	15.7		
631.deepsjeng_s	32	245	5.84	**246**	**5.83**			32	245	5.84	**246**	**5.83**		
641.leela_s	32	350	4.88	**350**	**4.88**			32	350	4.88	**350**	**4.88**		
648.exchange2_s	32	169	17.4	**169**	**17.4**			32	169	17.4	**169**	**17.4**		
657.xz_s	32	300	20.6	**301**	**20.6**			32	300	20.6	**301**	**20.6**		

SPECspeed®2017_int_base =	**10.3**
SPECspeed®2017_int_peak =	**10.5**

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

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:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH =
     "/mnt/ramdisk/kavya/lib/intel64:/mnt/ramdisk/kavya/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"
```

General Notes

```
 Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
 memory using Redhat Enterprise Linux 8.0
 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
 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

 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)
```

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Dell Inc.

PowerEdge M640 (Intel Xeon Silver 4215R, 3.20 GHz)

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SPECspeed®2017_int_peak = 10.5

CPU2017 License: 55   **Test Date:**   Nov-2021
Test Sponsor: Dell Inc.   **Hardware Availability:** Apr-2019
Tested by: Dell Inc.   **Software Availability:** May-2021

General Notes (Continued)

```
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.

Benchmark run from a 125 GB ramdisk created with the cmd: "mount -t tmpfs -o size=125G tmpfs /mnt/ramdisk"
```

Platform Notes

```
  BIOS Settings:
    Virtualization Technology : Disabled

                  System Profile : Custom
        CPU Power Management : Maximum Performance
                         C1E : Disabled
                    C States : Autonomous
        Memory Patrol Scrub : Disabled
     Energy Efficiency Policy : Performance
  CPU Interconnect Bus Link
            Power Management : Disabled
         PCI ASPM L1 Link
            Power Management : Disabled


  Sysinfo program /mnt/ramdisk/kavya/bin/sysinfo
  Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
  running on localhost.localdomain Wed Nov  3 11:56:12 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) Silver 4215R CPU @ 3.20GHz
        2  "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 : 8
        siblings  : 16
        physical 0: cores 0 1 2 3 4 5 6 7
        physical 1: cores 0 1 2 3 4 5 6 7

  From lscpu from util-linux 2.32.1:
       Architecture:        x86_64
       CPU op-mode(s):      32-bit, 64-bit
       Byte Order:          Little Endian
```

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CPU2017 License: 55
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Hardware Availability: Apr-2019
Software Availability: May-2021

Platform Notes (Continued)

```
        CPU(s):              32
        On-line CPU(s) list: 0-31
        Thread(s) per core:  2
        Core(s) per socket:  8
        Socket(s):           2
        NUMA node(s):        2
        Vendor ID:           GenuineIntel
        BIOS Vendor ID:      Intel
        CPU family:          6
        Model:               85
        Model name:          Intel(R) Xeon(R) Silver 4215R CPU @ 3.20GHz
        BIOS Model name:     Intel(R) Xeon(R) Silver 4215R CPU @ 3.20GHz
        Stepping:            7
        CPU MHz:             1525.276
        CPU max MHz:         4000.0000
        CPU min MHz:         1000.0000
        BogoMIPS:            6400.00
        Virtualization:      VT-x
        L1d cache:           32K
        L1i cache:           32K
        L2 cache:            1024K
        L3 cache:            11264K
        NUMA node0 CPU(s):   0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30
        NUMA node1 CPU(s):   1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31
        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
    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 fsgsbase tsc_adjust
    bmi1 hle avx2 smep bmi2 erms invpcid 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 : 11264 KB

 From numactl --hardware
 WARNING: a numactl 'node' might or might not correspond to a physical chip.
   available: 2 nodes (0-1)
   node 0 cpus: 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
   node 0 size: 192073 MB
   node 0 free: 191557 MB
   node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31
   node 1 size: 193494 MB
```

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Hardware Availability: Apr-2019
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Platform Notes (Continued)

```
   node 1 free: 183884 MB
   node distances:
   node   0   1
     0:  10  21
     1:  21  10

 From /proc/meminfo
    MemTotal:        394822048 kB
    HugePages_Total:         0
    Hugepagesize:         2048 kB

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

 /sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has
    performance

 From /etc/*release* /etc/*version*
    os-release:
       NAME="Red Hat Enterprise Linux"
       VERSION="8.4 (Ootpa)"
       ID="rhel"
       ID_LIKE="fedora"
       VERSION_ID="8.4"
       PLATFORM_ID="platform:el8"
       PRETTY_NAME="Red Hat Enterprise Linux 8.4 (Ootpa)"
       ANSI_COLOR="0;31"
    redhat-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
    system-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
    system-release-cpe: cpe:/o:redhat:enterprise_linux:8.4:ga

 uname -a:
    Linux localhost.localdomain 4.18.0-305.el8.x86_64 #1 SMP Thu Apr 29 08:54:30 EDT 2021
    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): Not affected
 CVE-2019-11135 (TSX Asynchronous Abort):              Mitigation: TSX disabled

 run-level 3 Nov 3 11:45

 SPEC is set to: /mnt/ramdisk/kavya
    Filesystem      Type   Size  Used Avail Use% Mounted on
    tmpfs           tmpfs  125G  4.4G  121G   4% /mnt/ramdisk

 From /sys/devices/virtual/dmi/id
     Vendor:          Dell Inc.
     Product:         PowerEdge M640
     Product Family:  PowerEdge

 Additional information from dmidecode 3.2 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:
     5x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2400
     4x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2400
     3x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2400

 BIOS:
    BIOS Vendor:      Dell Inc.
    BIOS Version:     2.12.2
    BIOS Date:        07/12/2021
    BIOS Revision:    2.12

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C           | 600.perlbench_s(peak)
------------------------------------------------------------------------------
Intel(R) C 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.
------------------------------------------------------------------------------


==============================================================================
C           | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak)
            | 625.x264_s(base, peak) 657.xz_s(base, peak)
```

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Software Availability: May-2021

Compiler Version Notes (Continued)

```
--------------------------------------------------------------------------
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.
--------------------------------------------------------------------------


==========================================================================
C        | 600.perlbench_s(peak)
--------------------------------------------------------------------------
Intel(R) C 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.
--------------------------------------------------------------------------


==========================================================================
C        | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak)
         | 625.x264_s(base, peak) 657.xz_s(base, peak)
--------------------------------------------------------------------------
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.
--------------------------------------------------------------------------


==========================================================================
C++      | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak)
         | 631.deepsjeng_s(base, peak) 641.leela_s(base, peak)
--------------------------------------------------------------------------
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 | 648.exchange2_s(base, peak)
--------------------------------------------------------------------------
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

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Base Compiler Invocation (Continued)

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-DSPEC_OPENMP -std=c11 -m64 -fiopenmp -Wl,-z,muldefs -xCORE-AVX2
-O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:
-DSPEC_OPENMP -m64 -Wl,-z,muldefs -xCORE-AVX2 -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:
-m64 -xCORE-AVX2 -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries

https://www.spec.org/

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Peak Compiler Invocation

C benchmarks (except as noted below):
`icx`

 600.perlbench_s: `icc`

C++ benchmarks:
`icpx`

Fortran benchmarks:
`ifort`

Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:

 600.perlbench_s: `-Wl,-z,muldefs` `-prof-gen`(pass 1) `-prof-use`(pass 2)
`-xCORE-AVX2 -ipo -O3 -no-prec-div`
`-qopt-mem-layout-trans=4 -fno-strict-overflow`
`-mbranches-within-32B-boundaries`
`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

 602.gcc_s: `-m64 -std=c11 -Wl,-z,muldefs -fprofile-generate`(pass 1)
`-fprofile-use=default.profdata`(pass 2) `-xCORE-AVX2 -flto`
`-Ofast`(pass 1) `-O3 -ffast-math -qopt-mem-layout-trans=4`
`-mbranches-within-32B-boundaries`
`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

 605.mcf_s: `basepeak = yes`

 625.x264_s: `-DSPEC_OPENMP -fiopenmp -std=c11 -m64 -Wl,-z,muldefs`
`-xCORE-AVX2 -flto -O3 -ffast-math`
`-qopt-mem-layout-trans=4 -fno-alias`
`-mbranches-within-32B-boundaries`
`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

 657.xz_s: `basepeak = yes`

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Peak Optimization Flags (Continued)

C++ benchmarks:

620.omnetpp_s: `basepeak = yes`

623.xalancbmk_s: `basepeak = yes`

631.deepsjeng_s: `basepeak = yes`

641.leela_s: `basepeak = yes`

Fortran benchmarks:

648.exchange2_s: `basepeak = yes`

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/Dell-Platform-Flags-PowerEdge-Intel-ICX-rev1.4.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/Dell-Platform-Flags-PowerEdge-Intel-ICX-rev1.4.xml`

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

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