SPEC CPU®2017 Integer Speed Result

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Dell Inc.

PowerEdge FC640 (Intel Xeon Bronze 3206R, 1.90 GHz)

$SPECspeed®2017\_int\_base = 5.53$

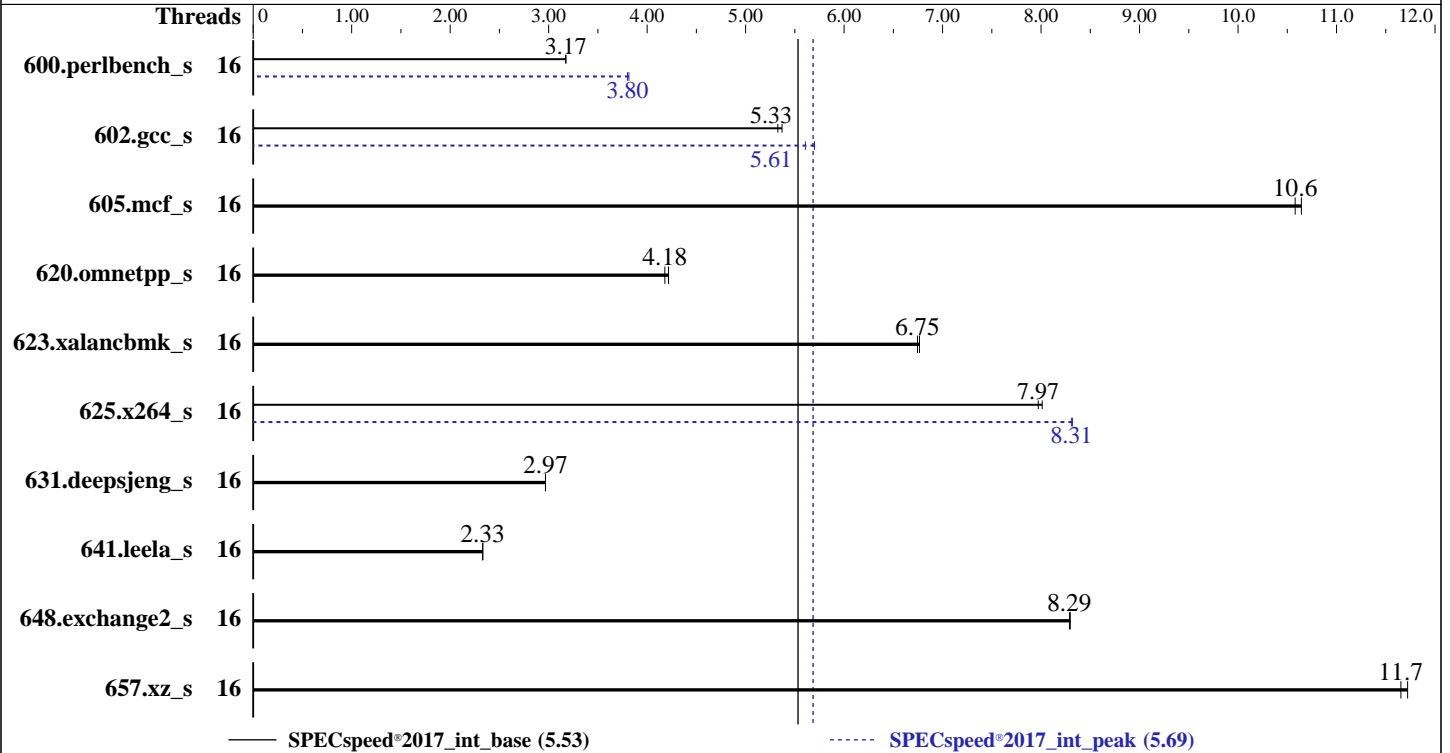$SPECspeed®2017\_int\_peak = 5.69$

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

Test Date: Nov-2021
Hardware Availability: Apr-2019
Software Availability: May-2021

Threads		
600.perlbench_s 16	3.17	3.80
602.gcc_s 16	5.33	5.61
605.mcf_s 16	10.6	
620.omnetpp_s 16	4.18	
623.xalancbmk_s 16	6.75	
625.x264_s 16	7.97	8.31
631.deepsjeng_s 16	2.97	
641.leela_s 16	2.33	
648.exchange2_s 16	8.29	
657.xz_s 16	11.7	

SPECspeed®2017_int_base (5.53)   SPECspeed®2017_int_peak (5.69)

Hardware

CPU Name: Intel Xeon Bronze 3206R
 Max MHz: 1900
 Nominal: 1900
Enabled: 16 cores, 2 chips
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 2133)
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	16	559	3.18	**559**	**3.17**			16	**467**	**3.80**	465	3.81		
602.gcc_s	16	742	5.37	**747**	**5.33**			16	699	5.70	**710**	**5.61**		
605.mcf_s	16	**446**	**10.6**	444	10.6			16	**446**	**10.6**	444	10.6		
620.omnetpp_s	16	387	4.22	**390**	**4.18**			16	387	4.22	**390**	**4.18**		
623.xalancbmk_s	16	**210**	**6.75**	209	6.77			16	**210**	**6.75**	209	6.77		
625.x264_s	16	220	8.01	**221**	**7.97**			16	212	8.32	**212**	**8.31**		
631.deepsjeng_s	16	**483**	**2.97**	483	2.97			16	**483**	**2.97**	483	2.97		
641.leela_s	16	**732**	**2.33**	732	2.33			16	**732**	**2.33**	732	2.33		
648.exchange2_s	16	354	8.30	**355**	**8.29**			16	354	8.30	**355**	**8.29**		
657.xz_s	16	**530**	**11.7**	527	11.7			16	**530**	**11.7**	527	11.7		
SPECspeed®2017_int_base =			**5.53**											
SPECspeed®2017_int_peak =			**5.69**											

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/cpu2017-1.1.8-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.
     1.8-ic2021.1/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.
```

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Hardware Availability: Apr-2019
Software Availability: May-2021

General Notes (Continued)

```
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.

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/cpu2017-1.1.8-ic2021.1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Mon Nov 22 10:49:09 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) Bronze 3206R CPU @ 1.90GHz
      2  "physical id"s (chips)
      16 "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  : 8
      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
```

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CPU2017 License: 55

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Platform Notes (Continued)

```
        Byte Order:          Little Endian
        CPU(s):              16
        On-line CPU(s) list: 0-15
        Thread(s) per core:  1
        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) Bronze 3206R CPU @ 1.90GHz
        BIOS Model name:     Intel(R) Xeon(R) Bronze 3206R CPU @ 1.90GHz
        Stepping:            7
        CPU MHz:             1899.999
        CPU max MHz:         1900.0000
        CPU min MHz:         1000.0000
        BogoMIPS:            3800.00
        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
        NUMA node1 CPU(s):   1,3,5,7,9,11,13,15
        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 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
   node 0 size: 192075 MB
   node 0 free: 183240 MB
   node 1 cpus: 1 3 5 7 9 11 13 15
```

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

Platform Notes (Continued)

```
  node 1 size: 193496 MB
  node 1 free: 193019 MB
  node distances:
  node   0   1
    0:  10  21
    1:  21  10

 From /proc/meminfo
    MemTotal:        394825944 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
```

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Platform Notes (Continued)

```
                                                   sanitization
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 22 10:46

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-ic2021.1
   Filesystem      Type    Size  Used Avail Use% Mounted on
   tmpfs           tmpfs   125G  4.1G  121G   4% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
    Vendor:         Dell Inc.
    Product:        PowerEdge FC640
    Product Family: PowerEdge
    Serial:         1234567

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:
    3x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2133
    6x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2133
    3x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2133

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.
------------------------------------------------------------------------------


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

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Compiler Version Notes (Continued)

```
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      | 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
```

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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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Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

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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-rev1.5.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-rev1.5.xml`

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

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