SPEC CPU®2017 Integer Speed Result

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Dell Inc.

$SPECspeed®2017\_int\_base = 10.5$

PowerEdge MX740c (Intel Xeon Gold 6242, 2.80GHz)
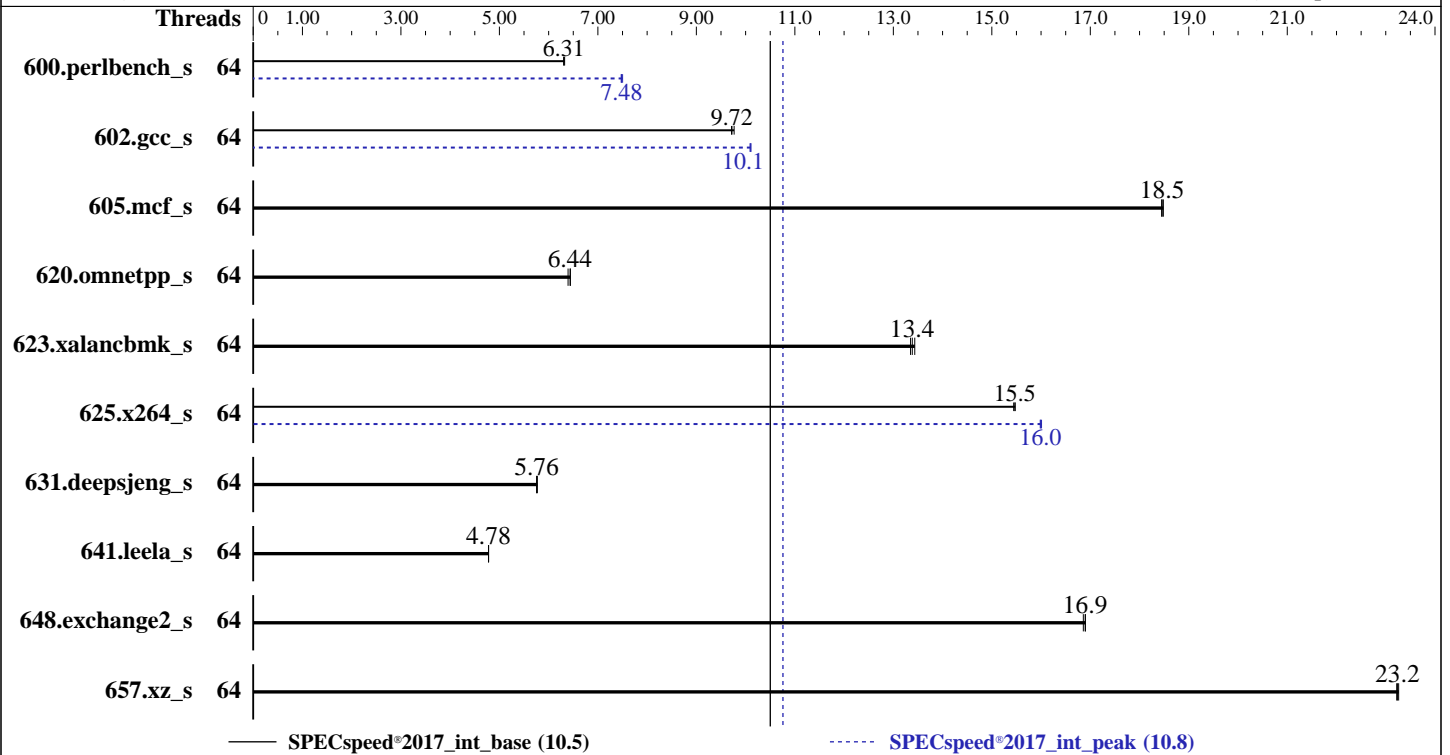
$SPECspeed®2017\_int\_peak = 10.8$

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

Test Date: Jun-2020
Hardware Availability: Apr-2019
Software Availability: Apr-2020

Threads — benchmark results:

- 600.perlbench_s 64: 6.31 / 7.48
- 602.gcc_s 64: 9.72 / 10.1
- 605.mcf_s 64: 18.5
- 620.omnetpp_s 64: 6.44
- 623.xalancbmk_s 64: 13.4
- 625.x264_s 64: 15.5 / 16.0
- 631.deepsjeng_s 64: 5.76
- 641.leela_s 64: 4.78
- 648.exchange2_s 64: 16.9
- 657.xz_s 64: 23.2

SPECspeed®2017_int_base (10.5) ———
SPECspeed®2017_int_peak (10.8) ------

Hardware

CPU Name: Intel Xeon Gold 6242
 Max MHz: 3900
 Nominal: 2800
Enabled: 32 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: 22 MB I+D on chip per chip
 Other: None
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)
Storage: 1 x 960 GB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 8.1
 kernel 4.18.0-147.el8.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: Yes
Firmware: Version 2.7.1 released Feb-2020
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 set to prefer performance at the cost of additional power usage.

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PowerEdge MX740c (Intel Xeon Gold 6242, 2.80GHz)

$SPECspeed®2017\_int\_base = 10.5$

$SPECspeed®2017\_int\_peak = 10.8$

CPU2017 License: 55	**Test Date:** Jun-2020
Test Sponsor: Dell Inc.	**Hardware Availability:** Apr-2019
Tested by: Dell Inc.	**Software Availability:** Apr-2020

Results Table

Benchmark	Base						Peak					
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	64	**281**	**6.31**	281	6.31	281	6.32	64	237	7.50	237	7.47	**237**	**7.48**
602.gcc_s	64	410	9.71	408	9.77	**410**	**9.72**	64	395	10.1	394	10.1	**394**	**10.1**
605.mcf_s	64	256	18.4	**256**	**18.5**	255	18.5	64	256	18.4	**256**	**18.5**	255	18.5
620.omnetpp_s	64	253	6.44	255	6.39	**253**	**6.44**	64	253	6.44	255	6.39	**253**	**6.44**
623.xalancbmk_s	64	**106**	**13.4**	105	13.4	106	13.3	64	**106**	**13.4**	105	13.4	106	13.3
625.x264_s	64	114	15.5	**114**	**15.5**	114	15.4	64	110	16.0	**110**	**16.0**	110	16.0
631.deepsjeng_s	64	**249**	**5.76**	248	5.77	249	5.76	64	**249**	**5.76**	248	5.77	249	5.76
641.leela_s	64	357	4.78	357	4.78	**357**	**4.78**	64	357	4.78	357	4.78	**357**	**4.78**
648.exchange2_s	64	**174**	**16.9**	174	16.9	174	16.9	64	**174**	**16.9**	174	16.9	174	16.9
657.xz_s	64	**266**	**23.2**	266	23.3	266	23.2	64	**266**	**23.2**	266	23.3	266	23.2

SPECspeed®2017_int_base =	**10.5**
SPECspeed®2017_int_peak =	**10.8**

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:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH =
     "/dev/shm/cpu2017-ic19.1u1/lib/intel64:/dev/shm/cpu2017-ic19.1u1/je5.0.1
     -64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"

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PowerEdge MX740c (Intel Xeon Gold 6242, 2.80GHz)

$SPECspeed®2017\_int\_base = 10.5$

$SPECspeed®2017\_int\_peak = 10.8$

CPU2017 License:	55	**Test Date:**	Jun-2020
Test Sponsor:	Dell Inc.	**Hardware Availability:**	Apr-2019
Tested by:	Dell Inc.	**Software Availability:**	Apr-2020

General Notes

```
Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5
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>
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
```

Platform Notes

```
BIOS settings:
Sub NUMA Cluster enabled
Virtualization Technology 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 /dev/shm/cpu2017-ic19.1u1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on localhost.localdomain Sat Jun  6 19:31:27 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
```

(Continued on next page)

SPEC CPU®2017 Integer Speed Result

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PowerEdge MX740c (Intel Xeon Gold 6242, 2.80GHz)

SPECspeed®2017_int_base = 10.5

SPECspeed®2017_int_peak = 10.8

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

Test Date: Jun-2020
Hardware Availability: Apr-2019
Software Availability: Apr-2020

Platform Notes (Continued)

```
 From /proc/cpuinfo
    model name : Intel(R) Xeon(R) Gold 6242 CPU @ 2.80GHz
       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
      Socket(s):           2
      NUMA node(s):        4
      Vendor ID:           GenuineIntel
      CPU family:          6
      Model:               85
      Model name:          Intel(R) Xeon(R) Gold 6242 CPU @ 2.80GHz
      Stepping:            6
      CPU MHz:             1218.992
      CPU max MHz:         3900.0000
      CPU min MHz:         1200.0000
      BogoMIPS:            5600.00
      Virtualization:      VT-x
      L1d cache:           32K
      L1i cache:           32K
      L2 cache:            1024K
      L3 cache:            22528K
      NUMA node0 CPU(s):   0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60
      NUMA node1 CPU(s):   1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61
      NUMA node2 CPU(s):   2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62
      NUMA node3 CPU(s):   3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63
      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
```

(Continued on next page)

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SPECspeed®2017_int_base = 10.5

SPECspeed®2017_int_peak = 10.8

CPU2017 License: 55
Test Sponsor: Dell Inc.
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Test Date: Jun-2020
Hardware Availability: Apr-2019
Software Availability: Apr-2020

Platform Notes (Continued)

```
       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 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60
    node 0 size: 192048 MB
    node 0 free: 182433 MB
    node 1 cpus: 1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61
    node 1 size: 193532 MB
    node 1 free: 193146 MB
    node 2 cpus: 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62
    node 2 size: 193532 MB
    node 2 free: 192378 MB
    node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 63
    node 3 size: 193532 MB
    node 3 free: 193078 MB
    node distances:
    node   0   1   2   3
      0:  10  21  11  21
      1:  21  10  21  11
      2:  11  21  10  21
      3:  21  11  21  10

 From /proc/meminfo
    MemTotal:       791188960 kB
    HugePages_Total:        0
    Hugepagesize:       2048 kB

 From /etc/*release* /etc/*version*
    os-release:
      NAME="Red Hat Enterprise Linux"
      VERSION="8.1 (Ootpa)"
      ID="rhel"
      ID_LIKE="fedora"
      VERSION_ID="8.1"
      PLATFORM_ID="platform:el8"
      PRETTY_NAME="Red Hat Enterprise Linux 8.1 (Ootpa)"
      ANSI_COLOR="0;31"
    redhat-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
    system-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
```

(Continued on next page)

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Tested by: Dell Inc.

Test Date: Jun-2020
Hardware Availability: Apr-2019
Software Availability: Apr-2020

Platform Notes (Continued)

```
    system-release-cpe: cpe:/o:redhat:enterprise_linux:8.1:ga

 uname -a:
    Linux localhost.localdomain 4.18.0-147.el8.x86_64 #1 SMP Thu Sep 26 15:52:44 UTC 2019
    x86_64 x86_64 x86_64 GNU/Linux

 Kernel self-reported vulnerability status:

 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


 run-level 3 Jun 5 10:50

 SPEC is set to: /dev/shm/cpu2017-ic19.1u1
    Filesystem      Type    Size  Used Avail Use% Mounted on
    tmpfs           tmpfs   378G  4.2G  374G   2% /dev/shm

 From /sys/devices/virtual/dmi/id
    BIOS:    Dell Inc. 2.7.1 02/14/2020
    Vendor:  Dell Inc.
    Product: PowerEdge MX740c
    Product Family: PowerEdge
    Serial:  1234567


 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:
      21x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
      1x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
      2x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933

 (End of data from sysinfo program)
```

Compiler Version Notes

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

(Continued on next page)

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PowerEdge MX740c (Intel Xeon Gold 6242, 2.80GHz)

SPECspeed®2017_int_base = 10.5

SPECspeed®2017_int_peak = 10.8

CPU2017 License: 55   **Test Date:** Jun-2020
Test Sponsor: Dell Inc.   **Hardware Availability:** Apr-2019
Tested by: Dell Inc.   **Software Availability:** Apr-2020

Compiler Version Notes (Continued)

```
         | 625.x264_s(base, peak) 657.xz_s(base, peak)
------------------------------------------------------------------------------
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        | 600.perlbench_s(peak)
------------------------------------------------------------------------------
Intel(R) C 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.
------------------------------------------------------------------------------


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


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

(Continued on next page)

Dell Inc.

PowerEdge MX740c (Intel Xeon Gold 6242, 2.80GHz)

SPECspeed®2017_int_base = 10.5

SPECspeed®2017_int_peak = 10.8

CPU2017 License: 55   **Test Date:**   Jun-2020
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Compiler Version Notes (Continued)

Base Compiler Invocation

C benchmarks:
`icc`

C++ benchmarks:
`icpc`

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:
```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX2 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-fuse-ld=gold -qopt-mem-layout-trans=4 -fopenmp -DSPEC_OPENMP
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

C++ benchmarks:
```
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX2 -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
```

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CPU2017 License: 55
Test Sponsor: Dell Inc.
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Base Optimization Flags (Continued)

Fortran benchmarks:
```
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -xCORE-AVX2
-O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte
-mbranches-within-32B-boundaries
```

Peak Compiler Invocation

C benchmarks:
```
icc
```

C++ benchmarks:
```
icpc
```

Fortran benchmarks:
```
ifort
```

Peak Portability Flags

600.perlbench_s: `-DSPEC_LP64 -DSPEC_LINUX_X64`
602.gcc_s: `-DSPEC_LP64`(*) `-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`

(*) Indicates a portability flag that was found in a non-portability variable.

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`

(Continued on next page)

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Test Sponsor: Dell Inc.
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Test Date: Jun-2020
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Peak Optimization Flags (Continued)

600.perlbench_s (continued):
```
-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 -qnextgen -std=c11 -fuse-ld=gold`
```
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-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
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

605.mcf_s: `basepeak = yes`

625.x264_s: `-m64 -qnextgen -std=c11`
```
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX2 -flto -O3 -ffast-math
-fuse-ld=gold -qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

657.xz_s: `basepeak = yes`

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-ic19.1u1-official-linux64_revA.html
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-revE10.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-revE10.xml

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CPU2017 License:	55	**Test Date:**	Jun-2020
Test Sponsor:	Dell Inc.	**Hardware Availability:**	Apr-2019
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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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