SPEC CPU®2017 Integer Speed Result

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Dell Inc.

PowerEdge R750 xa (Intel Xeon Gold 6338N, 2.20 GHz)

SPECspeed®2017_int_base = 11.9

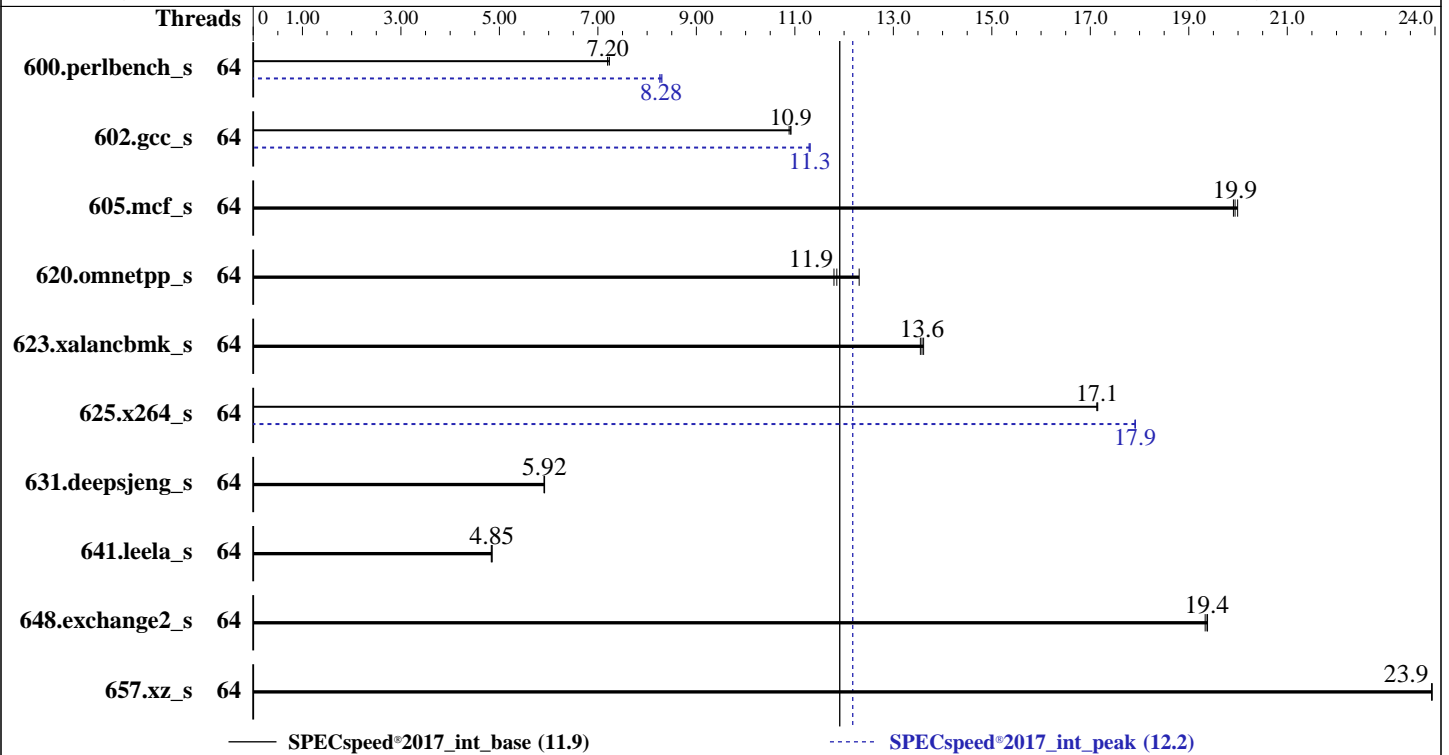SPECspeed®2017_int_peak = 12.2

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

Benchmark results (Threads = 64):

Benchmark	base	peak
600.perlbench_s	7.20	8.28
602.gcc_s	10.9	11.3
605.mcf_s	19.9	
620.omnetpp_s	11.9	
623.xalancbmk_s	13.6	
625.x264_s	17.1	17.9
631.deepsjeng_s	5.92	
641.leela_s	4.85	
648.exchange2_s	19.4	
657.xz_s	23.9	

SPECspeed®2017_int_base (11.9)   SPECspeed®2017_int_peak (12.2)

Hardware

CPU Name: Intel Xeon Gold 6338N
 Max MHz: 3500
 Nominal: 2200
Enabled: 64 cores, 2 chips
Orderable: 1,2 chips
Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 1.25 MB I+D on chip per core
 L3: 48 MB I+D on chip per chip
 Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)
Storage: 1 x 480 GB M.2 SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 8.3 (Ootpa)
4.18.0-240.15.1.el8_3.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 1.1.2 released Apr-2021
File System: xfs
System State: Run level 5 (graphical multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
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	64	**247**	**7.20**	247	7.20	245	7.23	64	214	8.30	**214**	**8.28**	215	8.26
602.gcc_s	64	365	10.9	**365**	**10.9**	366	10.9	64	352	11.3	353	11.3	**352**	**11.3**
605.mcf_s	64	236	20.0	**237**	**19.9**	237	19.9	64	236	20.0	**237**	**19.9**	237	19.9
620.omnetpp_s	64	138	11.8	133	12.3	**138**	**11.9**	64	138	11.8	133	12.3	**138**	**11.9**
623.xalancbmk_s	64	105	13.5	**104**	**13.6**	104	13.6	64	105	13.5	**104**	**13.6**	104	13.6
625.x264_s	64	**103**	**17.1**	103	17.1	103	17.2	64	98.5	17.9	98.5	17.9	**98.5**	**17.9**
631.deepsjeng_s	64	243	5.90	242	5.92	**242**	**5.92**	64	243	5.90	242	5.92	**242**	**5.92**
641.leela_s	64	**352**	**4.85**	352	4.85	353	4.83	64	**352**	**4.85**	352	4.85	353	4.83
648.exchange2_s	64	152	19.3	152	19.4	**152**	**19.4**	64	152	19.3	152	19.4	**152**	**19.4**
657.xz_s	64	258	23.9	**258**	**23.9**	258	23.9	64	258	23.9	**258**	**23.9**	258	23.9
SPECspeed®2017_int_base =		**11.9**										
SPECspeed®2017_int_peak =		**12.2**										

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 =
     "/home/cpu2017-1.1.5-ic2021.1/lib/intel64:/home/cpu2017-1.1.5-ic2021.1/j
     e5.0.1-64"
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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Standard Performance Evaluation Corporation (info@spec.org) https://www.spec.org/

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Dell Inc.

PowerEdge R750 xa (Intel Xeon Gold 6338N, 2.20 GHz)

SPECspeed®2017_int_base = 11.9

SPECspeed®2017_int_peak = 12.2

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.

Platform Notes

```
BIOS Settings:
          Logical Processor : Disabled
  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


Sysinfo program /home/cpu2017-1.1.5-ic2021.1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Thu Apr 22 10:01:50 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 6338N CPU @ 2.20GHz
      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 : 32
      siblings  : 32
      physical 0: cores 0 1 2 3 4 5 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
      28 29 30 31
      physical 1: cores 0 1 2 3 4 5 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
      28 29 30 31

From lscpu:
      Architecture:        x86_64
      CPU op-mode(s):      32-bit, 64-bit
```

Dell Inc.

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CPU2017 License: 55
Test Sponsor: Dell Inc.
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Test Date: Apr-2021
Hardware Availability: May-2021
Software Availability: Feb-2021

Platform Notes (Continued)

```
        Byte Order:          Little Endian
        CPU(s):              64
        On-line CPU(s) list: 0-63
        Thread(s) per core:  1
        Core(s) per socket:  32
        Socket(s):           2
        NUMA node(s):        2
        Vendor ID:           GenuineIntel
        CPU family:          6
        Model:               106
        Model name:          Intel(R) Xeon(R) Gold 6338N CPU @ 2.20GHz
        Stepping:            6
        CPU MHz:             2092.665
        BogoMIPS:            4400.00
        Virtualization:      VT-x
        L1d cache:           48K
        L1i cache:           32K
        L2 cache:            1280K
        L3 cache:            49152K
        NUMA node0 CPU(s):
        0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58
        ,60,62
        NUMA node1 CPU(s):
        1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59
        ,61,63
        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 invpcid_single
        intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsbase tsc_adjust bmi1 hle avx2
        smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma
        clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec xgetbv1
        xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local split_lock_detect wbnoinvd
        dtherm ida arat pln pts avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq
        avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d
        arch_capabilities

 /proc/cpuinfo cache data
    cache size : 49152 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 32 34 36 38 40 42 44 46 48 50
   52 54 56 58 60 62
```

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CPU2017 License: 55
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Platform Notes (Continued)

```
  node 0 size: 245587 MB
  node 0 free: 255513 MB
  node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51
  53 55 57 59 61 63
  node 1 size: 246498 MB
  node 1 free: 256830 MB
  node distances:
  node   0   1
    0:  10  20
    1:  20  10


From /proc/meminfo
   MemTotal:        527808492 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="8.3 (Ootpa)"
      ID="rhel"
      ID_LIKE="fedora"
      VERSION_ID="8.3"
      PLATFORM_ID="platform:el8"
      PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
      ANSI_COLOR="0;31"
   redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
   system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:
   Linux localhost.localdomain 4.18.0-240.15.1.el8_3.x86_64 #1 SMP Wed Feb 3 03:12:15 EST
   2021 x86_64 x86_64 x86_64 GNU/Linux


Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):             Not affected
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
```

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Platform Notes (Continued)

```
                                              barriers and __user pointer
                                              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):              Not affected


 run-level 5 Apr 22 10:00


 SPEC is set to: /home/cpu2017-1.1.5-ic2021.1
    Filesystem              Type  Size  Used Avail Use% Mounted on
    /dev/mapper/rhel-home xfs   168G  8.3G  160G   5% /home


 From /sys/devices/virtual/dmi/id
    Vendor:          Dell Inc.
    Product:         PowerEdge R750 xa
    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:
     16x 002C069D002C 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200, configured at 2666
     16x Not Specified Not Specified


 BIOS:
    BIOS Vendor:       Dell Inc.
    BIOS Version:      1.1.2
    BIOS Date:         04/09/2021
    BIOS Revision:     1.1


 (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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Software Availability: Feb-2021

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-AVX512
-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-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:
```
-m64 -xCORE-AVX512 -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-AVX512 -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-AVX512 -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-AVX512 -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-rev1.0.2021-05-18.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-rev1.0.2021-05-18.xml`

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

Tested with SPEC CPU®2017 v1.1.5 on 2021-04-21 22:01:50-0400.
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