



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate®2017_fp_base = 468

PowerEdge R750 (Intel Xeon Gold 6348, 2.60 GHz)

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 55

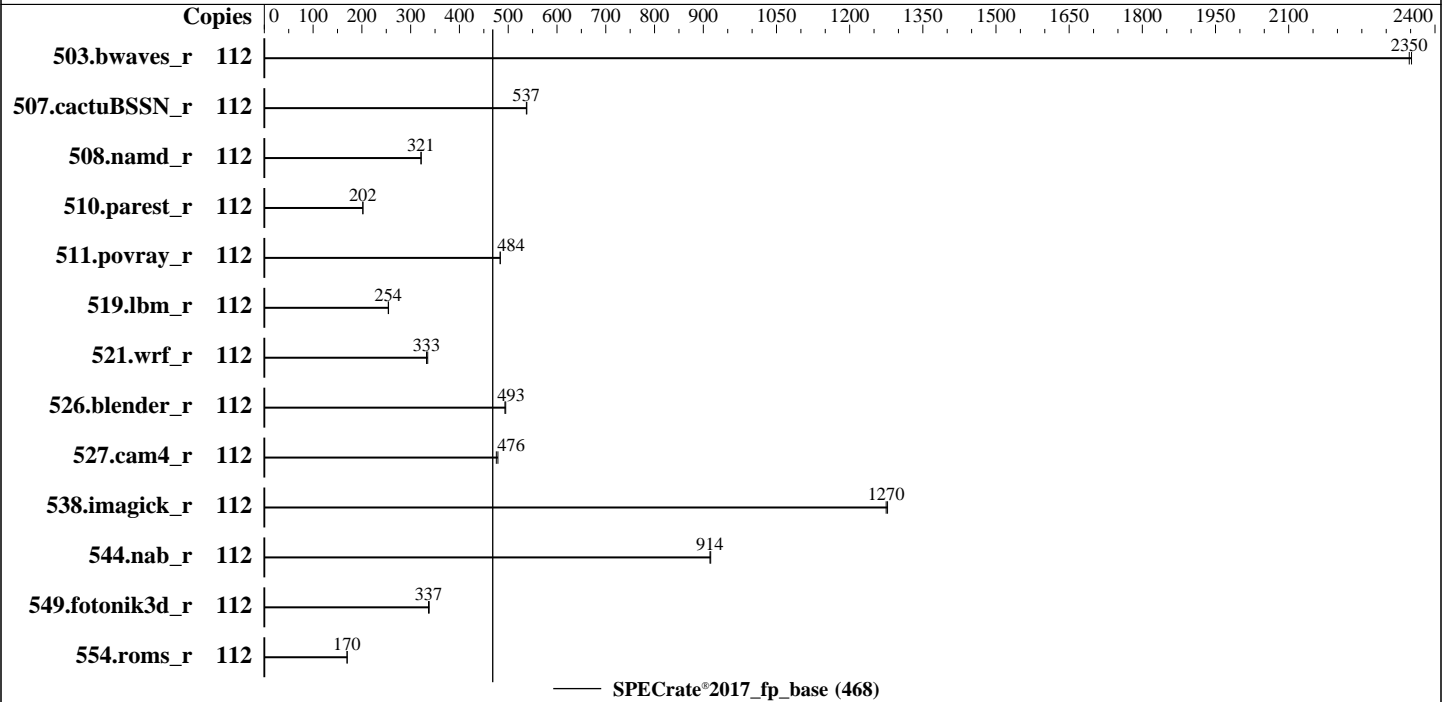
Test Date: Nov-2022

Test Sponsor: Dell Inc.

Hardware Availability: May-2021

Tested by: Dell Inc.

Software Availability: May-2022



Hardware

CPU Name: Intel Xeon Gold 6348
 Max MHz: 3500
 Nominal: 2600
 Enabled: 56 cores, 2 chips, 2 threads/core
 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: 42 MB I+D on chip per chip
 Other: None
 Memory: 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R)
 Storage: 80 GB on tmpfs
 Other: None

Software

OS: Red Hat Enterprise Linux 8.6 (Ootpa)
 4.18.0-372.9.1.el8.x86_64
 Compiler: C/C++: Version 2022.1 of Intel oneAPI DPC++/C++
 Compiler for Linux;
 Fortran: Version 2022.1 of Intel Fortran Compiler
 for Linux;
 Parallel: No
 Firmware: Version 1.7.5 released Sep-2022
 File System: tmpfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: Not Applicable
 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						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	112	478	2350	<u>478</u>	<u>2350</u>									
507.cactuBSSN_r	112	263	538	<u>264</u>	<u>537</u>									
508.namd_r	112	331	322	<u>331</u>	<u>321</u>									
510.parest_r	112	1449	202	<u>1452</u>	<u>202</u>									
511.povray_r	112	541	484	<u>541</u>	<u>484</u>									
519.lbm_r	112	<u>465</u>	<u>254</u>	464	255									
521.wrf_r	112	<u>754</u>	<u>333</u>	749	335									
526.blender_r	112	345	495	<u>346</u>	<u>493</u>									
527.cam4_r	112	409	479	<u>412</u>	<u>476</u>									
538.imagick_r	112	218	1280	<u>218</u>	<u>1270</u>									
544.nab_r	112	<u>206</u>	<u>914</u>	206	915									
549.fotonik3d_r	112	1291	338	<u>1297</u>	<u>337</u>									
554.roms_r	112	1048	170	<u>1049</u>	<u>170</u>									

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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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
"/mnt/ramdisk/cpu2017-1.1.8-ic2022.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.8-ic2022.1/je5.0.1-64"
MALLOC_CONF = "retain:true"

General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM memory using Red Hat Enterprise Linux 8.4
Transparent Huge Pages enabled by default

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General Notes (Continued)

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>

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.

Benchmark run from a 80 GB ramdisk created with the cmd: "mount -t tmpfs -o size=80G tmpfs /mnt/ramdisk"

Platform Notes

BIOS settings:

DIMM Self Healing on
 Uncorrectable Memory Error : Disabled
 Virtualization Technology : Disabled
 Sub NUMA Cluster : 2-way Clustering
 DCU Streamer Prefetcher : Disabled
 LLC Prefetch : Disabled
 Dead Line LLC Alloc : Disabled
 Optimizer Mode : Enabled

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

Sysinfo program /mnt/ramdisk/cpu2017-1.1.8-ic2022.1/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on auvcetilleml1.corp.emc.com Thu Nov 17 19:14:00 2022

SUT (System Under Test) info as seen by some common utilities.
 For more information on this section, see

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Platform Notes (Continued)

<https://www.spec.org/cpu2017/Docs/config.html#sysinfo>

From /proc/cpuinfo

```

model name : Intel(R) Xeon(R) Gold 6348 CPU @ 2.60GHz
 2 "physical id"s (chips)
 112 "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 : 28
siblings  : 56
physical 0: cores 0 1 2 3 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
physical 1: cores 0 1 2 3 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

```

From lscpu from util-linux 2.32.1:

```

Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:             Little Endian
CPU(s):                 112
On-line CPU(s) list:   0-111
Thread(s) per core:    2
Core(s) per socket:    28
Socket(s):              2
NUMA node(s):          4
Vendor ID:              GenuineIntel
BIOS Vendor ID:        Intel
CPU family:             6
Model:                  106
Model name:             Intel(R) Xeon(R) Gold 6348 CPU @ 2.60GHz
BIOS Model name:       Intel(R) Xeon(R) Gold 6348 CPU @ 2.60GHz
Stepping:               6
CPU MHz:                3500.000
CPU max MHz:            3500.0000
CPU min MHz:            800.0000
BogoMIPS:               5200.00
L1d cache:              48K
L1i cache:              32K
L2 cache:               1280K
L3 cache:               43008K
NUMA node0 CPU(s):     0, 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80, 84, 88, 92, 96, 100, 104, 108
NUMA node1 CPU(s):     2, 6, 10, 14, 18, 22, 26, 30, 34, 38, 42, 46, 50, 54, 58, 62, 66, 70, 74, 78, 82, 86, 90, 94, 98, 102, 106, 110
NUMA node2 CPU(s):     1, 5, 9, 13, 17, 21, 25, 29, 33, 37, 41, 45, 49, 53, 57, 61, 65, 69, 73, 77, 81, 85, 89, 93, 97, 101, 105, 109
NUMA node3 CPU(s):     3, 7, 11, 15, 19, 23, 27, 31, 35, 39, 43, 47, 51, 55, 59, 63, 67, 71, 75, 79, 83, 87, 91, 95, 99, 103, 107, 111
Flags:                  fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov

```

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Platform Notes (Continued)

```

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
aperfperf pni pclmulqdq dtes64 monitor ds_cpl smx est tm2 ssse3 sdbg fma cx16 xtpr
pdc_m 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 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 fsrm md_clear pconfig
flush_lld arch_capabilities

```

```

/proc/cpuinfo cache data
cache size : 43008 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 64 68 72 76 80 84 88 92 96
100 104 108

```

node 0 size: 128154 MB

node 0 free: 117550 MB

```

node 1 cpus: 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62 66 70 74 78 82 86 90 94 98
102 106 110

```

node 1 size: 129017 MB

node 1 free: 121555 MB

```

node 2 cpus: 1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69 73 77 81 85 89 93 97
101 105 109

```

node 2 size: 128976 MB

node 2 free: 121281 MB

```

node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 63 67 71 75 79 83 87 91 95 99
103 107 111

```

node 3 size: 129014 MB

node 3 free: 122120 MB

node distances:

```

node  0  1  2  3
 0:  10  11  20  20
 1:  11  10  20  20
 2:  20  20  10  11
 3:  20  20  11  10

```

From /proc/meminfo

MemTotal: 527526752 kB

HugePages_Total: 0

Hugepagesize: 2048 kB

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Platform Notes (Continued)

```

/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="8.6 (Ootpa)"
  ID="rhel"
  ID_LIKE="fedora"
  VERSION_ID="8.6"
  PLATFORM_ID="platform:el8"
  PRETTY_NAME="Red Hat Enterprise Linux 8.6 (Ootpa)"
  ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.6 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.6 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8::baseos

uname -a:
Linux auvcetilleml1.corp.emc.com 4.18.0-372.9.1.el8.x86_64 #1 SMP Fri Apr 15 22:12:19
EDT 2022 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/swaps
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 3 Nov 17 16:21

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-ic2022.1
Filesystem      Type      Size  Used Avail Use% Mounted on
tmpfs            tmpfs     80G   26G   55G   33% /mnt/ramdisk

```

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Platform Notes (Continued)

```

From /sys/devices/virtual/dmi/id
Vendor:      Dell Inc.
Product:     PowerEdge R750
Product Family: PowerEdge
Serial:      SLR7598

```

Additional information from dmidecode 3.3 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:

```

8x 002C00B3002C 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200
2x 002C0632002C 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200
1x 00AD063200AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200
5x 00CE063200CE M393A4G43AB3-CWE 32 GB 2 rank 3200

```

BIOS:

```

BIOS Vendor:      Dell Inc.
BIOS Version:     1.7.5
BIOS Date:        09/14/2022
BIOS Revision:    1.7

```

(End of data from sysinfo program)

Compiler Version Notes

```

=====
C          | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
-----

```

```

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
-----

```

```

=====
C++       | 508.namd_r(base) 510.parest_r(base)
-----

```

```

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
-----

```

```

=====
C++, C    | 511.povray_r(base) 526.blender_r(base)
-----

```

```

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,

```

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Compiler Version Notes (Continued)

Version 2022.1.0 Build 20220316
 Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
 Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
 Version 2022.1.0 Build 20220316
 Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

=====
 C++, C, Fortran | 507.cactuBSSN_r(base)
 =====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
 Version 2022.1.0 Build 20220316
 Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
 Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
 Version 2022.1.0 Build 20220316
 Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
 Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
 2022.1.0 Build 20220316
 Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

=====
 Fortran | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
 =====

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
 2022.1.0 Build 20220316
 Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

=====
 Fortran, C | 521.wrf_r(base) 527.cam4_r(base)
 =====

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
 2022.1.0 Build 20220316
 Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
 Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
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Base Compiler Invocation

C benchmarks:

icx

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Base Compiler Invocation (Continued)

C++ benchmarks:

icpx

Fortran benchmarks:

ifx

Benchmarks using both Fortran and C:

ifx icx

Benchmarks using both C and C++:

icpx icx

Benchmarks using Fortran, C, and C++:

icpx icx ifx

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
 507.cactuBSSN_r: -DSPEC_LP64
 508.namd_r: -DSPEC_LP64
 510.parest_r: -DSPEC_LP64
 511.povray_r: -DSPEC_LP64
 519.lbm_r: -DSPEC_LP64
 521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
 526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
 527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
 538.imagick_r: -DSPEC_LP64
 544.nab_r: -DSPEC_LP64
 549.fotonik3d_r: -DSPEC_LP64
 554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:

-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
 -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc
 -L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:

-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
 -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc
 -L/usr/local/jemalloc64-5.0.1/lib

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Base Optimization Flags (Continued)

Fortran benchmarks:

```
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto  
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc  
-L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using both Fortran and C:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math  
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc  
-L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using both C and C++:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math  
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc  
-L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using Fortran, C, and C++:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math  
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc  
-L/usr/local/jemalloc64-5.0.1/lib
```

The flags files that were used to format this result can be browsed at

http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.html

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.2.html>

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

http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.xml

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.2.xml>

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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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