SPEC CPU®2017 Integer Speed Result

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Supermicro

SuperServer SYS-621H-TN12R
(X13DEM , Intel Xeon Gold 6426Y)

$SPECspeed®2017\_int\_base = 15.1$

$SPECspeed®2017\_int\_peak = 15.4$

CPU2017 License: 001176	**Test Date:** Nov-2022
Test Sponsor: Supermicro	**Hardware Availability:** Jan-2023
Tested by: Supermicro	**Software Availability:** Jun-2022

Threads

- 600.perlbench_s 32 — 9.81 / 10.9
- 602.gcc_s 32 — 12.1 / 12.7
- 605.mcf_s 32 — 23.2
- 620.omnetpp_s 32 — 12.2
- 623.xalancbmk_s 32 — 29.0
- 625.x264_s 32 — 23.1 / 23.8
- 631.deepsjeng_s 32 — 7.51
- 641.leela_s 32 — 6.08
- 648.exchange2_s 32 — 24.1
- 657.xz_s 32 — 25.6

SPECspeed®2017_int_base (15.1) SPECspeed®2017_int_peak (15.4)

Hardware

CPU Name: Intel Xeon Gold 6426Y
  Max MHz: 4100
  Nominal: 2500
Enabled: 32 cores, 2 chips
Orderable: 2 chips
Cache L1: 32 KB I + 48 KB D on chip per core
  L2: 2 MB I+D on chip per core
  L3: 37.5 MB I+D on chip per chip
  Other: None
Memory: 2 TB (32 x 64 GB 2Rx4 PC5-4800B-R, running at 4400)
Storage: 1 x 960 GB SATA III SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4
    Kernel 5.14.21-150400.22-default
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: Yes
Firmware: Version 1.0a released Nov-2022
File System: xfs
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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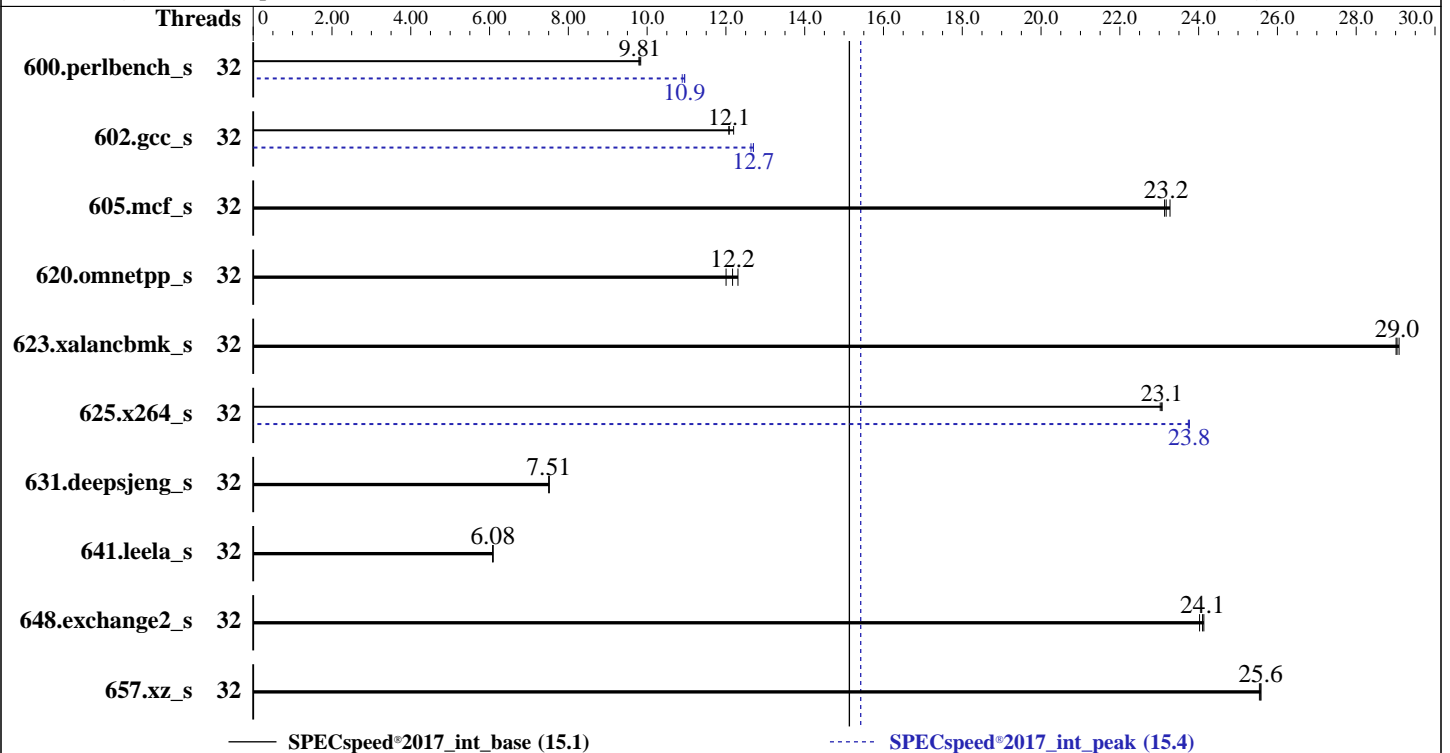Copyright 2017-2024 Standard Performance Evaluation Corporation

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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	180	9.84	**181**	**9.81**	181	9.79	32	**162**	**10.9**	163	10.9	162	11.0
602.gcc_s	32	330	12.1	**330**	**12.1**	326	12.2	32	**314**	**12.7**	314	12.7	315	12.6
605.mcf_s	32	204	23.1	**204**	**23.2**	203	23.3	32	204	23.1	**204**	**23.2**	203	23.3
620.omnetpp_s	32	133	12.3	**134**	**12.2**	136	12.0	32	133	12.3	**134**	**12.2**	136	12.0
623.xalancbmk_s	32	**48.8**	**29.0**	48.7	29.1	48.8	29.0	32	**48.8**	**29.0**	48.7	29.1	48.8	29.0
625.x264_s	32	**76.5**	**23.1**	76.6	23.0	76.5	23.1	32	74.3	23.7	74.2	23.8	**74.3**	**23.8**
631.deepsjeng_s	32	**191**	**7.51**	191	7.51	191	7.51	32	**191**	**7.51**	191	7.51	191	7.51
641.leela_s	32	281	6.08	**280**	**6.08**	280	6.09	32	281	6.08	**280**	**6.08**	280	6.09
648.exchange2_s	32	**122**	**24.1**	122	24.0	122	24.1	32	**122**	**24.1**	122	24.0	122	24.1
657.xz_s	32	**242**	**25.6**	242	25.5	242	25.6	32	**242**	**25.6**	242	25.5	242	25.6

SPECspeed®2017_int_base =	**15.1**
SPECspeed®2017_int_peak =	**15.4**

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

Compiler Notes

```
SPEC has ruled that the compiler used for this result was performing a compilation
that specifically improves the performance of the 523.xalancbmk_r / 623.xalancbmk_s
benchmarks using a priori knowledge of the SPEC code and dataset to perform a
transformation that has narrow applicability.

In order to encourage optimizations that have wide applicability (see rule 1.4
https://www.spec.org/cpu2017/Docs/runrules.html#rule_1.4), SPEC will no longer
publish results using this optimization.

This result is left in the SPEC results database for historical reference.
```

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/lib/intel64:/home/cpu2017/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"
```

General Notes

```
 Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
 memory using Redhat Enterprise Linux 8.0
 Transparent Huge Pages enabled by default
 Prior to runcpu invocation
```

(Continued on next page)

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

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General Notes (Continued)

```
Filesystem page cache synced and cleared with:
sync; echo 3>        /proc/sys/vm/drop_caches

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.
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:
Power Technology = Custom
Power Performance Tuning = BIOS Controls EPB
ENERGY_PERF_BIAS_CFG mode = Performance
DCU Streamer Prefetcher = Disable
Hyper-Threading [ALL] = Disable
LLC Dead Line Alloc = Disable
KTI Prefetch = Enable
Stale AtoS = Disable
Patrol Scrub = Disable

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on localhost Thu Nov 24 01:56:18 2022

 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 6426Y
       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 : 16
       siblings  : 16
       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 from util-linux 2.37.2:
     Architecture:             x86_64
     CPU op-mode(s):           32-bit, 64-bit
     Address sizes:            46 bits physical, 57 bits virtual
     Byte Order:               Little Endian
     CPU(s):                   32
     On-line CPU(s) list:      0-31
     Vendor ID:                GenuineIntel
     Model name:               Intel(R) Xeon(R) Gold 6426Y
     CPU family:               6
     Model:                    143
     Thread(s) per core:       1
     Core(s) per socket:       16
     Socket(s):                2
```

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CPU2017 License: 001176　　　　　　　　　　　　　　　　**Test Date:**　　　　Nov-2022
Test Sponsor:　　Supermicro　　　　　　　　　　　　　　**Hardware Availability:** Jan-2023
Tested by:　　　　Supermicro　　　　　　　　　　　　　　**Software Availability:**　Jun-2022

Platform Notes (Continued)

```
      Stepping:                 8
      Frequency boost:          enabled
      CPU max MHz:              2501.0000
      CPU min MHz:              800.0000
      BogoMIPS:                 5000.00
      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 tsc_known_freq 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 cat_l2 cdp_l3 invpcid_single cdp_l2 ssbd mba ibrs ibpb stibp
    ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1
    hle avx2 smep bmi2 erms invpcid rtm 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 avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts avx512vbmi
    umip pku ospke waitpkg avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg
    tme avx512_vpopcntdq la57 rdpid bus_lock_detect cldemote movdiri movdir64b enqcmd
    fsrm md_clear serialize tsxldtrk pconfig arch_lbr avx512_fp16 amx_tile flush_l1d
    arch_capabilities
      Virtualization:           VT-x
      L1d cache:                1.5 MiB (32 instances)
      L1i cache:                1 MiB (32 instances)
      L2 cache:                 64 MiB (32 instances)
      L3 cache:                 75 MiB (2 instances)
      NUMA node(s):             2
      NUMA node0 CPU(s):        0-15
      NUMA node1 CPU(s):        16-31
      Vulnerability Itlb multihit:    Not affected
      Vulnerability L1tf:             Not affected
      Vulnerability Mds:              Not affected
      Vulnerability Meltdown:         Not affected
      Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via
      prctl and seccomp
      Vulnerability Spectre v1:       Mitigation; usercopy/swapgs barriers and __user
      pointer sanitization
      Vulnerability Spectre v2:       Mitigation; Enhanced IBRS, IBPB conditional, RSB
      filling
      Vulnerability Srbds:            Not affected
      Vulnerability Tsx async abort:  Not affected

  From lscpu --cache:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL  SETS PHY-LINE COHERENCY-SIZE
      L1d      48K     1.5M   12 Data           1    64      1             64
      L1i      32K      1M    8 Instruction     1    64      1             64
      L2        2M      64M   16 Unified        2  2048      1             64
      L3     37.5M      75M   15 Unified        3 40960      1             64

  /proc/cpuinfo cache data
     cache size : 38400 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 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    node 0 size: 1031791 MB
    node 0 free: 1030057 MB
    node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
    node 1 size: 1032167 MB
```

(Continued on next page)

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Hardware Availability: Jan-2023
Software Availability: Jun-2022

Platform Notes (Continued)

```
  node 1 free: 1031667 MB
  node distances:
  node   0   1
    0:  10  21
    1:  21  10

From /proc/meminfo
   MemTotal:       2113493588 kB
   HugePages_Total:         0
   Hugepagesize:         2048 kB

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

From /etc/*release* /etc/*version*
   os-release:
      NAME="SLES"
      VERSION="15-SP4"
      VERSION_ID="15.4"
      PRETTY_NAME="SUSE Linux Enterprise Server 15 SP4"
      ID="sles"
      ID_LIKE="suse"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:15:sp4"

uname -a:
   Linux localhost 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18
   UTC 2022 (49db222) 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
                                                  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 24 01:54

SPEC is set to: /home/cpu2017
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda2      xfs   892G  8.4G  883G   1% /

From /sys/devices/virtual/dmi/id
     Vendor:        Supermicro
     Product:       Super Server
     Product Family: Family
     Serial:        0123456789

  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
```

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Platform Notes (Continued)

```
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:
    28x SK Hynix HMCG94MEBRA109N 64 GB 2 rank 4800, configured at 4400
    4x SK Hynix HMCG94MEBRA124N 64 GB 2 rank 4800, configured at 4400

  BIOS:
    BIOS Vendor:        American Megatrends International, LLC.
    BIOS Version:       1.0a
    BIOS Date:          11/18/2022
    BIOS Revision:      5.29

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C        | 600.perlbench_s(base, peak) 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 2022.1.0 Build 20220316
Copyright (C) 1985-2022 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 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran | 648.exchange2_s(base, peak)
------------------------------------------------------------------------------
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.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
```
icx
```

C++ benchmarks:
```
icpx
```

Fortran benchmarks:
```
ifx
```

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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 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto`
`-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp`
`-DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

C++ benchmarks:
`-m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto`
`-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

Fortran benchmarks:
`-m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto`
`-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
`-nostandard-realloc-lhs -align array32byte`
`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

Peak Compiler Invocation

C benchmarks:
`icx`

C++ benchmarks:
`icpx`

Fortran benchmarks:
`ifx`

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Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:

```
600.perlbench_s: -m64 -std=c11 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -O3
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP
-fno-strict-overflow -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 -O3
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

```
605.mcf_s: basepeak = yes
```

```
625.x264_s: -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -O3
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP
-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
```

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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/Supermicro-Platform-Settings-V1.2-SPR-revC.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/Supermicro-Platform-Settings-V1.2-SPR-revC.xml

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

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