SPEC CPU®2017 Floating Point Speed Result

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Supermicro

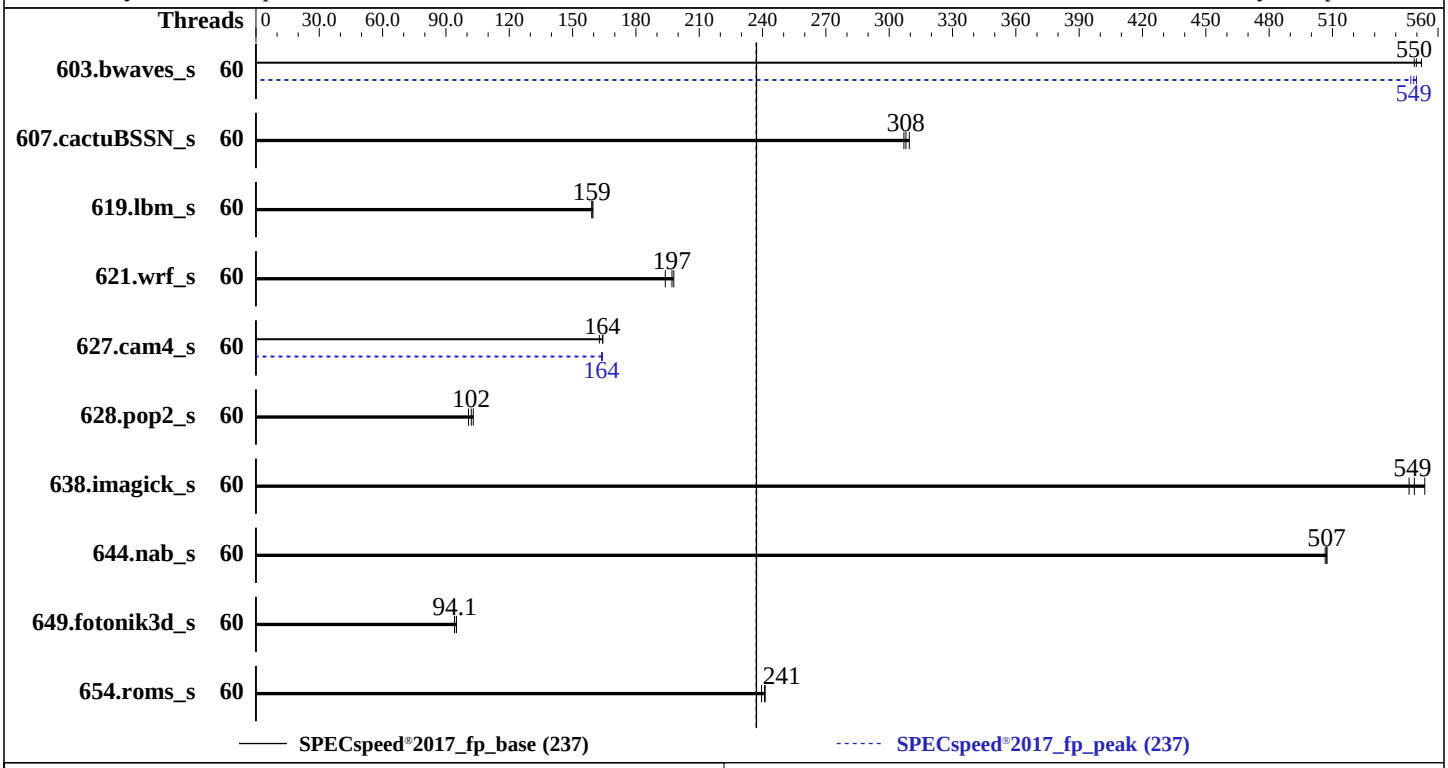
SuperServer SYS-211E-FRDN2T
(X13SEM-TF , Intel Xeon Platinum 8490H)

SPECspeed®2017_fp_base = 237

SPECspeed®2017_fp_peak = 237

CPU2017 License: 001176
Test Sponsor: Supermicro
Tested by: Supermicro

Test Date: Dec-2022
Hardware Availability: Jan-2023
Software Availability: Sep-2022



Hardware

CPU Name:	Intel Xeon Platinum 8490H
Max MHz:	3500
Nominal:	1900
Enabled:	60 cores, 1 chip
Orderable:	1 chip
Cache L1:	32 KB I + 48 KB D on chip per core
L2:	2 MB I+D on chip per core
L3:	112.5 MB I+D on chip per chip
Other:	None
Memory:	512 GB (8 x 64 GB 2Rx8 PC5-4800B-R)
Storage:	1 x 600 GB SATA III SSD
Other:	None

Software

OS:	SUSE Linux Enterprise Server 15 SP4 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 1.0c released Jan-2023 tested as Nov-2022
File System:	btrfs
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.

Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	60	107	552	**107**	**550**	108	549	60	108	547	**108**	**549**	107	550
607.cactuBSSN_s	60	**54.1**	**308**	53.9	310	54.3	307	60	**54.1**	**308**	53.9	310	54.3	307
619.lbm_s	60	32.9	159	**32.9**	**159**	32.8	160	60	32.9	159	**32.9**	**159**	32.8	160
621.wrf_s	60	**67.1**	**197**	68.2	194	66.8	198	60	**67.1**	**197**	68.2	194	66.8	198
627.cam4_s	60	54.5	163	**54.0**	**164**	53.9	164	60	54.0	164	**54.1**	**164**	54.1	164
628.pop2_s	60	115	103	118	101	**116**	**102**	60	115	103	118	101	**116**	**102**
638.imagick_s	60	26.1	554	**26.3**	**549**	26.4	546	60	26.1	554	**26.3**	**549**	26.4	546
644.nab_s	60	**34.4**	**507**	34.5	507	34.4	507	60	**34.4**	**507**	34.5	507	34.4	507
649.fotonik3d_s	60	96.9	94.1	96.0	95.0	**96.8**	**94.1**	60	96.9	94.1	96.0	95.0	**96.8**	**94.1**
654.roms_s	60	65.3	241	65.7	240	**65.4**	**241**	60	65.3	241	65.7	240	**65.4**	**241**

SPECspeed®2017_fp_base = 237

SPECspeed®2017_fp_peak = 237

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,compact"
LD_LIBRARY_PATH =
     "/root/cpu22017-1.1.8/lib/intel64:/root/cpu22017-1.1.8/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
Filesystem page cache synced and cleared with:
sync; echo 3>       /proc/sys/vm/drop_caches
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.
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.
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the
system as tested and documented.
 jemalloc, a general purpose malloc implementation
```

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General Notes (Continued)

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 = Maximum Performance
SNC = Enable SNC4 (4-Clusters)
KTI Prefetch = Enable
LLC Dead Line Alloc = Disable
DCU Streamer Prefetcher = Disable
Hyper-Threading [ALL] = Disable

 Sysinfo program /root/cpu22017-1.1.8/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on 139-164 Sun Dec  4 06:53:48 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) Platinum 8490H
       1  "physical id"s (chips)
       60 "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 : 60
       siblings  : 60
       physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
       25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
       53 54 55 56 57 58 59

 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):                          60
      On-line CPU(s) list:             0-59
      Vendor ID:                       GenuineIntel
      Model name:                      Intel(R) Xeon(R) Platinum 8490H
      CPU family:                      6
      Model:                           143
```

(Continued on next page)

Platform Notes (Continued)

```
      Thread(s) per core:                  1
      Core(s) per socket:                  60
      Socket(s):                           1
      Stepping:                            6
      CPU max MHz:                         3500.0000
      CPU min MHz:                         800.0000
      BogoMIPS:                            3800.00
      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 hwp
      hwp_act_window hwp_epp hwp_pkg_req 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:                           2.8 MiB (60 instances)
      L1i cache:                           1.9 MiB (60 instances)
      L2 cache:                            120 MiB (60 instances)
      L3 cache:                            112.5 MiB (1 instance)
      NUMA node(s):                        4
      NUMA node0 CPU(s):                   0-14
      NUMA node1 CPU(s):                   15-29
      NUMA node2 CPU(s):                   30-44
      NUMA node3 CPU(s):                   45-59
      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:
```

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Platform Notes (Continued)

```
      NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL   SETS PHY-LINE COHERENCY-SIZE
      L1d       48K     2.8M   12 Data            1     64        1             64
      L1i       32K     1.9M    8 Instruction     1     64        1             64
      L2         2M     120M   16 Unified         2   2048        1             64
      L3     112.5M   112.5M   15 Unified         3 122880        1             64

   /proc/cpuinfo cache data
      cache size : 115200 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 1 2 3 4 5 6 7 8 9 10 11 12 13 14
     node 0 size: 128627 MB
     node 0 free: 123647 MB
     node 1 cpus: 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
     node 1 size: 129020 MB
     node 1 free: 120084 MB
     node 2 cpus: 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44
     node 2 size: 129020 MB
     node 2 free: 126296 MB
     node 3 cpus: 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59
     node 3 size: 128991 MB
     node 3 free: 125606 MB
     node distances:
     node   0   1   2   3
       0:  10  12  12  12
       1:  12  10  12  12
       2:  12  12  10  12
       3:  12  12  12  10

   From /proc/meminfo
      MemTotal:       528034504 kB
      HugePages_Total:       0
      Hugepagesize:       2048 kB

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

   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"
```

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Platform Notes (Continued)

```
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:15:sp4"

uname -a:
   Linux 139-164 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 Dec 3 21:04

SPEC is set to: /root/cpu22017-1.1.8
   Filesystem     Type   Size  Used Avail Use% Mounted on
   /dev/sda2      btrfs  559G  174G  384G  32% /root

From /sys/devices/virtual/dmi/id
    Vendor:          Supermicro
    Product:         Super Server
    Product Family:  SMC X13
    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
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 Micron Technology MTC40F2046S1RC48BA1 64 GB 2 rank 4800

BIOS:
   BIOS Vendor:       American Megatrends International, LLC.
   BIOS Version:      1.0c
   BIOS Date:         11/30/2022
```

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Platform Notes (Continued)

```
    BIOS Revision:     5.29

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C               | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
                | 644.nab_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++, C, Fortran | 607.cactuBSSN_s(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2022.1.0 Build 20220316
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2022.1.0 Build 20220316
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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         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
                | 654.roms_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.
------------------------------------------------------------------------------

==============================================================================
Fortran, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
                | 628.pop2_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.
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.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
icx

Fortran benchmarks:
ifx

Benchmarks using both Fortran and C:
ifx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifx

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
-assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

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

Fortran benchmarks:
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -Ofast -ffast-math

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Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using both Fortran and C:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Peak Compiler Invocation

C benchmarks:
icx

Fortran benchmarks:
ifx

Benchmarks using both Fortran and C:
ifx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifx

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

(Continued on next page)

Peak Optimization Flags (Continued)

619.lbm_s: basepeak = yes

638.imagick_s: basepeak = yes

644.nab_s: basepeak = yes

Fortran benchmarks:

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

649.fotonik3d_s: basepeak = yes

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: basepeak = yes

627.cam4_s: -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

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

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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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