SPECaccel®2023 Result

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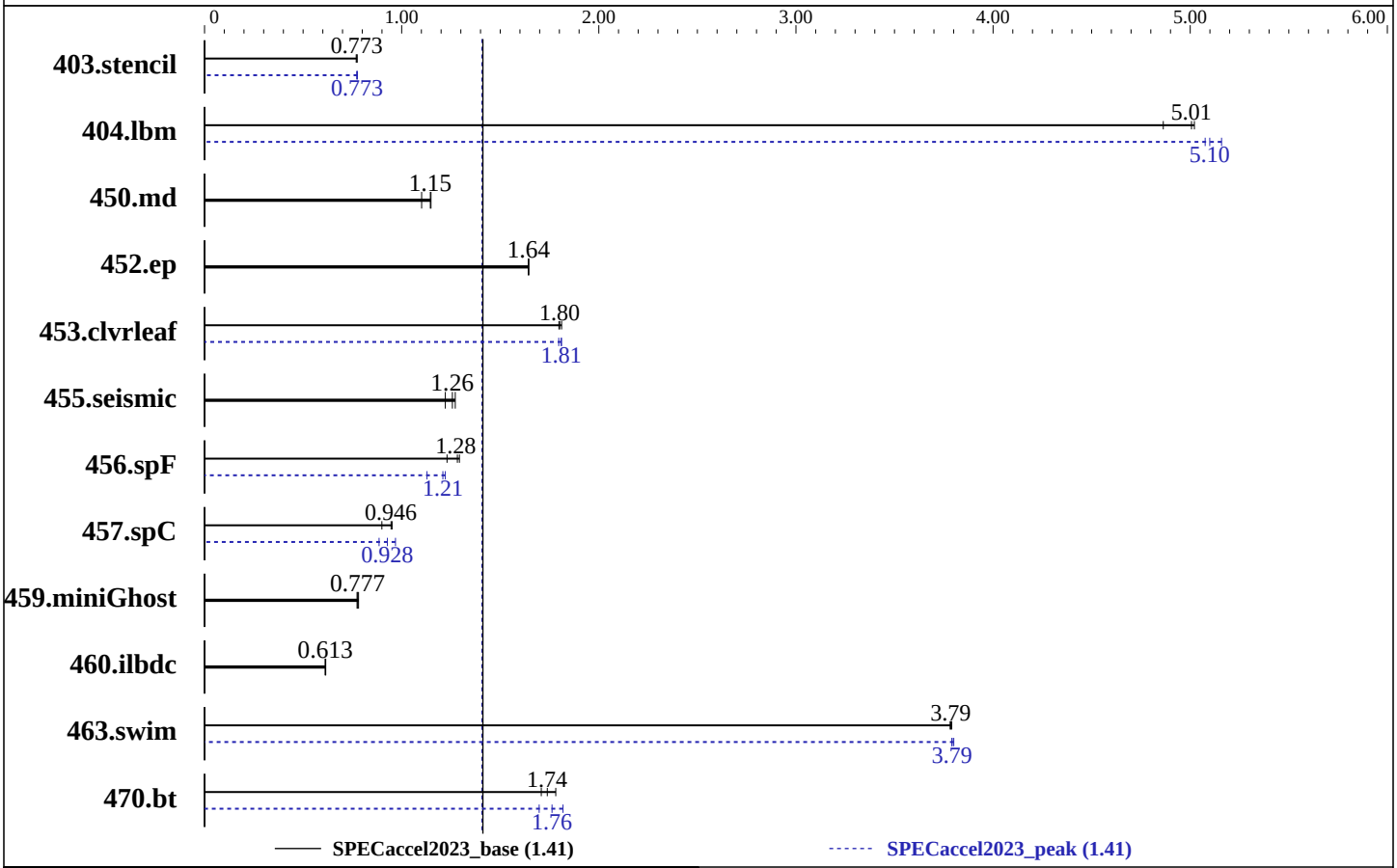
Supermicro
Intel Xeon Platinum 8592+
GPU SuperServer SYS-741GE-TNRT

SPECaccel 2023_base = 1.41

SPECaccel 2023_peak = 1.41

accel2023 License: 6569
Test Sponsor: Supermicro
Tested by: Supermicro

Test Date: Feb-2024
Hardware Availability: Dec-2023
Software Availability: Nov-2023



Hardware

CPU Name:	INTEL Xeon Platinum 8592+
Max MHz.:	3900
Nominal:	1900
Enabled:	128 cores, 2 chips, 2 threads/core
Orderable:	1,2 chips
Cache L1:	32 KB I + 48 KB D on chip per core
L2:	2 MB I+D on chip per core
L3:	320 MB I+D on chip per chip
Other:	None
Memory:	1 TB (16 x 64 GB 2Rx4 PC5-5600B-R)
Storage:	1 x 512 GB M.2 NVMe SSD
Other:	None
Base Threads Run:	256
Min. Peak Threads:	256
Max. Peak Threads:	256

Accelerator

Accel Model Name:	Intel Xeon Platinum 8592+
Accel Vendor:	Intel
Accel Name:	Intel Xeon Platinum 8592+
Type of Accel:	CPU
Accel Connection:	N/A
Does Accel Use ECC:	Yes
Accel Description:	2 x Intel Xeon Platinum 8592+
Accel Driver:	N/A

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Software

OS:	SUSE Linux Enterprise Server 15 SP5 Kernel 5.14.21-150500.53-default
Compiler:	C/C++/Fortran: Version 2024.0.0.20231017 of Intel oneAPI DPC++/C++
Firmware:	Version 2.1 released Dec-2023
File System:	xfs
System State:	Run level 3 (multi-user)
Other:	None
Base Parallel Model:	LOP
Base Threads Run:	256
Peak Parallel Models:	LOP
Max. Peak Threads:	256
Min. Peak Threads:	256

Results Table

Benchmark	Base							Peak						
	Model	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Model	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
403.stencil	LOP	569	0.774	572	0.769	**569**	**0.773**	LOP	567	0.776	570	0.772	**569**	**0.773**
404.lbm	LOP	93.6	4.86	**90.9**	**5.01**	90.6	5.02	LOP	**89.2**	**5.10**	89.6	5.08	88.2	5.16
450.md	LOP	**524**	**1.15**	522	1.15	545	1.10	LOP	**524**	**1.15**	522	1.15	545	1.10
452.ep	LOP	**252**	**1.64**	253	1.64	252	1.64	LOP	**252**	**1.64**	253	1.64	252	1.64
453.clvrleaf	LOP	552	1.81	556	1.80	**555**	**1.80**	LOP	**553**	**1.81**	557	1.80	552	1.81
455.seismic	LOP	639	1.22	**620**	**1.26**	613	1.27	LOP	639	1.22	**620**	**1.26**	613	1.27
456.spF	LOP	386	1.23	367	1.29	**370**	**1.28**	LOP	**393**	**1.21**	421	1.13	389	1.22
457.spC	LOP	600	0.900	568	0.951	**571**	**0.946**	LOP	610	0.885	558	0.969	**582**	**0.928**
459.miniGhost	LOP	**760**	**0.777**	755	0.781	763	0.774	LOP	**760**	**0.777**	755	0.781	763	0.774
460.ilbdc	LOP	**905**	**0.613**	903	0.615	907	0.612	LOP	**905**	**0.613**	903	0.615	907	0.612
463.swim	LOP	116	3.79	116	3.78	**116**	**3.79**	LOP	**116**	**3.79**	116	3.80	116	3.79
470.bt	LOP	592	1.78	618	1.71	**607**	**1.74**	LOP	580	1.82	622	1.70	**599**	**1.76**

SPEC accel2023_base = 1.41

SPEC accel2023_peak = 1.41

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"
```

General Notes

```
Environment variables set by runaccel before the start of the run:
FORT_BUFFERED = "true"
KMP_AFFINITY = "compact,0"
KMP_BLOCKTIME = "infinite"
KMP_HW_SUBSET = "2S,64C,2T"
KMP_LIBRARY = "turnaround"
```

(Continued on next page)

General Notes (Continued)

```
OMP_DYNAMIC = "FALSE"
OMP_NUM_THREADS = "128"
OMP_WAIT_POLICY = "active"

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, the 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

```
 Sysinfo program /home/accel2023/bin/sysinfo
 Rev: r6622 of 2021-04-07 b1a7d5f8f71be5aff70a755cad7211a0
 running on 135-172-248 Fri Feb  9 02:56:27 2024

 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 8592+
       2  "physical id"s (chips)
       256 "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 : 64
       siblings  : 128
       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 60 61 62 63
       physical 1: 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 60 61 62 63

 From lscpu from util-linux 2.37.4:
      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):                          256
      On-line CPU(s) list:             0-255
      Vendor ID:                       GenuineIntel
      Model name:                      INTEL(R) XEON(R) PLATINUM 8592+
```

(Continued on next page)

Platform Notes (Continued)

```
CPU family:                          6
Model:                               207
Thread(s) per core:                  2
Core(s) per socket:                  64
Socket(s):                           2
Stepping:                            2
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 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:                           6 MiB (128 instances)
L1i cache:                           4 MiB (128 instances)
L2 cache:                            256 MiB (128 instances)
L3 cache:                            640 MiB (2 instances)
NUMA node(s):                        4
NUMA node0 CPU(s):                   0-31,128-159
NUMA node1 CPU(s):                   32-63,160-191
NUMA node2 CPU(s):                   64-95,192-223
NUMA node3 CPU(s):                   96-127,224-255
Vulnerability Itlb multihit:         Not affected
Vulnerability L1tf:                  Not affected
Vulnerability Mds:                   Not affected
Vulnerability Meltdown:              Not affected
Vulnerability Mmio stale data:       Not affected
Vulnerability Retbleed:              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, PBRSB-eIBRS SW sequence
Vulnerability Srbds:                 Not affected
Vulnerability Tsx async abort:       Not affected
```

(Continued on next page)

Platform Notes (Continued)

```
From lscpu --cache:
     NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL   SETS PHY-LINE COHERENCY-SIZE
     L1d       48K       6M   12 Data            1     64        1             64
     L1i       32K       4M    8 Instruction     1     64        1             64
     L2         2M     256M   16 Unified         2   2048        1             64
     L3       320M     640M   20 Unified         3 262144        1             64

/proc/cpuinfo cache data
   cache size : 327680 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 15 16 17 18 19 20 21 22 23 24 25 26 27
  28 29 30 31 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146
  147 148 149 150 151 152 153 154 155 156 157 158 159
  node 0 size: 257669 MB
  node 0 free: 256517 MB
  node 1 cpus: 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 60 61 62 63 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175
  176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191
  node 1 size: 258031 MB
  node 1 free: 256275 MB
  node 2 cpus: 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88
  89 90 91 92 93 94 95 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207
  208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223
  node 2 size: 258031 MB
  node 2 free: 257228 MB
  node 3 cpus: 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114
  115 116 117 118 119 120 121 122 123 124 125 126 127 224 225 226 227 228 229 230 231 232
  233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254
  255
  node 3 size: 257922 MB
  node 3 free: 257289 MB
  node distances:
  node   0   1   2   3
    0:  10  12  21  21
    1:  12  10  21  21
    2:  21  21  10  12
    3:  21  21  12  10

From /proc/meminfo
   MemTotal:       1056415792 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
```

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Platform Notes (Continued)

```
    os-release:
       NAME="SLES"
       VERSION="15-SP5"
       VERSION_ID="15.5"
       PRETTY_NAME="SUSE Linux Enterprise Server 15 SP5"
       ID="sles"
       ID_LIKE="suse"
       ANSI_COLOR="0;32"
       CPE_NAME="cpe:/o:suse:sles:15:sp5"

  uname -a:
     Linux 135-172-248 5.14.21-150500.53-default #1 SMP PREEMPT_DYNAMIC Wed May 10 07:56:26
     UTC 2023 (b630043) 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
  mmio_stale_data:                                         Not affected
  retbleed:                                                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,
                                                           PBRSB-eIBRS: SW sequence
  CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
  CVE-2019-11135 (TSX Asynchronous Abort):                 Not affected

  run-level 3 Feb 8 16:23

  SPEC is set to: /home/accel2023
     Filesystem     Type  Size  Used Avail Use% Mounted on
     /dev/nvme0n1p2 xfs   475G   55G  420G  12% /

  From /sys/devices/virtual/dmi/id
      Vendor:         Supermicro
      Product:        SYS-741GE-TNRT
      Product Family: Family
      Serial:         1234567890

  Additional information from dmidecode 3.4 follows.  WARNING: Use caution when you
```

(Continued on next page)

Platform Notes (Continued)

```
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:
    14x SK Hynix HMCG94AGBRA181N 64 GB 2 rank 5600
    2x SK Hynix HMCG94AGBRA184N 64 GB 2 rank 5600

BIOS:
   BIOS Vendor:       American Megatrends International, LLC.
   BIOS Version:      2.1
   BIOS Date:         12/12/2023
   BIOS Revision:     5.32

(End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C          | 403.stencil(base, peak) 404.lbm(base, peak) 452.ep(base, peak)
           | 457.spC(base, peak) 470.bt(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler 2024.0.0 (2024.0.0.20231017)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/intel/oneapi/compiler/2024.0/bin/compiler
Configuration file: /opt/intel/oneapi/compiler/2024.0/bin/compiler/../icx.cfg
------------------------------------------------------------------------------

==============================================================================
Fortran    | 450.md(base, peak) 455.seismic(base, peak) 456.spF(base, peak)
           | 460.ilbdc(base, peak) 463.swim(base, peak)
------------------------------------------------------------------------------
ifx (IFX) 2024.0.0 20231017
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran, C | 453.clvrleaf(base, peak) 459.miniGhost(base, peak)
------------------------------------------------------------------------------
ifx (IFX) 2024.0.0 20231017
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler 2024.0.0 (2024.0.0.20231017)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/intel/oneapi/compiler/2024.0/bin/compiler
Configuration file: /opt/intel/oneapi/compiler/2024.0/bin/compiler/../icx.cfg
```

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Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
icx

Fortran benchmarks:
ifx

Benchmarks using both Fortran and C:
ifx icx

Base Portability Flags

450.md: -80
457.spC: -Wl,--no-relax(icx)(*) -mcmodel=medium -shared-intel
-Wl,--no-relax(icx)
459.miniGhost: -nofor-main

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

Base Optimization Flags

C benchmarks:
-Ofast -O3 -xsapphirerapids -mprefer-vector-width=512
-qopt-multiple-gather-scatter-by-shuffles -flto -ffast-math -fiopenmp
-qopt-dynamic-align -fvec-peel-loops -qopt-streaming-stores always
-Xclang -fopenmp-declare-target-scalar-defaultmap-firstprivate
-fimf-precision=low

Fortran benchmarks:
-Ofast -O3 -xsapphirerapids -mprefer-vector-width=512
-qopt-multiple-gather-scatter-by-shuffles -flto -ffast-math -fiopenmp
-qopt-dynamic-align -fvec-peel-loops -qopt-streaming-stores always
-nostandard-realloc-lhs -align array32byte -auto
-fimf-accuracy-bits-sqrt=14 -fimf-precision=low

Benchmarks using both Fortran and C:
-Ofast -O3 -xsapphirerapids -mprefer-vector-width=512
-qopt-multiple-gather-scatter-by-shuffles -flto -ffast-math -fiopenmp

(Continued on next page)

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
`-qopt-dynamic-align -fvec-peel-loops -qopt-streaming-stores always -Xclang -fopenmp-declare-target-scalar-defaultmap-firstprivate -fimf-precision=low -nostandard-realloc-lhs -align array32byte -auto -fimf-accuracy-bits-sqrt=14`

Peak Compiler Invocation

C benchmarks:
`icx`

Fortran benchmarks:
`ifx`

Benchmarks using both Fortran and C:
`ifx icx`

Peak Portability Flags

450.md: `-80`
457.spC: `-Wl,--no-relax`(icx)(*) `-mcmodel=medium -shared-intel -Wl,--no-relax`(icx)
459.miniGhost: `-nofor-main`

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

Peak Optimization Flags

C benchmarks:

403.stencil: `-Ofast -O3 -xsapphirerapids -mprefer-vector-width=512 -qopt-multiple-gather-scatter-by-shuffles -flto -ffast-math -fiopenmp -qopt-dynamic-align -fvec-peel-loops -qopt-streaming-stores always -Xclang -fopenmp-declare-target-scalar-defaultmap-firstprivate -fimf-precision=low`

404.lbm: `Same as 403.stencil`

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Peak Optimization Flags (Continued)

452.ep: `basepeak = yes`

457.spC: `Same as 403.stencil`

470.bt: `Same as 403.stencil`

Fortran benchmarks:

450.md: `basepeak = yes`

455.seismic: `basepeak = yes`

456.spF: `-Ofast -O3 -xsapphirerapids -mprefer-vector-width=512 -qopt-multiple-gather-scatter-by-shuffles -flto -ffast-math -fiopenmp -qopt-dynamic-align -fvec-peel-loops -qopt-streaming-stores always -nostandard-realloc-lhs -align array32byte -auto -fimf-accuracy-bits-sqrt=14 -fimf-precision=low`

460.ilbdc: `basepeak = yes`

463.swim: `Same as 456.spF`

Benchmarks using both Fortran and C:

453.clvrleaf: `-Ofast -O3 -xsapphirerapids -mprefer-vector-width=512 -qopt-multiple-gather-scatter-by-shuffles -flto -ffast-math -fiopenmp -qopt-dynamic-align -fvec-peel-loops -qopt-streaming-stores always -Xclang -fopenmp-declare-target-scalar-defaultmap-firstprivate -fimf-precision=low -nostandard-realloc-lhs -align array32byte -auto -fimf-accuracy-bits-sqrt=14`

459.miniGhost: `basepeak = yes`

The flags files that were used to format this result can be browsed at
`http://www.spec.org/accel2023/flags/Supermicro-Platform-Settings-V1.2-SPR-revG.html`
`http://www.spec.org/accel2023/flags/Intel_compiler_flags.2024-03-06.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/accel2023/flags/Supermicro-Platform-Settings-V1.2-SPR-revG.xml`
`http://www.spec.org/accel2023/flags/Intel_compiler_flags.2024-03-06.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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