SPECaccel®2023 Result

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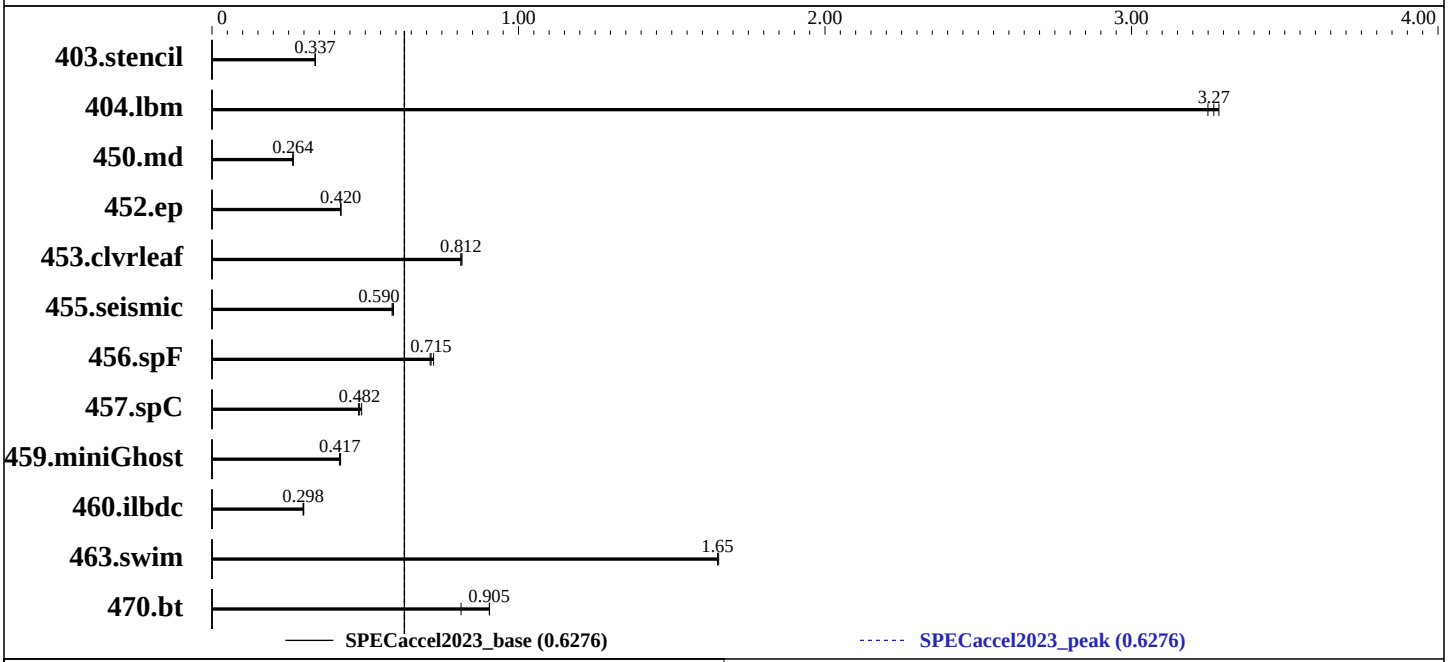
Supermicro
Intel Xeon Gold 5520+
UP SuperServer SYS-521C-NR

SPECaccel 2023_base = 0.6276

SPECaccel 2023_peak = 0.6276

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 Gold 5520+
Max MHz.:	4000
Nominal:	2200
Enabled:	28 cores, 1 chip, 2 threads/core
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:	52.5 MB I+D on chip per chip
Other:	None
Memory:	512 GB (8 x 64 GB 2Rx4 PC5-5600B-R, running at 4800)
Storage:	1 x 240 GB SATA III SSD
Other:	None
Base Threads Run:	56
Min. Peak Threads:	56
Max. Peak Threads:	56

Accelerator

Accel Model Name:	Intel Xeon Gold 5520+
Accel Vendor:	Intel
Accel Name:	Intel Xeon Gold 5520+
Type of Accel:	CPU
Accel Connection:	N/A
Does Accel Use ECC:	Yes
Accel Description:	1 x Intel Xeon Gold 5520+
Accel Driver:	N/A

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

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Software (Continued)

Base Threads Run: 56
Peak Parallel Models: LOP
Max. Peak Threads: 56
Min. Peak Threads: 56

Results Table

Benchmark	Base							Peak						
	Model	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Model	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
403.stencil	LOP	1308	0.336	**1307**	**0.337**	1305	0.337	LOP	1308	0.336	**1307**	**0.337**	1305	0.337
404.lbm	LOP	139	3.29	**139**	**3.27**	140	3.25	LOP	139	3.29	**139**	**3.27**	140	3.25
450.md	LOP	2272	0.264	**2270**	**0.264**	2266	0.265	LOP	2272	0.264	**2270**	**0.264**	2266	0.265
452.ep	LOP	988	0.420	**988**	**0.420**	987	0.421	LOP	988	0.420	**988**	**0.420**	987	0.421
453.clvrleaf	LOP	**1231**	**0.812**	1231	0.812	1226	0.816	LOP	**1231**	**0.812**	1231	0.812	1226	0.816
455.seismic	LOP	1328	0.587	**1322**	**0.590**	1317	0.592	LOP	1328	0.587	**1322**	**0.590**	1317	0.592
456.spF	LOP	657	0.723	**665**	**0.715**	667	0.712	LOP	657	0.723	**665**	**0.715**	667	0.712
457.spC	LOP	1106	0.488	**1121**	**0.482**	1130	0.478	LOP	1106	0.488	**1121**	**0.482**	1130	0.478
459.miniGhost	LOP	1419	0.416	1406	0.420	**1414**	**0.417**	LOP	1419	0.416	1406	0.420	**1414**	**0.417**
460.ilbdc	LOP	**1864**	**0.298**	1865	0.298	1854	0.299	LOP	**1864**	**0.298**	1865	0.298	1854	0.299
463.swim	LOP	266	1.65	**267**	**1.65**	267	1.65	LOP	266	1.65	**267**	**1.65**	267	1.65
470.bt	LOP	**1166**	**0.905**	1165	0.905	1298	0.813	LOP	**1166**	**0.905**	1165	0.905	1298	0.813

SPEC accel2023_base = 0.6276

SPEC accel2023_peak = 0.6276

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 = "1S,28C,2T"
KMP_LIBRARY = "turnaround"
OMP_DYNAMIC = "FALSE"
OMP_NUM_THREADS = "28"
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)
```

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General Notes (Continued)

```
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 135-175-25 Sat Feb  3 13:40:15 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) GOLD 5520+
       1  "physical id"s (chips)
       56 "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 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
       25 26 27

 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):                          56
      On-line CPU(s) list:             0-55
      Vendor ID:                       GenuineIntel
      Model name:                      INTEL(R) XEON(R) GOLD 5520+
      CPU family:                      6
      Model:                           207
      Thread(s) per core:              2
      Core(s) per socket:              28
      Socket(s):                       1
      Stepping:                        2
      Frequency boost:                 enabled
      CPU max MHz:                     2201.0000
      CPU min MHz:                     800.0000
      BogoMIPS:                        4400.00
      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
```

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Platform Notes (Continued)

```
      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:                       1.3 MiB (28 instances)
      L1i cache:                       896 KiB (28 instances)
      L2 cache:                        56 MiB (28 instances)
      L3 cache:                        52.5 MiB (1 instance)
      NUMA node(s):                    2
      NUMA node0 CPU(s):               0-13,28-41
      NUMA node1 CPU(s):               14-27,42-55
      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

  From lscpu --cache:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL  SETS PHY-LINE COHERENCY-SIZE
      L1d       48K     1.3M   12 Data            1    64        1             64
      L1i       32K     896K    8 Instruction     1    64        1             64
      L2         2M      56M   16 Unified         2  2048        1             64
      L3      52.5M    52.5M   15 Unified         3 57344        1             64

  /proc/cpuinfo cache data
     cache size : 53760 KB

  From numactl --hardware
  WARNING: a numactl 'node' might or might not correspond to a physical chip.
```

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Platform Notes (Continued)

```
  available: 2 nodes (0-1)
  node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 28 29 30 31 32 33 34 35 36 37 38 39 40 41
  node 0 size: 257681 MB
  node 0 free: 256110 MB
  node 1 cpus: 14 15 16 17 18 19 20 21 22 23 24 25 26 27 42 43 44 45 46 47 48 49 50 51 52
  53 54 55
  node 1 size: 257994 MB
  node 1 free: 257359 MB
  node distances:
  node   0   1
    0:  10  12
    1:  12  10

From /proc/meminfo
   MemTotal:       528052212 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

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

From /etc/*release* /etc/*version*
   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 135-175-25 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
```

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Platform Notes (Continued)

```
 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 2 12:37

 SPEC is set to: /home/accel2023
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda2      xfs   221G   38G  184G  18% /

 From /sys/devices/virtual/dmi/id
     Vendor:         PM_202207070954
     Product:        PPM_202207070954
     Product Family: Family
     Serial:         PS_202207070954

 Additional information from dmidecode 3.4 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 MTC40F2046S1RC56BD1 64 GB 2 rank 5600, configured at 4800

 BIOS:
    BIOS Vendor:       American Megatrends International, LLC.
    BIOS Version:      2.1
    BIOS Date:         12/06/2023
    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
```

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Compiler Version Notes (Continued)

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

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`
`-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: `basepeak = yes`

404.lbm: `basepeak = yes`

452.ep: `basepeak = yes`

457.spC: `basepeak = yes`

470.bt: `basepeak = yes`

Fortran benchmarks:

450.md: `basepeak = yes`

455.seismic: `basepeak = yes`

456.spF: `basepeak = yes`

460.ilbdc: `basepeak = yes`

463.swim: `basepeak = yes`

Benchmarks using both Fortran and C:

453.clvrleaf: `basepeak = yes`

459.miniGhost: `basepeak = yes`

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

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