# SPECaccel®2023 Result

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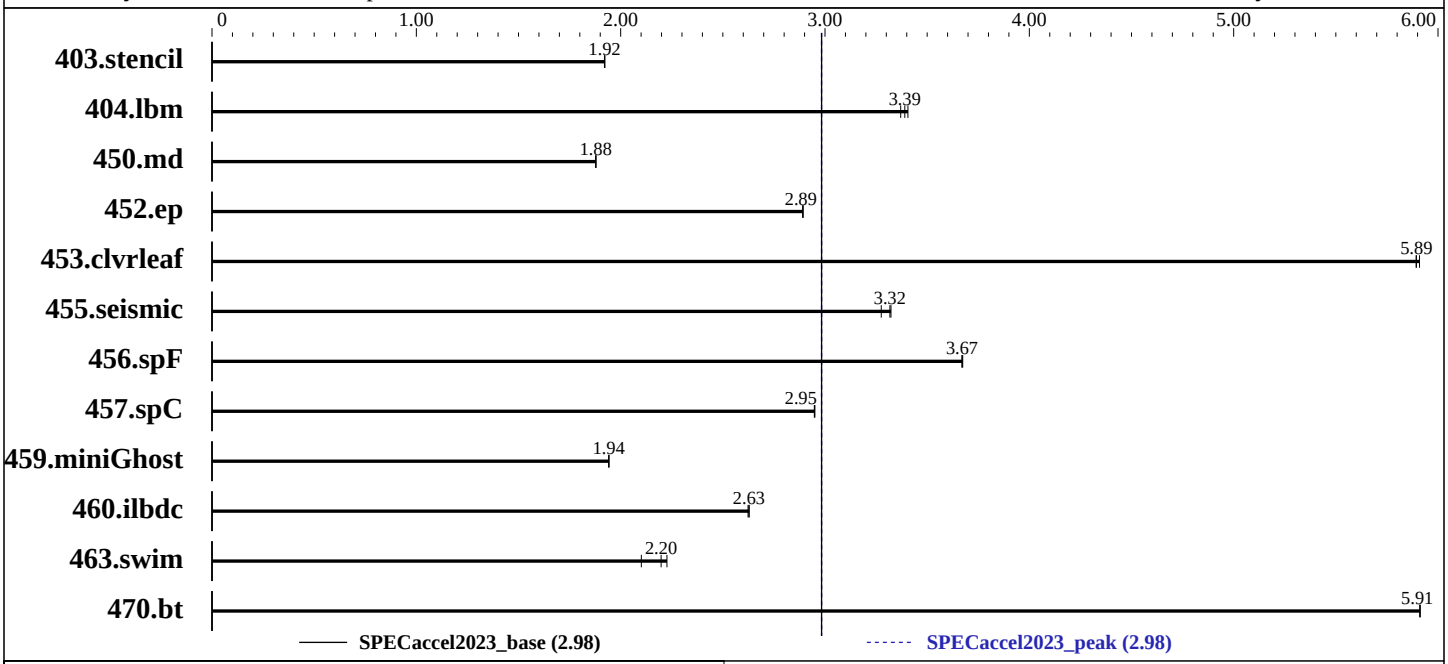
Supermciro
(Test Sponsor: NVIDIA Corporation)
Tesla H100 PCIe 80GB
120GQ-TNRT

SPECaccel 2023_base = 2.98
SPECaccel 2023_peak = 2.98

**accel2023 License:** 9045
**Test Sponsor:** NVIDIA Corporation
**Tested by:** NVIDIA Corporation

**Test Date:** Oct-2023
**Hardware Availability:** Mar-2023
**Software Availability:** Nov-2023




## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon Gold 6338 |
| Max MHz.: | 3400 |
| Nominal: | 2000 |
| Enabled: | 64 cores, 2 chips, 2 threads/core |
| Orderable: | 2 chips |
| Cache L1: | 32 KB I + 48 KB D on chip per core |
| L2: | 1280 KB I+D on chip per core |
| L3: | 48 MB I+D on chip per chip |
| Other: | None |
| Memory: | 512 GB (16x 16GB, PC3200 CL3 DDR4) |
| Storage: | 1TB SATA |
| Other: | None |
| Base Threads Run: | 1 |
| Min. Peak Threads: | 1 |
| Max. Peak Threads: | 1 |

## Accelerator

| | |
|---|---|
| Accel Model Name: | H100 PCIe 80GB |
| Accel Vendor: | NVIDIA |
| Accel Name: | Tesla H100 PCIe 80GB |
| Type of Accel: | GPU |
| Accel Connection: | PCIe 4.0 16x |
| Does Accel Use ECC: | Yes |
| Accel Description: | See Notes |
| Accel Driver: | NVIDIA UNIX x86_64 Kernel Module 525.60.13 |

## Software

| | |
|---|---|
| OS: | Rocky Linux release 8.8 (Green Obsidian)<br>4.18.0-477.15.1.el8_8.x86_64 |
| Compiler: | C/Fortran: Version 23.11 of NVHPC SDK |
| Firmware: | 1.4a 10/11/2022 |
| File System: | xfs |
| System State: | Run level 3 (multi-user) |
| Other: | None |
| Base Parallel Model: | LOP |
| Base Threads Run: | 1 |
| Peak Parallel Models: | LOP |

**(Continued on next page)**

## Software (Continued)

Max. Peak Threads: 1
Min. Peak Threads: 1

## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Model | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Model | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 403.stencil | LOP | 229 | 1.92 | 229 | 1.92 | **229** | **1.92** | LOP | 229 | 1.92 | 229 | 1.92 | **229** | **1.92** |
| 404.lbm | LOP | **134** | **3.39** | 134 | 3.41 | 135 | 3.37 | LOP | **134** | **3.39** | 134 | 3.41 | 135 | 3.37 |
| 450.md | LOP | 320 | 1.88 | **319** | **1.88** | 319 | 1.88 | LOP | 320 | 1.88 | **319** | **1.88** | 319 | 1.88 |
| 452.ep | LOP | 143 | 2.89 | 144 | 2.89 | **144** | **2.89** | LOP | 143 | 2.89 | 144 | 2.89 | **144** | **2.89** |
| 453.clvrleaf | LOP | 170 | 5.89 | 169 | 5.91 | **170** | **5.89** | LOP | 170 | 5.89 | 169 | 5.91 | **170** | **5.89** |
| 455.seismic | LOP | 235 | 3.32 | **235** | **3.32** | 238 | 3.28 | LOP | 235 | 3.32 | **235** | **3.32** | 238 | 3.28 |
| 456.spF | LOP | 129 | 3.67 | 129 | 3.67 | **129** | **3.67** | LOP | 129 | 3.67 | 129 | 3.67 | **129** | **3.67** |
| 457.spC | LOP | **183** | **2.95** | 183 | 2.95 | 183 | 2.95 | LOP | **183** | **2.95** | 183 | 2.95 | 183 | 2.95 |
| 459.miniGhost | LOP | **304** | **1.94** | 304 | 1.94 | 304 | 1.94 | LOP | **304** | **1.94** | 304 | 1.94 | 304 | 1.94 |
| 460.ilbdc | LOP | **211** | **2.63** | 211 | 2.63 | 212 | 2.62 | LOP | **211** | **2.63** | 211 | 2.63 | 212 | 2.62 |
| 463.swim | LOP | **200** | **2.20** | 198 | 2.23 | 209 | 2.10 | LOP | **200** | **2.20** | 198 | 2.23 | 209 | 2.10 |
| 470.bt | LOP | **178** | **5.91** | 178 | 5.91 | 178 | 5.91 | LOP | **178** | **5.91** | 178 | 5.91 | 178 | 5.91 |

**SPEC accel2023_base = 2.98**

**SPEC accel2023_peak = 2.98**

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

## Operating System Notes

```
Shell stacksize set to unlimited via "limit stacksize unlimited"
```

## Platform Notes

```
 Information from nvaccelinfo
 CUDA Driver Version:           12000
 NVRM version:                  NVIDIA UNIX x86_64 Kernel Module  525.60.13  Wed Nov 30 06:39:21 UTC 2022
 Device Number:                 0
 Device Name:                   NVIDIA H100 PCIe
 Device Revision Number:        9.0
 Global Memory Size:            85021163520
 Number of Multiprocessors:     114
 Concurrent Copy and Execution: Yes
 Total Constant Memory:         65536
 Total Shared Memory per Block: 49152
 Registers per Block:           65536
 Warp Size:                     32
 Maximum Threads per Block:     1024
 Maximum Block Dimensions:      1024, 1024, 64
 Maximum Grid Dimensions:       2147483647 x 65535 x 65535
```

**(Continued on next page)**

## Platform Notes (Continued)

```
 Maximum Memory Pitch:          2147483647B
 Texture Alignment:             512B
 Clock Rate:                    1755 MHz
 Execution Timeout:             No
 Integrated Device:             No
 Can Map Host Memory:           Yes
 Compute Mode:                  default
 Concurrent Kernels:            Yes
 ECC Enabled:                   Yes
 Memory Clock Rate:             1593 MHz
 Memory Bus Width:              5120 bits
 L2 Cache Size:                 52428800 bytes
 Max Threads Per SMP:           2048
 Async Engines:                 3
 Unified Addressing:            Yes
 Managed Memory:                Yes
 Concurrent Managed Memory:     Yes
 Preemption Supported:          Yes
 Cooperative Launch:            Yes
 Cluster Launch:                Yes
 Unified Function Pointers:     Yes
 Default Target:                cc90

 Sysinfo program /local/home/mcolgrove/ACCELV2/bin/sysinfo
 Rev: r6622 of 2021-04-07 b1a7d5f8f71be5aff70a755cad7211a0
 running on ice3 Fri Oct 20 17:48:42 2023

 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 6338 CPU @ 2.00GHz
       2  "physical id"s (chips)
       128 "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 : 32
       siblings  : 64
       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
       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

 From lscpu from util-linux 2.32.1:
      Architecture:        x86_64
      CPU op-mode(s):      32-bit, 64-bit
```

**(Continued on next page)**

## Platform Notes (Continued)

```
      Byte Order:            Little Endian
      CPU(s):                128
      On-line CPU(s) list:   0-127
      Thread(s) per core:    2
      Core(s) per socket:    32
      Socket(s):             2
      NUMA node(s):          2
      Vendor ID:             GenuineIntel
      CPU family:            6
      Model:                 106
      Model name:            Intel(R) Xeon(R) Gold 6338 CPU @ 2.00GHz
      Stepping:              6
      CPU MHz:               3200.000
      CPU max MHz:           3200.0000
      CPU min MHz:           800.0000
      BogoMIPS:              4000.00
      Virtualization:        VT-x
      L1d cache:             48K
      L1i cache:             32K
      L2 cache:              1280K
      L3 cache:              49152K
      NUMA node0 CPU(s):     0-31,64-95
      NUMA node1 CPU(s):     32-63,96-127
      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 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 invpcid_single ssbd
      mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad
      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_l1d arch_capabilities

/proc/cpuinfo cache data
   cache size : 49152 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 16 17 18 19 20 21 22 23 24 25 26 27
  28 29 30 31 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
  node 0 size: 257616 MB
```

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## Platform Notes (Continued)

```
   node 0 free: 126167 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 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
   node 1 size: 257985 MB
   node 1 free: 227371 MB
   node distances:
   node   0   1
     0:  10  20
     1:  20  10

 From /proc/meminfo
    MemTotal:       527975808 kB
    HugePages_Total:       0
    Hugepagesize:       2048 kB

 /sbin/tuned-adm active
     Current active profile: throughput-performance

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

 /usr/bin/lsb_release -d
    Rocky Linux release 8.8 (Green Obsidian)

 From /etc/*release* /etc/*version*
    centos-release: Rocky Linux release 8.8 (Green Obsidian)
    os-release:
       NAME="Rocky Linux"
       VERSION="8.8 (Green Obsidian)"
       ID="rocky"
       ID_LIKE="rhel centos fedora"
       VERSION_ID="8.8"
       PLATFORM_ID="platform:el8"
       PRETTY_NAME="Rocky Linux 8.8 (Green Obsidian)"
       ANSI_COLOR="0;32"
    redhat-release: Rocky Linux release 8.8 (Green Obsidian)
    rocky-release: Rocky Linux release 8.8 (Green Obsidian)
    rocky-release-upstream: Derived from Red Hat Enterprise Linux 8.8
    system-release: Rocky Linux release 8.8 (Green Obsidian)
    system-release-cpe: cpe:/o:rocky:rocky:8:GA

 uname -a:
    Linux ice3 4.18.0-477.15.1.el8_8.x86_64 #1 SMP Wed Jun 28 15:04:18 UTC 2023 x86_64
    x86_64 x86_64 GNU/Linux

 Kernel self-reported vulnerability status:
```

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## Platform Notes (Continued)

```
 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:                                        Mitigation: Clear CPU buffers; SMT
                                                           vulnerable
 retbleed:                                                Not affected
 CVE-2018-3639 (Speculative Store Bypass):                Mitigation: Speculative Store
                                                          Bypass disabled via prctl
 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 Sep 19 12:23

 SPEC is set to: /local/home/mcolgrove/ACCELV2
    Filesystem                Type  Size  Used Avail Use% Mounted on
    /dev/mapper/rl_ice33-local xfs   930G  201G  729G  22% /local

 From /sys/devices/virtual/dmi/id
     Vendor:         Supermicro
     Product:        SYS-120GQ-TNRT
     Product Family: SMC X12

 Cannot run dmidecode; consider saying (as root)
    chmod +s /usr/sbin/dmidecode

 BIOS:
    BIOS Vendor:       American Megatrends International, LLC.
    BIOS Version:      1.4a
    BIOS Date:         10/11/2022

 (End of data from sysinfo program)
```

## Compiler Version Notes

```
==============================================================================
C          | 457.spC(base)
------------------------------------------------------------------------------
/usr/lib64/crt1.o: In function ‘_start’:
```

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## Compiler Version Notes (Continued)

```
(.text+0x24): undefined reference to ‘main’
pgacclnk: child process exit status 1: /usr/bin/ld
nvc Rel Dev-r239283 64-bit target on x86-64 Linux -tp icelake-server
NVIDIA Compilers and Tools
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------------------------------------------------------------------------------

==============================================================================
C           | 403.stencil(base) 404.lbm(base) 452.ep(base) 470.bt(base)
------------------------------------------------------------------------------
nvc Rel Dev-r239283 64-bit target on x86-64 Linux -tp icelake-server
NVIDIA Compilers and Tools
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------------------------------------------------------------------------------

==============================================================================
C           | 457.spC(base)
------------------------------------------------------------------------------
/usr/lib64/crt1.o: In function ‘_start’:
(.text+0x24): undefined reference to ‘main’
pgacclnk: child process exit status 1: /usr/bin/ld
nvc Rel Dev-r239283 64-bit target on x86-64 Linux -tp icelake-server
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------------------------------------------------------------------------------

==============================================================================
C           | 403.stencil(base) 404.lbm(base) 452.ep(base) 470.bt(base)
------------------------------------------------------------------------------
nvc Rel Dev-r239283 64-bit target on x86-64 Linux -tp icelake-server
NVIDIA Compilers and Tools
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------------------------------------------------------------------------------

==============================================================================
Fortran     | 450.md(base) 455.seismic(base) 456.spF(base) 460.ilbdc(base)
            | 463.swim(base)
------------------------------------------------------------------------------
nvfortran Rel Dev-r239283 64-bit target on x86-64 Linux -tp icelake-server
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------------------------------------------------------------------------------

==============================================================================
Fortran, C | 453.clvrleaf(base) 459.miniGhost(base)
------------------------------------------------------------------------------
nvfortran Rel Dev-r239283 64-bit target on x86-64 Linux -tp icelake-server
```

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## Compiler Version Notes (Continued)

```
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nvc Rel Dev-r239283 64-bit target on x86-64 Linux -tp icelake-server
NVIDIA Compilers and Tools
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------------------------------------------------------------------------------
```

## Base Compiler Invocation

C benchmarks:
`nvc`

Fortran benchmarks:
`nvfortran`

Benchmarks using both Fortran and C:
`nvfortran nvc`

## Base Portability Flags

403.stencil: `-DSPEC_NO_NOTHING`
457.spC: `-mcmodel=medium -Wl,--no-relax`

## Base Optimization Flags

C benchmarks:
`-Ofast -mp=gpu -Mfprelaxed -Mstack_arrays -static-nvidia`

Fortran benchmarks:
`-Ofast -mp=gpu -Mfprelaxed -Mstack_arrays -static-nvidia`

Benchmarks using both Fortran and C:

453.clvrleaf: `-Ofast -mp=gpu -Mfprelaxed -Mstack_arrays -static-nvidia`

459.miniGhost: `-Mnomain -Ofast -mp=gpu -Mfprelaxed -Mstack_arrays -static-nvidia`

## 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 file that was used to format this result can be browsed at
`http://www.spec.org/accel2023/flags/nv2023_flags_v2.html`

You can also download the XML flags source by saving the following link:
`http://www.spec.org/accel2023/flags/nv2023_flags_v2.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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