# SPECaccel®2023 Result

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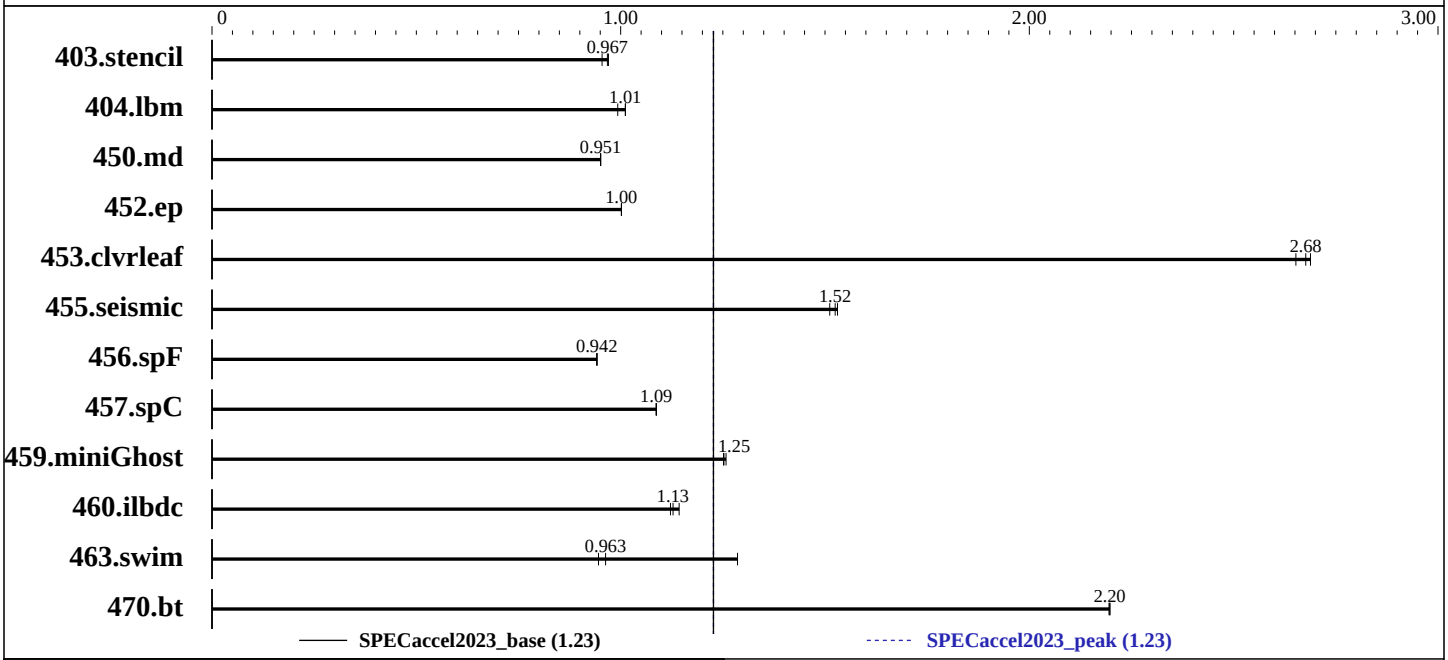
Supermicro
(Test Sponsor: NVIDIA Corporation)
Tesla V100-PCIE-16GB
SuperServer SYS-1029GQ-TRT

SPECaccel 2023_base = 1.23
SPECaccel 2023_peak = 1.23

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

**Test Date:** Oct-2023
**Hardware Availability:** Feb-2018
**Software Availability:** Oct-2023




## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon Gold 6148 |
| Max MHz.: | 3700 |
| Nominal: | 2400 |
| Enabled: | 40 cores, 2 chips, 2 threads/core |
| Orderable: | 2 chips |
| Cache L1: | 32 KB I + 32 KB D on chip per core |
| L2: | 1 MB I+D on chip per core |
| L3: | 28160 KB I+D on chip per chip |
| Other: | None |
| Memory: | 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R) |
| Storage: | 440 GB SATA |
| Other: | None |
| Base Threads Run: | 1 |
| Min. Peak Threads: | 1 |
| Max. Peak Threads: | 1 |

## Accelerator

| | |
|---|---|
| Accel Model Name: | Tesla V100 |
| Accel Vendor: | NVIDIA |
| Accel Name: | Tesla V100-PCIE-16GB |
| Type of Accel: | GPU |
| Accel Connection: | PCIe 3.0 x 16 |
| Does Accel Use ECC: | Yes |
| Accel Description: | See Notes |
| Accel Driver: | NVIDIA UNIX x86_64 Kernel Module 465.19.01 |

## Software

| | |
|---|---|
| OS: | Ubuntu 18.04.2 LTS<br>4.15.0-50-generic |
| Compiler: | C/Fortran: Version 23.9 of NVIDIA NVHPC SDK |
| Firmware: | American Megatrends Inc. 3.2 11/07/2019 |
| File System: | ext4 |
| System State: | Run level 5 (multi-user) |
| Other: | None |
| Base Parallel Model: | ACC |
| Base Threads Run: | 1 |
| Peak Parallel Models: | ACC |

**(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 | ACC | 454 | 0.970 | 461 | 0.954 | **455** | **0.967** | ACC | 454 | 0.970 | 461 | 0.954 | **455** | **0.967** |
| 404.lbm | ACC | 450 | 1.01 | **450** | **1.01** | 458 | 0.993 | ACC | 450 | 1.01 | **450** | **1.01** | 458 | 0.993 |
| 450.md | ACC | 631 | 0.951 | **631** | **0.951** | 631 | 0.951 | ACC | 631 | 0.951 | **631** | **0.951** | 631 | 0.951 |
| 452.ep | ACC | 414 | 1.00 | **414** | **1.00** | 414 | 1.00 | ACC | 414 | 1.00 | **414** | **1.00** | 414 | 1.00 |
| 453.clvrleaf | ACC | 377 | 2.65 | 372 | 2.69 | **374** | **2.68** | ACC | 377 | 2.65 | 372 | 2.69 | **374** | **2.68** |
| 455.seismic | ACC | 516 | 1.51 | **512** | **1.52** | 510 | 1.53 | ACC | 516 | 1.51 | **512** | **1.52** | 510 | 1.53 |
| 456.spF | ACC | 504 | 0.942 | **504** | **0.942** | 504 | 0.942 | ACC | 504 | 0.942 | **504** | **0.942** | 504 | 0.942 |
| 457.spC | ACC | **497** | **1.09** | 497 | 1.09 | 497 | 1.09 | ACC | **497** | **1.09** | 497 | 1.09 | 497 | 1.09 |
| 459.miniGhost | ACC | 471 | 1.25 | 469 | 1.26 | **471** | **1.25** | ACC | 471 | 1.25 | 469 | 1.26 | **471** | **1.25** |
| 460.ilbdc | ACC | 486 | 1.14 | 495 | 1.12 | **492** | **1.13** | ACC | 486 | 1.14 | 495 | 1.12 | **492** | **1.13** |
| 463.swim | ACC | **457** | **0.963** | 465 | 0.946 | 342 | 1.29 | ACC | **457** | **0.963** | 465 | 0.946 | 342 | 1.29 |
| 470.bt | ACC | 480 | 2.20 | **480** | **2.20** | 481 | 2.19 | ACC | 480 | 2.20 | **480** | **2.20** | 481 | 2.19 |

**SPEC accel2023_base = 1.23**
**SPEC accel2023_peak = 1.23**

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:           11030
NVRM version:                  NVIDIA UNIX x86_64 Kernel Module  465.19.01  Fri Mar 19 07:44:41 UTC 2021
Device Number:                 0
Device Name:                   NVIDIA Tesla V100-PCIE-16GB
Device Revision Number:        7.0
Global Memory Size:            16945512448
Number of Multiprocessors:     80
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
Maximum Memory Pitch:          2147483647B
```

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## Platform Notes (Continued)

```
Texture Alignment:              512B
Clock Rate:                     1380 MHz
Execution Timeout:              No
Integrated Device:              No
Can Map Host Memory:            Yes
Compute Mode:                   default
Concurrent Kernels:             Yes
ECC Enabled:                    Yes
Memory Clock Rate:              877 MHz
Memory Bus Width:               4096 bits
L2 Cache Size:                  6291456 bytes
Max Threads Per SMP:            2048
Async Engines:                  7
Unified Addressing:             Yes
Managed Memory:                 Yes
Concurrent Managed Memory:      Yes
Preemption Supported:           Yes
Cooperative Launch:             Yes
Default Target:                 cc70

Sysinfo program /local/home/mcolgrove/ACCELv2b/bin/sysinfo
Rev: r6622 of 2021-04-07 b1a7d5f8f71be5aff70a755cad7211a0
running on dev-sky5 Fri Oct 13 14:55:26 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 6148 CPU @ 2.40GHz
      2  "physical id"s (chips)
      80 "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 : 20
      siblings  : 40
      physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
      physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

From lscpu from util-linux 2.31.1:
     Architecture:        x86_64
     CPU op-mode(s):      32-bit, 64-bit
     Byte Order:          Little Endian
     CPU(s):              80
     On-line CPU(s) list: 0-79
     Thread(s) per core:  2
     Core(s) per socket:  20
```

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## Platform Notes (Continued)

```
      Socket(s):             2
      NUMA node(s):          2
      Vendor ID:             GenuineIntel
      CPU family:            6
      Model:                 85
      Model name:            Intel(R) Xeon(R) Gold 6148 CPU @ 2.40GHz
      Stepping:              4
      CPU MHz:               1000.011
      CPU max MHz:           2401.0000
      CPU min MHz:           1000.0000
      BogoMIPS:              4800.00
      Virtualization:        VT-x
      L1d cache:             32K
      L1i cache:             32K
      L2 cache:              1024K
      L3 cache:              28160K
      NUMA node0 CPU(s):     0-19,40-59
      NUMA node1 CPU(s):     20-39,60-79
      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 cdp_l3
      invpcid_single pti intel_ppin ssbd mba ibrs ibpb stibp tpr_shadow vnmi flexpriority
      ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a
      avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
      xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
      dtherm ida arat pln pts pku ospke md_clear flush_l1d

  /proc/cpuinfo cache data
     cache size : 28160 KB

  Unable to get information from 'numactl --hardware'
  Please verify numactl installation.

  From /proc/meminfo
     MemTotal:       394882320 kB
     HugePages_Total:       0
     Hugepagesize:       2048 kB

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

  /usr/bin/lsb_release -d
     Ubuntu 18.04.2 LTS
```

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## Platform Notes (Continued)

```
From /etc/*release* /etc/*version*
   debian_version: buster/sid
   os-release:
      NAME="Ubuntu"
      VERSION="18.04.2 LTS (Bionic Beaver)"
      ID=ubuntu
      ID_LIKE=debian
      PRETTY_NAME="Ubuntu 18.04.2 LTS"
      VERSION_ID="18.04"
      HOME_URL="https://www.ubuntu.com/"
      SUPPORT_URL="https://help.ubuntu.com/"

uname -a:
   Linux dev-sky5 4.15.0-50-generic #54-Ubuntu SMP Mon May 6 18:46:08 UTC 2019 x86_64
   x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):                          No status reported
CVE-2018-3620 (L1 Terminal Fault):                       Mitigation: PTE Inversion; VMX:
                                                         conditional cache flushes, SMT
                                                         vulnerable
Microarchitectural Data Sampling:                       Mitigation: Clear CPU buffers; SMT
                                                         vulnerable
CVE-2017-5754 (Meltdown):                                Mitigation: PTI
CVE-2018-3639 (Speculative Store Bypass):                Mitigation: Speculative Store
                                                         Bypass disabled via prctl and
                                                         seccomp
CVE-2017-5753 (Spectre variant 1):                       Mitigation: __user pointer
                                                         sanitization
CVE-2017-5715 (Spectre variant 2):                       Mitigation: Full generic
                                                         retpoline, IBPB: conditional,
                                                        IBRS_FW, STIBP: conditional, RSB
                                                         filling
CVE-2020-0543 (Special Register Buffer Data Sampling): No status reported
CVE-2019-11135 (TSX Asynchronous Abort):                 No status reported

run-level 5 Oct 12 10:32

SPEC is set to: /local/home/mcolgrove/ACCELv2b
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda1      ext4  440G  281G  137G  68% /

From /sys/devices/virtual/dmi/id
    Vendor:         Supermicro
    Product:        SYS-1029GQ-TRT
    Product Family: SMC X11
```

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## Platform Notes (Continued)

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

 BIOS:
    BIOS Vendor:       American Megatrends Inc.
    BIOS Version:      3.2
    BIOS Date:         11/07/2019

 (End of data from sysinfo program)
```

## Compiler Version Notes

```
==============================================================================
C          | 457.spC(base)
------------------------------------------------------------------------------
/usr/lib/x86_64-linux-gnu/crt1.o: In function ‘_start’:
(.text+0x20): undefined reference to ‘main’
pgacclnk: child process exit status 1: /usr/bin/ld
nvc Rel Dev-r238789 64-bit target on x86-64 Linux -tp skylake-avx512
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------------------------------------------------------------------------------

==============================================================================
C          | 403.stencil(base) 404.lbm(base) 452.ep(base) 470.bt(base)
------------------------------------------------------------------------------
nvc Rel Dev-r238789 64-bit target on x86-64 Linux -tp skylake-avx512
NVIDIA Compilers and Tools
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------------------------------------------------------------------------------

==============================================================================
C          | 457.spC(base)
------------------------------------------------------------------------------
/usr/lib/x86_64-linux-gnu/crt1.o: In function ‘_start’:
(.text+0x20): undefined reference to ‘main’
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------------------------------------------------------------------------------

==============================================================================
C          | 403.stencil(base) 404.lbm(base) 452.ep(base) 470.bt(base)
------------------------------------------------------------------------------
```

**(Continued on next page)**

## Compiler Version Notes (Continued)

```
nvc Rel Dev-r238789 64-bit target on x86-64 Linux -tp skylake-avx512
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------------------------------------------------------------------------------

==============================================================================
Fortran    | 450.md(base) 455.seismic(base) 456.spF(base) 460.ilbdc(base)
           | 463.swim(base)
------------------------------------------------------------------------------
nvfortran Rel Dev-r238789 64-bit target on x86-64 Linux -tp skylake-avx512
NVIDIA Compilers and Tools
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------------------------------------------------------------------------------

==============================================================================
Fortran, C | 453.clvrleaf(base) 459.miniGhost(base)
------------------------------------------------------------------------------
nvfortran Rel Dev-r238789 64-bit target on x86-64 Linux -tp skylake-avx512
NVIDIA Compilers and Tools
Copyright (c) 2023, NVIDIA CORPORATION & AFFILIATES.  All rights reserved.
nvc Rel Dev-r238789 64-bit target on x86-64 Linux -tp skylake-avx512
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

457.spC: -mcmodel=medium -Wl,--no-relax

## Base Optimization Flags

C benchmarks:
`-fast -acc`

Fortran benchmarks:
`-fast -acc`

Benchmarks using both Fortran and C:

453.clvrleaf: `-fast -acc`

459.miniGhost: `-Mnomain -fast -acc`

## 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/nv2021_flags_v1.0.3.html`

You can also download the XML flags source by saving the following link:
`http://www.spec.org/accel2023/flags/nv2021_flags_v1.0.3.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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