SPECaccel®2023 Result

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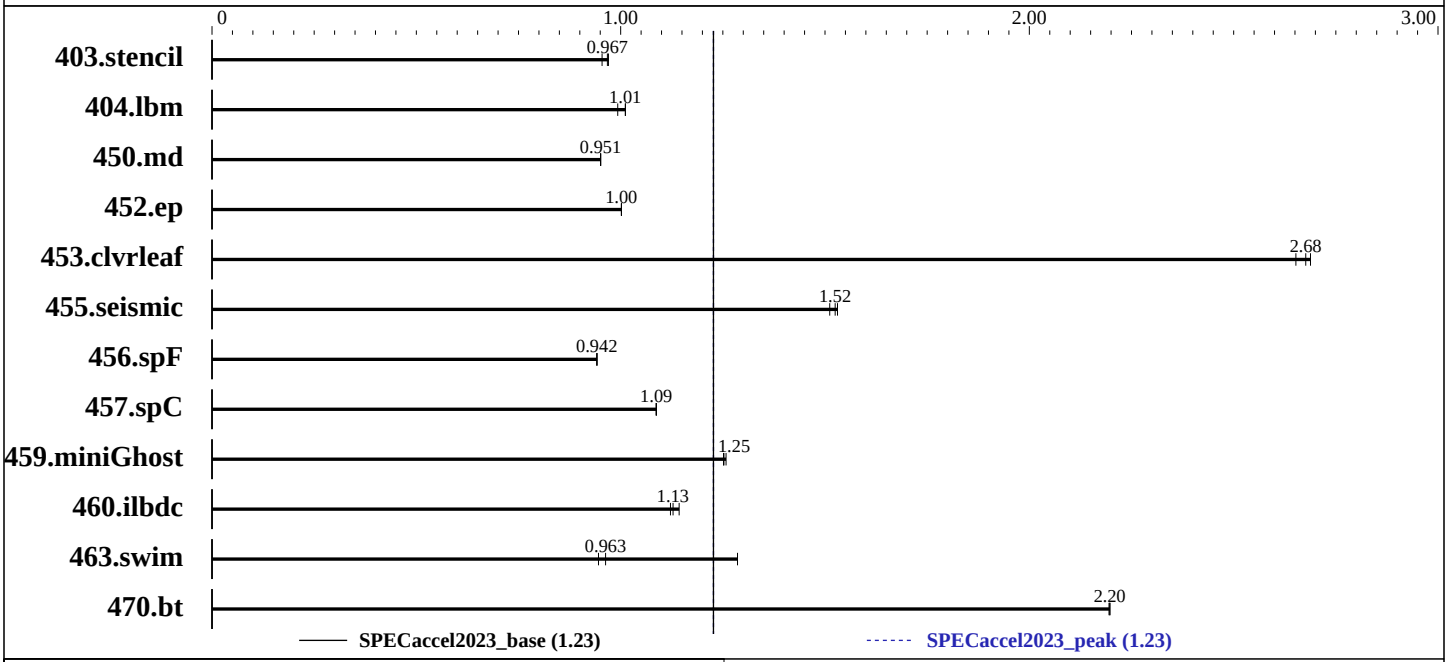
Supermicro
(Test Sponsor: NVIDIA Corporation)
Tesla V100-PCIE-16GB
SuperServer SYS-1029GQ-TRT

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 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

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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"
```

General Notes

```
Submitted_by: Mathew Colgrove <mcolgrove@nvidia.com>
Submitted: Mon Nov  6 17:49:03 EST 2023
Submission: accel2023-20231024-00001.sub
```

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
```

(Continued on next page)

Platform Notes (Continued)

```
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
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
```

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Platform Notes (Continued)

```
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
     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
```

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Platform Notes (Continued)

```
   Hugepagesize:       2048 kB

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

 /usr/bin/lsb_release -d
   Ubuntu 18.04.2 LTS

 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
```

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Platform Notes (Continued)

```
 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

 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
NVIDIA Compilers and Tools
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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
Copyright (c) 2023, NVIDIA CORPORATION & AFFILIATES.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
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
```

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Compiler Version Notes (Continued)

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

==============================================================================
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
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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

403.stencil: `No flags used`
404.lbm: `No flags used`
450.md: `No flags used`
452.ep: `No flags used`
453.clvrleaf: `No flags used`
455.seismic: `No flags used`
456.spF: `No flags used`
457.spC: `-mcmodel=medium -Wl,--no-relax`
459.miniGhost: `No flags used`
460.ilbdc: `No flags used`
463.swim: `No flags used`
470.bt: `No flags used`

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`

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Peak Optimization Flags (Continued)

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
`https://pro.spec.org/private/hpg/submit/accel2023/flags/nv2021_flags_v1.0.3.html`

You can also download the XML flags source by saving the following link:
`https://pro.spec.org/private/hpg/submit/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.

Tested with SPECaccel2023 v2.0.17 on 2023-10-13 17:55:25-0400.
Report generated on 2023-11-08 13:07:19 by accel2023 PS formatter v112.
Originally published on 2023-11-08.