



# SPECaccel<sup>®</sup>2023 Result

Copyright 2023 Standard Performance Evaluation Corporation

NVIDIA Corporation  
Tesla H100 96GB  
MGX-GH200

SPECaccel2023\_base = 6.32

SPECaccel2023\_peak = 6.32

accel2023 License: 9045

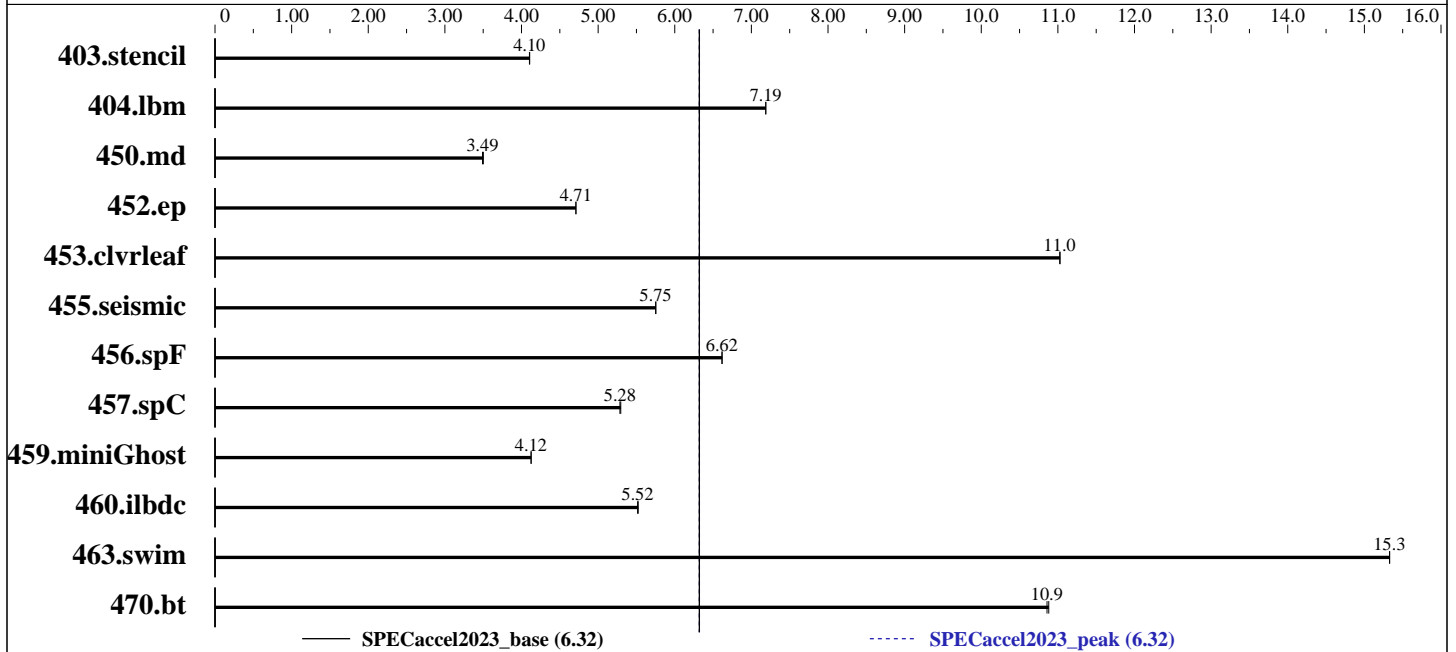
Test Sponsor: NVIDIA Corporation

Tested by: NVIDIA Corporation

Test Date: Oct-2023

Hardware Availability: Sep-2023

Software Availability: Nov-2023



## Hardware

CPU Name: Grace  
 Max MHz.: 3100  
 Nominal: 2900  
 Enabled: 72 cores, 1 chip  
 Orderable: 1 chip  
 Cache L1: 64 KB I + 64 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 117 MB I+D on chip per chip  
 Other: None  
 Memory: 480 GB (1 x 480 GB LPDDR5)  
 Storage: 1.8 TB NVMe  
 Other: None  
 Base Threads Run: 1  
 Min. Peak Threads: 1  
 Max. Peak Threads: 1

## Accelerator

Accel Model Name: H100 96GB  
 Accel Vendor: NVIDIA Corporation  
 Accel Name: Tesla H100 96GB  
 Type of Accel: GPU  
 Accel Connection: NVLink-C2C  
 Does Accel Use ECC: Yes  
 Accel Description: Grace Hopper Superchip w/ 96GB device memory  
 Accel Driver: NVIDIA UNIX Open Kernel Module for aarch64 525.105.17

## Software

OS: Ubuntu 22.04.3 LTS  
 6.2.0-1010-nvidia-64k  
 Compiler: C/Fortran: Version 23.11 NVHPC SDK  
 Firmware: NVIDIA 00010001 09/21/2023  
 File System: ext4  
 System State: Run level 3 (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	107	4.11	<u>107</u>	<u>4.10</u>			ACC	107	4.11	<u>107</u>	<u>4.10</u>		
404.lbm	ACC	63.3	7.19	<u>63.3</u>	<u>7.19</u>			ACC	63.3	7.19	<u>63.3</u>	<u>7.19</u>		
450.md	ACC	<u>172</u>	<u>3.49</u>	171	3.50			ACC	<u>172</u>	<u>3.49</u>	171	3.50		
452.ep	ACC	<u>88.1</u>	<u>4.71</u>	88.1	4.71			ACC	<u>88.1</u>	<u>4.71</u>	88.1	4.71		
453.civrleaf	ACC	<u>90.7</u>	<u>11.0</u>	90.7	11.0			ACC	<u>90.7</u>	<u>11.0</u>	90.7	11.0		
455.seismic	ACC	136	5.75	<u>136</u>	<u>5.75</u>			ACC	136	5.75	<u>136</u>	<u>5.75</u>		
456.spF	ACC	71.8	6.62	<u>71.8</u>	<u>6.62</u>			ACC	71.8	6.62	<u>71.8</u>	<u>6.62</u>		
457.spC	ACC	102	5.30	<u>102</u>	<u>5.28</u>			ACC	102	5.30	<u>102</u>	<u>5.28</u>		
459.miniGhost	ACC	143	4.13	<u>143</u>	<u>4.12</u>			ACC	143	4.13	<u>143</u>	<u>4.12</u>		
460.ilbdc	ACC	<u>101</u>	<u>5.52</u>	100	5.52			ACC	<u>101</u>	<u>5.52</u>	100	5.52		
463.swim	ACC	28.7	15.3	<u>28.7</u>	<u>15.3</u>			ACC	28.7	15.3	<u>28.7</u>	<u>15.3</u>		
470.bt	ACC	<u>97.2</u>	<u>10.9</u>	97.0	10.9			ACC	<u>97.2</u>	<u>10.9</u>	97.0	10.9		

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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

Environment variables set by runaccel before the start of the run:  
LD\_LIBRARY\_PATH = "/var/data0/sandbox/nvuser/SPECACCEL/nv239\_libs"  
Set to the location of the NVHPC compiler runtime libraries.

## Platform Notes

Sysinfo program /var/data0/sandbox/nvuser/mcolgrove/ACCELv2/bin/sysinfo  
Rev: r6622 of 2021-04-07 bla7d5f8f71be5aff70a755cad7211a0  
running on LegoCG1-96GB-QS-102 Tue Oct 17 01:11:22 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>

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## Platform Notes (Continued)

From /proc/cpuinfo

```

*
* Did not identify cpu model.  If you would
* like to write your own sysinfo program, see
* www.spec.org/cpu2017/config.html#sysinfo
*
*
* 0 "physical id" tags found.  Perhaps this is an older system,
* or a virtualized system.  Not attempting to guess how to
* count chips/cores for this system.
*
    72 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following
excerpts from /proc/cpuinfo might not be reliable.  Use with caution.)

```

From lscpu from util-linux 2.37.2:

```

Architecture:          aarch64
CPU op-mode(s):        64-bit
Byte Order:             Little Endian
CPU(s):                 72
On-line CPU(s) list:   0-71
Vendor ID:              ARM
Model:                  0
Thread(s) per core:    1
Core(s) per socket:    72
Socket(s):              1
Stepping:               r0p0
Frequency boost:       disabled
CPU max MHz:           3429.0000
CPU min MHz:           81.0000
BogoMIPS:               2000.00
Flags:                  fp asimd evtstrm aes pmull sha1 sha2 crc32
atomics fphp asimdhp cpuid asimdrdm jscvt fcma lrcpc dcpop sha3 sm3 sm4 asimddp
sha512 sve asimdfhm dit uscat ilrcpc flagm ssbs sb paca pacg dcpodp sve2 sveaes
svepmull svebitperm svesha3 svesm4 flagm2 frint svei8mm svebf16 i8mm bf16 dgh bti
L1d cache:             4.5 MiB (72 instances)
L1i cache:             4.5 MiB (72 instances)
L2 cache:              72 MiB (72 instances)
L3 cache:              114 MiB (1 instance)
NUMA node(s):          9
NUMA node0 CPU(s):     0-71
NUMA node1 CPU(s):
NUMA node2 CPU(s):
NUMA node3 CPU(s):
NUMA node4 CPU(s):
NUMA node5 CPU(s):
NUMA node6 CPU(s):

```

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## Platform Notes (Continued)

```

NUMA node7 CPU(s):
NUMA node8 CPU(s):
Vulnerability Gather data sampling: Not affected
Vulnerability Itlb multihit: Not affected
Vulnerability Lltf: 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
Vulnerability Spectre v1: Mitigation; __user pointer sanitization
Vulnerability Spectre v2: Not affected
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	64K	4.5M	4	Data	1	256		64
L1i	64K	4.5M	4	Instruction	1	256		64
L2	1M	72M	8	Unified	2	2048		64
L3	114M	114M	12	Unified	3	155648		64

From numactl --hardware

WARNING: a numactl 'node' might or might not correspond to a physical chip.

```

available: 9 nodes (0-8)
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 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 64 65 66 67 68 69 70 71
node 0 size: 490308 MB
node 0 free: 76775 MB
node 1 cpus:
node 1 size: 97280 MB
node 1 free: 96957 MB
node 2 cpus:
node 2 size: 0 MB
node 2 free: 0 MB
node 3 cpus:
node 3 size: 0 MB
node 3 free: 0 MB
node 4 cpus:
node 4 size: 0 MB
node 4 free: 0 MB
node 5 cpus:
node 5 size: 0 MB
node 5 free: 0 MB
node 6 cpus:

```

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## Platform Notes (Continued)

```

node 6 size: 0 MB
node 6 free: 0 MB
node 7 cpus:
node 7 size: 0 MB
node 7 free: 0 MB
node 8 cpus:
node 8 size: 0 MB
node 8 free: 0 MB
node distances:
node  0  1  2  3  4  5  6  7  8
0:  10  80  80  80  80  80  80  80  80
1:  80  10  255  255  255  255  255  255  255
2:  80  255  10  255  255  255  255  255  255
3:  80  255  255  10  255  255  255  255  255
4:  80  255  255  255  10  255  255  255  255
5:  80  255  255  255  255  10  255  255  255
6:  80  255  255  255  255  255  10  255  255
7:  80  255  255  255  255  255  255  10  255
8:  80  255  255  255  255  255  255  255  10

```

```

From /proc/meminfo
MemTotal:      601690240 kB
HugePages_Total:      0
Hugepagesize:    524288 kB

```

```

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

```

```

/usr/bin/lsb_release -d
Ubuntu 22.04.3 LTS

```

```

From /etc/*release* /etc/*version*
debian_version: bookworm/sid
l4t-release:
  L4T_NAME="L4T Server"
  L4T_PRETTY_NAME="NVIDIA L4T Server"
  L4T_SWBUILD_DATE="2023-09-12-19-18-30"
  L4T_SWBUILD_VERSION="6.0.0-nvidia"
  L4T_COMMIT_ID="3244539"
  L4T_PLATFORM=""
  L4T_SERIAL_NUMBER=""
os-release:
  PRETTY_NAME="Ubuntu 22.04.3 LTS"
  NAME="Ubuntu"
  VERSION_ID="22.04"
  VERSION="22.04.3 LTS (Jammy Jellyfish)"
  VERSION_CODENAME=jammy

```

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## Platform Notes (Continued)

ID=ubuntu  
ID\_LIKE=debian  
HOME\_URL="https://www.ubuntu.com/"

```
uname -a:
Linux LegoCG1-96GB-QS-102 6.2.0-1010-nvidia-64k #10-Ubuntu SMP PREEMPT_DYNAMIC Wed Aug
30 06:23:50 UTC 2023 aarch64 aarch64 aarch64 GNU/Linux
```

Kernel self-reported vulnerability status:

gather_data_sampling:	Not affected
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
CVE-2017-5753 (Spectre variant 1):	Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):	Not affected
CVE-2020-0543 (Special Register Buffer Data Sampling):	Not affected
CVE-2019-11135 (TSX Asynchronous Abort):	Not affected

```
run-level 3 Oct 14 00:07
```

```
SPEC is set to: /var/data0/sandbox/nvuser/mcolgrove/ACCELv2
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/nvme0n1p2 ext4  1.8T  1.5T  200G  89% /
```

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

```
BIOS:
  BIOS Vendor:      NVIDIA
  BIOS Version:    00010001
  BIOS Date:       20230921
```

(End of data from sysinfo program)

## Compiler Version Notes

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

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## Compiler Version Notes (Continued)

nvc Rel Dev-r238862 linuxarm64 target on aarch64 Linux -tp neoverse-v2  
NVIDIA Compilers and Tools  
Copyright (c) 2023, NVIDIA CORPORATION & AFFILIATES. All rights reserved.

=====  
C | 457.spC(base)  
=====

nvc-Warning-Only small, tiny and large code models are allowed on AArch64.  
The code model large will be used.  
/usr/bin/ld: /usr/lib/aarch64-linux-gnu/crt1.o: in function `\_\_wrap\_main':  
(.text+0x38): undefined reference to `main'  
pgacclnk: child process exit status 1: /usr/bin/ld  
nvc Rel Dev-r238862 linuxarm64 target on aarch64 Linux -tp neoverse-v2  
NVIDIA Compilers and Tools  
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=====  
C | 403.stencil(base) 404.lbm(base) 452.ep(base) 470.bt(base)  
=====

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=====  
C | 457.spC(base)  
=====

nvc-Warning-Only small, tiny and large code models are allowed on AArch64.  
The code model large will be used.  
/usr/bin/ld: /usr/lib/aarch64-linux-gnu/crt1.o: in function `\_\_wrap\_main':  
(.text+0x38): undefined reference to `main'  
pgacclnk: child process exit status 1: /usr/bin/ld  
nvc Rel Dev-r238862 linuxarm64 target on aarch64 Linux -tp neoverse-v2  
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=====  
Fortran | 450.md(base) 455.seismic(base) 456.spF(base) 460.ilbdc(base)  
| 463.swim(base)  
=====

nvfortran Rel Dev-r238862 linuxarm64 target on aarch64 Linux -tp neoverse-v2  
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## Compiler Version Notes (Continued)

```

=====
Fortran, C | 453.clvrleaf(base) 459.miniGhost(base)
-----
nvfortran Rel Dev-r238862 linuxarm64 target on aarch64 Linux -tp neoverse-v2
NVIDIA Compilers and Tools
Copyright (c) 2023, NVIDIA CORPORATION & AFFILIATES. All rights reserved.
nvc Rel Dev-r238862 linuxarm64 target on aarch64 Linux -tp neoverse-v2
NVIDIA Compilers and Tools
Copyright (c) 2023, NVIDIA CORPORATION & AFFILIATES. All rights reserved.
=====

```

## Base Compiler Invocation

C benchmarks:  
nvc

Fortran benchmarks:  
nvfortran

Benchmarks using both Fortran and C:  
nvfortran nvc

## Base Portability Flags

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

## Base Optimization Flags

C benchmarks:  
-Ofast -acc -Mfprelaxed -Mstack\_arrays -static-nvidia  
-march=neoverse-v2

Fortran benchmarks:  
-Ofast -acc -Mfprelaxed -Mstack\_arrays -static-nvidia  
-march=neoverse-v2

Benchmarks using both Fortran and C:

453.clvrleaf: -Ofast -acc -Mfprelaxed -Mstack\_arrays -static-nvidia  
-march=neoverse-v2

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## Base Optimization Flags (Continued)

459.miniGhost: -Mnomain -Ofast -acc -Mfprelaxed -Mstack\_arrays  
-static-nvidia -march=neoverse-v2

## 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.clvleaf: 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\\_arm.html](http://www.spec.org/accel2023/flags/nv2023_flags_v2_arm.html)

You can also download the XML flags source by saving the following link:

[http://www.spec.org/accel2023/flags/nv2023\\_flags\\_v2\\_arm.xml](http://www.spec.org/accel2023/flags/nv2023_flags_v2_arm.xml)



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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

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