



# SPECaccel<sup>®</sup>2023 Result

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Supermicro  
(Test Sponsor: NVIDIA Corporation)

Tesla A100 PCIe 80GB  
120GQ-TNRT

SPECaccel2023\_base = 2.57

SPECaccel2023\_peak = 2.57

accel2023 License: 9045

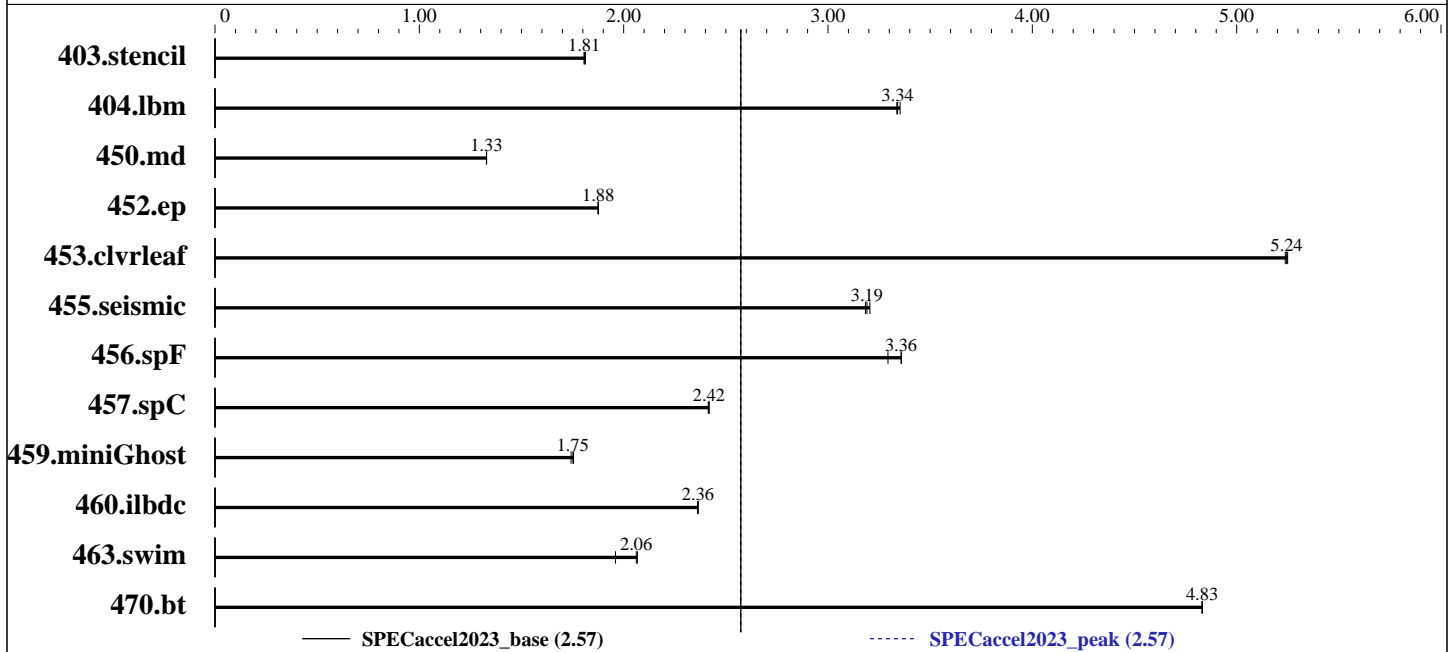
Test Sponsor: NVIDIA Corporation

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: A100 PCIe 80GB  
 Accel Vendor: NVIDIA  
 Accel Name: Tesla A100 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)  
 4.18.0-477.15.1.el8\_8.x86\_64  
 Compiler: C/Fortran: Version 23.11 of NVHPC SDK  
 Firmware: 1.1b 11/01/2021  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Other: None  
 Base Parallel Model: LOP  
 Base Threads Run: 1  
 Peak Parallel Models: LOP

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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	LOP	243	1.81	244	1.81	<b>243</b>	<b>1.81</b>	LOP	243	1.81	244	1.81	<b>243</b>	<b>1.81</b>
404.lbm	LOP	<b>136</b>	<b>3.34</b>	136	3.34	136	3.35	LOP	<b>136</b>	<b>3.34</b>	136	3.34	136	3.35
450.md	LOP	<b>451</b>	<b>1.33</b>	452	1.33	451	1.33	LOP	<b>451</b>	<b>1.33</b>	452	1.33	451	1.33
452.ep	LOP	<b>221</b>	<b>1.88</b>	221	1.88	221	1.87	LOP	<b>221</b>	<b>1.88</b>	221	1.88	221	1.87
453.clvleaf	LOP	190	5.25	191	5.24	<b>191</b>	<b>5.24</b>	LOP	190	5.25	191	5.24	<b>191</b>	<b>5.24</b>
455.seismic	LOP	243	3.21	<b>244</b>	<b>3.19</b>	245	3.18	LOP	243	3.21	<b>244</b>	<b>3.19</b>	245	3.18
456.spF	LOP	141	3.36	<b>141</b>	<b>3.36</b>	144	3.29	LOP	141	3.36	<b>141</b>	<b>3.36</b>	144	3.29
457.spC	LOP	224	2.41	223	2.42	<b>223</b>	<b>2.42</b>	LOP	224	2.41	223	2.42	<b>223</b>	<b>2.42</b>
459.miniGhost	LOP	336	1.75	<b>337</b>	<b>1.75</b>	339	1.74	LOP	336	1.75	<b>337</b>	<b>1.75</b>	339	1.74
460.ilbdc	LOP	235	2.36	<b>235</b>	<b>2.36</b>	235	2.36	LOP	235	2.36	<b>235</b>	<b>2.36</b>	235	2.36
463.swim	LOP	<b>213</b>	<b>2.06</b>	213	2.07	224	1.96	LOP	<b>213</b>	<b>2.06</b>	213	2.07	224	1.96
470.bt	LOP	218	4.83	<b>218</b>	<b>4.83</b>	218	4.83	LOP	218	4.83	<b>218</b>	<b>4.83</b>	218	4.83

SPEC accel2023\_base = 2.57

SPEC accel2023\_peak = 2.57

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 A100 80GB PCIe
Device Revision Number:       8.0
Global Memory Size:           85024112640
Number of Multiprocessors:    108
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)



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## Platform Notes (Continued)

Maximum Memory Pitch:	2147483647B
Texture Alignment:	512B
Clock Rate:	1410 MHz
Execution Timeout:	No
Integrated Device:	No
Can Map Host Memory:	Yes
Compute Mode:	default
Concurrent Kernels:	Yes
ECC Enabled:	Yes
Memory Clock Rate:	1512 MHz
Memory Bus Width:	5120 bits
L2 Cache Size:	41943040 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
Default Target:	cc80

Sysinfo program /local/home/mcolgrove/ACCELV2/bin/sysinfo  
Rev: r6622 of 2021-04-07 b1a7d5f8f71be5aff70a755cad7211a0  
running on ice2 Tue Oct 24 10:32:15 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 2.34:
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:             Little Endian

```

(Continued on next page)



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## Platform Notes (Continued)

```

Address sizes:                46 bits physical, 57 bits virtual
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
Frequency boost:              enabled
CPU MHz:                      1774.338
CPU max MHz:                  3200.0000
CPU min MHz:                  800.0000
BogoMIPS:                     4000.00
Virtualization:              VT-x
L1d cache:                    3 MiB
L1i cache:                    2 MiB
L2 cache:                     80 MiB
L3 cache:                     96 MiB
NUMA node0 CPU(s):           0-31,64-95
NUMA node1 CPU(s):           32-63,96-127
Vulnerability Itlb multihit:  Not affected
Vulnerability L1tf:           Not affected
Vulnerability Mds:            Not affected
Vulnerability Meltdown:       Not affected
Vulnerability Mmio stale data: Mitigation; Clear CPU buffers; SMT vulnerable
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, PBR SB-eIBRS SW sequence
Vulnerability Srbds:           Not affected
Vulnerability Tsx async abort: Not affected
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_adjst bmi1 avx2 smep bmi2 erms invpcid
cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt

```

(Continued on next page)



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## Platform Notes (Continued)

avx512cd sha\_ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm\_llc  
cqm\_occup\_llc cqm\_mbm\_total cqm\_mbm\_local wbnoinvd dtherm ida arat pln pts  
avx512vbmi umip pku ospke avx512\_vbmi2 gfni vaes vpclmulqdq avx512\_vnni  
avx512\_bitalg tme avx512\_vpopcntdq rdpid md\_clear pconfig flush\_lld  
arch\_capabilities

From lscpu --cache:

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL
L1d	48K	3M	12	Data	1
L1i	32K	2M	8	Instruction	1
L2	1.3M	80M	20	Unified	2
L3	48M	96M	12	Unified	3

/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: 257622 MB

node 0 free: 209175 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: 257990 MB

node 1 free: 244915 MB

node distances:

node 0 1

0: 10 20

1: 20 10

From /proc/meminfo

MemTotal: 527987596 kB

HugePages\_Total: 0

Hugepagesize: 2048 kB

/sys/devices/system/cpu/cpu\*/cpufreq/scaling\_governor has  
performance

/usr/bin/lsb\_release -d

Ubuntu 20.04.6 LTS

From /etc/\*release\* /etc/\*version\*

debian\_version: bullseye/sid

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## Platform Notes (Continued)

```
os-release:
  NAME="Ubuntu"
  VERSION="20.04.6 LTS (Focal Fossa)"
  ID=ubuntu
  ID_LIKE=debian
  PRETTY_NAME="Ubuntu 20.04.6 LTS"
  VERSION_ID="20.04"
  HOME_URL="https://www.ubuntu.com/"
  SUPPORT_URL="https://help.ubuntu.com/"
```

```
uname -a:
Linux ice2 5.4.0-153-generic #170-Ubuntu SMP Fri Jun 16 13:43:31 UTC 2023 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:	Mitigation: Clear CPU buffers; SMT vulnerable
retbleed:	Not affected
CVE-2018-3639 (Speculative Store Bypass):	Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1):	Mitigation: usercopy/swaps barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):	Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling, PBRSE-eIBRS: SW sequence
CVE-2020-0543 (Special Register Buffer Data Sampling):	Not affected
CVE-2019-11135 (TSX Asynchronous Abort):	Not affected

```
run-level 3 Aug 10 17:47
```

```
SPEC is set to: /local/home/mcolgrove/ACCELV2
Filesystem Type Size Used Avail Use% Mounted on
/dev/nvme1n1p1 ext4 916G 24G 846G 3% /local
```

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

Cannot run dmidecode; consider saying (as root)

(Continued on next page)



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## Platform Notes (Continued)

```
chmod +s /usr/sbin/dmidecode
```

BIOS:

```
BIOS Vendor: American Megatrends International, LLC.
BIOS Version: 1.1b
BIOS Date: 11/01/2021
```

(End of data from sysinfo program)

## Compiler Version Notes

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

```
/usr/bin/ld: /usr/lib/x86_64-linux-gnu/crt1.o: in function `_start':  
(.text+0x24): undefined reference to `main'  
pgacclnk: child process exit status 1: /usr/bin/ld  
nvc 23.11-0 64-bit target on x86-64 Linux -tp icelake-server  
NVIDIA Compilers and Tools  
Copyright (c) 2023, NVIDIA CORPORATION & AFFILIATES. All rights reserved.  
=====
```

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

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=====
```

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

```
/usr/bin/ld: /usr/lib/x86_64-linux-gnu/crt1.o: in function `_start':  
(.text+0x24): undefined reference to `main'  
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=====
```

```
=====  
C | 403.stencil(base) 404.lbm(base) 452.ep(base) 470.bt(base)  
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## Compiler Version Notes (Continued)

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```

=====
Fortran      | 450.md(base) 455.seismic(base) 456.spF(base) 460.ilbdc(base)
              | 463.swim(base)
=====

```

nvfortran 23.11-0 64-bit target on x86-64 Linux -tp icelake-server

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```

=====
Fortran, C   | 453.clvrleaf(base) 459.miniGhost(base)
=====

```

nvfortran 23.11-0 64-bit target on x86-64 Linux -tp icelake-server

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nvc 23.11-0 64-bit target on x86-64 Linux -tp icelake-server

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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: -mcmmodel=medium -Wl,--no-relax





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## 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.clvleaf: -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.clvleaf: basepeak = yes

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## Peak Optimization Flags (Continued)

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](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](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](mailto:info@spec.org).

Tested with SPECaccel2023 v2.0.17 on 2023-10-24 13:32:15-0400.  
Report generated on 2023-12-06 13:07:32 by accel2023 PDF formatter v112.  
Originally published on 2023-11-08.