



# SPECaccel<sup>®</sup>2023 Result

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**NVIDIA Corporation**  
**Tesla H100 SXM 80GB**  
**DGX-H100**

**SPECaccel2023\_base = 3.38**

**SPECaccel2023\_peak = 3.38**

accel2023 License: 9045

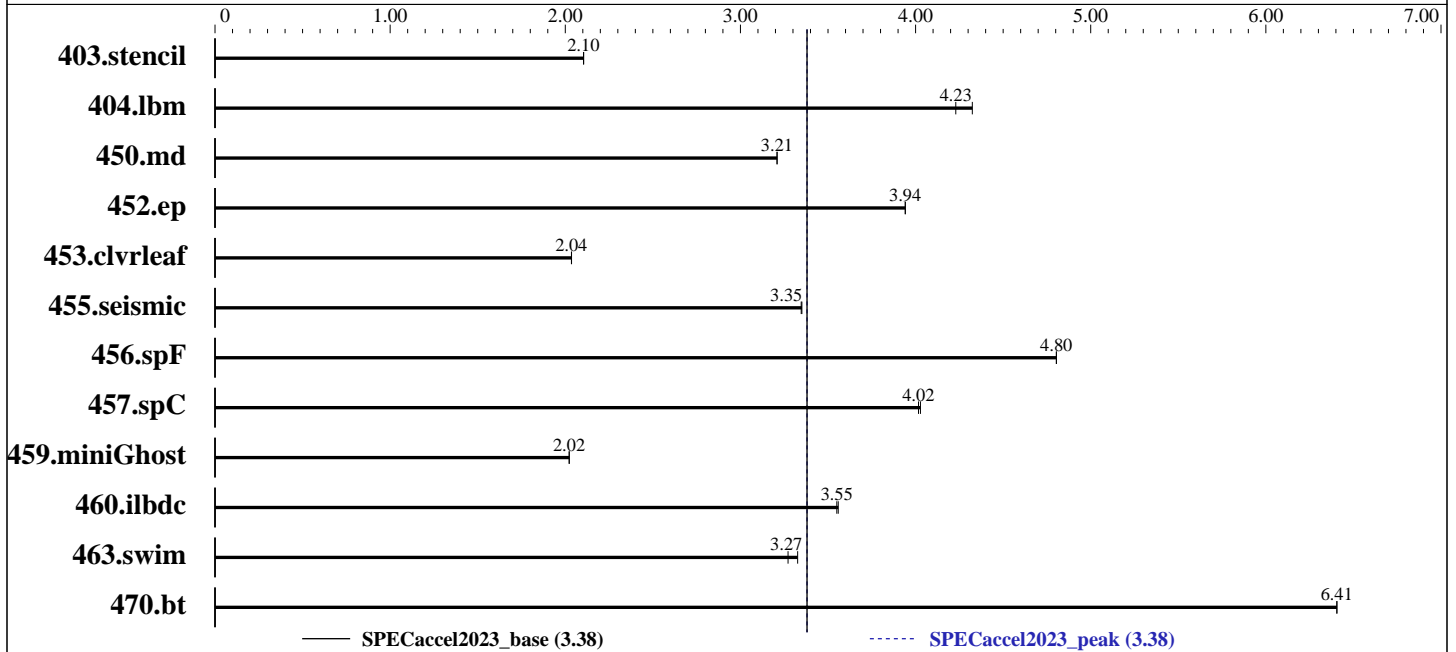
Test Sponsor: NVIDIA Corporation

Tested by: NVIDIA Corporation

Test Date: Oct-2023

Hardware Availability: Jul-2023

Software Availability: Nov-2023



### Hardware

CPU Name: Intel Xeon Platinum 8480CL  
 Max MHz.: 3800  
 Nominal: 2000  
 Enabled: 112 cores, 2 chips, 2 threads/core  
 Orderable: 2 chips  
 Cache L1: 32 KB I + 48 KB D on chip per core  
 L2: 2 MB I+D on chip per core  
 L3: 105 MB I+D on chip per chip  
 Other: None  
 Memory: 2 TB (32 x 64 GB 2Rx8 PC5-4800B-R)  
 Storage: OS: 2x 1.9TB NVMe M.2  
 Internal storage: 8x 3.84TB NVMe U.2  
 Other: None  
 Base Threads Run: 1  
 Min. Peak Threads: 1  
 Max. Peak Threads: 1

### Accelerator

Accel Model Name: H100 SXM 80GB  
 Accel Vendor: NVIDIA  
 Accel Name: Tesla H100 SXM 80GB  
 Type of Accel: GPU  
 Accel Connection: NVLink 4  
 Does Accel Use ECC: Yes  
 Accel Description: System contains 8 H100 SXM with GPU 0 used for measurement. GPU contain 80GB of memory.  
 Accel Driver: NVIDIA UNIX Open Kernel Module for x86\_64 535.104.05

### Software

OS: Ubuntu 22.04.2 LTS  
 5.15.0-1025-nvidia  
 Compiler: C/fortran: Version 23.11 of NVHPC SDK  
 Firmware: 1.1.1 07/31/2023  
 File System: ext4  
 System State: Run level 3 (multi-user)  
 Other: None  
 Base Parallel Model: TGT  
 Base Threads Run: 1

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## Software (Continued)

Peak Parallel Models: TGT  
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	TGT	209	2.11	<b><u>209</u></b>	<b><u>2.10</u></b>			TGT	209	2.11	<b><u>209</u></b>	<b><u>2.10</u></b>		
404.lbm	TGT	105	4.32	<b><u>108</u></b>	<b><u>4.23</u></b>			TGT	105	4.32	<b><u>108</u></b>	<b><u>4.23</u></b>		
450.md	TGT	187	3.21	<b><u>187</u></b>	<b><u>3.21</u></b>			TGT	187	3.21	<b><u>187</u></b>	<b><u>3.21</u></b>		
452.ep	TGT	<b><u>105</u></b>	<b><u>3.94</u></b>	105	3.94			TGT	<b><u>105</u></b>	<b><u>3.94</u></b>	105	3.94		
453.clvleaf	TGT	<b><u>491</u></b>	<b><u>2.04</u></b>	491	2.04			TGT	<b><u>491</u></b>	<b><u>2.04</u></b>	491	2.04		
455.seismic	TGT	233	3.35	<b><u>233</u></b>	<b><u>3.35</u></b>			TGT	233	3.35	<b><u>233</u></b>	<b><u>3.35</u></b>		
456.spF	TGT	<b><u>98.9</u></b>	<b><u>4.80</u></b>	98.9	4.80			TGT	<b><u>98.9</u></b>	<b><u>4.80</u></b>	98.9	4.80		
457.spC	TGT	<b><u>134</u></b>	<b><u>4.02</u></b>	134	4.03			TGT	<b><u>134</u></b>	<b><u>4.02</u></b>	134	4.03		
459.miniGhost	TGT	<b><u>292</u></b>	<b><u>2.02</u></b>	292	2.02			TGT	<b><u>292</u></b>	<b><u>2.02</u></b>	292	2.02		
460.ilbdc	TGT	<b><u>156</u></b>	<b><u>3.55</u></b>	156	3.56			TGT	<b><u>156</u></b>	<b><u>3.55</u></b>	156	3.56		
463.swim	TGT	<b><u>134</u></b>	<b><u>3.27</u></b>	132	3.33			TGT	<b><u>134</u></b>	<b><u>3.27</u></b>	132	3.33		
470.bt	TGT	165	6.41	<b><u>165</u></b>	<b><u>6.41</u></b>			TGT	165	6.41	<b><u>165</u></b>	<b><u>6.41</u></b>		

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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/SPECACCEL/bin/sysinfo  
Rev: r6622 of 2021-04-07 bla7d5f8f71be5aff70a755cad7211a0  
running on VIKING80-DVT-800 Thu Oct 19 16:13:09 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

```

model name      : Intel(R) Xeon(R) Platinum 8480CL
 2 "physical id"s (chips)
 224 "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      : 56
  siblings       : 112
 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 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
 53 54 55
 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 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
 53 54 55

```

From lscpu from util-linux 2.37.2:

```

Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Address sizes:         52 bits physical, 57 bits virtual
Byte Order:            Little Endian
CPU(s):                224
On-line CPU(s) list:  0-223
Vendor ID:             GenuineIntel
Model name:            Intel(R) Xeon(R) Platinum 8480CL
CPU family:            6
Model:                 143
Thread(s) per core:   2
Core(s) per socket:   56
Socket(s):             2
Stepping:              7
CPU max MHz:          3800.0000
CPU min MHz:          800.0000
BogoMIPS:              4000.00
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
pdpelgb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology
nonstop_tsc cpuid aperfperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl 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 cat_l2 cdp_l3 invpcid_single intel_ppin cdp_l2 ssbd mba ibrs ibpb stibp
ibrs_enhanced 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 avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln
pts hwp hwp_act_window hwp_epp hwp_pkg_req avx512vbmi umip pku ospke waitpkg
avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq
la57 rdpid bus_lock_detect cldemote movdiri movdir64b enqcmd fstrm md_clear serialize

```

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## Platform Notes (Continued)

```

tsxldtrk pconfig arch_lbr amx_bf16 avx512_fpl6 amx_tile amx_int8 flush_lld
arch_capabilities
Lld cache:                5.3 MiB (112 instances)
L1i cache:                3.5 MiB (112 instances)
L2 cache:                 224 MiB (112 instances)
L3 cache:                 210 MiB (2 instances)
NUMA node(s):             2
NUMA node0 CPU(s):       0-55,112-167
NUMA node1 CPU(s):       56-111,168-223
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 and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling, PBRSE-eIBRS SW sequence
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
Lld	48K	5.3M	12	Data	1	64	1	64
L1i	32K	3.5M	8	Instruction	1	64	1	64
L2	2M	224M	16	Unified	2	2048	1	64
L3	105M	210M	15	Unified	3	114688	1	64

/proc/cpuinfo cache data  
cache size : 107520 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 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 112
113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134
135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156
157 158 159 160 161 162 163 164 165 166 167
node 0 size: 1031795 MB
node 0 free: 845562 MB
node 1 cpus: 56 57 58 59 60 61 62 63 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 96 97 98 99 100 101 102 103 104 105 106
107 108 109 110 111 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184

```

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## Platform Notes (Continued)

185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206  
207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223

node 1 size: 1032154 MB

node 1 free: 950740 MB

node distances:

```
node    0    1
0:    10   21
1:    21   10
```

From /proc/meminfo

```
MemTotal:      2113484880 kB
HugePages_Total:      0
Hugepagesize:    2048 kB
```

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

/usr/bin/lsb\_release -d  
Ubuntu 22.04.2 LTS

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

```
debian_version: bookworm/sid
dgx-release:
```

```
DGX_NAME="DGX Server"
DGX_PRETTY_NAME="NVIDIA DGX Server"
DGX_SWBUILD_DATE="2023-05-16-16-18-31"
DGX_SWBUILD_VERSION="6.0.11"
DGX_COMMIT_ID="d0b730d"
DGX_PLATFORM="DGX Server for DGX H100"
DGX_SERIAL_NUMBER="1661623000112"
```

os-release:

```
PRETTY_NAME="Ubuntu 22.04.2 LTS"
NAME="Ubuntu"
VERSION_ID="22.04"
VERSION="22.04.2 LTS (Jammy Jellyfish)"
VERSION_CODENAME=jammy
ID=ubuntu
ID_LIKE=debian
HOME_URL="https://www.ubuntu.com/"
```

uname -a:

```
Linux VIKING80-DVT-800 5.15.0-1025-nvidia #25-Ubuntu SMP Fri Apr 21 21:46:57 UTC 2023
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit): Not affected

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## Platform Notes (Continued)

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 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 Oct 19 05:44

```
SPEC is set to: /var/data0/sandbox/nvuser/SPECACCEL
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/md127      ext4  28T   11T   16T   41% /raid
```

```
From /sys/devices/virtual/dmi/id
Vendor:          NVIDIA
Product:         DGXH100
Product Family:  DGX
```

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

```
BIOS:
BIOS Vendor:     NVIDIA
BIOS Version:    1.1.1
BIOS Date:       07/31/2023
```

(End of data from sysinfo program)

## Compiler Version Notes

```
=====  
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
```

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## Compiler Version Notes (Continued)

nvc Rel Dev-r239081 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-r239081 64-bit target on x86-64 Linux -tp icelake-server  
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/usr/lib64/crt1.o: In function `\_start':  
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=====  
C | 403.stencil(base) 404.lbm(base) 452.ep(base) 470.bt(base)  
=====

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

nvfortran Rel Dev-r239081 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-r239081 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

## 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





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## 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.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 2023-10-19 19:13:09-0400.

Report generated on 2023-12-06 13:07:14 by accel2023 PDF formatter v112.

Originally published on 2023-11-08.