SPECaccel®2023 Result

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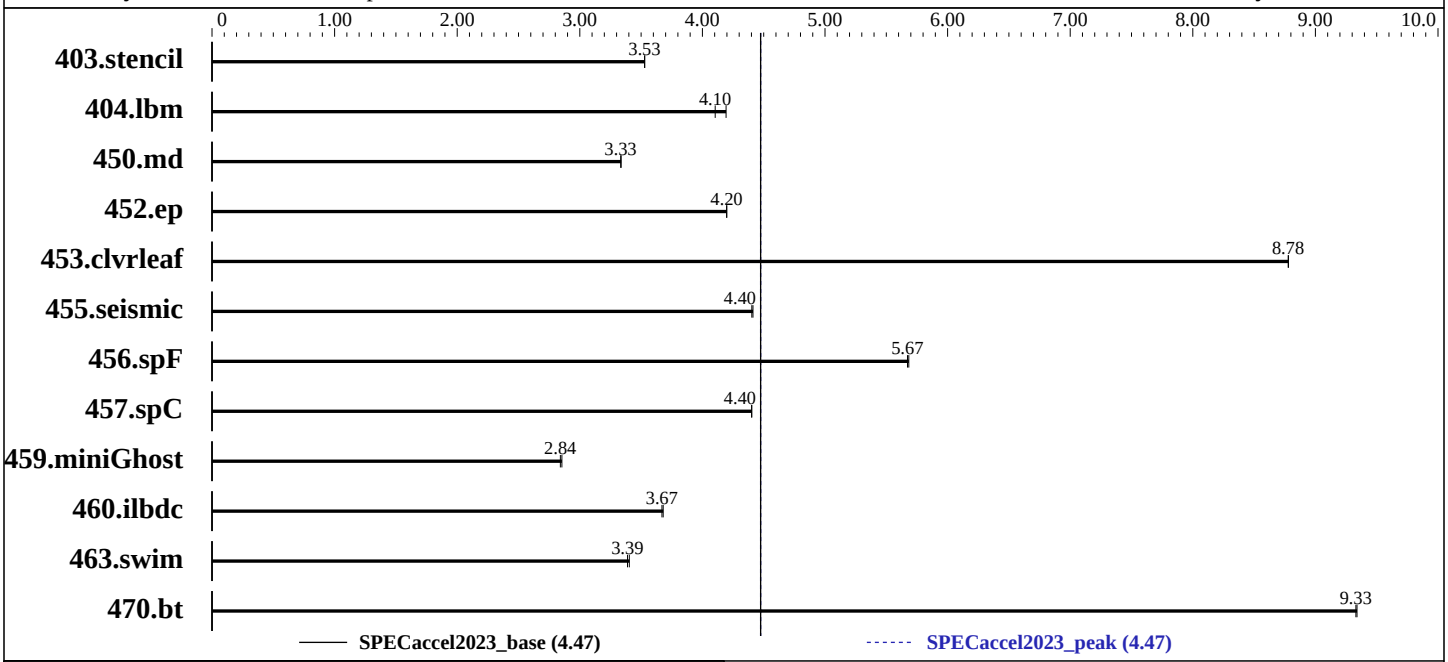
NVIDIA Corporation
Tesla H100 SXM 80GB
DGX-H100

SPECaccel 2023_base = 4.47

SPECaccel 2023_peak = 4.47

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:	ACC
Base Threads Run:	1

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Software (Continued)

Peak Parallel Models: ACC
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	125	3.53	**125**	**3.53**			ACC	125	3.53	**125**	**3.53**		
404.lbm	ACC	109	4.19	**111**	**4.10**			ACC	109	4.19	**111**	**4.10**		
450.md	ACC	**180**	**3.33**	180	3.34			ACC	**180**	**3.33**	180	3.34		
452.ep	ACC	**98.9**	**4.20**	98.8	4.20			ACC	**98.9**	**4.20**	98.8	4.20		
453.clvrleaf	ACC	114	8.78	**114**	**8.78**			ACC	114	8.78	**114**	**8.78**		
455.seismic	ACC	**177**	**4.40**	177	4.41			ACC	**177**	**4.40**	177	4.41		
456.spF	ACC	**83.7**	**5.67**	83.6	5.68			ACC	**83.7**	**5.67**	83.6	5.68		
457.spC	ACC	**123**	**4.40**	123	4.40			ACC	**123**	**4.40**	123	4.40		
459.miniGhost	ACC	**208**	**2.84**	207	2.85			ACC	**208**	**2.84**	207	2.85		
460.ilbdc	ACC	**151**	**3.67**	151	3.68			ACC	**151**	**3.67**	151	3.68		
463.swim	ACC	129	3.40	**130**	**3.39**			ACC	129	3.40	**130**	**3.39**		
470.bt	ACC	**113**	**9.33**	113	9.34			ACC	**113**	**9.33**	113	9.34		

SPEC accel2023_base = 4.47

SPEC accel2023_peak = 4.47

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.

Submitted_by: Mathew Colgrove <mcolgrove@nvidia.com>
Submitted: Wed Nov  8 11:35:52 EST 2023
Submission: accel2023-20231027-00006.sub
```

Platform Notes

```
Sysinfo program /var/data0/sandbox/nvuser/SPECACCEL/bin/sysinfo
Rev: r6622 of 2021-04-07 b1a7d5f8f71be5aff70a755cad7211a0
running on VIKING80-DVT-800 Thu Oct 19 14:11:28 2023
```

(Continued on next page)

Platform Notes (Continued)

```
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) 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
     pdpe1gb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology
     nonstop_tsc cpuid aperfmperf 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
```

(Continued on next page)

Platform Notes (Continued)

```
      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 fsrm md_clear serialize
      tsxldtrk pconfig arch_lbr amx_bf16 avx512_fp16 amx_tile amx_int8 flush_l1d
      arch_capabilities
      L1d 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 L1tf:              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, PBRSB-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
      L1d       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
```

(Continued on next page)

Platform Notes (Continued)

```
   node 0 free: 854000 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
   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: 950860 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
```

(Continued on next page)

Platform Notes (Continued)

```
 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:                                         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/swapgs
                                                          barriers and __user pointer
                                                          sanitization
 CVE-2017-5715 (Spectre variant 2):                      Mitigation: Enhanced IBRS, IBPB:
                                                          conditional, RSB filling,
                                                          PBRSB-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)
```

(Continued on next page)

Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------
/usr/lib64/crt1.o: In function '_start':
(.text+0x24): undefined reference to 'main'
pgacclnk: child process exit status 1: /usr/bin/ld
nvc Rel Dev-r239081 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)
------------------------------------------------------------------------------
nvc Rel Dev-r239081 64-bit target on x86-64 Linux -tp icelake-server
NVIDIA Compilers and Tools
Copyright (c) 2023, NVIDIA CORPORATION & AFFILIATES.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
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
nvc Rel Dev-r239081 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)
------------------------------------------------------------------------------
nvc Rel Dev-r239081 64-bit target on x86-64 Linux -tp icelake-server
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-r239081 64-bit target on x86-64 Linux -tp icelake-server
NVIDIA Compilers and Tools
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------------------------------------------------------------------------------

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

(Continued on next page)

Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------
nvfortran Rel Dev-r239081 64-bit target on x86-64 Linux -tp icelake-server
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nvc Rel Dev-r239081 64-bit target on x86-64 Linux -tp icelake-server
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

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:
-Ofast -acc -Mfprelaxed -Mstack_arrays -static-nvidia

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Base Optimization Flags (Continued)

Fortran benchmarks:
`-Ofast -acc -Mfprelaxed -Mstack_arrays -static-nvidia`

Benchmarks using both Fortran and C:

453.clvrleaf: `-Ofast -acc -Mfprelaxed -Mstack_arrays -static-nvidia`

459.miniGhost: `-Mnomain -Ofast -acc -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.clvrleaf: `basepeak = yes`

459.miniGhost: `basepeak = yes`

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The flags file that was used to format this result can be browsed at
`https://pro.spec.org/private/hpg/submit/accel2023/flags/nv2023_flags_v2.2023-10-27.html`

You can also download the XML flags source by saving the following link:
`https://pro.spec.org/private/hpg/submit/accel2023/flags/nv2023_flags_v2.2023-10-27.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 2023-10-19 17:11:28-0400.
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