IBM Corporation
(Test Sponsor: NVIDIA Corporation)

**Tesla V100**
IBM Power Systems AC922 for High Performance Computing (8335-GTH)

<table>
<thead>
<tr>
<th>ACCEL license:</th>
<th>019</th>
<th>Test date:</th>
<th>Aug-2018</th>
</tr>
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<tr>
<td>Test sponsor:</td>
<td>NVIDIA Corporation</td>
<td>Hardware Availability:</td>
<td>May-2018</td>
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<table>
<thead>
<tr>
<th>Test</th>
<th>SPECaccel_acc_base</th>
<th>SPECaccel_acc_peak</th>
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<tbody>
<tr>
<td>303.ostencil</td>
<td>11.3</td>
<td></td>
</tr>
<tr>
<td>304.olbm</td>
<td>12.8</td>
<td></td>
</tr>
<tr>
<td>314.omriq</td>
<td>22.6</td>
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<tr>
<td>350.md</td>
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<tr>
<td>351.palm</td>
<td>3.37</td>
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<tr>
<td>354.cg</td>
<td>13.5</td>
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<td>355.seismic</td>
<td>13.1</td>
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<tr>
<td>356.sp</td>
<td>12.4</td>
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<td>357.csp</td>
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<tr>
<td>359.miniGhost</td>
<td>7.96</td>
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**Hardware**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>CPU Name:</td>
<td>POWER9, altivec supported</td>
</tr>
<tr>
<td>CPU Characteristics:</td>
<td></td>
</tr>
<tr>
<td>CPU MHz:</td>
<td>3400</td>
</tr>
<tr>
<td>CPU MHz Maximum:</td>
<td>3800</td>
</tr>
<tr>
<td>FPU:</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled:</td>
<td>40 cores, 2 chips, 20 cores/chip, 4 threads/core</td>
</tr>
<tr>
<td>CPU(s) orderable:</td>
<td>1,2 chips</td>
</tr>
<tr>
<td>Primary Cache:</td>
<td>64 KB I + 64 KB D on chip per core</td>
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<tr>
<td>Secondary Cache:</td>
<td>512 KB I+D on chip per core</td>
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<tr>
<td>L3 Cache:</td>
<td>100 MB I+D on chip per chip shared NUCA / 20 cores</td>
</tr>
<tr>
<td>Other Cache:</td>
<td>None</td>
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</tbody>
</table>

**Accelerator**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accel Model Name:</td>
<td>Tesla V100-SXM2-16GB</td>
</tr>
<tr>
<td>Accel Vendor:</td>
<td>NVIDIA Corporation</td>
</tr>
<tr>
<td>Accel Name:</td>
<td>Tesla V100</td>
</tr>
<tr>
<td>Type of Accel:</td>
<td>GPU</td>
</tr>
<tr>
<td>Accel Connection:</td>
<td>NVLink</td>
</tr>
<tr>
<td>Does Accel Use ECC:</td>
<td>Yes</td>
</tr>
<tr>
<td>Accel Description:</td>
<td>See notes</td>
</tr>
<tr>
<td>Accel Driver:</td>
<td>NVIDIA UNIX ppc64le Kernel Module 396.26</td>
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</tbody>
</table>
IBM Corporation
(Test Sponsor: NVIDIA Corporation)

Tesla V100
IBM Power Systems AC922 for High Performance Computing (8335-GTH)

SPECCaccel_acc_peak = 11.9
SPECCaccel_acc_base = 11.9

ACCEL license: 019
Test date: Aug-2018
Test sponsor: NVIDIA Corporation
Hardware Availability: May-2018
Tested by: NVIDIA Corporation
Software Availability: Aug-2018

Hardware (Continued)
Memory: 128 GB (16 x 8 GB 1Rx4 PC4-2666V-R)
Disk Subsystem: 1 x 1TB 7200 RPM SATA HDD
Other Hardware: None

Software
Operating System: Red Hat Enterprise Linux Server release 7.5 (Maipo)
File System: xfs
System State: Run level 3 (multi-user)
Other Software: None

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Bas Seconds</th>
<th>Bas Ratio</th>
<th>Peak Seconds</th>
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<td>9.98</td>
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</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Platform Notes

Sysinfo program /local/home/colgrove/SPECACCEL/Docs/sysinfo
$Rev: 6965 $ $Date:: 2015-04-21 #$ c05a7f14b1b1765e3fe1df68447e8a35
running on wsn1 Wed Aug 1 09:48:43 2018

This section contains SUT (System Under Test) info as seen by some common utilities. To remove or add to this section, see:

Continued on next page
IBM Corporation
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**SPECaccel_acc_peak** = 11.9

**SPECaccel_acc_base** = 11.9

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**Platform Notes (Continued)**

http://www.spec.org/accel/Docs/config.html#sysinfo

From `/proc/cpuinfo`
- `clock`: 3000.000000MHz
- `clock`: 3616.000000MHz
- `machine`: PowerNV 8335-GTC
- `model`: 8335-GTC
- `platform`: PowerNV
- `revision`: 2.2 (pvr 004e 1202)
- `cpu`: POWER9, altivec supported
- "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.
- 160 "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 `/proc/meminfo`
- `MemTotal`: 199796800 kB
- `HugePages_Total`: 0
- `Hugepagesize`: 2048 kB

`/usr/bin/lsb_release -d`
Red Hat Enterprise Linux Server release 7.5 (Maipo)

From `/etc/*release* /etc/*version*
- `os-release`
  * `NAME="Red Hat Enterprise Linux Server"
  * `VERSION="7.5 (Maipo)"
  * `ID="rhel"
  * `ID_LIKE="fedora"
  * `VARIANT="Server"
  * `VARIANT_ID="server"
  * `VERSION_ID="7.5"
  * `PRETTY_NAME="Red Hat Enterprise Linux Server 7.5 (Maipo)"
  * `redhat-release: Red Hat Enterprise Linux Server release 7.5 (Maipo)
  * `system-release: Red Hat Enterprise Linux Server release 7.5 (Maipo)
  * `system-release-cpe: cpe:/o:redhat:enterprise_linux:7.5:ga:server

`uname -a`
- `Linux wsn1 4.14.0-49.8.1.el7a.ibmnvidia.6.1.ppc64le #1 SMP Tue Jun 5 13:56:12 -03 2018 ppc64le ppc64le ppc64le GNU/Linux`

`run-level`
- 3 Jun 29 16:37

SPEC is set to: `/local/home/colgrove/SPECACCEL`
IBM Corporation
(Test Sponsor: NVIDIA Corporation)

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IBM Power Systems AC922 for High Performance Computing (8335-GTH)

SPECCaccel_acc_peak = 11.9
SPECCaccel_acc_base = 11.9

ACCEL license: 019
Test sponsor: NVIDIA Corporation
Tested by: NVIDIA Corporation

Platform Notes (Continued)

Filesystem: /dev/mapper/rhel_wsn1-root
Type: xfs
Size: 927G
Used: 95G
Avail: 832G
Use%: 11%
Mounted on: /

CUDA Driver Version: 9.0.20
NVRM version: NVIDIA UNIX ppc64le Kernel Module 396.26
Device Number: 0
Device Name: Tesla V100-SXM2-16GB
Device Revision Number: 7.0
Global Memory Size: 16911433728
Number of Multiprocessors: 80
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
Maximum Memory Pitch: 2147483647B
Texture Alignment: 512B
Clock Rate: 1530 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: 4
Unified Addressing: Yes
Managed Memory: Yes
Concurrent Managed Memory: Yes
Preemption Supported: Yes
Cooperative Launch: Yes
Multi-Device: Yes
PGI Default Target: -ta=tesla:cc70

General Notes
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.

Continued on next page
## SPEC ACCEL ACC Result

**IBM Corporation**  
(Test Sponsor: NVIDIA Corporation)  

**Tesla V100**  
IBM Power Systems AC922 for High Performance Computing (8335-GTH)  

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**Test date:** Aug-2018  
**Test sponsor:** NVIDIA Corporation  
**Hardware Availability:** May-2018  
**Tested by:** NVIDIA Corporation  
**Software Availability:** Aug-2018  

### General Notes (Continued)

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

### Base Compiler Invocation

**C benchmarks:**  
- pgcc  

**Fortran benchmarks:**  
- pgfortran

Benchmarks using both Fortran and C:  
- pgcc pgfortran

### Base Optimization Flags

**C benchmarks:**  
- -fast -Mfprelaxed -acc -ta=tesla:cc70

**Fortran benchmarks:**  
- -fast -Mfprelaxed -acc -ta=tesla:cc70

Benchmarks using both Fortran and C:  
- 353.clvleaf: -fast -Mfprelaxed -acc -ta=tesla:cc70  
- 359.miniGhost: -fast -Mfprelaxed -acc -ta=tesla:cc70 -Mnomain

### Peak Optimization Flags

**C benchmarks:**  
- 303.ostencil: basepeak = yes  
- 304.olbm: basepeak = yes  
- 314.omriq: basepeak = yes  
- 352.ep: basepeak = yes  
- 354.cg: basepeak = yes

Continued on next page
IBM Corporation
(Test Sponsor: NVIDIA Corporation)

Tesla V100

IBM Power Systems AC922 for High Performance Computing (8335-GTH)

SPECaccel_acc_peak = 11.9
SPECaccel_acc_base = 11.9

Peak Optimization Flags (Continued)

357.csp: basepeak = yes
370.bt: basepeak = yes

Fortran benchmarks:
350.md: basepeak = yes
351.palm: basepeak = yes
355.seismic: basepeak = yes
356.sp: basepeak = yes
360.libdc: basepeak = yes
363.swim: basepeak = yes

Benchmarks using both Fortran and C:
353.clvrleaf: basepeak = yes
359.miniGhost: basepeak = yes

The flags files that were used to format this result can be browsed at
https://www.spec.org/accel/flags/PGI-Platform-Multicore-OMP.html
https://www.spec.org/accel/flags/pgi2018_flags.html

You can also download the XML flags sources by saving the following links:
https://www.spec.org/accel/flags/PGI-Platform-Multicore-OMP.xml
https://www.spec.org/accel/flags/pgi2018_flags.xml

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For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

Tested with SPEC ACCEL v1.2.
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