SPEChpc™ 2021 Tiny Result

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Lenovo Global Technology

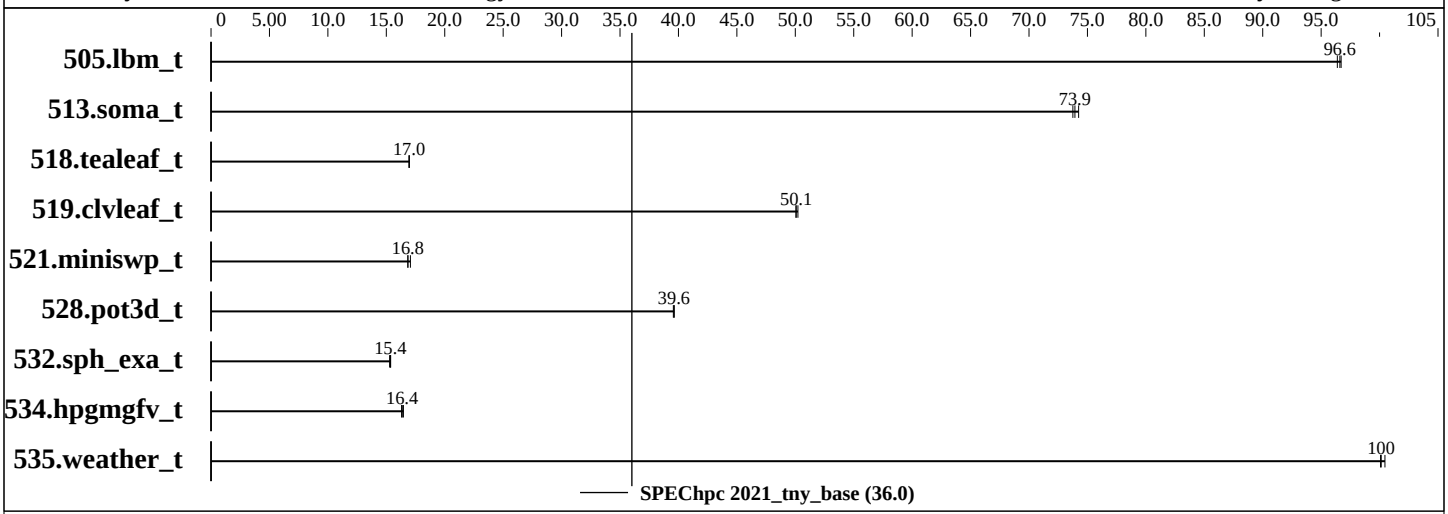
ThinkSystem SD650-N V2 (Intel Xeon Platinum 8368Q, Tesla A100-SXM-40GB)

SPEChpc 2021_tny_base = 36.0

SPEChpc 2021_tny_peak = Not Run

hpc2021 License: 28
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Aug-2021
Hardware Availability: Aug-2021
Software Availability: Aug-2021



Results Table

Benchmark	Base									Peak								
	Model	Ranks	Thrds/Rnk	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Model	Ranks	Thrds/Rnk	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
505.lbm_t	ACC	4	1	23.3	96.4	**23.3**	**96.6**	23.3	96.7									
513.soma_t	ACC	4	1	49.8	74.2	50.2	73.8	**50.0**	**73.9**									
518.tealeaf_t	ACC	4	1	97.3	17.0	97.3	17.0	**97.3**	**17.0**									
519.clvleaf_t	ACC	4	1	33.0	50.1	**32.9**	**50.1**	32.9	50.2									
521.miniswp_t	ACC	4	1	93.8	17.1	95.0	16.8	**95.0**	**16.8**									
528.pot3d_t	ACC	4	1	**53.6**	**39.6**	53.7	39.6	53.6	39.6									
532.sph_exa_t	ACC	4	1	127	15.4	128	15.3	**127**	**15.4**									
534.hpgmgfv_t	ACC	4	1	**71.8**	**16.4**	71.4	16.5	72.1	16.3									
535.weather_t	ACC	4	1	32.1	100	**32.2**	**100**	32.2	100									

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

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Hardware Summary

Type of System:	Homogenous Cluster
Compute Node:	ThinkSystem SD650-N V2
Interconnect:	Nvidia Mellanox ConnectX-6 HDR
File Server Node:	ThinkSystem SD650-N V2
Compute Nodes Used:	1
Total Chips:	2
Total Cores:	76
Total Threads:	76
Total Memory:	512 GB
Max. Peak Threads:	--

Software Summary

Compiler:	Nvidia HPC SDK 21.5
MPI Library:	Open MPI 4.0.5
Other MPI Info:	--
Other Software:	--
Base Parallel Model:	ACC
Base Ranks Run:	4
Base Threads Run:	1
Peak Parallel Models:	Not Run
Minimum Peak Ranks:	--
Maximum Peak Ranks:	--
Max. Peak Threads:	--
Min. Peak Threads:	--

Node Description: ThinkSystem SD650-N V2

Hardware

Number of nodes:	1
Uses of the node:	compute
Vendor:	Lenovo Global Technology
Model:	ThinkSystem SD650-N V2
CPU Name:	Intel Xeon Platinum 8368Q
CPU(s) orderable:	2 chips
Chips enabled:	2
Cores enabled:	76
Cores per chip:	38
Threads per core:	1
CPU Characteristics:	Turbo up to 3.7 GHz
CPU MHz:	2600
Primary Cache:	32 KB I + 48 KB D on chip per core
Secondary Cache:	1280 KB I+D on chip per core
L3 Cache:	57 MB I+D on chip per chip
Other Cache:	None
Memory:	512 GB (16 x 32 GB 2Rx8 PC4-3200A-R)
Disk Subsystem:	1 x 480 GB 2.5" SSD
Other Hardware:	None
Accel Count:	4
Accel Model:	Tesla A100 SXM4 40GB
Accel Vendor:	Nvidia Corporation
Accel Type:	GPU
Accel Connection:	NVLink
Accel ECC enabled:	Yes
Accel Description:	Nvidia Tesla A100 SXM4 40GB
Adapter:	Mellanox ConnectX-6 HDR
Number of Adapters:	1
Slot Type:	PCI-Express 4.0 x16
Data Rate:	200 Gb/s
Ports Used:	1
Interconnect Type:	Nvidia Mellanox ConnectX-6 HDR

Software

Accelerator Driver:	460.32.03
Adapter:	Mellanox ConnectX-6 HDR
Adapter Driver:	5.1-2.3.7
Adapter Firmware:	20.28.1002
Operating System:	Red Hat Enterprise Linux Server release 8.3, Kernel 4.18.0-193.el8.x86_64
Local File System:	xfs
Shared File System:	NFS
System State:	Multi-user, run level 3
Other Software:	None

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Test Date: Aug-2021
Hardware Availability: Aug-2021
Software Availability: Aug-2021

Node Description: ThinkSystem SD650-N V2

Hardware

Number of nodes:	1
Uses of the node:	Fileserver
Vendor:	Lenovo Global Technology
Model:	ThinkSystem SD650-N V2
CPU Name:	Intel Xeon Platinum 8368Q
CPU(s) orderable:	2 chips
Chips enabled:	2
Cores enabled:	76
Cores per chip:	38
Threads per core:	1
CPU Characteristics:	Turbo up to 3.7 GHz
CPU MHz:	2600
Primary Cache:	32 KB I + 48 KB D on chip per core
Secondary Cache:	1280 KB I+D on chip per core
L3 Cache:	57 MB I+D on chip per chip
Other Cache:	None
Memory:	512 GB (16 x 32 GB 2Rx8 PC4-3200A-R)
Disk Subsystem:	1 x 960 GB NVME 2.5" SSD
Other Hardware:	None
Accel Count:	4
Accel Model:	Tesla A100 SXM4 40GB
Accel Vendor:	Nvidia
Accel Type:	GPU
Accel Connection:	Nvidia Tesla A100 SXM4 40GB
Accel ECC enabled:	Yes
Accel Description:	Nvidia Tesla A100 SXM4 40GB
Adapter:	Mellanox ConnectX-6 HDR
Number of Adapters:	1
Slot Type:	PCI-Express 4.0 x16
Data Rate:	200 Gb/s
Ports Used:	1
Interconnect Type:	Nvidia Mellanox ConnectX-6 HDR

Software

Accelerator Driver:	N/A
Adapter:	Mellanox ConnectX-6 HDR
Adapter Driver:	5.1-2.3.7
Adapter Firmware:	20.28.1002
Operating System:	Red Hat Enterprise Linux Server release 8.3
Local File System:	xfs
Shared File System:	N/A
System State:	Multi-User, run level 3
Other Software:	None

Interconnect Description: Nvidia Mellanox ConnectX-6 HDR

Hardware

Vendor:	Nvidia
Model:	Nvidia Mellanox ConnectX-6 HDR
Switch Model:	N/A
Number of Switches:	0
Number of Ports:	0
Data Rate:	N/A
Firmware:	N/A
Topology:	Direct Connect

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Software

: --

Interconnect Description: Nvidia Mellanox ConnectX-6 HDR

Hardware (Continued)

Primary Use: MPI Traffic, NFS Access

Submit Notes

```
Indiviual Ranks were bound to the CPU cores on the same NUMA node as
the GPU using 'numactl' within the following "bind.pl" perl script:
---- Start bind.pl ------
my %bind;
$bind{0} = "1-3";
$bind{1} = "4-7";
$bind{2} = "8-10";
$bind{3} = "11-14";
$bind{4} = "41-43";
$bind{5} = "44-47";
$bind{6} = "61-63";
$bind{7} = "64-67";
my $rank = $ENV{OMPI_COMM_WORLD_LOCAL_RANK};
my $cmd = "taskset -c $bind{$rank} ";
while (my $arg = shift) {
 $cmd .= "$arg ";
}
my $rc = system($cmd);
exit($rc);
---- End bind.pl ------
 The config file option 'submit' was used.
 submit = mpirun ${MPIRUN_OPTS} --allow-run-as-root --oversubscribe
 -host 192.168.99.171:4,192.168.99.172:4 -x UCX_MEMTYPE_CACHE=n
 -mca coll_hcoll_enable 1 -x HCOLL_MAIN_IB=mlx5_0:1 -mca pml ucx
 -x UCX_TLS=sm,dc,rc,knem,cuda_copy,cuda_ipc -npernode 4 --map-by core -np $ranks
```

General Notes

```
Environment variables set by runhpc before the start of the run:
UCX_MEMTYPE_CACHE = "n"
UCX_TLS = "self,shm,cuda_copy"
```

Compiler Version Notes

```
==============================================================================
 CC  505.lbm_t(base) 513.soma_t(base) 518.tealeaf_t(base) 521.miniswp_t(base)
      534.hpgmgfv_t(base)
------------------------------------------------------------------------------
```

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Compiler Version Notes (Continued)

```
nvc 21.5-0 LLVM 64-bit target on x86-64 Linux -tp skylake
NVIDIA Compilers and Tools
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------------------------------------------------------------------------------

==============================================================================
 CXXC 532.sph_exa_t(base)
------------------------------------------------------------------------------
nvc++ 21.5-0 LLVM 64-bit target on x86-64 Linux -tp skylake
NVIDIA Compilers and Tools
Copyright (c) 2021, NVIDIA CORPORATION.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 FC  519.clvleaf_t(base) 528.pot3d_t(base) 535.weather_t(base)
------------------------------------------------------------------------------
nvfortran 21.5-0 LLVM 64-bit target on x86-64 Linux -tp skylake
NVIDIA Compilers and Tools
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------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
mpicc

C++ benchmarks:
mpicxx

Fortran benchmarks:
mpif90

Base Portability Flags

521.miniswp_t: -DUSE_KBA -DUSE_ACCELDIR
532.sph_exa_t: -DSPEC_USE_LT_IN_KERNELS --c++17

Base Optimization Flags

C benchmarks:
-Mfprelaxed -Mnouniform -Mstack_arrays -fast -acc=gpu -Minfo=accel

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Base Optimization Flags (Continued)

C benchmarks (continued):
-DSPEC_ACCEL_AWARE_MPI

C++ benchmarks:
-Mfprelaxed -Mnouniform -Mstack_arrays -fast -acc=gpu -Minfo=accel
-DSPEC_ACCEL_AWARE_MPI

Fortran benchmarks:
-DSPEC_ACCEL_AWARE_MPI -Mfprelaxed -Mnouniform -Mstack_arrays -fast
-acc=gpu -Minfo=accel

Base Other Flags

C benchmarks:
-w

C++ benchmarks:
-w

Fortran benchmarks:
-w

The flags file that was used to format this result can be browsed at
http://www.spec.org/hpc2021/flags/nv2021_flags.html

You can also download the XML flags source by saving the following link:
http://www.spec.org/hpc2021/flags/nv2021_flags.xml

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

Tested with SPEChpc2021 v1.0.1 on 2021-08-21 04:23:28-0400.
Report generated on 2023-08-25 18:57:50 by hpc2021 PS formatter v1.0.3.
Originally published on 2021-10-20.