SPEChpc™ 2021 Small Result

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Lenovo Global Technology

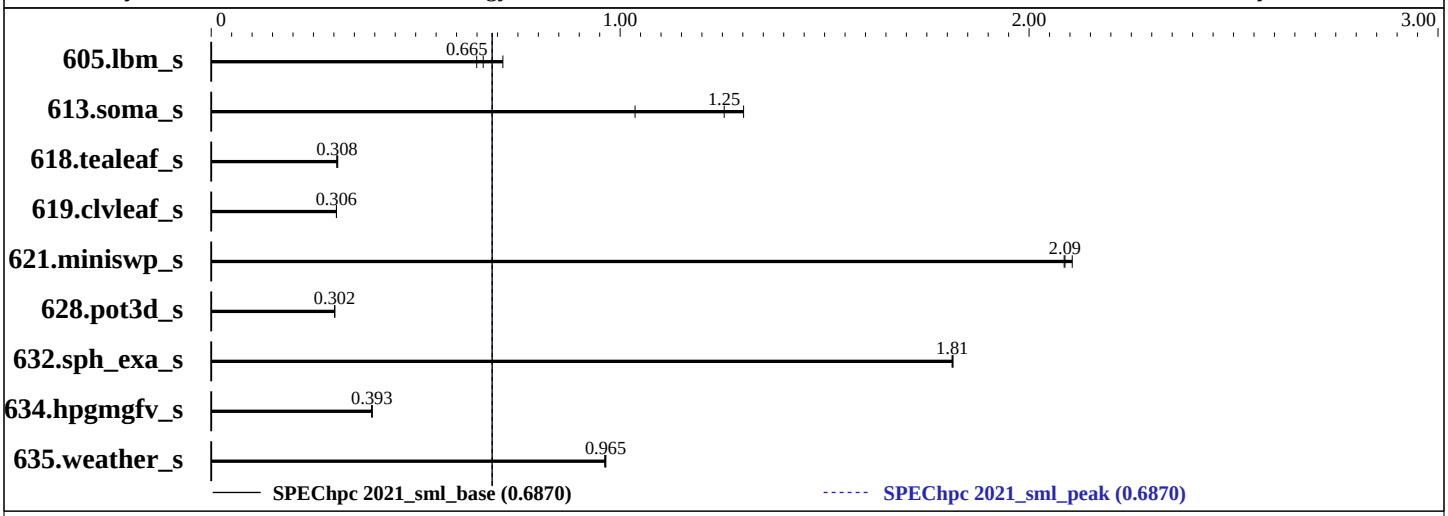
ThinkSystem SR645 (AMD EPYC 7773X)

SPEChpc 2021_sml_base = 0.6870

SPEChpc 2021_sml_peak = 0.6870

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

Test Date: Feb-2022
Hardware Availability: May-2022
Software Availability: Oct-2020



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
605.lbm_s	OMP	16	8	**2330**	**0.665**	2173	0.713	2387	0.649	OMP	16	8	**2330**	**0.665**	2173	0.713	2387	0.649
613.soma_s	OMP	16	8	**1275**	**1.25**	1544	1.04	1229	1.30	OMP	16	8	**1275**	**1.25**	1544	1.04	1229	1.30
618.tealeaf_s	OMP	16	8	6674	0.307	6625	0.309	**6656**	**0.308**	OMP	16	8	6674	0.307	6625	0.309	**6656**	**0.308**
619.clvleaf_s	OMP	16	8	5387	0.306	**5387**	**0.306**	5387	0.306	OMP	16	8	5387	0.306	**5387**	**0.306**	5387	0.306
621.miniswp_s	OMP	16	8	**527**	**2.09**	527	2.09	522	2.11	OMP	16	8	**527**	**2.09**	527	2.09	522	2.11
628.pot3d_s	OMP	16	8	5546	0.302	5549	0.302	**5548**	**0.302**	OMP	16	8	5546	0.302	5549	0.302	**5548**	**0.302**
632.sph_exa_s	OMP	16	8	1268	1.81	**1269**	**1.81**	1269	1.81	OMP	16	8	1268	1.81	**1269**	**1.81**	1269	1.81
634.hpgmgfv_s	OMP	16	8	2477	0.394	**2480**	**0.393**	2485	0.392	OMP	16	8	2477	0.394	**2480**	**0.393**	2485	0.392
635.weather_s	OMP	16	8	**2695**	**0.965**	2702	0.962	2695	0.965	OMP	16	8	**2695**	**0.965**	2702	0.962	2695	0.965

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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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Software Availability: Oct-2020

Hardware Summary

Type of System:	Homogenous
Compute Node:	ThinkSystem SR645
Interconnect:	Nvidia Mellanox ConnectX-6 HDR
File Server Node:	ThinkSystem SR645
Compute Nodes Used:	1
Total Chips:	2
Total Cores:	128
Total Threads:	128
Total Memory:	1 TB
Max. Peak Threads:	8

Software Summary

Compiler:	Intel C/C++/Fortran Compiler 2021.5.0
MPI Library:	Intel MPI 2021.5
Other MPI Info:	--
Other Software:	--
Base Parallel Model:	OMP
Base Ranks Run:	16
Base Threads Run:	8
Peak Parallel Models:	OMP
Minimum Peak Ranks:	16
Maximum Peak Ranks:	16
Max. Peak Threads:	8
Min. Peak Threads:	8

Node Description: ThinkSystem SR645

Hardware

Number of nodes:	1
Uses of the node:	Compute
Vendor:	Lenovo Global Technology
Model:	ThinkSystem SR645
CPU Name:	AMD EPYC 7773X
CPU(s) orderable:	1,2 chips
Chips enabled:	2
Cores enabled:	128
Cores per chip:	64
Threads per core:	1
CPU Characteristics:	Max Boost Clock up to 3.5 GHz
CPU MHz:	2200
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	512 KB I+D on chip per core
L3 Cache:	768 MB I+D on chip per chip 96 MB shared / 8 cores
Other Cache:	None
Memory:	1 TB (16 x 64 GB 2Rx4 PC4-3200A-R)
Disk Subsystem:	1 x 7.68 TB 2.5" SSD
Other Hardware:	None
Accel Count:	--
Accel Model:	--
Accel Vendor:	--
Accel Type:	--
Accel Connection:	--
Accel ECC enabled:	--
Accel Description:	--
Adapter:	Mellanox ConnectX-6 HDR
Number of Adapters:	1
Slot Type:	PCI-Express 4.0 x16
Data Rate:	200 Gb/s
Ports Used:	1

(Continued on next page)

Software

Accelerator Driver:	--
Adapter:	Mellanox ConnectX-6 HDR
Adapter Driver:	5.2-1.0.4
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 Sponsor: Lenovo Global Technology
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Test Date: Feb-2022
Hardware Availability: May-2022
Software Availability: Oct-2020

Node Description: ThinkSystem SR645

Hardware (Continued)

Interconnect Type: Nvidia Mellanox ConnectX-6 HDR

Node Description: ThinkSystem SR645

Hardware

Number of nodes:	1
Uses of the node:	Fileserver
Vendor:	Lenovo Global Technology
Model:	ThinkSystem SR645
CPU Name:	AMD EPYC 7773X
CPU(s) orderable:	1,2 chips
Chips enabled:	2
Cores enabled:	128
Cores per chip:	64
Threads per core:	1
CPU Characteristics:	Max Boost Clock up to 3.5 GHz
CPU MHz:	2200
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	512 KB I+D on chip per core
L3 Cache:	768 MB I+D on chip per chip 96 MB shared / 8 cores
Other Cache:	None
Memory:	1 TB (16 x 64 GB 2Rx4 PC4-3200A-R)
Disk Subsystem:	1 x 7.68 TB 2.5" SSD
Other Hardware:	None
Accel Count:	--
Accel Model:	--
Accel Vendor:	--
Accel Type:	--
Accel Connection:	--
Accel ECC enabled:	--
Accel Description:	--
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:	--
Adapter:	Mellanox ConnectX-6 HDR
Adapter Driver:	5.2-1.0.4
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:	QM8700 Series
Number of Switches:	1
Number of Ports:	40
Data Rate:	200 Gb/s
Firmware:	3.9.0606
Topology:	Mesh
Primary Use:	MPI Traffic, NFS Access

Software

: --

Submit Notes

```
 The config file option 'submit' was used.
submit = mpirun -host localhost -genv coll_hcoll_enable 1
-genv HCOLL_MAIN_IB=mlx5_0:1 -genv UCX_TLS=sm
-genv pml ucx --map-by numa -np 16
```

General Notes

```
Environment variables set by runhpc before the start of the run:
UCX_MEMTYPE_CACHE = "n"
UCX_TLS = "self,shm,cuda_copy"
Numa Information:
available: 16 nodes (0-15)
node 0 cpus: 0 1 2 3 4 5 6 7
node 1 cpus: 8 9 10 11 12 13 14 15
node 2 cpus: 16 17 18 19 20 21 22 23
node 3 cpus: 24 25 26 27 28 29 30 31
node 4 cpus: 32 33 34 35 36 37 38 39
node 5 cpus: 40 41 42 43 44 45 46 47
node 6 cpus: 48 49 50 51 52 53 54 55
node 7 cpus: 56 57 58 59 60 61 62 63
node 8 cpus: 64 65 66 67 68 69 70 71
node 9 cpus: 72 73 74 75 76 77 78 79
node 10 cpus: 80 81 82 83 84 85 86 87
node 11 cpus: 88 89 90 91 92 93 94 95
node 12 cpus: 96 97 98 99 100 101 102 103
node 13 cpus: 104 105 106 107 108 109 110 111
node 14 cpus: 112 113 114 115 116 117 118 119
node 15 cpus: 120 121 122 123 124 125 126 127
```

Compiler Version Notes

```
==============================================================================
 CC  605.lbm_s(base) 613.soma_s(base) 618.tealeaf_s(base) 621.miniswp_s(base)
      634.hpgmgfv_s(base)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
  64, Version 2021.5.0 Build 20211109_000000
Copyright (C) 1985-2021 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 CXXC 632.sph_exa_s(base)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on
  Intel(R) 64, Version 2021.5.0 Build 20211109_000000
Copyright (C) 1985-2021 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 FC  619.clvleaf_s(base) 628.pot3d_s(base) 635.weather_s(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
  Intel(R) 64, Version 2021.5.0 Build 20211109_000000
Copyright (C) 1985-2021 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
mpiicc

C++ benchmarks:
mpiicpc

Fortran benchmarks:
mpiifort

Base Portability Flags

613.soma_s: -DSPEC_NO_VAR_ARRAY_REDUCE
621.miniswp_s: -DUSE_KBA -DUSE_ACCELDIR
632.sph_exa_s: -DSPEC_USE_LT_IN_KERNELS

Base Optimization Flags

C benchmarks:
`-Ofast -no-prec-div -march=core-avx2 -ipo -qopenmp -ansi-alias`

C++ benchmarks:
`-Ofast -no-prec-div -march=core-avx2 -ipo -qopenmp -ansi-alias`

Fortran benchmarks:
`-Ofast -no-prec-div -march=core-avx2 -ipo -qopenmp`

Peak Optimization Flags

C benchmarks:

605.lbm_s: `basepeak = yes`

613.soma_s: `basepeak = yes`

618.tealeaf_s: `basepeak = yes`

621.miniswp_s: `basepeak = yes`

634.hpgmgfv_s: `basepeak = yes`

C++ benchmarks:

632.sph_exa_s: `basepeak = yes`

Fortran benchmarks:

619.clvleaf_s: `basepeak = yes`

628.pot3d_s: `basepeak = yes`

635.weather_s: `basepeak = yes`

The flags file that was used to format this result can be browsed at
`http://www.spec.org/hpc2021/flags/Intel_compiler_flags.2021-10-20.html`

You can also download the XML flags source by saving the following link:
`http://www.spec.org/hpc2021/flags/Intel_compiler_flags.2021-10-20.xml`

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

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