SPEChpc™ 2021 Small Result

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xFusion

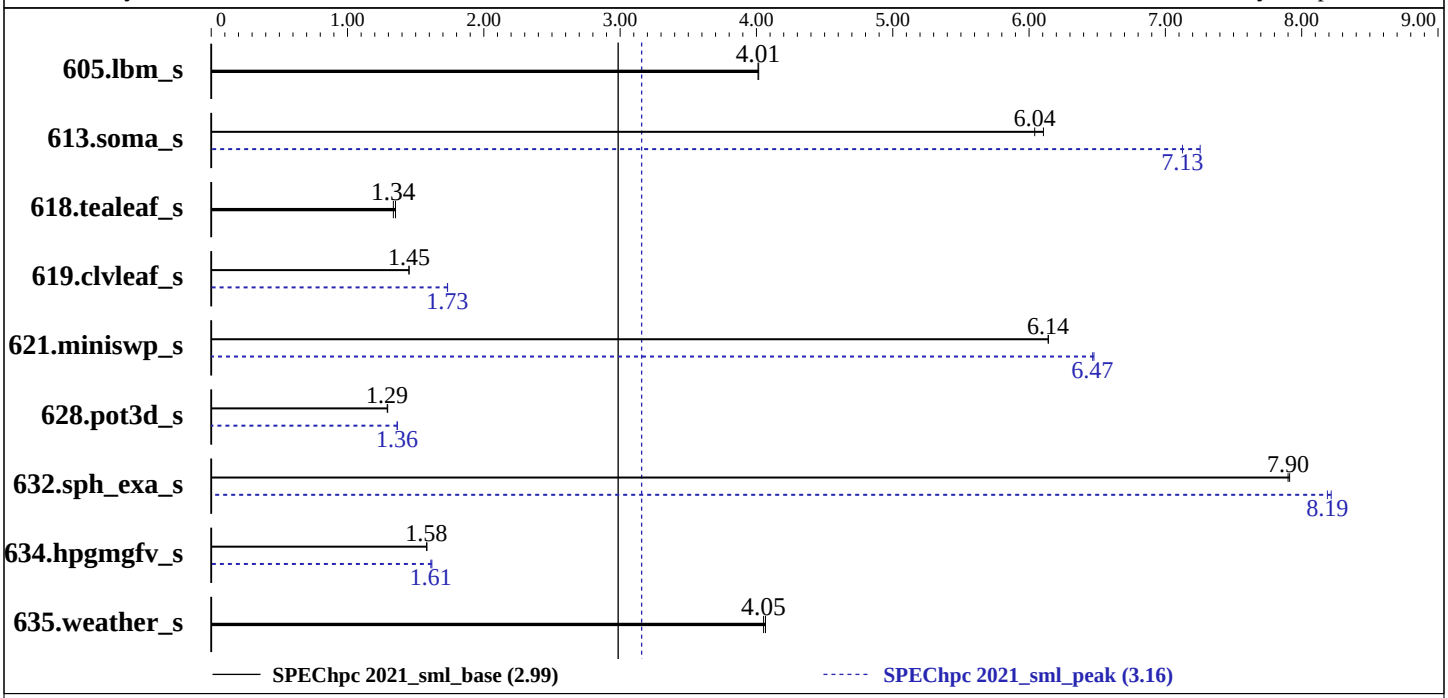
xFusion FusionServer 2288H V7 (Intel Xeon Platinum 8490H)

SPEChpc 2021_sml_base = 2.99

SPEChpc 2021_sml_peak = 3.16

hpc2021 License: 6488
Test Sponsor: xFusion
Tested by: xFusion

Test Date: Dec-2023
Hardware Availability: Jan-2023
Software Availability: Apr-2023



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	24	30	386	4.02	**386**	**4.01**			OMP	24	30	386	4.02	**386**	**4.01**		
613.soma_s	OMP	24	30	**265**	**6.04**	262	6.11			OMP	6	120	**225**	**7.13**	221	7.26		
618.tealeaf_s	OMP	24	30	**1534**	**1.34**	1516	1.35			OMP	24	30	**1534**	**1.34**	1516	1.35		
619.clvleaf_s	OMP	24	30	1137	1.45	**1137**	**1.45**			OMP	180	4	**952**	**1.73**	951	1.73		
621.miniswp_s	OMP	24	30	179	6.14	**179**	**6.14**			OMP	6	120	170	6.48	**170**	**6.47**		
628.pot3d_s	OMP	24	30	1294	1.29	**1297**	**1.29**			OMP	360	2	**1228**	**1.36**	1226	1.37		
632.sph_exa_s	OMP	24	30	**291**	**7.90**	291	7.91			OMP	48	15	**281**	**8.19**	280	8.22		
634.hpgmgfv_s	OMP	24	30	**617**	**1.58**	616	1.58			OMP	90	8	602	1.62	**605**	**1.61**		
635.weather_s	OMP	24	30	**642**	**4.05**	639	4.07			OMP	24	30	**642**	**4.05**	639	4.07		

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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:	xFusion FusionServer 2288H V7
Interconnect:	Mellanox HDR
Node Node:	xFusion FusionServer 2288H V7
Compute Nodes Used:	3
Total Chips:	6
Total Cores:	360
Total Threads:	720
Total Memory:	1536 GB
Max. Peak Threads:	120

Software Summary

Compiler:	Intel oneAPI Compiler 2023.0.0
MPI Library:	Intel MPI Library 2021.8 for Linux OS
Other MPI Info:	None
Other Software:	None
Base Parallel Model:	OMP
Base Ranks Run:	24
Base Threads Run:	30
Peak Parallel Models:	OMP
Minimum Peak Ranks:	6
Maximum Peak Ranks:	360
Max. Peak Threads:	120
Min. Peak Threads:	2

Node Description: xFusion FusionServer 2288H V7

Hardware

Number of nodes:	3
Uses of the node:	Compute Node
Vendor:	xFusion
Model:	xFusion FusionServer 2288H V7
CPU Name:	Intel Xeon Platinum 8490H
CPU(s) orderable:	1, 2 chips
Chips enabled:	2
Cores enabled:	120
Cores per chip:	60
Threads per core:	2
CPU Characteristics:	Turbo Boost Technology up to 3.5 GHz
CPU MHz:	1900
Primary Cache:	32 KB I + 48 KB D on chip per core
Secondary Cache:	2 MB I+D on chip per core
L3 Cache:	112.5 MB I+D on chip per chip
Other Cache:	None
Memory:	512 GB (16 x 32 GB 2Rx8 PC5-4800B-R)
Disk Subsystem:	1 x 7.68 TB NVMe SSD
Other Hardware:	None
Accel Count:	0
Accel Model:	None
Accel Vendor:	None
Accel Type:	None
Accel Connection:	None
Accel ECC enabled:	None
Accel Description:	None
Adapter:	MCX653105A-EFAT
Number of Adapters:	1
Slot Type:	PCI-Express 4.0 x16
Data Rate:	100 Gb/s
Ports Used:	1
Interconnect Type:	Mellanox HDR

Software

Accelerator Driver:	None
Adapter:	MCX653105A-EFAT
Adapter Driver:	5.4-3.1.0
Adapter Firmware:	20.32.1010
Operating System:	Rocky Linux release 8.7 (Green Obsidian) 4.18.0-425.3.1.el8.x86_64
Local File System:	xfs
Shared File System:	NFS
System State:	Multi-user, run level 3
Other Software:	N/A

Interconnect Description: Mellanox HDR

Hardware

Vendor:	Mellanox
Model:	Mellanox HDR
Switch Model:	Mellanox MQM8790-HS2F InfiniBand Switch
Number of Switches:	1
Number of Ports:	40
Data Rate:	200 Gbit/s
Firmware:	27.2010.1202
Topology:	Mesh
Primary Use:	MPI

Software

: --

Submit Notes

```
The config file option 'submit' was used.
```

Compiler Version Notes

```
==============================================================================
 CXXC 632.sph_exa_s(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler 2023.0.0 (2023.0.0.20221201)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /share/app/intel/2023.0.0/compiler/latest/linux/bin-llvm
Configuration file:
  /share/app/intel/2023.0.0/compiler/latest/linux/bin-llvm/../bin/icpx.cfg
------------------------------------------------------------------------------

==============================================================================
 CC  613.soma_s(peak) 634.hpgmgfv_s(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler 2023.0.0 (2023.0.0.20221201)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /share/app/intel/2023.0.0/compiler/latest/linux/bin-llvm
Configuration file:
  /share/app/intel/2023.0.0/compiler/latest/linux/bin-llvm/../bin/icx.cfg
------------------------------------------------------------------------------

==============================================================================
 CC  605.lbm_s(base, peak) 613.soma_s(base) 618.tealeaf_s(base, peak)
      621.miniswp_s(base)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler 2023.2.0 (2023.2.0.20230622)
```

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Compiler Version Notes (Continued)

```
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /share/opt/2023.2.0/compiler/2023.2.0/linux/bin-llvm
Configuration file:
  /share/opt/2023.2.0/compiler/2023.2.0/linux/bin-llvm/../bin/icx.cfg
------------------------------------------------------------------------------

==============================================================================
 CC  621.miniswp_s(peak)
------------------------------------------------------------------------------
icc: remark #10441: The Intel(R) C++ Compiler Classic (ICC) is deprecated and
  will be removed from product release in the second half of 2023. The
  Intel(R) oneAPI DPC++/C++ Compiler (ICX) is the recommended compiler moving
  forward. Please transition to use this compiler. Use '-diag-disable=10441'
  to disable this message.
icc: command line warning #10148: option
  '-Wno-incompatible-function-pointer-types' not supported
icc (ICC) 2021.8.0 20221119
Copyright (C) 1985-2022 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 FC  619.clvleaf_s(peak)
------------------------------------------------------------------------------
ifort (IFORT) 2021.8.0 20221119
Copyright (C) 1985-2022 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 FC  628.pot3d_s(base, peak) 635.weather_s(base, peak)
------------------------------------------------------------------------------
ifx (IFORT) 2023.0.0 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 FC  619.clvleaf_s(base)
------------------------------------------------------------------------------
ifx (IFX) 2023.2.0 20230622
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
mpiicc -cc=icx

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Base Compiler Invocation (Continued)

C++ benchmarks:
`mpiicpc -cxx=icpx`

Fortran benchmarks:
`mpiifort -fc=ifx`

Base Portability Flags

605.lbm_s: `-lstdc++ -std=c++14`
613.soma_s: `-lstdc++ -std=c++14`
618.tealeaf_s: `-lstdc++ -std=c++14`
621.miniswp_s: `-lstdc++ -std=c++14`
634.hpgmgfv_s: `-lstdc++ -std=c++14`

Base Optimization Flags

C benchmarks:
`-O3 -Ofast -ipo -fiopenmp -xCORE-AVX512 -mprefer-vector-width=512 -qopt-multiple-gather-scatter-by-shuffles -ffast-math -flto -funroll-loops`

C++ benchmarks:
`-O3 -Ofast -ipo -fiopenmp -xCORE-AVX512 -mprefer-vector-width=512 -qopt-multiple-gather-scatter-by-shuffles -ffast-math -flto -funroll-loops`

Fortran benchmarks:
`-O3 -Ofast -ipo -fiopenmp -xCORE-AVX512 -mprefer-vector-width=512 -qopt-multiple-gather-scatter-by-shuffles -ffast-math -flto -funroll-loops -nostandard-realloc-lhs -align array64byte`

Base Other Flags

C benchmarks:
`-Wno-incompatible-function-pointer-types`

Peak Compiler Invocation

C benchmarks (except as noted below):
`mpiicc -cc=icx`

621.miniswp_s: `mpiicc`

C++ benchmarks:
`mpiicpc -cxx=icpx`

Fortran benchmarks (except as noted below):
`mpiifort -fc=ifx`

619.clvleaf_s: `mpiifort`

Peak Portability Flags

605.lbm_s: `-lstdc++ -std=c++14`
613.soma_s: `-lstdc++ -std=c++14`
618.tealeaf_s: `-lstdc++ -std=c++14`
621.miniswp_s: `-lstdc++ -std=c++14`
634.hpgmgfv_s: `-lstdc++ -std=c++14`

Peak Optimization Flags

C benchmarks:

605.lbm_s: `basepeak = yes`

613.soma_s: `-O3 -Ofast -ipo -fiopenmp -xCORE-AVX512 -mprefer-vector-width=512 -qopt-multiple-gather-scatter-by-shuffles -ffast-math -flto -funroll-loops`

618.tealeaf_s: `basepeak = yes`

621.miniswp_s: `-O3 -Ofast -xCORE-AVX512 -ansi-alias -qopenmp -ipo -qopt-zmm-usage=high -qopt-multiple-gather-scatter-by-shuffles`

634.hpgmgfv_s: `Same as 613.soma_s`

C++ benchmarks:
`-O3 -Ofast -ipo -fiopenmp -xCORE-AVX512 -mprefer-vector-width=512`

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Peak Optimization Flags (Continued)

C++ benchmarks (continued):
-qopt-multiple-gather-scatter-by-shuffles -ffast-math -flto
-funroll-loops

Fortran benchmarks:

619.clvleaf_s: -O3 -Ofast -xCORE-AVX512 -ansi-alias -qopenmp -ipo
-qopt-zmm-usage=high
-qopt-multiple-gather-scatter-by-shuffles
-nostandard-realloc-lhs -align array64byte

628.pot3d_s: -O3 -Ofast -ipo -fiopenmp -xCORE-AVX512
-mprefer-vector-width=512
-qopt-multiple-gather-scatter-by-shuffles -ffast-math -flto
-funroll-loops -qopt-streaming-stores=always
-nostandard-realloc-lhs -align array64byte

635.weather_s: basepeak = yes

Peak Other Flags

C benchmarks:
-Wno-incompatible-function-pointer-types

The flags file that was used to format this result can be browsed at
http://www.spec.org/hpc2021/flags/Intel_compiler_flags.2023-08-16.html

You can also download the XML flags source by saving the following link:
http://www.spec.org/hpc2021/flags/Intel_compiler_flags.2023-08-16.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 v1.1.8 on 2023-12-25 03:48:45-0500.
Report generated on 2024-01-10 17:34:56 by hpc2021 PS formatter v1.0.3.
Originally published on 2024-01-10.