SPEChpc™ 2021 Small Result

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xFusion

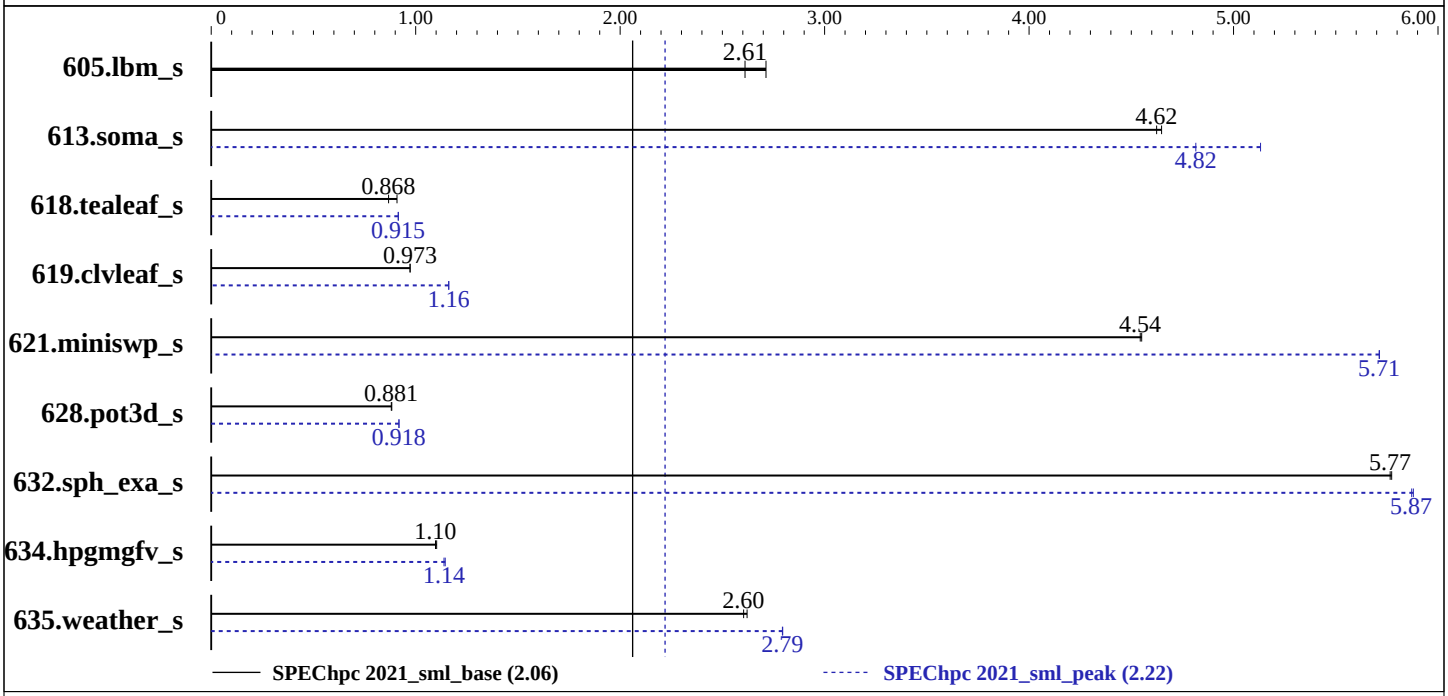
xFusion FusionServer 2288H V7 (Intel Xeon Platinum 8490H)

SPEChpc 2021_sml_base = 2.06

SPEChpc 2021_sml_peak = 2.22

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	20	571	2.71	**594**	**2.61**			OMP	24	20	571	2.71	**594**	**2.61**		
613.soma_s	OMP	24	20	344	4.65	**346**	**4.62**			OMP	4	120	312	5.13	**332**	**4.82**		
618.tealeaf_s	OMP	24	20	**2363**	**0.868**	2256	0.909			OMP	40	12	2240	0.915	**2241**	**0.915**		
619.clvleaf_s	OMP	24	20	**1696**	**0.973**	1696	0.973			OMP	240	2	**1420**	**1.16**	1420	1.16		
621.miniswp_s	OMP	24	20	242	4.55	**242**	**4.54**			OMP	8	60	193	5.71	**193**	**5.71**		
628.pot3d_s	OMP	24	20	**1902**	**0.881**	1897	0.883			OMP	240	2	**1825**	**0.918**	1823	0.919		
632.sph_exa_s	OMP	24	20	398	5.77	**399**	**5.77**			OMP	40	12	391	5.88	**392**	**5.87**		
634.hpgmgfv_s	OMP	24	20	**889**	**1.10**	884	1.10			OMP	32	15	852	1.14	**856**	**1.14**		
635.weather_s	OMP	24	20	**998**	**2.60**	992	2.62			OMP	60	8	930	2.80	**931**	**2.79**		

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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:	2
Total Chips:	4
Total Cores:	240
Total Threads:	480
Total Memory:	1 TB
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:	20
Peak Parallel Models:	OMP
Minimum Peak Ranks:	4
Maximum Peak Ranks:	240
Max. Peak Threads:	120
Min. Peak Threads:	2

Node Description: xFusion FusionServer 2288H V7

Hardware

Number of nodes:	2
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  605.lbm_s(base, peak) 613.soma_s(base, peak) 618.tealeaf_s(base)
      621.miniswp_s(base) 634.hpgmgfv_s(base)
------------------------------------------------------------------------------
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  618.tealeaf_s(peak) 621.miniswp_s(peak) 634.hpgmgfv_s(peak)
------------------------------------------------------------------------------
icc: remark #10441: The Intel(R) C++ Compiler Classic (ICC) is deprecated and
```

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Compiler Version Notes (Continued)

```
  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  619.clvleaf_s(base) 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.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`mpiicc -cc=icx`

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
```

605.lbm_s: `mpiicc -cc=icx`

613.soma_s: `mpiicc -cc=icx`

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

621.miniswp_s: `Same as 618.tealeaf_s`

634.hpgmgfv_s: `Same as 618.tealeaf_s`

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:

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 -nostandard-realloc-lhs -align array64byte`

635.weather_s: `-O3 -Ofast -ipo -fiopenmp -xCORE-AVX512 -mprefer-vector-width=512`

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Peak Optimization Flags (Continued)

635.weather_s (continued):
-qopt-multiple-gather-scatter-by-shuffles -ffast-math -flto
-funroll-loops -qopt-streaming-stores=always
-nostandard-realloc-lhs -align array64byte

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.

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