



# SPEChpc™ 2021 Tiny Result

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## xFusion

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

SPEChpc 2021\_tny\_base = 18.6

SPEChpc 2021\_tny\_peak = 19.9

hpc2021 License: 6488

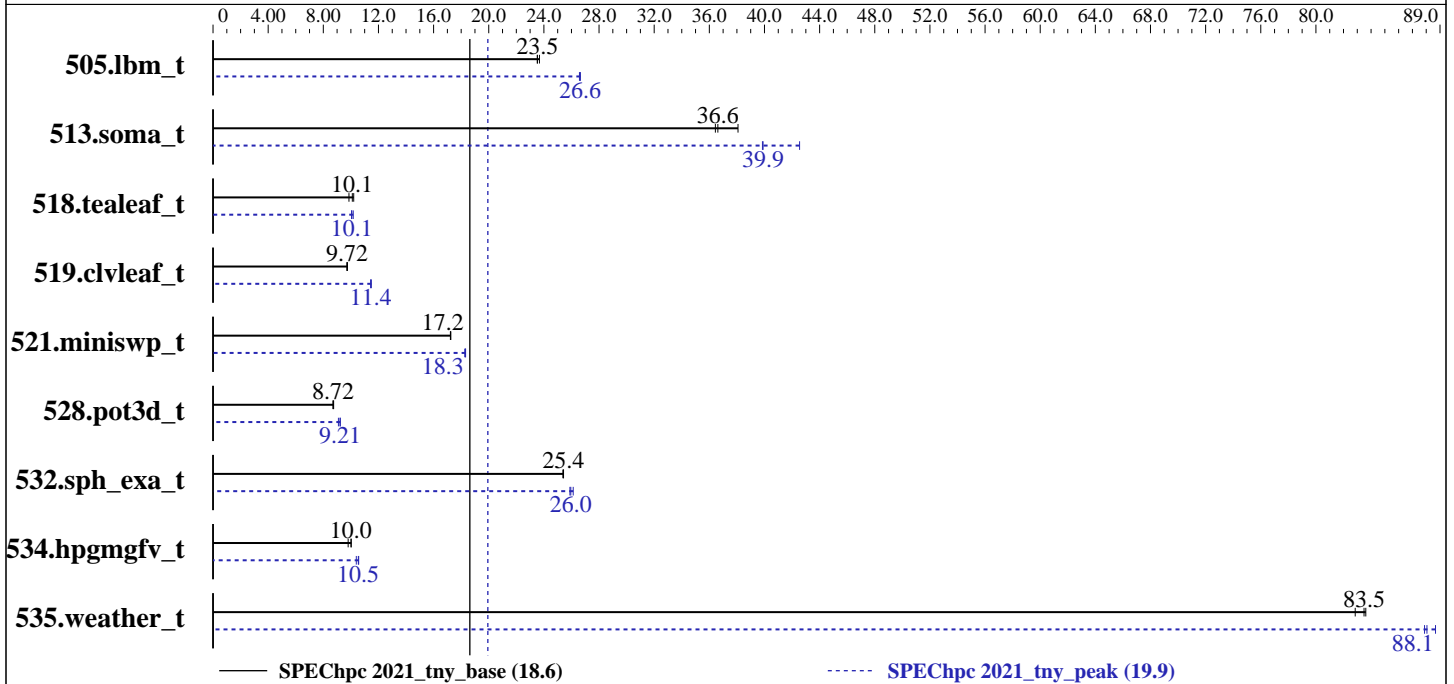
Test Sponsor: xFusion

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
505.lbm_t	OMP	24	20	95.7	23.5	95.0	23.7	<b>95.6</b>	<b>23.5</b>	OMP	60	8	<b>84.5</b>	<b>26.6</b>	84.7	26.6	84.4	26.6
513.soma_t	OMP	24	20	102	36.4	<b>101</b>	<b>36.6</b>	97.2	38.1	OMP	4	120	<b>92.7</b>	<b>39.9</b>	87.0	42.5	92.8	39.9
518.tealeaf_t	OMP	24	20	162	10.2	167	9.86	<b>163</b>	<b>10.1</b>	OMP	60	8	164	10.0	162	10.2	<b>164</b>	<b>10.1</b>
519.civleaf_t	OMP	24	20	<b>170</b>	<b>9.72</b>	169	9.75	170	9.72	OMP	48	10	<b>144</b>	<b>11.4</b>	144	11.5	144	11.4
521.miniswp_t	OMP	24	20	92.8	17.2	92.9	17.2	<b>92.9</b>	<b>17.2</b>	OMP	8	60	87.3	18.3	87.6	18.3	<b>87.4</b>	<b>18.3</b>
528.pot3d_t	OMP	24	20	<b>244</b>	<b>8.72</b>	244	8.70	243	8.75	OMP	80	6	230	9.23	234	9.10	<b>231</b>	<b>9.21</b>
532.sph_exa_t	OMP	24	20	76.7	25.4	<b>76.7</b>	<b>25.4</b>	76.8	25.4	OMP	60	8	74.6	26.1	<b>75.1</b>	<b>26.0</b>	75.3	25.9
534.hpgmgfv_t	OMP	24	20	<b>117</b>	<b>10.0</b>	117	10.0	120	9.80	OMP	80	6	113	10.4	<b>111</b>	<b>10.5</b>	111	10.6
535.weather_t	OMP	24	20	38.6	83.6	38.9	82.9	<b>38.6</b>	<b>83.5</b>	OMP	80	6	36.4	88.7	<b>36.6</b>	<b>88.1</b>	36.7	87.9

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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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**Test Date:** Dec-2023  
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**Software Availability:** Apr-2023

### 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: 80  
Max. Peak Threads: 120  
Min. Peak Threads: 6

## 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



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### Interconnect Description: Mellanox HDR

#### Hardware

#### Software

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

: --

### Submit Notes

The config file option 'submit' was used.

### Compiler Version Notes

=====  
CXXC 532.sph\_exa\_t(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 505.lbm\_t(base, peak) 513.soma\_t(base, peak) 518.tealeaf\_t(base)  
521.miniswp\_t(base, peak) 534.hpgmgfv\_t(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 518.tealeaf\_t(peak) 534.hpgmgfv\_t(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

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=====  
FC 519.clvleaf\_t(peak)

-----  
ifort (IFORT) 2021.8.0 20221119

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=====  
FC 519.clvleaf\_t(base) 528.pot3d\_t(base, peak) 535.weather\_t(base, peak)

-----  
ifx (IFORT) 2023.0.0 20221201

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### Base Compiler Invocation

C benchmarks:

mpiicc -cc=icx

C++ benchmarks:

mpicpc -cxx=icpx

Fortran benchmarks:

mpiifort -fc=ifx

### Base Portability Flags

505.lbm\_t: -lstdc++ -std=c++14

513.soma\_t: -lstdc++ -std=c++14

518.tealeaf\_t: -lstdc++ -std=c++14

521.miniswp\_t: -lstdc++ -std=c++14

534.hpgmgfv\_t: -lstdc++ -std=c++14



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**Tested by:** xFusion

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## 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
```

```
518.tealeaf_t: mpiicc
```

```
534.hpgmgfv_t: mpiicc
```

C++ benchmarks:

```
mpicpc -cxx=icpx
```

Fortran benchmarks (except as noted below):

```
mpiifort -fc=ifx
```

```
519.clvleaf_t: mpiifort
```



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## Peak Portability Flags

```
505.lbm_t: -lstdc++ -std=c++14
513.soma_t: -lstdc++ -std=c++14
518.tealeaf_t: -lstdc++ -std=c++14
521.miniswp_t: -lstdc++ -std=c++14
534.hpgmgfv_t: -lstdc++ -std=c++14
```

## Peak Optimization Flags

C benchmarks:

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

513.soma\_t: Same as 505.lbm\_t

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

521.miniswp\_t: Same as 505.lbm\_t

534.hpgmgfv\_t: Same as 518.tealeaf\_t

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:

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

```
528.pot3d_t: -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
```

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## Peak Optimization Flags (Continued)

```
535.weather_t: -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
```

## 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](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](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](mailto:info@spec.org).

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