



# SPEC® MPIM2007 Result

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## Lenovo Global Technology

ThinkSystem SR665  
(AMD EPYC 7763, 2.45 GHz)

SPECmpiM\_peak2007 = 74.5

SPECmpiM\_base2007 = 74.5

MPI2007 license: 28

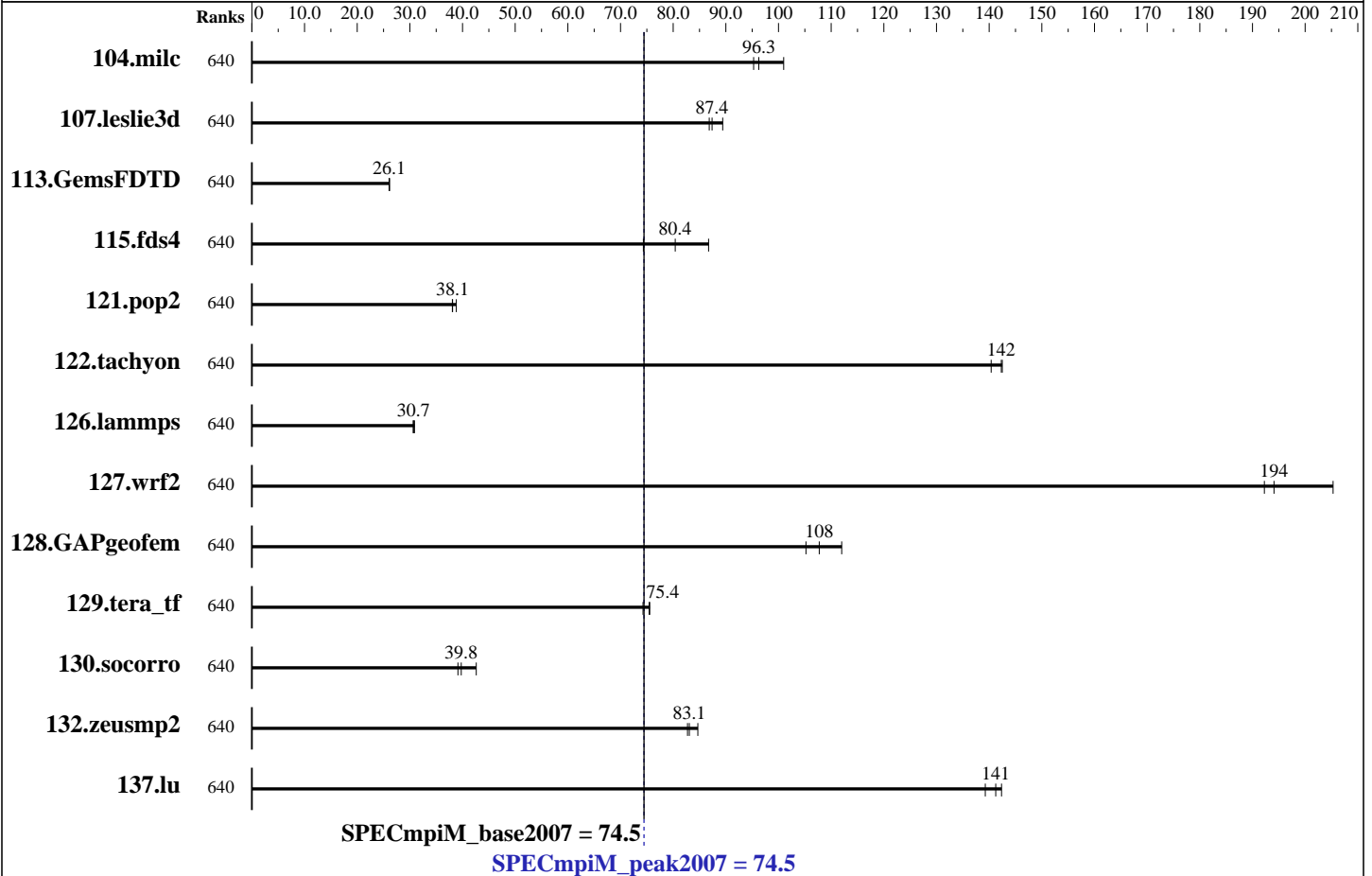
Test sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test date: Mar-2021

Hardware Availability: Mar-2021

Software Availability: Mar-2021



## Results Table

| Benchmark     | Base  |             |             |             |             |             |            |       | Peak        |             |             |             |             |            |  |  |
|---------------|-------|-------------|-------------|-------------|-------------|-------------|------------|-------|-------------|-------------|-------------|-------------|-------------|------------|--|--|
|               | Ranks | Seconds     | Ratio       | Seconds     | Ratio       | Seconds     | Ratio      | Ranks | Seconds     | Ratio       | Seconds     | Ratio       | Seconds     | Ratio      |  |  |
| 104.milc      | 640   | <u>16.3</u> | <u>96.3</u> | 16.4        | 95.3        | 15.5        | 101        | 640   | <u>16.3</u> | <u>96.3</u> | 16.4        | 95.3        | 15.5        | 101        |  |  |
| 107.leslie3d  | 640   | 58.4        | 89.4        | <u>59.7</u> | <u>87.4</u> | 60.1        | 86.8       | 640   | 58.4        | 89.4        | <u>59.7</u> | <u>87.4</u> | 60.1        | 86.8       |  |  |
| 113.GemsFDTD  | 640   | 241         | 26.1        | <u>242</u>  | <u>26.1</u> | 242         | 26.1       | 640   | 241         | 26.1        | <u>242</u>  | <u>26.1</u> | 242         | 26.1       |  |  |
| 115.fds4      | 640   | <u>24.3</u> | <u>80.4</u> | 26.2        | 74.3        | 22.5        | 86.7       | 640   | <u>24.3</u> | <u>80.4</u> | 26.2        | 74.3        | 22.5        | 86.7       |  |  |
| 121.pop2      | 640   | 108         | 38.1        | <u>108</u>  | <u>38.1</u> | 106         | 38.8       | 640   | 108         | 38.1        | <u>108</u>  | <u>38.1</u> | 106         | 38.8       |  |  |
| 122.tachyon   | 640   | 19.6        | 142         | <u>19.7</u> | <u>142</u>  | 19.9        | 140        | 640   | 19.6        | 142         | <u>19.7</u> | <u>142</u>  | 19.9        | 140        |  |  |
| 126.lammps    | 640   | 94.4        | 30.9        | <u>95.0</u> | <u>30.7</u> | 95.2        | 30.6       | 640   | 94.4        | 30.9        | <u>95.0</u> | <u>30.7</u> | 95.2        | 30.6       |  |  |
| 127.wrf2      | 640   | 38.0        | 205         | 40.6        | 192         | <u>40.2</u> | <u>194</u> | 640   | 38.0        | 205         | 40.6        | 192         | <u>40.2</u> | <u>194</u> |  |  |
| 128.GAPgeofem | 640   | <u>19.2</u> | <u>108</u>  | 18.4        | 112         | 19.6        | 105        | 640   | <u>19.2</u> | <u>108</u>  | 18.4        | 112         | 19.6        | 105        |  |  |
| 129.tera_tf   | 640   | 36.6        | 75.6        | <u>36.7</u> | <u>75.4</u> | 37.3        | 74.3       | 640   | 36.6        | 75.6        | <u>36.7</u> | <u>75.4</u> | 37.3        | 74.3       |  |  |

Table continues on next page. Results appear in the order in which they were run. Bold underlined text indicates a median measurement.



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### Results Table (Continued)

| Benchmark   | Base  |         |       |             |             |             |             | Peak  |         |       |             |             |             |             |
|-------------|-------|---------|-------|-------------|-------------|-------------|-------------|-------|---------|-------|-------------|-------------|-------------|-------------|
|             | Ranks | Seconds | Ratio | Seconds     | Ratio       | Seconds     | Ratio       | Ranks | Seconds | Ratio | Seconds     | Ratio       | Seconds     | Ratio       |
| 130.socorro | 640   | 97.6    | 39.1  | 89.6        | 42.6        | <b>96.0</b> | <b>39.8</b> | 640   | 97.6    | 39.1  | 89.6        | 42.6        | <b>96.0</b> | <b>39.8</b> |
| 132.zeusmp2 | 640   | 36.6    | 84.7  | <b>37.4</b> | <b>83.1</b> | 37.5        | 82.7        | 640   | 36.6    | 84.7  | <b>37.4</b> | <b>83.1</b> | 37.5        | 82.7        |
| 137.lu      | 640   | 25.8    | 142   | <b>26.0</b> | <b>141</b>  | 26.4        | 139         | 640   | 25.8    | 142   | <b>26.0</b> | <b>141</b>  | 26.4        | 139         |

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

#### Hardware Summary

Type of System: Homogeneous  
 Compute Node: ThinkSystem SR665  
 Interconnect: Mellanox ConnectX-6 HDR  
 File Server Node: NFS  
 Total Compute Nodes: 5  
 Total Chips: 10  
 Total Cores: 640  
 Total Threads: 640  
 Total Memory: 5 TB  
 Base Ranks Run: 640  
 Minimum Peak Ranks: 640  
 Maximum Peak Ranks: 640

#### Software Summary

C Compiler: AMD Optimizing C Compiler for Linux  
 Version 2.3.0 Build 2020\_11\_10  
 C++ Compiler: AMD Optimizing C++ Compiler for Linux  
 Version 2.3.0 Build 2020\_11\_10  
 Fortran Compiler: AMD Optimizing Fortran Compiler for Linux  
 Version 2.3.0 Build 2020\_11\_10  
 Base Pointers: 64-bit  
 Peak Pointers: Not Applicable  
 MPI Library: Open MPI Library  
 Version 4.1.0  
 Other MPI Info: None  
 Pre-processors: No  
 Other Software: None

### Node Description: ThinkSystem SR665

#### Hardware

Number of nodes: 5  
 Uses of the node: compute  
 Vendor: Lenovo Global Technology  
 Model: SR665  
 CPU Name: AMD EPYC 7763  
 CPU(s) orderable: 1-2 chips  
 Chips enabled: 2  
 Cores enabled: 128  
 Cores per chip: 64  
 Threads per core: 1  
 CPU Characteristics: None  
 CPU MHz: 2450  
 Primary Cache: 32 KB I + 32 KB D on chip per core  
 Secondary Cache: 512 KB I+D on chip per core  
 L3 Cache: 256 MB I+D on chip per chip  
 32 MB shared / 8 cores  
 Other Cache: None  
 Memory: 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R)  
 Disk Subsystem: 1 x 480 GB SATA 2.5" SSD  
 Other Hardware: None  
 Adapter: Mellanox ConnectX-6 HDR Infiniband  
 Number of Adapters: 1  
 Slot Type: PCI-Express 4.0 x16

#### Software

Adapter: Mellanox ConnectX-6 HDR Infiniband  
 Adapter Driver: 5.2-1.0.4  
 Adapter Firmware: 20.25.2006  
 Operating System: Red Hat Enterprise Linux Server release 8.3  
 4.18.0-240.el8.x86\_64  
 Local File System: xfs  
 Shared File System: None  
 System State: Multi-user, run level 3  
 Other Software: None

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Test sponsor: Lenovo Global Technology

Hardware Availability: Mar-2021

Tested by: Lenovo Global Technology

Software Availability: Mar-2021

### Node Description: ThinkSystem SR665

Data Rate: 200 Gbs/s  
Ports Used: 1  
Interconnect Type: Mellanox ConnectX-6 HDR Infiniband Adapter

### Node Description: NFS

#### Hardware

#### Software

Number of nodes: 1  
Uses of the node: Fileserver  
Vendor: Lenovo Global Technology  
Model: ThinkSystem SR665  
CPU Name: AMD EPYC 7763 CPU  
CPU(s) orderable: 1-2 chips  
Chips enabled: 2  
Cores enabled: 128  
Cores per chip: 64  
Threads per core: 1  
CPU Characteristics: None  
CPU MHz: 2450  
Primary Cache: 32 KB I + 32 KB D on chip per core  
Secondary Cache: 512 KB I+D on chip per core  
L3 Cache: 256 MB I+D on chip per chip  
32 MB shared / 8 cores  
Other Cache: None  
Memory: 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R)  
Disk Subsystem: 1 x 480 GB SATA 2.5" SSD  
Other Hardware: None  
Adapter: Mellanox ConnectX-6 HDR Infiniband  
Number of Adapters: 1  
Slot Type: PCI-Express 4.0 x16  
Data Rate: 200 Gb/s  
Ports Used: 1  
Interconnect Type: Mellanox ConnectX-6 HDR Infiniband

Adapter: Mellanox ConnectX-6 HDR Infiniband  
Adapter Driver: 5.2-1.0.4  
Adapter Firmware: 20.25.2006  
Operating System: Red Hat Enterprise Linux Server release 8.3  
Local File System: None  
Shared File System: NFS  
System State: Multi-User, run level 3  
Other Software: None

### Interconnect Description: Mellanox ConnectX-6 HDR

#### Hardware

#### Software

Vendor: Mellanox  
Model: Infiniband HDR 200Gb/s Switch  
Switch Model: QM8700 Series  
Number of Switches: 1  
Number of Ports: 40  
Data Rate: 200 Gb/s  
Firmware: 3.9.0606  
Topology: Mesh

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## Interconnect Description: Mellanox ConnectX-6 HDR

Primary Use: MPI Traffic

### Submit Notes

The config file option 'submit' was used.

### General Notes

MPI startup command:

mpiexec command was used to start MPI jobs.

RAM configuration:

Compute nodes have 1 x 64 GB RDIMM on each memory channel.

Add "idle=poll" into grub

BIOS settings:

Operating Mode : Maximum Performance Mode

Hyper-Threading Technology (SMT): Enabled

NPS4

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

### Base Compiler Invocation

C benchmarks:

mpicc

C++ benchmarks:

126.lammps: mpicxx

Fortran benchmarks:

mpifort

Benchmarks using both Fortran and C:

mpicc mpifort

### Base Portability Flags

121.pop2: -DSPEC\_MPI\_CASE\_FLAG

126.lammps: -DMPICH\_IGNORE\_CXX\_SEEK

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## Base Portability Flags (Continued)

127.wrf2: -DSPEC\_MPI\_CASE\_FLAG -DSPEC\_MPI\_LINUX -Wno-return-type

## Base Optimization Flags

C benchmarks:

-Ofast -flto -ffast-math -march=znver2 -mno-avx2  
-L/home/amd-libm/lib -lamdlibm

C++ benchmarks:

126.lammps: -Ofast -flto -ffast-math -march=znver2 -mno-avx2  
-L/home/amd-libm/lib -lamdlibm

Fortran benchmarks:

-Ofast -flto -ffast-math -march=znver2 -mno-avx2 -funroll-loops  
-L/home/amd-libm/lib -lamdlibm

Benchmarks using both Fortran and C:

-Ofast -flto -ffast-math -march=znver2 -mno-avx2 -funroll-loops  
-L/home/amd-libm/lib -lamdlibm

## Peak Optimization Flags

C benchmarks:

104.milc: basepeak = yes

122.tachyon: basepeak = yes

C++ benchmarks:

126.lammps: basepeak = yes

Fortran benchmarks:

107.leslie3d: basepeak = yes

113.GemsFDTD: basepeak = yes

129.tera\_tf: basepeak = yes

137.lu: basepeak = yes

Benchmarks using both Fortran and C:

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## Peak Optimization Flags (Continued)

115.fds4: basepeak = yes

121.pop2: basepeak = yes

127.wrf2: basepeak = yes

128.GAPgeofem: basepeak = yes

130.socorro: basepeak = yes

132.zeusmp2: basepeak = yes

The flags file that was used to format this result can be browsed at

[http://www.spec.org/mpi2007/flags/AMD\\_flags.20210315.html](http://www.spec.org/mpi2007/flags/AMD_flags.20210315.html)

You can also download the XML flags source by saving the following link:

[http://www.spec.org/mpi2007/flags/AMD\\_flags.20210315.xml](http://www.spec.org/mpi2007/flags/AMD_flags.20210315.xml)

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For questions about this result, please contact the tester.  
For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

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