SPEC® MPIM2007 Result

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Lenovo Global Technology

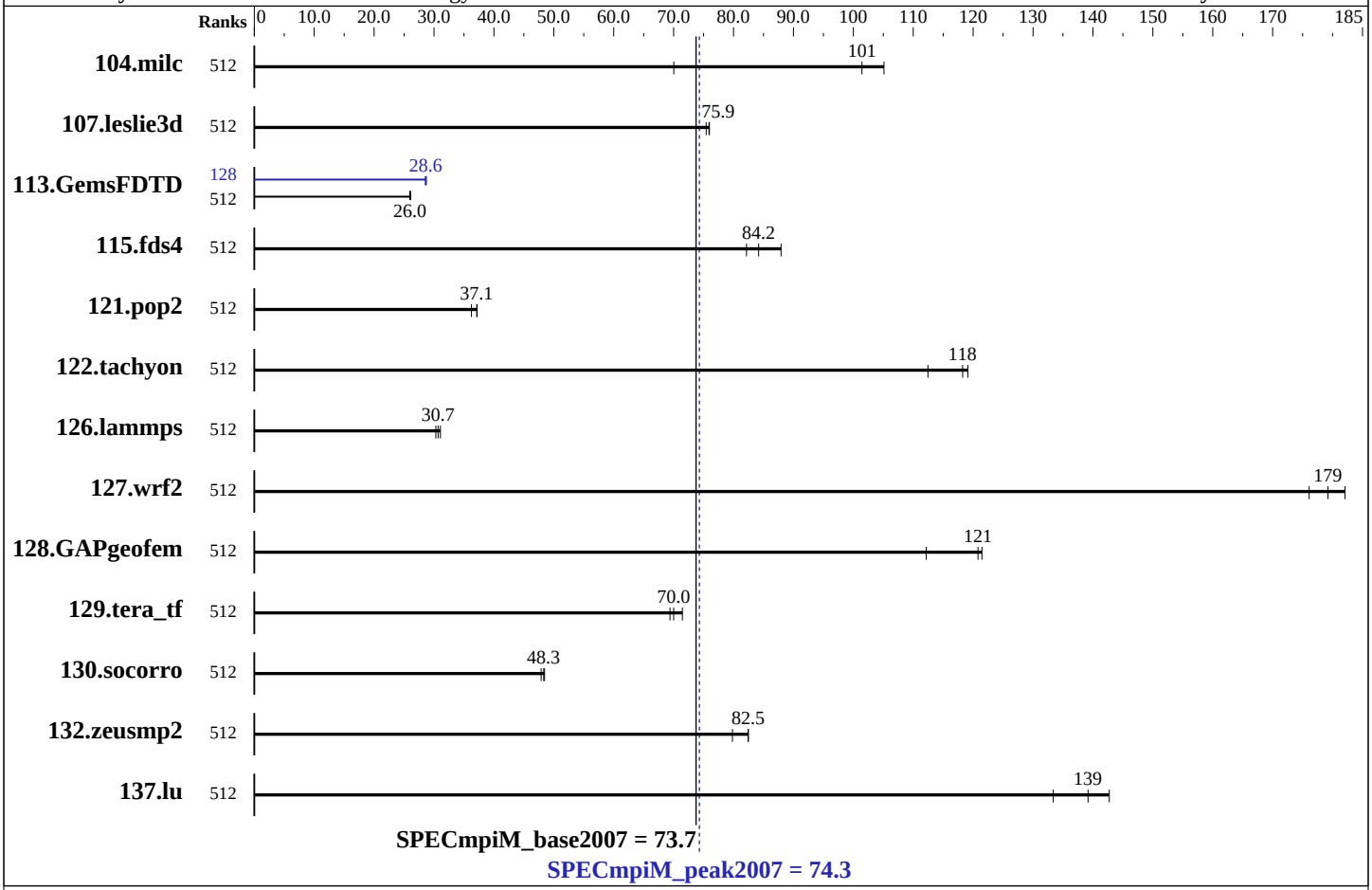
ThinkSystem SR665
(AMD EPYC 7763, 2.45 GHz)

SPECmpiM_peak2007 = 74.3

SPECmpiM_base2007 = 73.7

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	512	22.3	70.0	**15.4**	**101**	14.9	105	512	22.3	70.0	**15.4**	**101**	14.9	105
107.leslie3d	512	69.2	75.4	68.7	76.0	**68.8**	**75.9**	512	69.2	75.4	68.7	76.0	**68.8**	**75.9**
113.GemsFDTD	512	243	26.0	242	26.1	**243**	**26.0**	128	220	28.7	**220**	**28.6**	221	28.5
115.fds4	512	23.7	82.2	22.2	87.9	**23.2**	**84.2**	512	23.7	82.2	22.2	87.9	**23.2**	**84.2**
121.pop2	512	111	37.2	**111**	**37.1**	114	36.3	512	111	37.2	**111**	**37.1**	114	36.3
122.tachyon	512	**23.7**	**118**	23.5	119	24.9	112	512	**23.7**	**118**	23.5	119	24.9	112
126.lammps	512	93.8	31.1	96.2	30.3	**95.0**	**30.7**	512	93.8	31.1	96.2	30.3	**95.0**	**30.7**
127.wrf2	512	**43.5**	**179**	42.8	182	44.3	176	512	**43.5**	**179**	42.8	182	44.3	176
128.GAPgeofem	512	17.0	121	**17.1**	**121**	18.4	112	512	17.0	121	**17.1**	**121**	18.4	112
129.tera_tf	512	39.9	69.4	**39.5**	**70.0**	38.7	71.5	512	39.9	69.4	**39.5**	**70.0**	38.7	71.5

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	512	78.8	48.5	**79.0**	**48.3**	79.7	47.9	512	78.8	48.5	**79.0**	**48.3**	79.7	47.9
132.zeusmp2	512	**37.6**	**82.5**	38.9	79.8	37.6	82.5	512	**37.6**	**82.5**	38.9	79.8	37.6	82.5
137.lu	512	**26.4**	**139**	25.8	143	27.6	133	512	**26.4**	**139**	25.8	143	27.6	133

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:	4
Total Chips:	8
Total Cores:	512
Total Threads:	512
Total Memory:	4 TB
Base Ranks Run:	512
Minimum Peak Ranks:	128
Maximum Peak Ranks:	512

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:	4
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

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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
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Test date: Mar-2021
Hardware Availability: Mar-2021
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

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

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
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

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

Software

Continued on next page

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.
```

Compiler Invocation

C benchmarks:
`mpicc`

C++ benchmarks:

126.lammps: `mpicxx`

Fortran benchmarks:
`mpifort`

Benchmarks using both Fortran and C:
`mpicc mpifort`

Portability Flags

121.pop2: `-DSPEC_MPI_CASE_FLAG`
126.lammps: `-DMPICH_IGNORE_CXX_SEEK`

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

129.tera_tf: basepeak = yes

137.lu: basepeak = yes

Benchmarks using both Fortran and C:

Continued on next page

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`

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

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