

SGI OpenFOAM Cloud Benchmark Part 3

Masashi Imano

Test cluster conditions

- **Hardware:** SGI Altix ICE8200
- **CPU:** Intel Xeon X5365 3.00GHz 4cores x 2
- **Node:** 16 nodes
- **Memory:** 16GB/node (No swap memory)
- **Interconnect:** InfiniBand DDR
- **OS:** SUSE LINUX ENTERPRISE SERVER 10.3
- **MPI:**
 - ✓ SGI MPT (1.2.6)
 - ✓ OpenMPI
(ThirdParty package distributed with OpenFOAM)

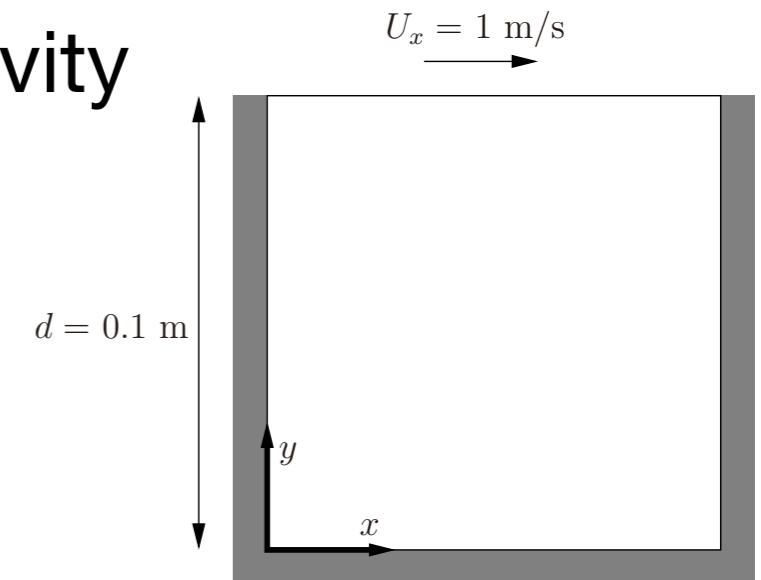


sgi



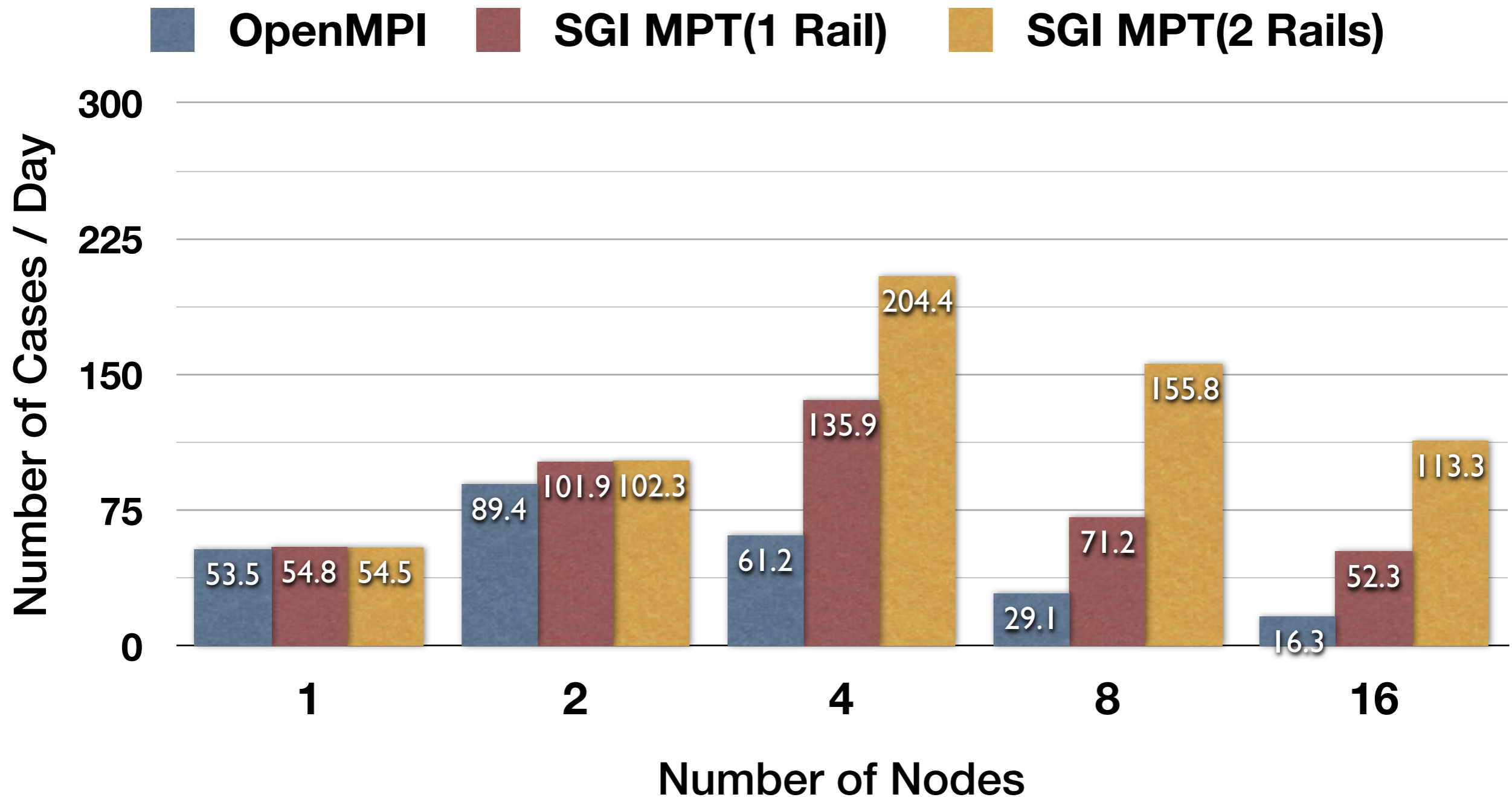
Calculation conditions

- **OpenFOAM versions: 2.1.x**
- **MPI (interconnect: InfiniBand):**
 - ✓ OpenMPI (Ver. 1.5.3), mpirun options: `--mca btl openib,self,sm`
 - ✓ SGI MPT (Ver.1.2.6)
 - Number of InfiniBand rails: **1, 2** (export `MPI_IB_RAILS=1` or `2`)
- **Benchmark problem**
 - ✓ **Flow:** Lid-driven 2D cavity(tutorials), 3D cavity
 - ✓ **Re:** 100 (laminar)
 - ✓ **solver:** icoFoam (piso)
 - ✓ **Linear solver:** p(AMG), U(PBiCG)
 - ✓ **Mesh:**
 - 2D ($\Delta t=10^{-6}$ s, 100 steps): **1000², 2000², 4000²**
 - 3D ($\Delta t=10^{-5}$ s, 50 steps): **100³, 200³**



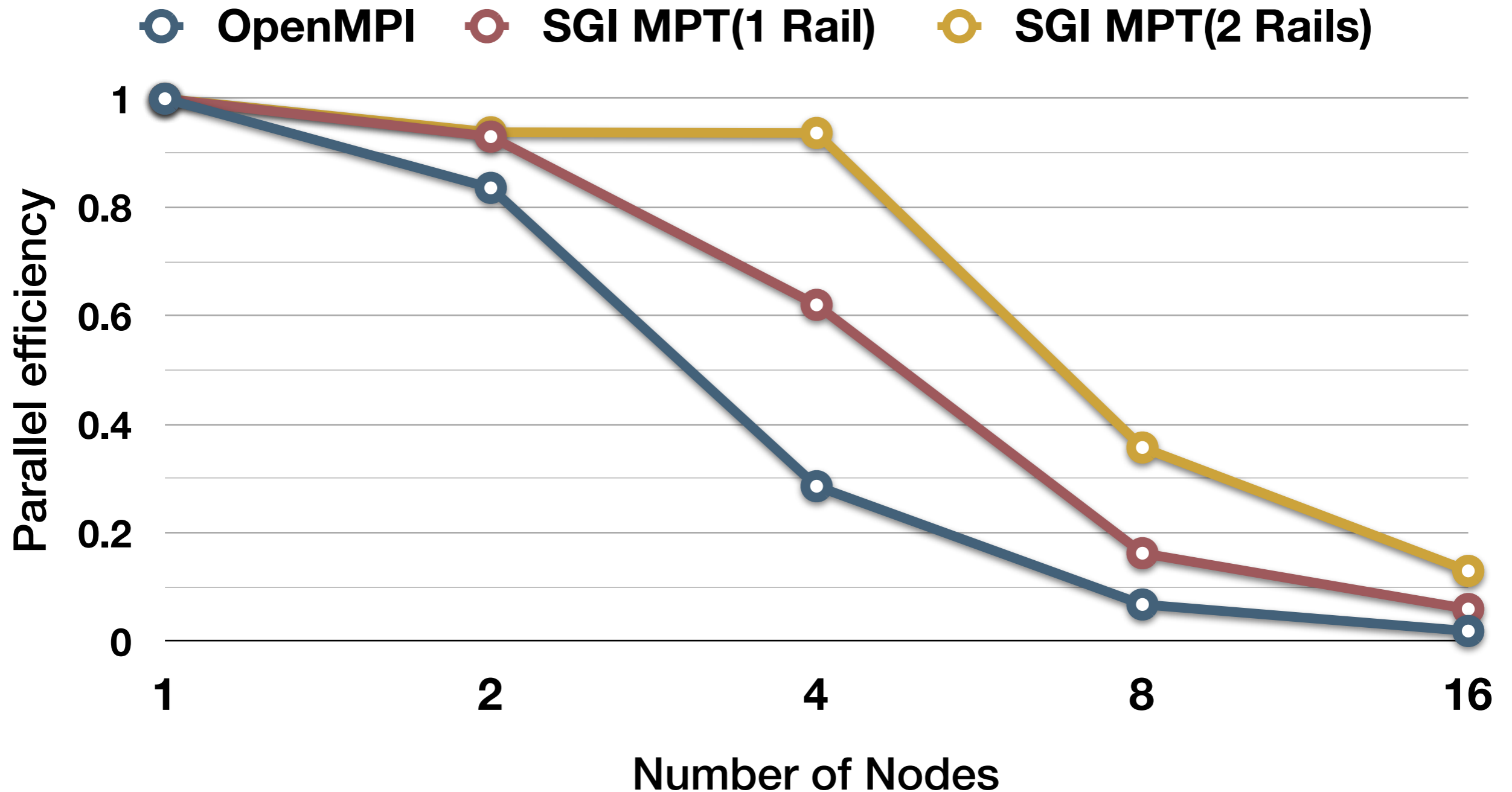
Benchmark results

2D cavity, mesh:1000² (1 Million)



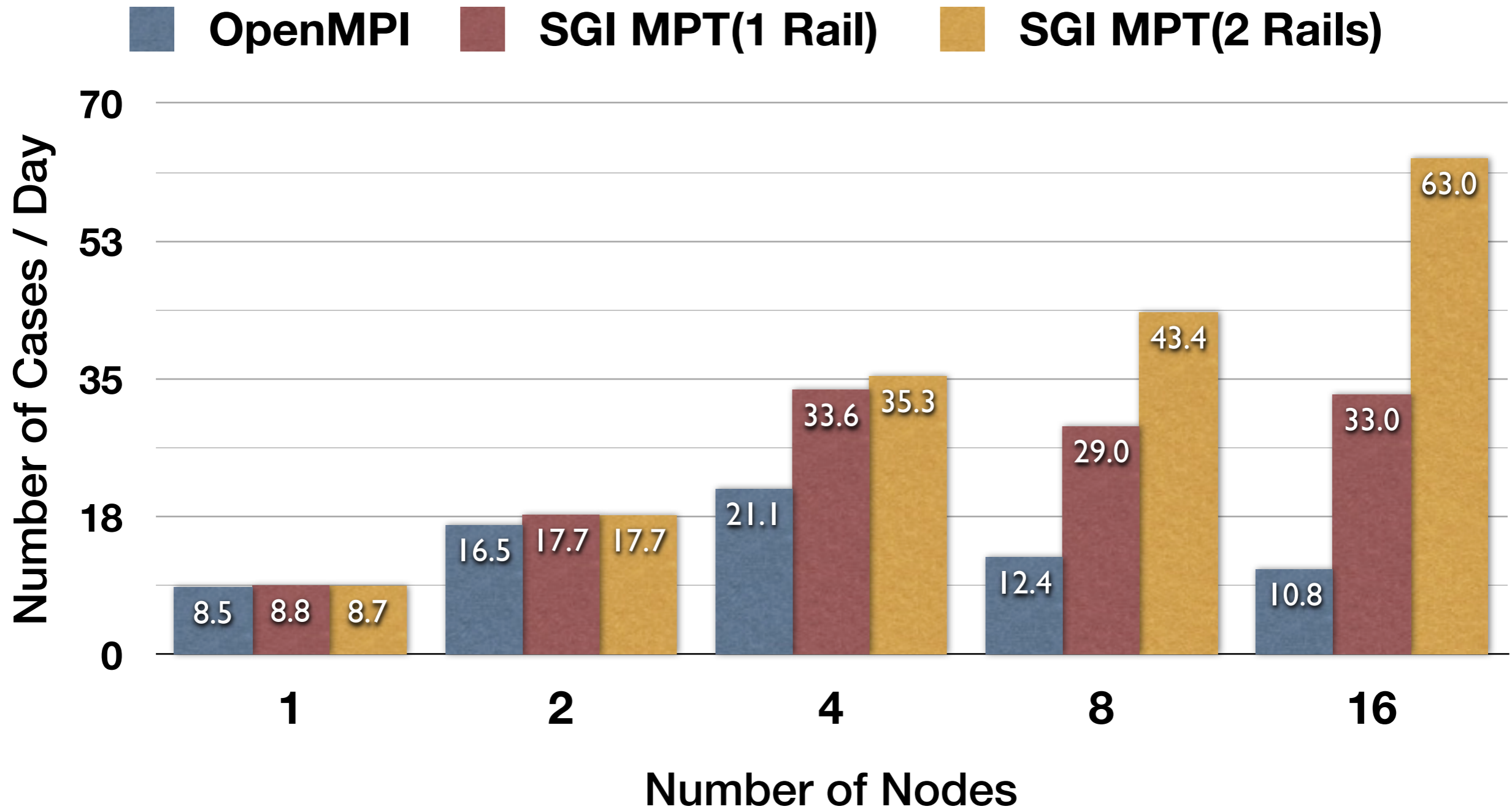
Benchmark results

2D cavity, mesh:1000² (1 Million)



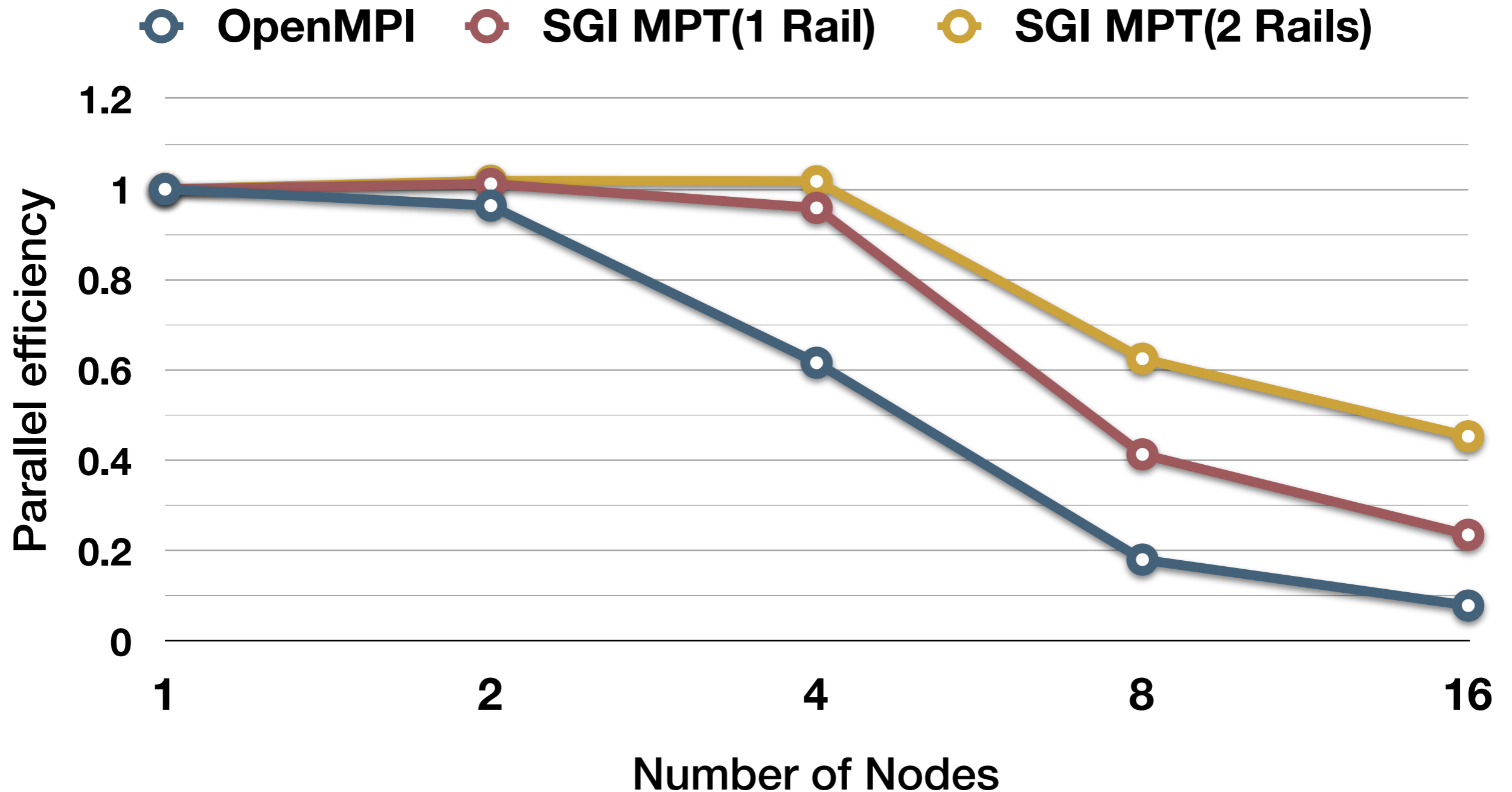
Benchmark results

2D cavity, mesh:2000² (4 Millions)



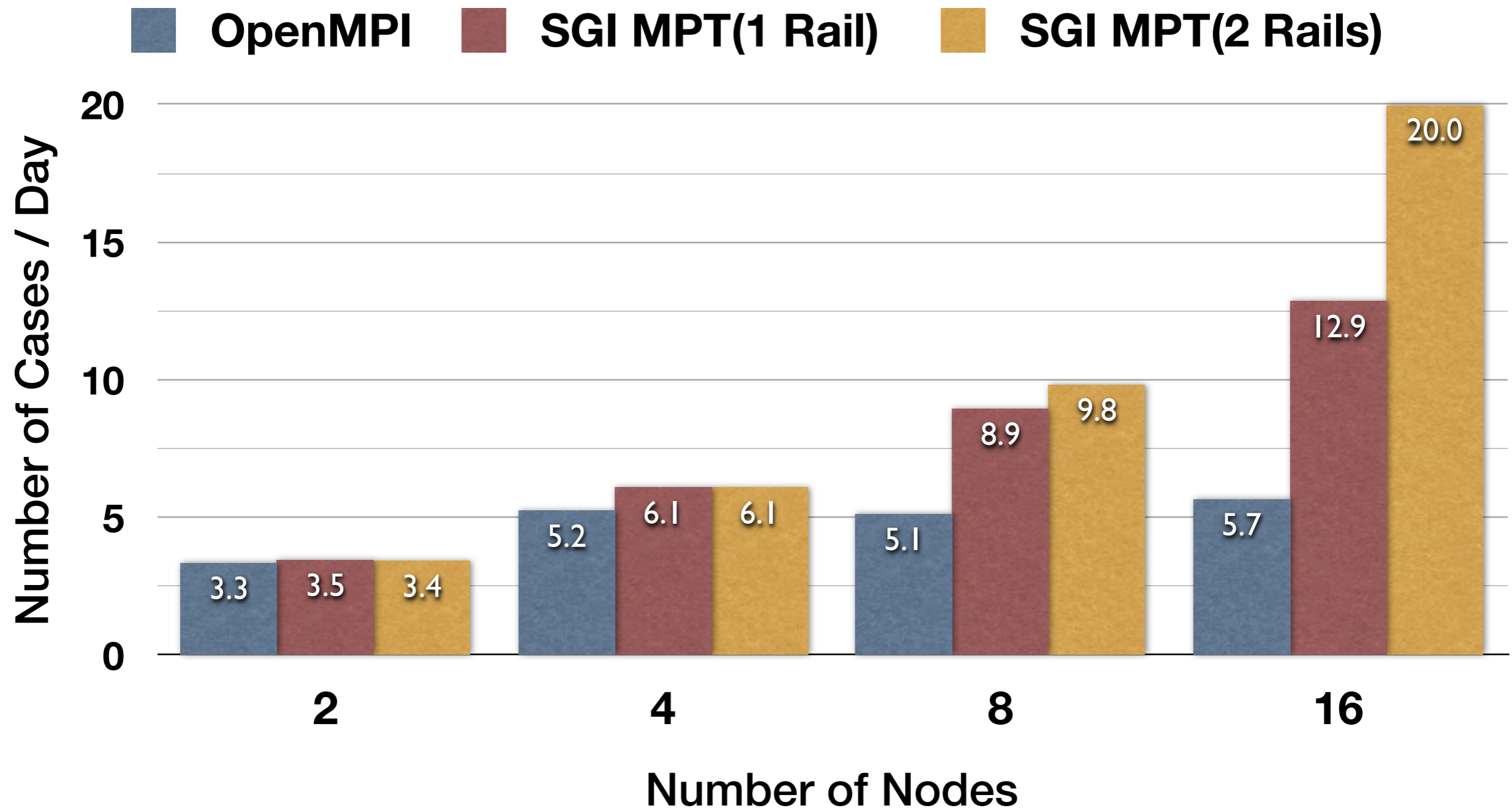
Benchmark results

2D cavity, mesh:2000² (4 Millions)



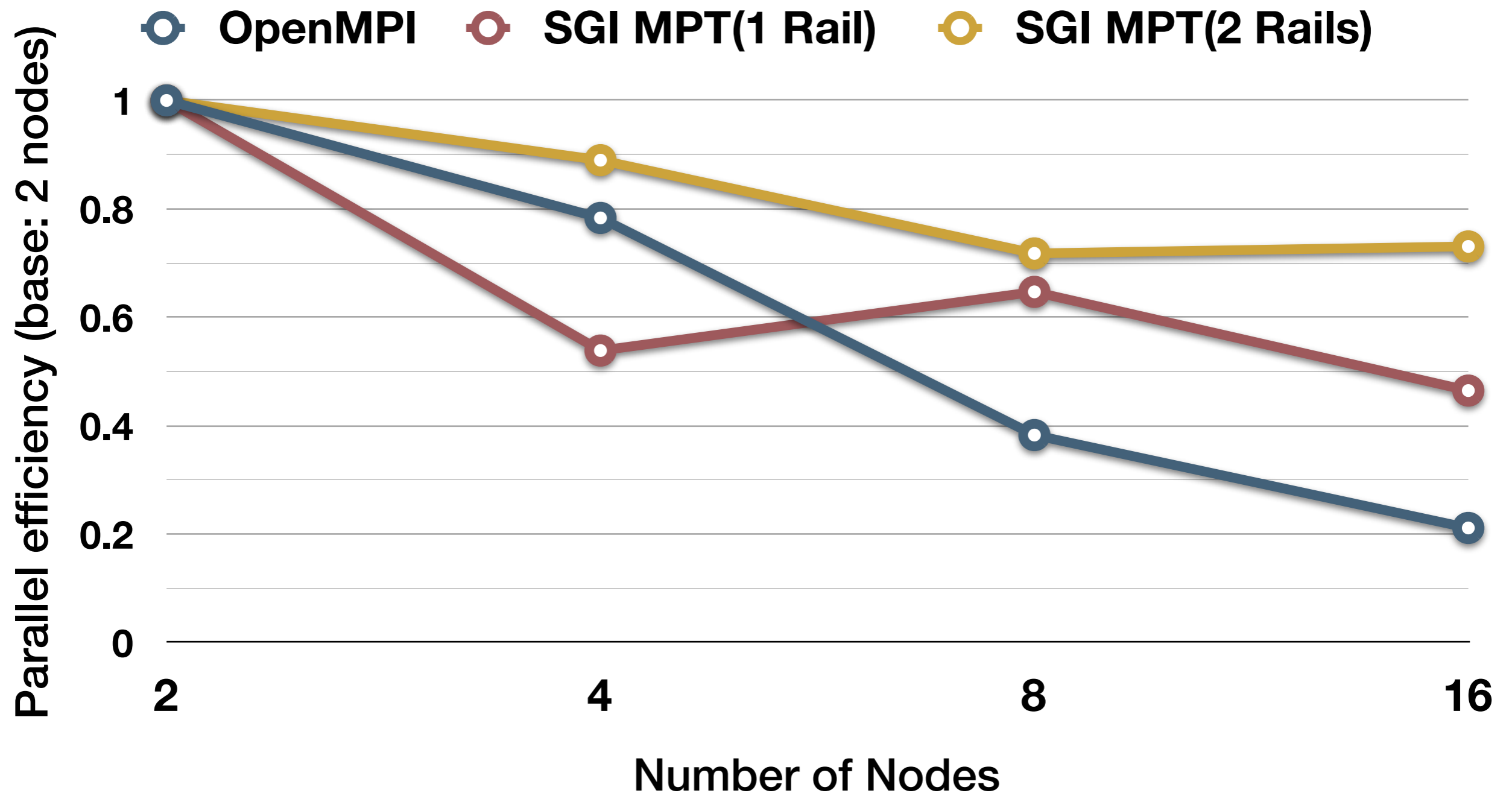
Benchmark results

2D cavity, mesh:4000² (16 Millions)



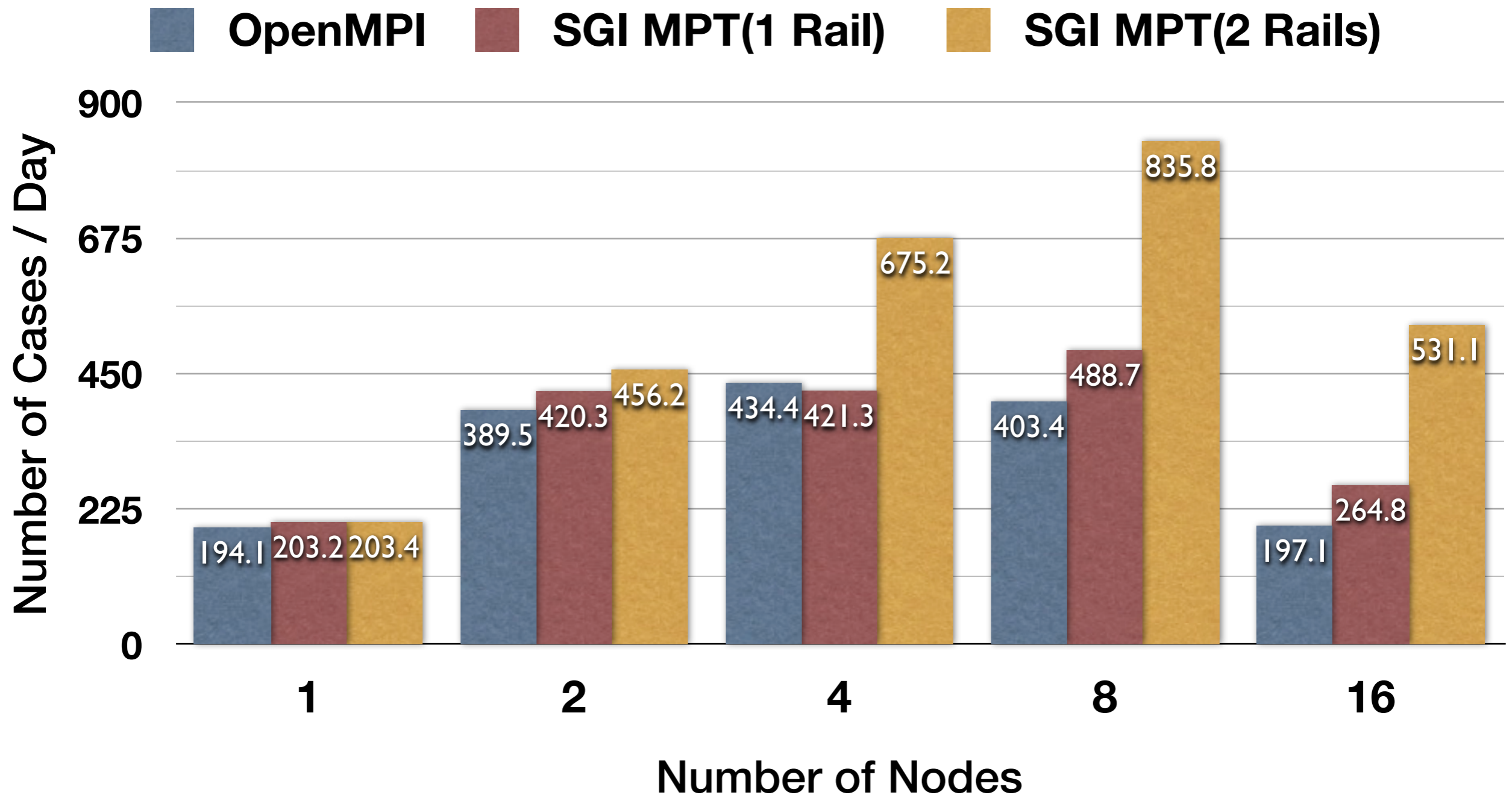
Benchmark results

2D cavity, mesh:4000² (16 Millions)



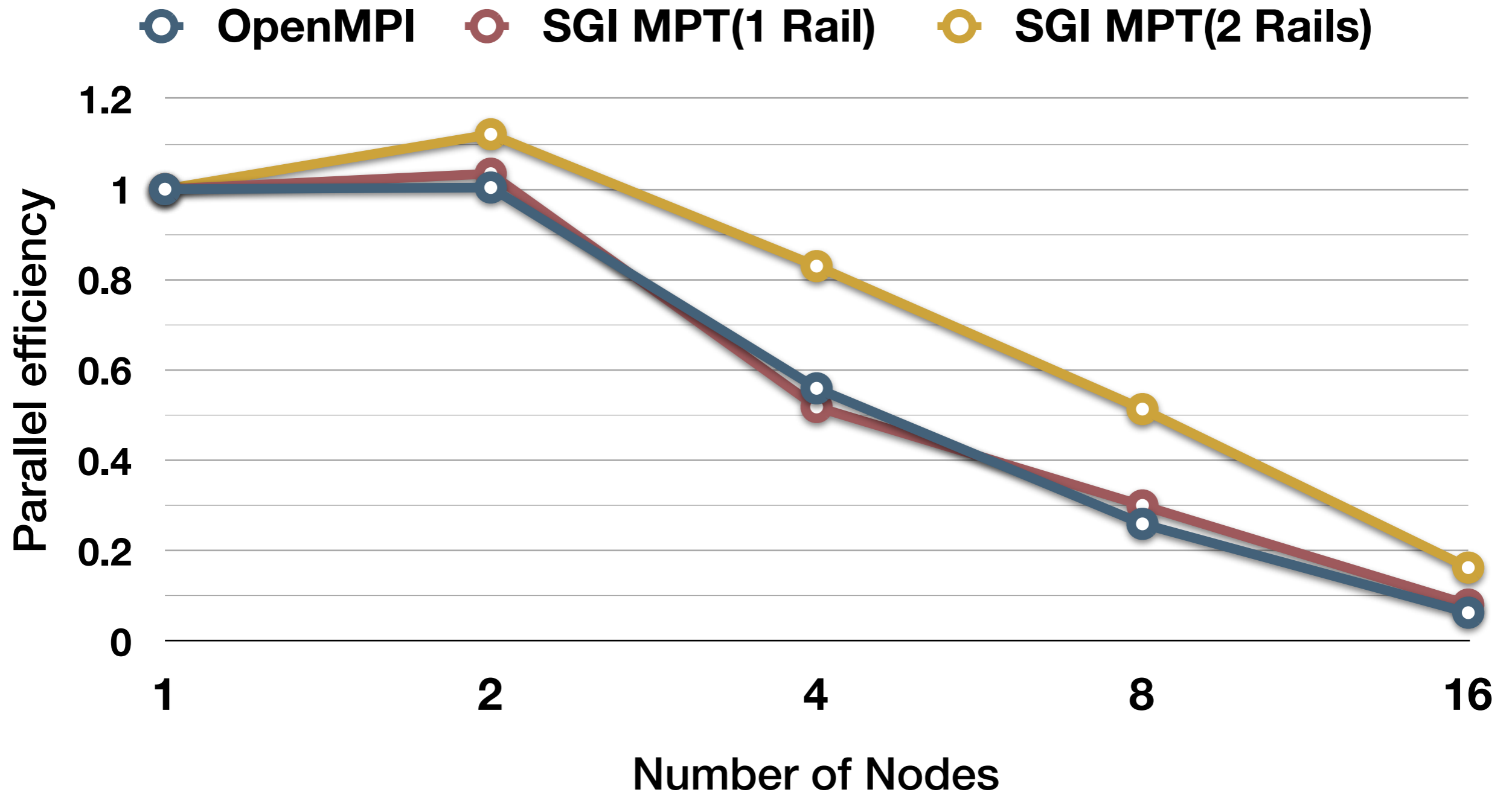
Benchmark results

3D cavity, mesh: 100^3 (1 Million)



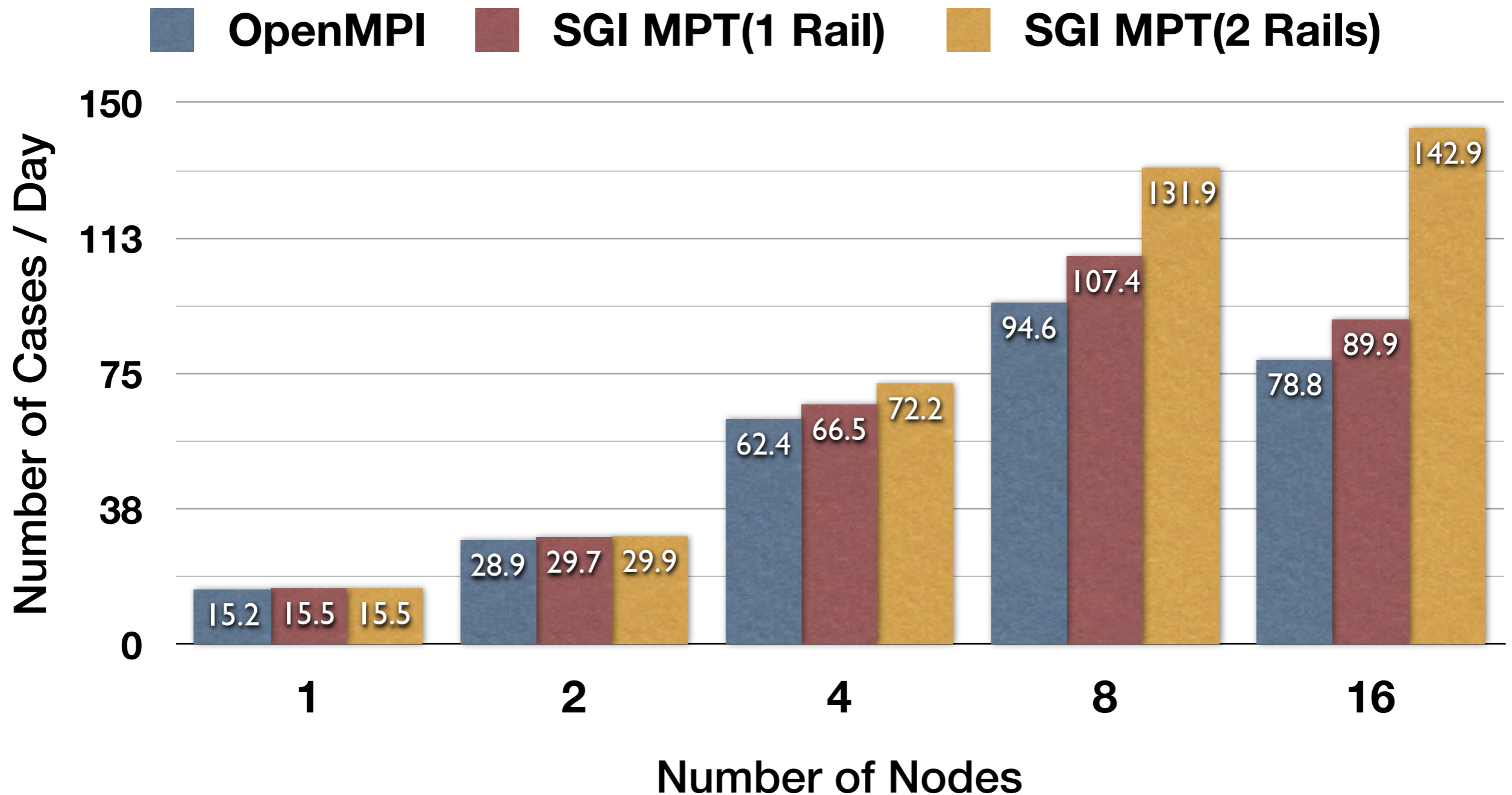
Benchmark results

3D cavity, mesh: 100^3 (1 Million)



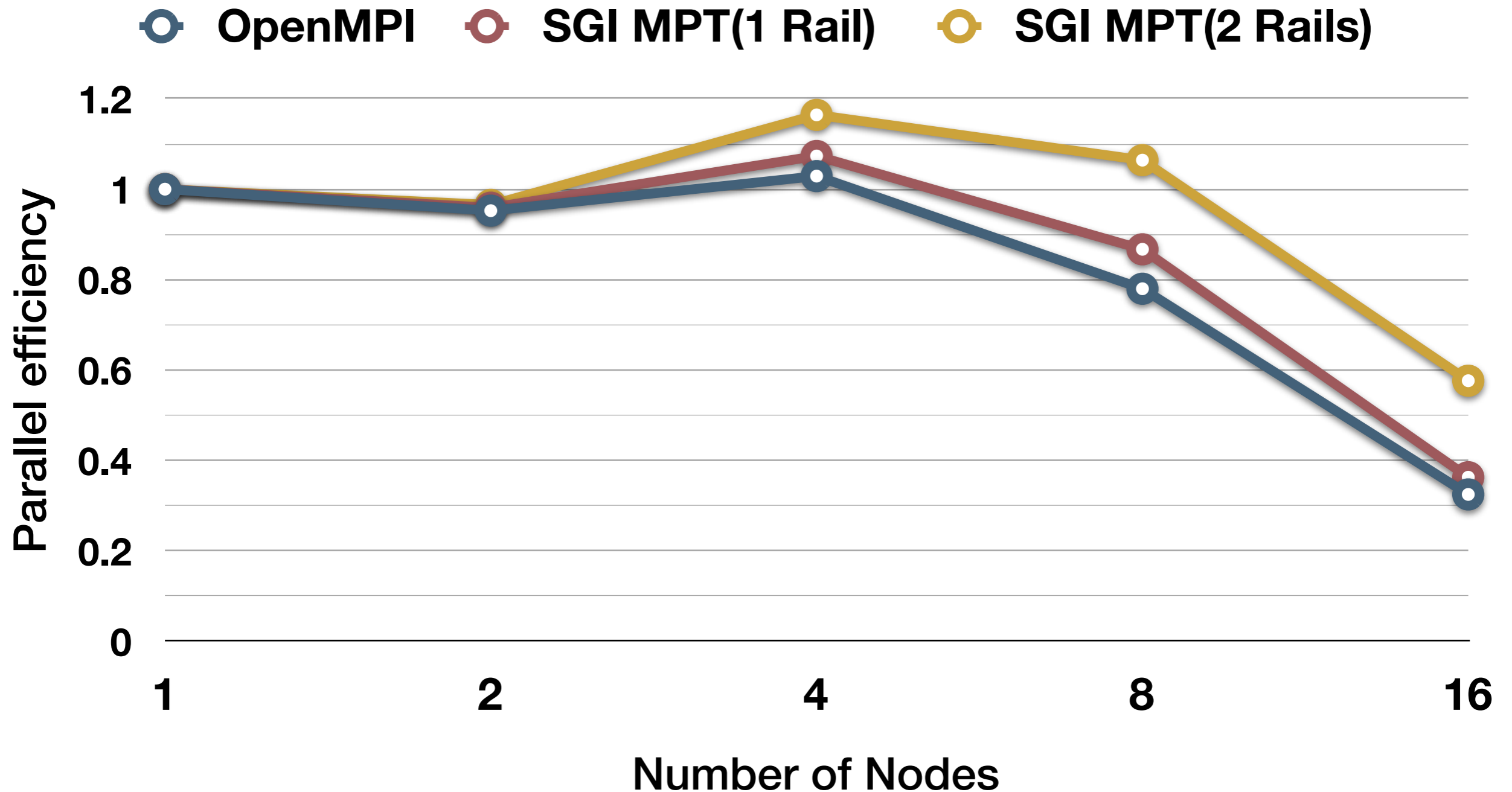
Benchmark results

3D cavity, mesh:200³ (8 Millions)



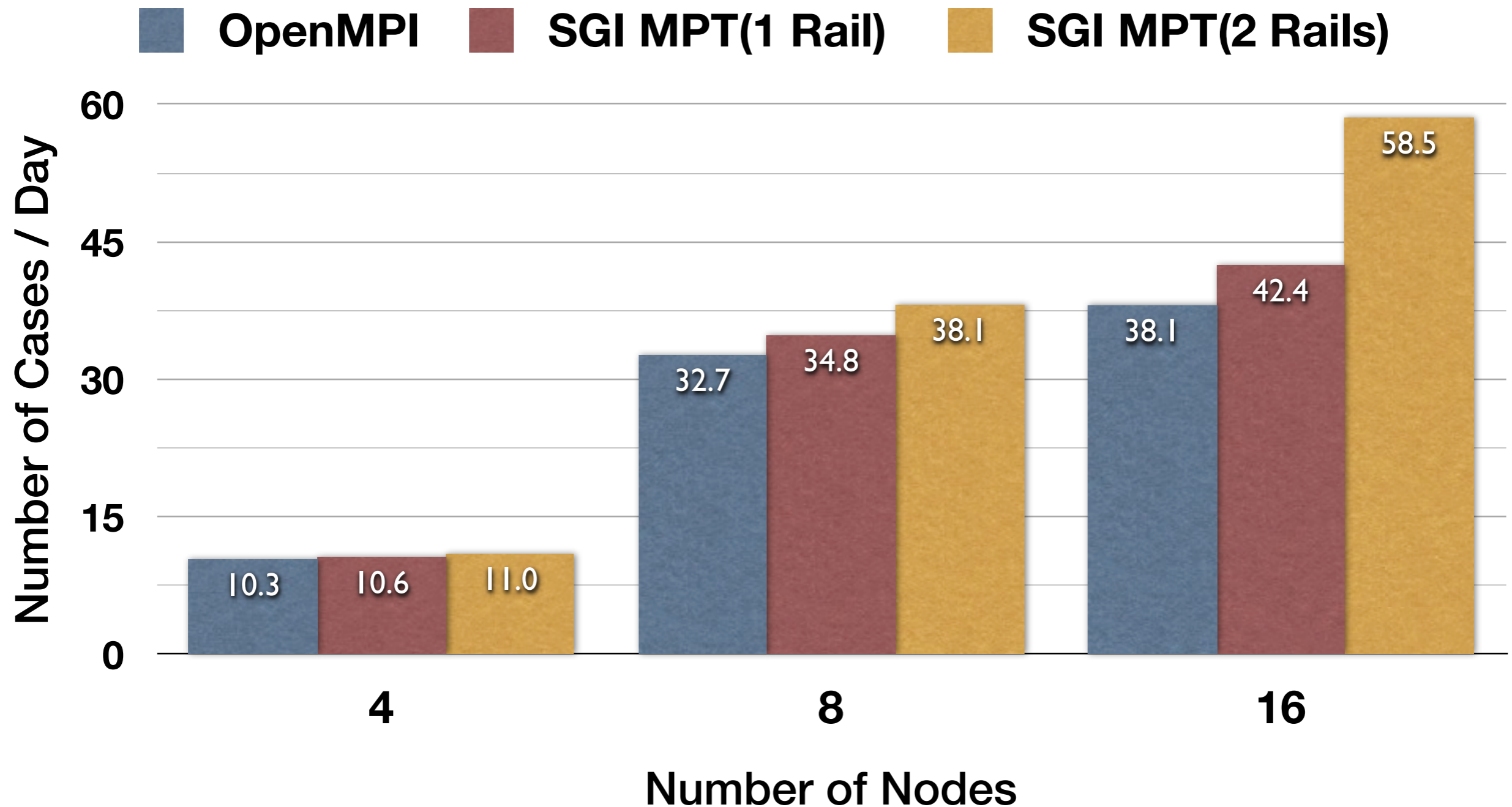
Benchmark results

3D cavity, mesh:200³ (8 Millions)



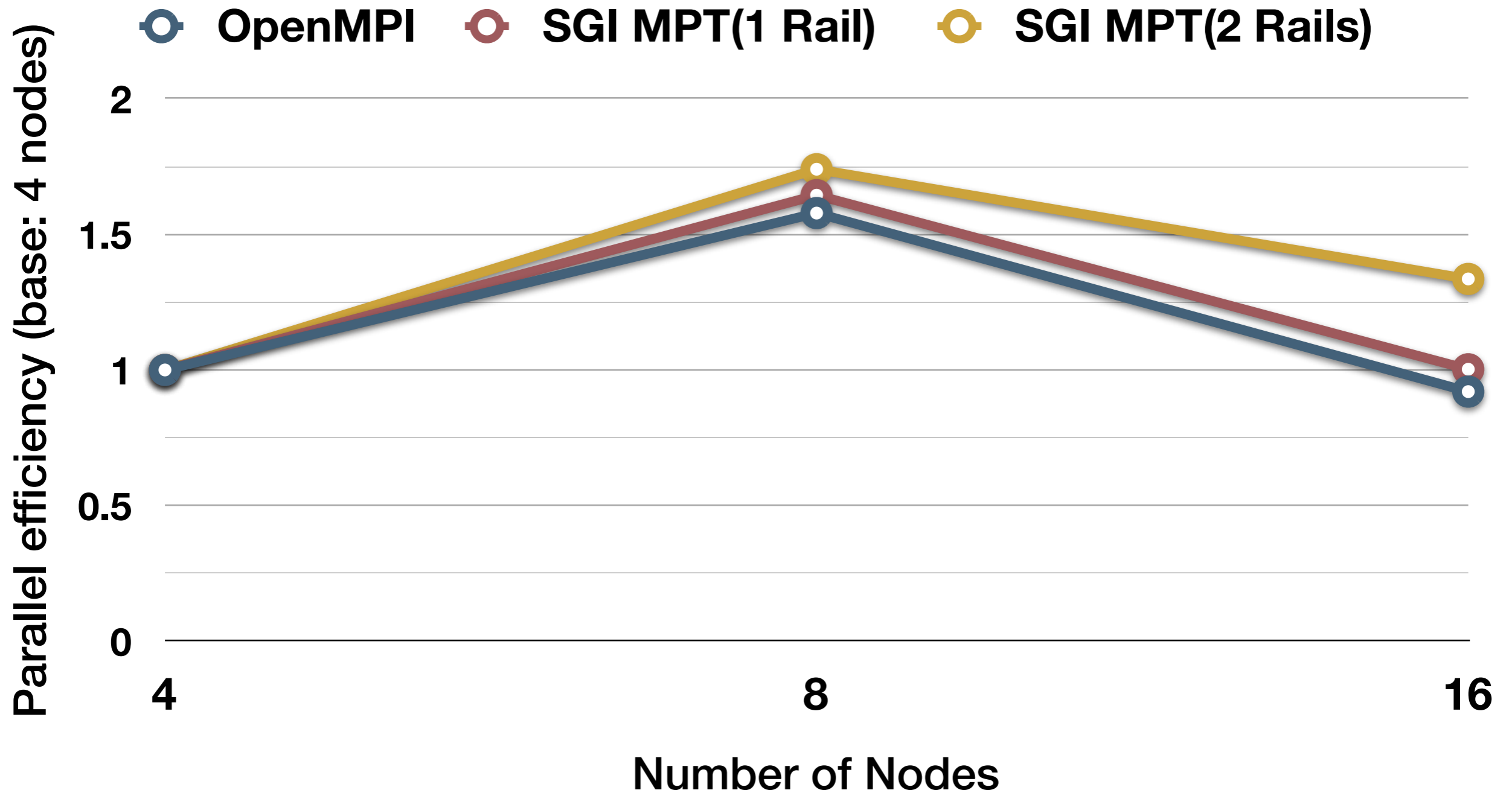
Benchmark results

3D cavity, mesh:300³ (27 Millions)



Benchmark results

3D cavity, mesh:200³ (8 Millions)



Any Questions?