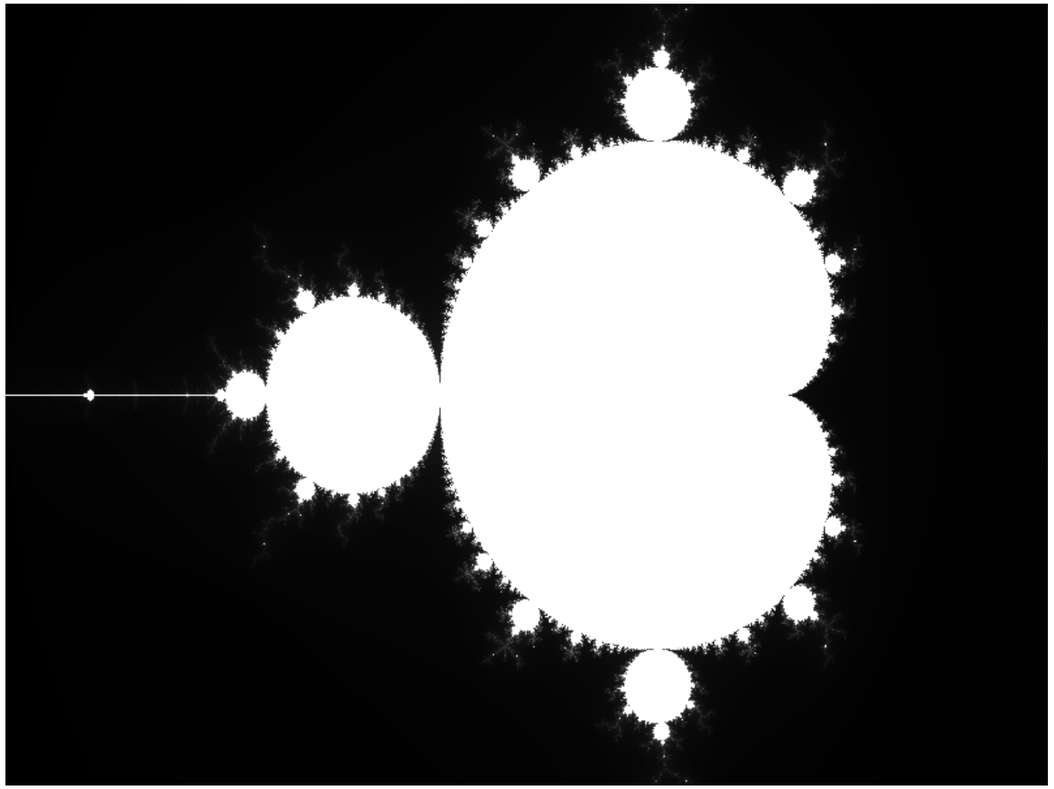
HPC - Exercise 2

Edoardo Zappia

Objective

Computing the Mandelbrot set

- Distributed memory parallelization (MPI)
- Shared memory parallelization (OMP)



Experimental Setup

ORFEO CLUSTER

- 2 THIN node (48 cores)
- Static partitioning
- Strong scaling
- Weak scaling

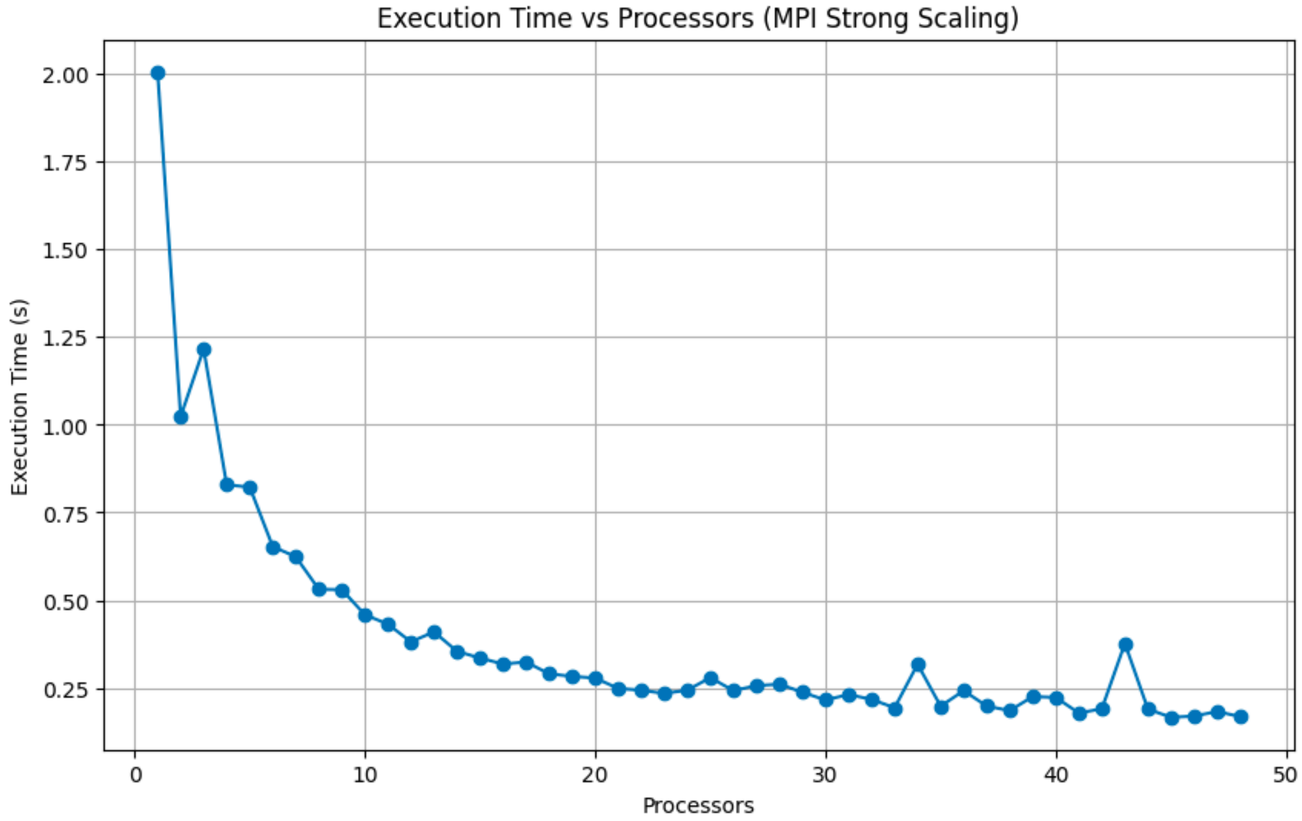
Assessment

- Speedup $S(n) = \frac{T(1)}{T(n)}$
- Efficiency $E(n) = \frac{T(1)}{n \times T(n)}$

Strong scaling

Strong scaling

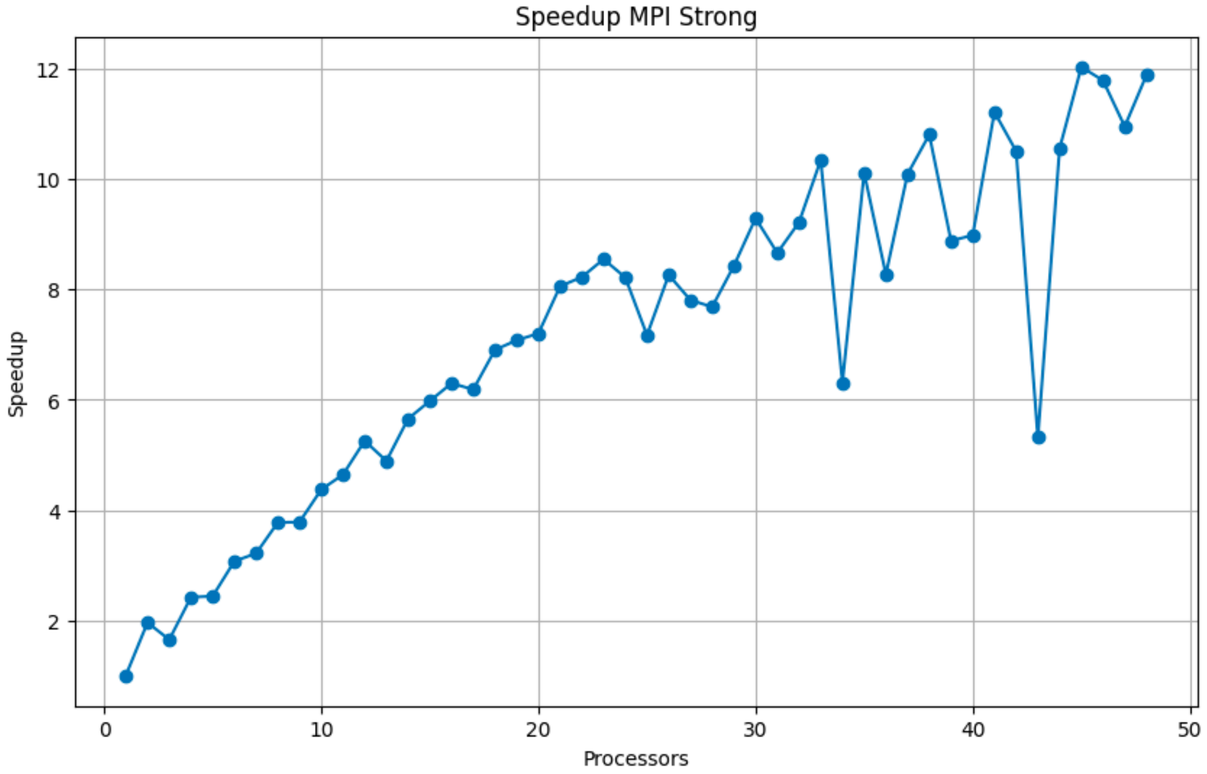
MPI

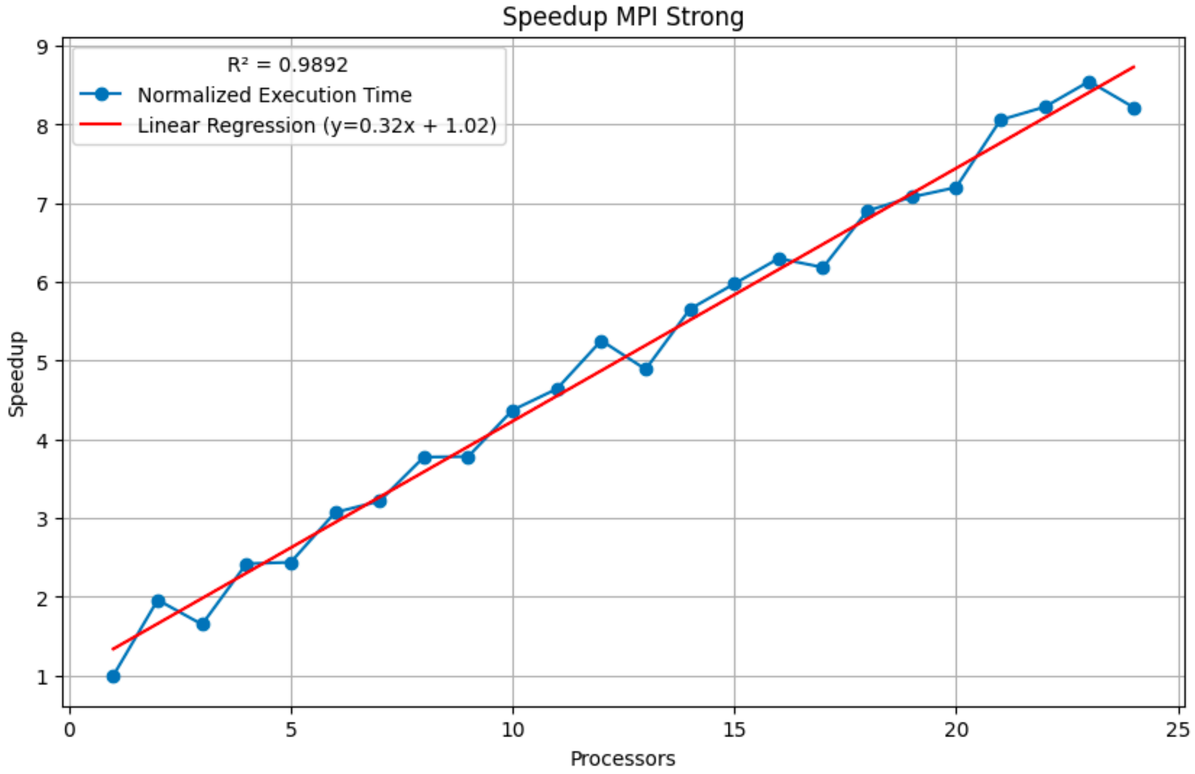


Matrix dimensions: 1600x2400

Strong scaling

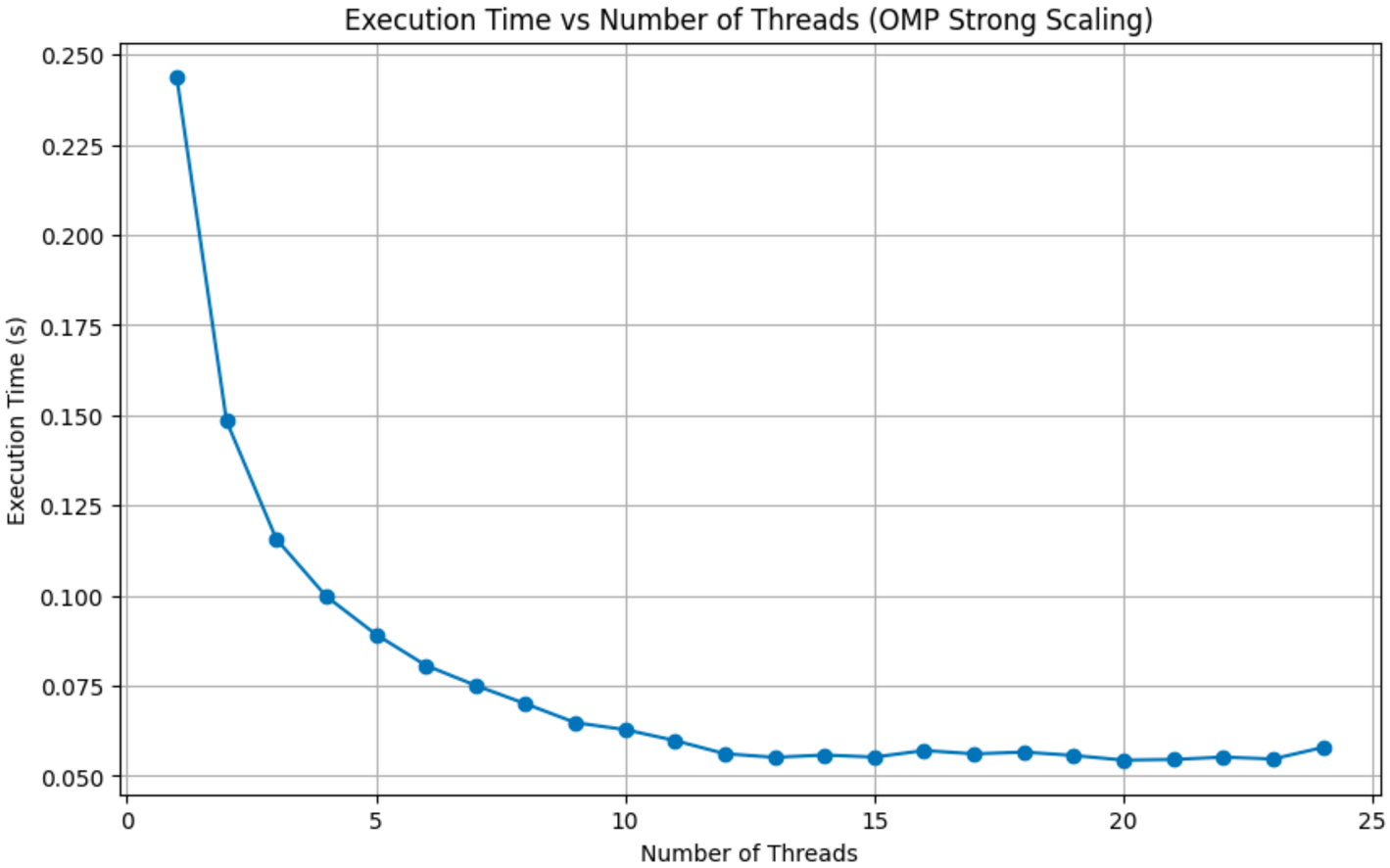
MPI - Speedup





Strong scaling

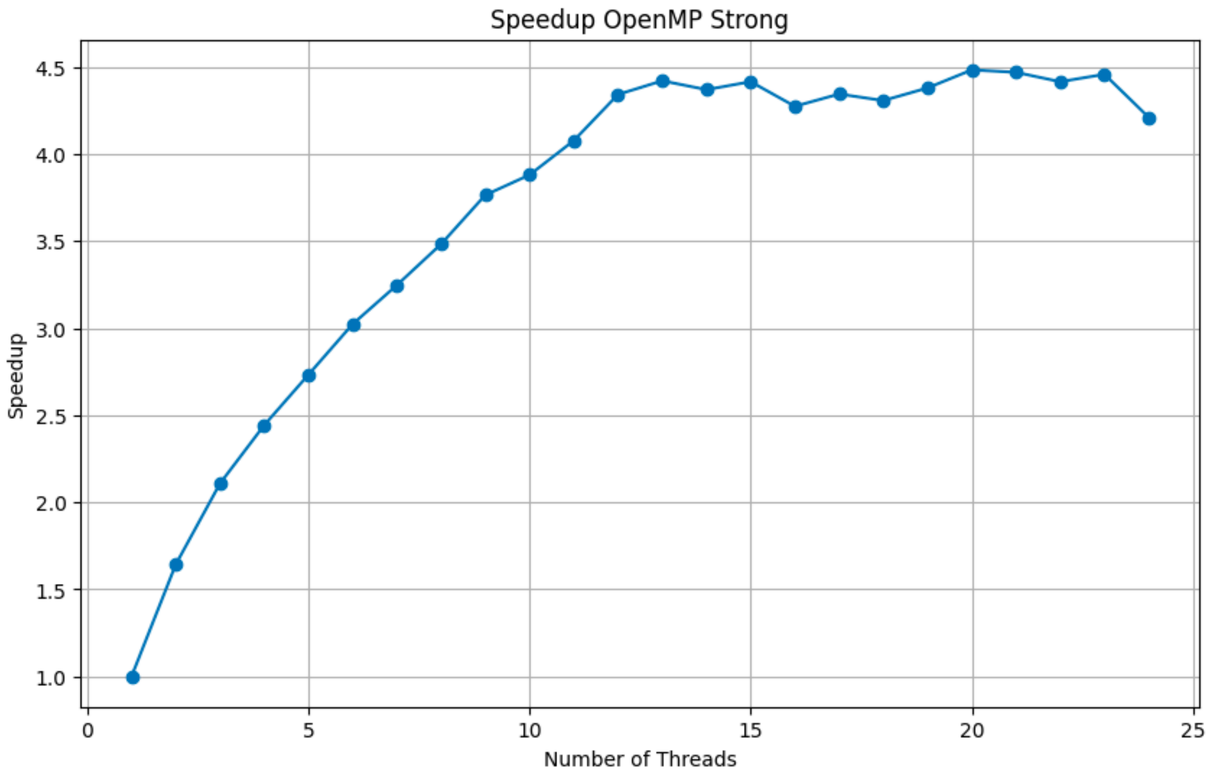
OMP

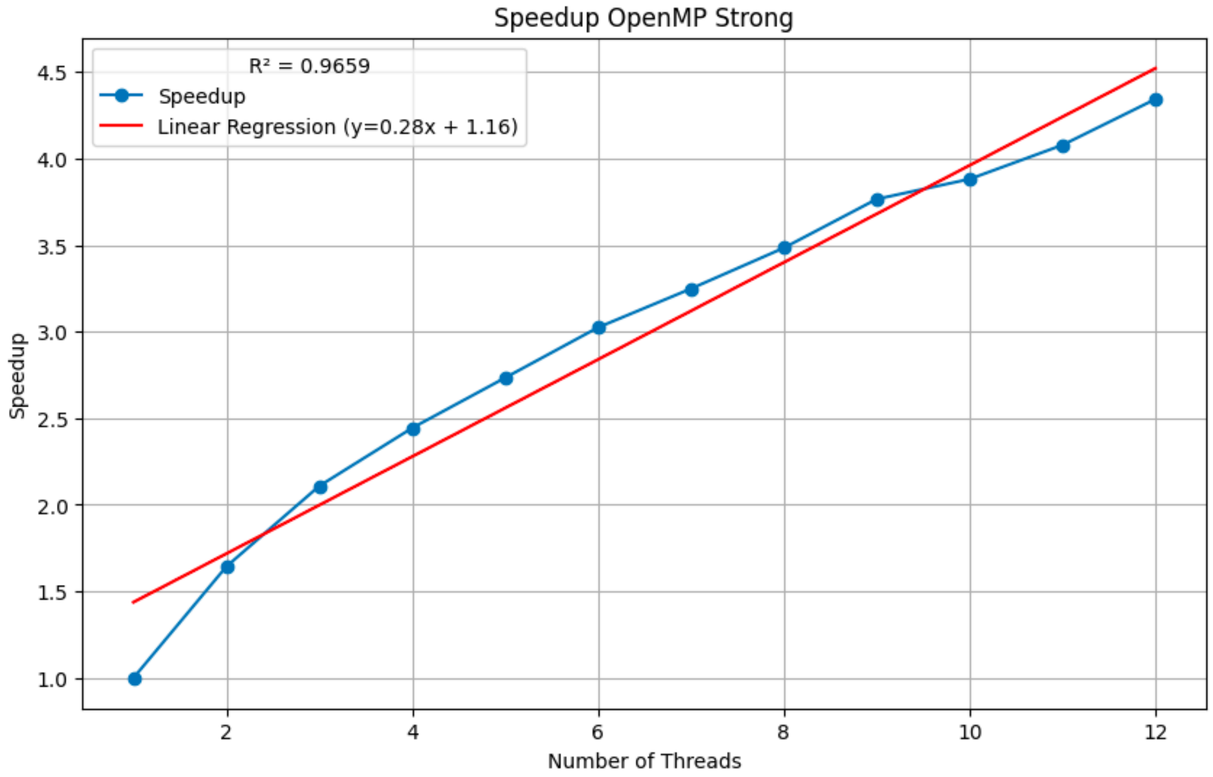


Matrix dimensions: 600x800

Strong scaling

OMP - Speedup





Weak scaling

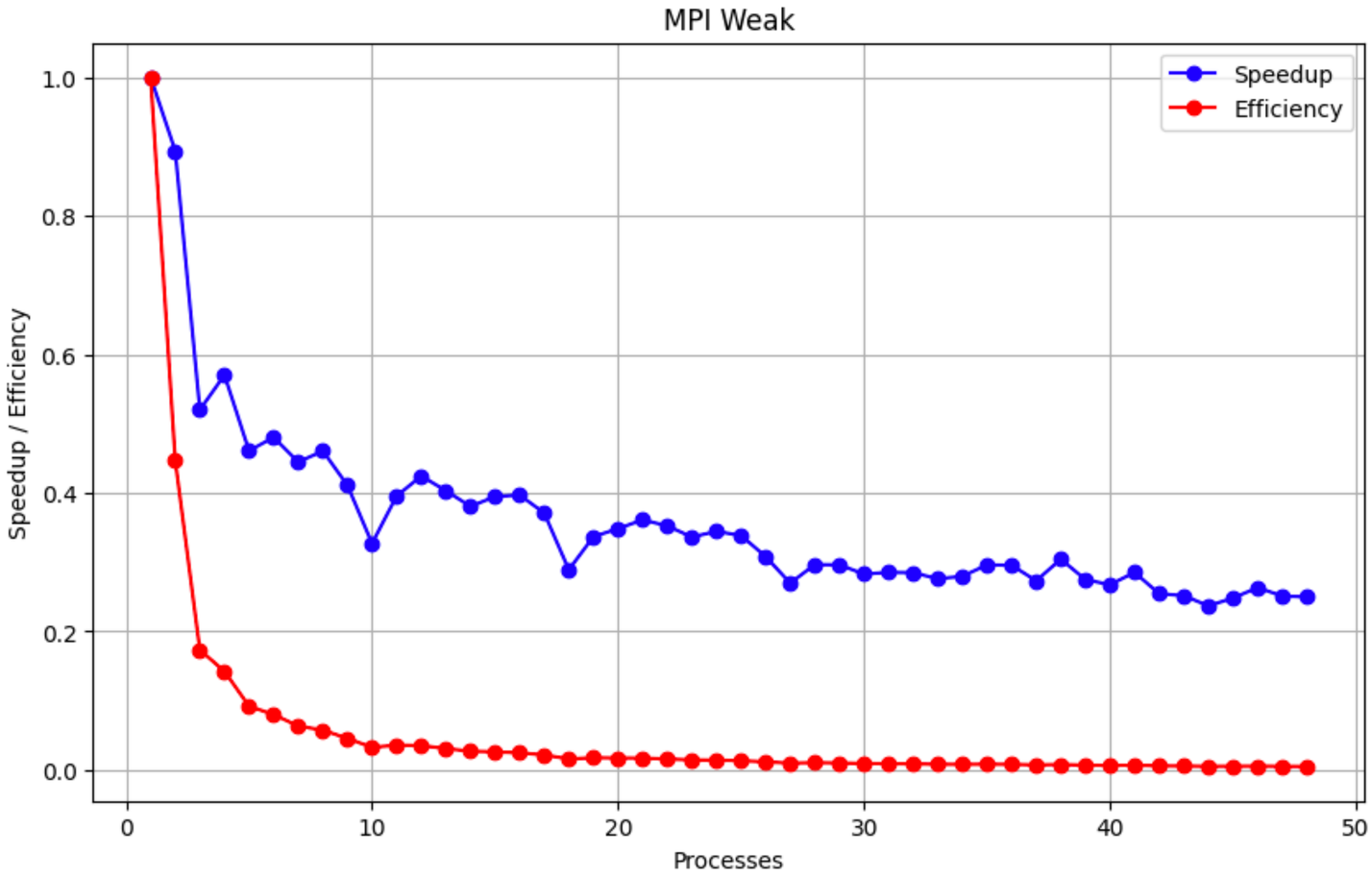
Weak scaling

MPI

Matrix dimensions: 1000x1000 to 48000x1000

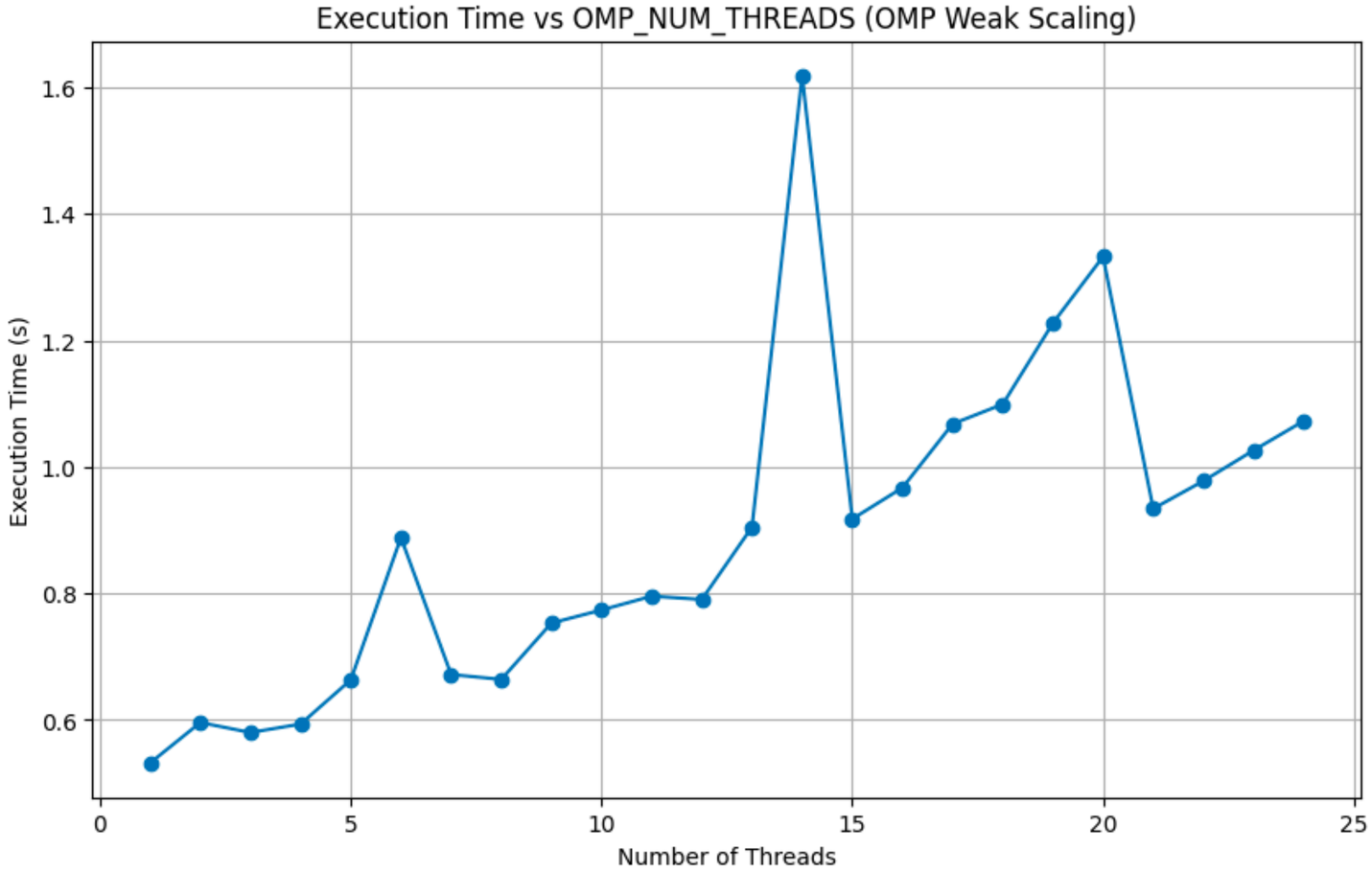
Weak scaling

MPI - Speedup and efficiency



Weak scaling

OMP



Matrix dimensions: 1000x1000 to 48000x1000

Weak scaling

OMP - Speedup and efficiency