

# Programming Assignment 3

ECE 759, Prof. TW Huang

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GitHub link to programming tasks:

<https://github.com/phantom3012/repo759/tree/main/HW03>

## 1 Question 1

### 1.a

matmul.cpp can be found at <https://github.com/phantom3012/repo759/blob/main/HW03/matmul.cpp>

### 1.b

task1.cpp can be found at <https://github.com/phantom3012/repo759/blob/main/HW03/task1.cpp>

### 1.c

Scaling analysis reveals an exponential decrease in time. See Figure 1

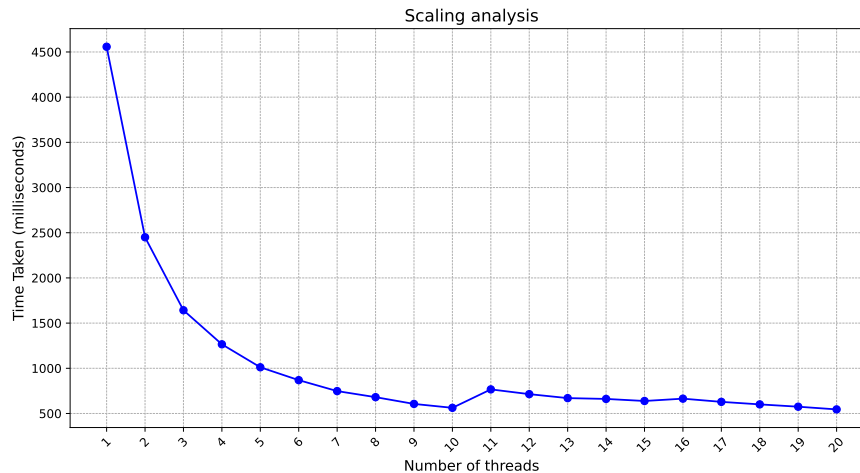


Figure 1: Time taken for matrix multiplication with varying number of threads

## 2 Question 2

### 2.a

convolution.cpp can be found at <https://github.com/phantom3012/repo759/blob/main/HW03/convolution.cpp>

### 2.b

task2.cpp can be found at <https://github.com/phantom3012/repo759/blob/main/HW03/task2.cpp>

### 2.c

Scaling analysis reveals an exponential decrease in time. See Figure 1  
The time taken after a certain number of threads essentially remains the same because of other bottleneck factors like memory access time, etc.

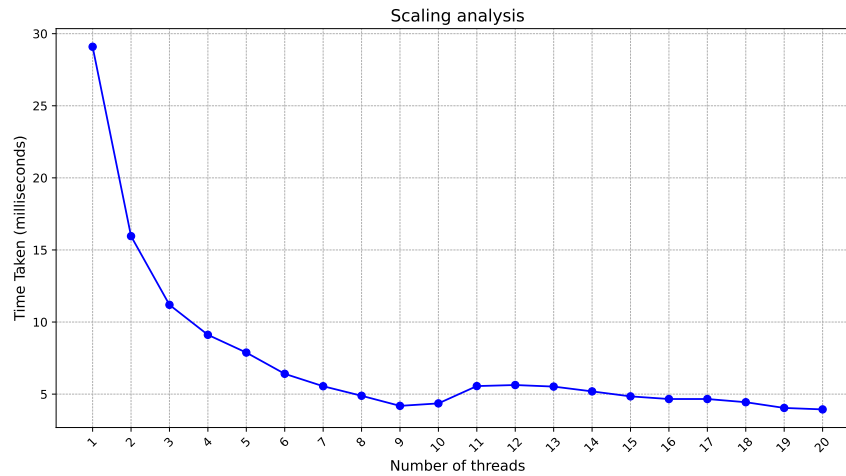


Figure 2: Time taken for matrix multiplication with varying number of threads

### 3 Question 3

#### 3.a

msort.cpp can be found at <https://github.com/phantom3012/repo759/blob/main/HW03/msort.cpp>

#### 3.b

task3.cpp can be found at <https://github.com/phantom3012/repo759/blob/main/HW03/task3.cpp>

### 3.c

#### 3.c.1

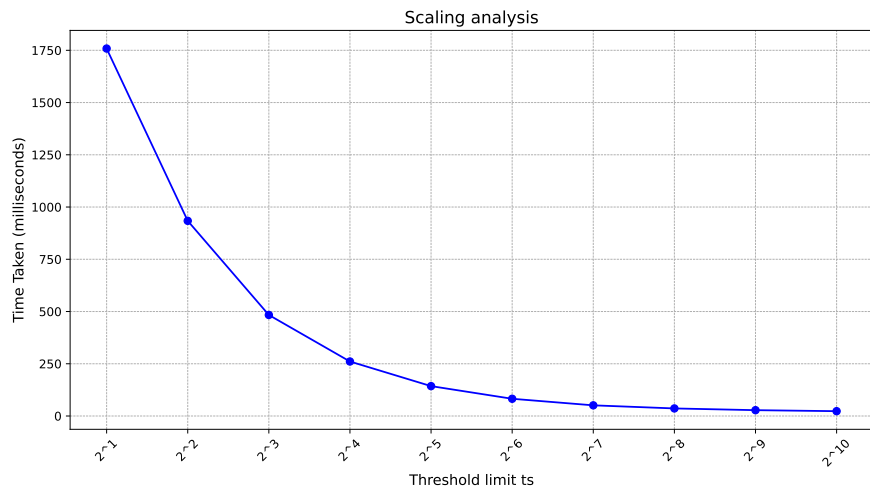


Figure 3: Time vs threshold size  $ts$  for 8 threads

### 3.c.2

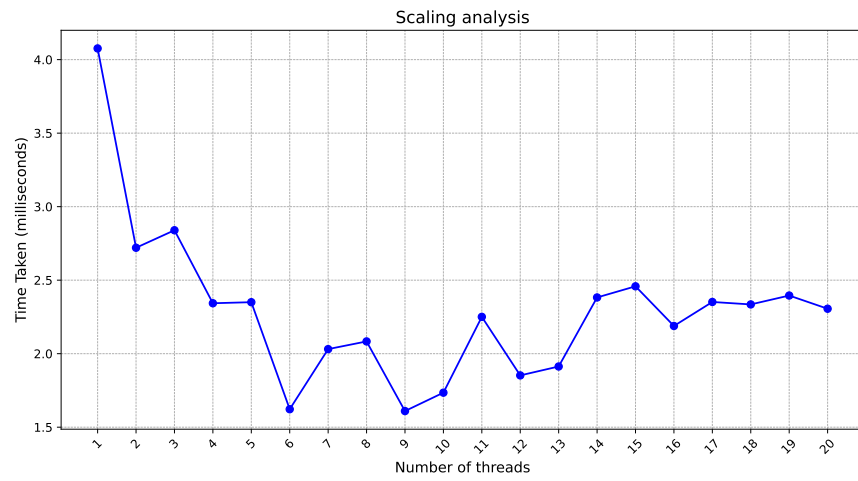


Figure 4: Time vs threads for  $ts = 256$