Concurrency and Parallel Programming
Assignment 1

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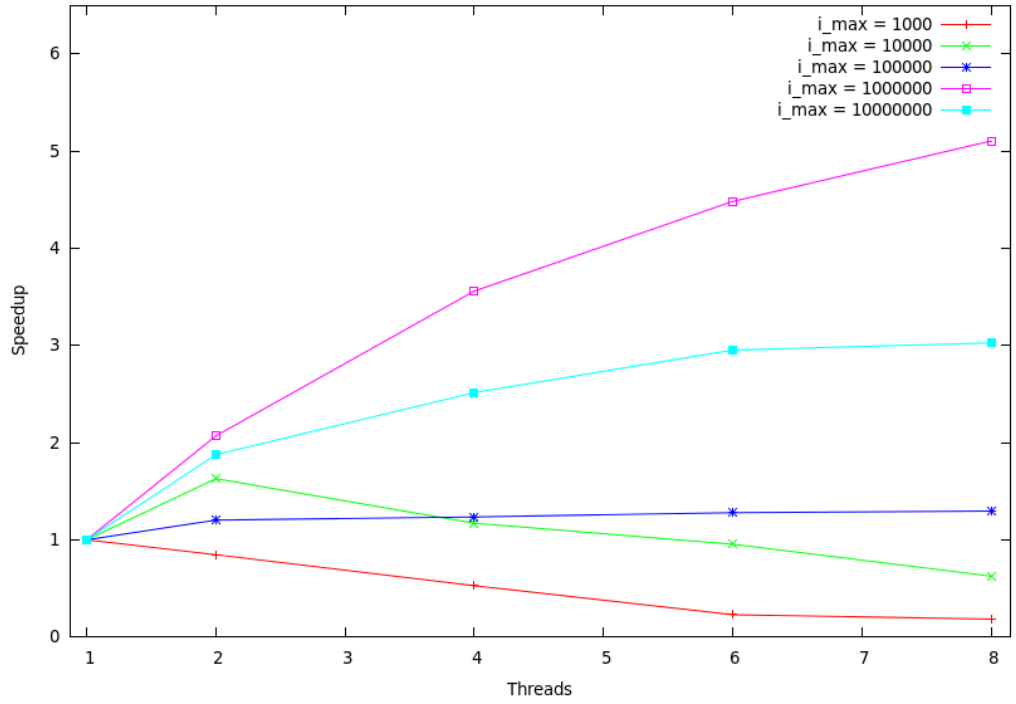
1 Assignment 1.1

As can be seen in the graph, the speedup differs a lot between the different problem sizes. With the smallest problem size, i_max = 10^3, the speedup with all amount of threads is lower than one. This means that using the sequential algorithm is the fastest is this specific case. This is probably caused by the relatively high amount of time that is spent in the critical section with small problem sizes. With i_max = 10^4 the maximum speedup is at two threads. After that it goes downhill quickly.
The three largest problem sizes all benefit from more threads. The most likely reason for this is that waiting in a critical section occurs less per calculations a thread does. i_max = 10^6 has the largest speedup. With eight threads it reaches a speedup of a little above five.



2 Assignment 1.2

Assignment 1.2 is a program generating an infinite stream of prime numbers, using the sieve of Eratosthenes. When the program is executed, one main tread is created. This main thread generates a stream of natural numbers, which are passed to the next thread. This thread takes the first number of this stream, which is a 2 for the first "slave-thread". For a slave thread, there are three options: the number which will be processed is the first number that enters the thread, which means it is a prime number. This number will then be printed and the next number will be processed. If the next number can be divided trough the prime number, it is discarded. When it can't be divided, the number is possibly a prime number and it will be passed to the next thread.

All thread communicate with each other trough a buffer, locked with mutexes to prevent errors. To ensure all printing will be done, after printing each prime the stdout buffer will be flushed.