

▼ COMP2004 - Assignment 3

Question 1: Analyzing Amdahl's Law for Different Levels of Parallelism

Objective: Understand the impact of Amdahl's Law on the speedup of parallel applications with varying levels of parallelism and processing cores.

Tasks:

1. Using Amdahl's Law (refer to the Computer Architecture and Amdahl's Law material provided in the course), calculate the potential speedup for the following scenarios:

a. 40% of the application is parallelizable:

- With 4 processing cores
- With 16 processing cores

b. 90% of the application is parallelizable:

- With 4 processing cores
- With 8 processing cores

For each scenario, provide your calculation process and the resulting speedup value.

Question 2: Multithreaded Statistics Calculator

Objective: Demonstrate understanding of thread creation and basic operations using thread libraries.

Problem Statement:

You are given a list of N integers. Your task is to calculate the average, maximum, and minimum values using three separate threads:

1. Thread 1: Calculate the average of the numbers.
2. Thread 2: Identify the maximum value from the list.
3. Thread 3: Identify the minimum value from the list.

After the three threads have completed their computations, the main program should display the calculated average, maximum, and minimum values.

Input:

- A text file named `input.txt` that contains one number per line.

Output:

- Print the average, maximum, and minimum values in the following format:

```
Average: average_value
Maximum: maximum_value
Minimum: minimum_value
```

Requirements:

1. Use the appropriate thread library functions for creating and joining threads.
2. Ensure each thread performs only its specified task.
3. The main program should wait for all threads to complete before displaying the results.
4. Use the starter file given to get started and look for the 5 TODOs

Note: Focus on correct thread creation and operations. Handling of race conditions and deadlocks is not required for this assignment.