FACULTEIT
WETENSCHAPPEN

# PARALLEL AND DISTRIBUTED SOFTWARE SYSTEMS HOMEWORK ASSIGNMENT 3

Baert Jan-Pieter

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GHENT
UNIVERSITY

# 1 Questions

Q1.1: In the function pimontecarlo there's a write-write race on the pi variable. The solution for this is to use a local value for the addition to pi in that thread and then update pi in a section protected by locking a mutex.
Q1.2: The i value in main is passed by reference, but when the threads start executing the value is always equal to numThreads, this means the threadId is wrong in the pimontecarlo function. The solution for this is passing by value, which will copy the current value and will cause the threadId values to be correct.
Q2.1: The runtime and speedup relative to the runtime with 1 thread can be found in Table 1. This data is using no compiler optimization.

| **number of threads** | **runtime** | **speedup** |
|---|---|---|
| 1 | 0.597 | 1 |
| 2 | 1.229 | 0.486 |
| 4 | 1.891 | 0.316 |
| 8 | 1.006 | 0.593 |
| 16 | 0.908 | 0.657 |

Table 1: runtime and speedup data

Q2.2: The runtime and speedup relative to the runtime with 1 thread can be found in Table 2. This data is using full compiler optimizations.

| **number of threads** | **runtime** | **speedup** |
|---|---|---|
| 1 | 0.1681 | 1 |
| 2 | 0.0870 | 1.932 |
| 4 | 0.0494 | 3.403 |
| 8 | 0.0303 | 5.548 |
| 16 | 0.0290 | 5.797 |

Table 2: runtime and speedup data

Q2.3: