National University of Modern Languages, Islamabad

Faculty of Engineering & Computer Science
Department of Computer Science

First Quiz

BS CS (8 A) Morning-SPRING-2023
Parallel and Distributed Computing
Faculty Name: Farhad Muhammad Riaz

Maximum Time Allowed: 20 minutes **Maximum Points: 05**

Name/Roll Number:_____

Instruction:

- **Please don't write unnecessary information, be specific.**
- **Write your answer within the space you provide.**

QNO1. Suppose you have a task that takes 1000 seconds to complete. 80% of the task can be parallelized, while the remaining 20% can't be parallelized. If you run the task on one processor, it takes 1000 seconds to complete.

a. How long will it take if you use eight processors? Now we parallelized the 90% of the Task and remaining 10 % can't be parallelized. How long will it take if you use eight processors? **[1.5]**

Speedup = 1 / (1 - 0.8+ (0.8 / 8)) Speedup = 1 / 0.3 Speedup = 3.33
Using eight processors would result in a speedup of 3.33, which means the task would take 1000/3.33 = 300 seconds to complete.
Speedup = 1 / (1 - 0.9+ (0.9 / 8)) Speedup = 1 / 0.2 Speedup = 5
Using eight processors would result in a speedup of 5, which means the task would take 1000/5 = 200 seconds to complete.

b. Suppose we increase the processors with factor 2, i.e. 16 processors how long it takes to perform task with 80% parallelized code and 90 % parallelized code. **[1.5]**

Speedup = 1 / (1 - 0.8+ (0.8 / 16)) Speedup = 1 / 0.25 Speedup = 4
Using eight processors would result in a speedup of 4, which means the task would take 1000/4 = 250 seconds to complete.
Speedup = 1 / (1 - 0.9+ (0.9 / 16)) Speedup = 1 / 0.156 Speedup = 6.41
Using eight processors would result in a speedup of 6.41, which means the task would take 1000/6.41 = 156 seconds to complete.

QNO2. Let's take 8-core CPU without hyper threading and a 128 bit-wide vector unit. What is the uses of the theoretical processing capability of this processor?

a. A serial program using a single core and no vectorization **[1]**

08 cores × 1 × (128 bit-wide vector unit)/(64-bit double) = 16-way parallelism
As Serial Program use only single core so the processor utilization of the Serial Program= 1/16= 0.0625

b. Parallel Program with vectorization **[1]**

100-0.0625= 99.93