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امتحان حسابات 2019

Faculty of Electronic Engineering Fourth Year Dept. of Computer Science & Engineering Time (3 hrs.): 10 am – 1 pm Instructor: Prof. Nabil Ismail		Subject: Elective 5 1 st Semester 2018/2019 Sunday 6/1/2019 No. of pages: 2 Total Marks: 70 Marks
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Answer as much as you can:

[1] [15 Marks]

i) Multiple choice questions (you must select only one choice):

- 1- To take advantages of the multicore CPUs/manycore GPUs you have to use:
 - a) Shared programs
 - b) distributed programs
 - c) multithreaded programs
- 2- A parallel program runs on a single multicore node uses
 - a) distributed memory
 - b) loosely coupled cores
 - c) shared memory
- 3- CUDA is well suited for implementing the parallel design model.
 - a) SISD
 - b) SIMD
 - c) SPMD

ii) Fill in the spaces:

- 1- Parallel programmers use a, or to write shared memory parallel programs
- 2- Parallel application dimensions taxonomy are, and
- 3- PCAM parallel solutions methodology stands for,,,, and
- 4- CNNs are the most representative supervised deep learning model. They consist of mainly 4 types of layers,,, and

iii) True/False you should state why?

- 1- A shared address space facilitates migration from a sequential programming model to a parallel one.
- 2- GPU cores best performance model is MIMD parallelism
- 3- OpenCL distinguishes between the devices (usually GPUs or CPUs) and the host (CPU).
- 4- Data-dependent branching will perform well on a GPU.

[2] [20 Marks]

- i) A sequential application with a 20% part that must be executed sequentially, is required to be accelerated three-fold. How many CPUs are required for this task? If the required speedup was 5, what would be the number of CPUs required?
- ii) A parallel application running on 10 CPUs, spends 15% of its total time, in sequential execution. What kind of CPU (how much faster) would we need to run this application completely sequentially, while keeping the same total time?
- iii) Why is multithreading needed? How can multiple threads run simultaneously in a single-processor system? and how can they run on multicore system? Write a program that launches 1,000 threads. Each thread adds 1 to a variable sum that initially is 0.

[3] [20 Marks]

- i) Recall that a number is prime if it is divisible only by itself and 1.
 - a) Write an algorithm uses a trial division to test the primality of a number x, i.e. whether the number x is prime or not.
 - b) Write the parallel program steps to test a big number x if prime or not. You can use any parallel programming model (language) to implement the proposed algorithm in (i-a). In your parallel program steps, you must use the multicore multithreaded.
- ii) Why use the parallel reduction pattern?
Write a parallel program to implement the Monto Carlo algorithm to approximate the value of π .

