Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Computer Science and Technology
300 level 2nd Semester Examination – Dec. - 2017/Jan. - 2018
CST342-3 Parallel and Distributed Computing

Uva Wellassa University

Instructions to candidates
Duration: Two (02) hours
Number of questions: Four (04)
Answer all questions
Mark allocation: 100

1.

a. Explain the FLYNN's taxonomy of computer architecture. (5 mark)

b. Differentiate Uniform Memory Access vs. Non-Uniform Memory access using figures. (5 mark)

c. Describe domain decomposition and functional decomposition in terms of designing parallel programs. (5 mark)

d. List advantages and disadvantages of Fine-gran parallelism and Coarse-grain parallelism. (5 mark)

e. How to calculate the average degree of concurrency using a task-dependency graph? (5 mark)

2.

a. Explain static task generation and dynamic task generation with examples. (6 mark)

b. Discuss the problem in incoherent caches in multiprocessor system and how to overcome it. (5 mark)

c. Explain hardware cache coherent protocols; Snoopy and Directory based systems. (5 mark)

d. Describe the following array distribution schemes using block diagrams.
   i. Block Distributions
   ii. Block-cyclic Distribution
   iii. Randomized Block Distributions

(3x3 = 9 mark)

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3.

a. Explain the mapping between logical view and hardware view of CUDA programming in terms of thread, thread block, grid, CUDA core, streaming multiprocessor and the device. (6 mark)

b. What is meant by Warp and Warp scheduler in GPU architecture? (5 mark)

c. Discuss the problem warp divergence in GPU computing. (5 mark)

d. Write a pseudo code for parallel matrix multiplication using GPGPU with shared memory capability. (9 mark)

4.

a. Explain steps for doing parallel scan with the aid of block diagrams. (6 mark)

b. What is meant by distributed memory model? (4 mark)

c. Write all-to-one reduce pseudo code in distributed memory model by explaining each steps and using the following point-to-point communication primitives.

- handle ← sendAsync(buf[1:n] → destination)
- handle ← recvAsync(buf[1:n] ← source)
- wait(*)

(10 mark)

d. Depict block diagrams to explain scatter vs. gather and all-gather vs. reduce-scatter. (5 mark)