**CSC521 Q233 Midterm Exam (Part A)**

Due by the end of this class

Total: /50

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“*Things [exams] should be made as simple as possible –   
but not simpler”*

*Computing Models and Parallel Processing*

# 1. [10 points] Describe the Data flow computational model, in terms of: Basic items of computation Style Description Interpretation Execution Semantics control of execution Sequence, and Concurrency Ans: Data flow computational model

# a. Basic items of computation: Data assigned to named entities (variables), operations performed on data.

* Variables (named data entities)
* Memory or register locations whose addresses correspond to the names of the variables
* Data container
* Multiple assignments of data to variables are allow

# b. Style: Procedural (Sequence of instructions)

# c. Description: Input data -> data flow graphs -> output data

# d. Interpretation: Input data flows through the dataflow graph and as a consequence, output data is produced.

# e. Execution semantics: Data flow semantics

# f. Control of execution Sequence: Data Driven

# g. Concurrency: parallel

# 

# 

# 

# Describe what are “available parallelism” and “utilize parallelism” and provide two types of available parallelism [10 points]

Ans:

**Available parallelism**

Available parallelism is based in the program or in the problem solutions.

**Utilize parallelism**

Utilized parallelism occurs during the execution phase of the program.

**Types of available parallelism**

Functional: Functional parallelism arises from the logic of the problem solution

Data: Data parallelism arises from data structures.

# Describe what are “process” and “thread”, and discuss their differences. [10 points]

Ans:

**Process**:

A process is a collection of memory, instructions, data and other resources.

Process is an ordered set of instructions whereas it is also an executable file in operating system’s point of view.

The Concept of process: OS view, process relates to execution.

Creation of process:

* First, setting up the description of process
* Allocating an address space and
* Loading the program into the allocated space of address and passing the description of process to the scheduler in operating system.

States in the process:

* Ready to run,
* Running,
* Wait

**Threads**

Lightweight and small parts of code.

Threads are created within the process and thread is a segment of process.

For parallel processing of thread, scheduling is performed on a per thread basis.

**Differences:**

Process level

* Multitasking

Thread level

* Multi-threading.

# Draw a data dependency graphs for the following instructions (label all the data dependencies). [10 points]

Load(r2, r10) # i1

Add(r4, r2, r2) # i2

Sub(r2, r4, r2) # i3

Addi(r4, r5, 1) # i4

# Discuss how Time and Space basic parallel techniques are implemented in processors. [10 points]