CS 54200: Distributed Database Systems
Professor Bharat Bhargava
Homework 2
Due date: February 20, 2020 11:59 PM (EST)

Note: *Submit the homework via Blackboard. Answer each question briefly.*
Max. Marks: 100

Q1: Discuss on the suitability of using variations of the following strategies for concurrency control. You may use examples. (15 points)

    a) Locking.
    b) Timestamps.
    c) Versions.

Q2: Discuss different ideas for increasing the degree of concurrency? You may give examples. (15 points)

Q3: Assume that we use a centralized control and issue updates to all sites after a transaction has been committed at the central site. (20 points)

    a) How can we ensure mutual consistency?
    b) What ideas can be used to reduce waiting at other sites?

Q4: Read the following paper: A Model for Adaptable Systems for Transaction Processing, Bharat Bhargava and John Riedl, IEEE Transactions on Knowledge and Data Engineering, 1(4), Dec 1989 (20 points)

    a) What do we mean by adaptability in transaction processing?
    b) Can you switch between timestamp and locking based algorithms? What transformations are needed? You may give examples.

Q5: Read the paper: The serializability of concurrent database updates, C. Papadimitriou, Journal of the ACM (JACM), 26(4), 1979. (15 points)

    a) What are the different performance criteria for evaluating concurrency control algorithms?
    b) What is the difference between class DSR and 2PL? **(optional)**
    c) When DSR is equivalent to SR class of concurrency control? **(optional)**

Q6: Read the paper: Granularity of Locks and Degrees of Consistency in a Shared Data Base by J. Gray, R. Lorie, G. Putzolu, I. Traiger. (15 points)

    a) What are advantages and disadvantages of multiple granularity locks?