

**CS 54200: Distributed Database Systems**  
**Professor Bharat Bhargava**  
**Homework 2**  
**Due date: February 23, 2022 11:59 PM (EST)**

Note: Submit the homework via Brightspace. Answer each question briefly.

**Q1:** Discuss on the suitability of using variations of the following strategies for concurrency control. You may use examples.

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

**Q2:** Discuss different ideas for increasing the degree of concurrency? You may give examples.

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

- 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

- 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.

- 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.

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