RECOVERY AND CONCURRENCY

OBJECTIVES

- Concurrency and recovery techniques are known to be two of the main bottlenecks in distributed environments. However, they are a key aspect you must bear in mind. In this session you will gain hands on knowledge on the main concurrency control techniques and on the main concepts behind the recovery system. Specifically:
    - Concurrency
        - Distinguish between pessimistic and optimistic techniques,
        - Elaborate on advanced locking techniques
            - Adding the read-for-update locking,
            - Multi-granule locking
        - Reproduce the time-stamping technique for both, centralized and distributed environments, which is the most popular concurrency control technique for NOSQL databases,
        - Elaborate on multi-version concurrency control, which is a most popular strategy for both RDBMSs and NOSQL.
    - Recovery
        - Understand the four different recovery policies a log-based recovery strategy may follow:
            - Steal / No Force policy,
            - No Steal / No Force policy,
            - Steal / Force policy,
            - No Steal / Force policy

REQUIRED KNOWLEDGE

This laboratory session requires understanding the "principles of distributed databases", "design of distributed databases", "distributed query processing" and "concurrency and recovery" slides. Furthermore, three support documents are provided: "Transaction Models and Concurrency Control", "Slides on Optimistic Concurrency Control" and "Recovery System".
Your lab mates for this session will be those of the team creation 2 event.

TOOLS

These exercises will be done in paper.

TRAINING (ACTIVITIES TO DO DURING THE WEEK)

- Agree with your teammate how to distribute the following readings:
    - Advanced locking techniques (pg. 16 to 23 on the "Transaction Models and Concurrency Control" document),
    - Multi-version (pg. 33 to 35 on the "Transaction Models and Concurrency Control" document),
    - Distributed time-stamping (pg. 53-54 on the "Transaction Model and Concurrency Control" document),
    - Comprehend the optimistic-strategy slides provided in the "Slides on Optimistic Concurrency Control",
    - Section 2.4 (Comparative Analysis of Concurrency Control Mechanisms) in the "Transaction Models and Concurrency Control" document,
    - Finally, the logging recovery manager policies (pg. 17 on the "Recovery System" document), and Steal / No Force, No Steal / No Force and Steal / Force policies (pg. 18 to 29).

You may also want to refresh the concurrency lecture and read more about time-stamping techniques (pg. 26 to 33).

DELIVERABLES

During this session you will be asked to solve exercises related to what you have read (questionnaire attached to the session) and upload the solution before the specified deadline via Learn-SQL.