Distributed Database Systems

Subject Introduction

Ha Thanh Le

0937142075, lehathanh@ptithcm.edu.vn

General Information

- Name: **Distributed Database**
- Code: INT1414
- Credits: 2
- Course type: Compulsory
- Prerequisites: Databases (INT1313)

Workload

- Lectures: 24h
- Exercises: 0h
- Projects: 6h
- Lab: 0h
- Individual reading: 0h

Subjectives

- Backgrounds of the Distributed database systems (DBS)
  - Basic concepts and fundamentals of DBS
  - Design process
  - Query processing
  - Applications
- Distributed and concurrent transactions
- Advanced topics

Course Contents

1. Introduction
2. Distributed Database Design
3. Query Processing
4. Transaction Management and Concurrency Control
5. Advanced Topics on Distributed Databases

1. Introduction

1. Distributed database concepts
2. Applications of distributed database systems
3. Architecture of distributed database systems
4. Transactions in distributed database systems
5. Examples of distributed databases

2. Distributed Database Design

1. Top-down design process
2. Distributed database design issues
3. Fragmentation
    1. Horizontal fragmentation
    2. Vertical fragmentation
    3. Hybrid fragmentation
4. Allocation
5. Bottom-up design methodology
6. Data and access control
    1. View management
    2. Data security
    3. Semantic integrity control

3. Query Processing

1. Query processing problems and objectives
2. Complexity of relational algebra operations
3. Characterization of query processors
4. Layers of query processing
    1. Query decomposition
    2. Data localization
    3. Global query optimization
    4. Distributed query optimization
    5. Distributed query execution
5. Multi-database query processing

4. Transaction Management and Concurrency Control

1. Concepts and properties of transactions
2. Types of transactions
3. Distributed concurrency control
    1. Taxonomy of concurrency control mechanism
    2. Concurrency control algorithms
    3. Deadlock management

5. Advanced Topics on Distributed Databases

1. Reliability of distributed database management systems
2. Data replication
3. Parallel database systems
4. Distributed object database management
5. Peer-to-peer data management
6. Streaming data and cloud computing

Textbooks

- M. Tamer Özsu and Patrick Valduriez. **Principles of Distributed Database Systems**. Springer, 3rd Edition, 2011
  - M. Tamer Özsu and Patrick Valduriez. **Principles of Distributed Database Systems**. Springer, 4th Edition, 2020
  - https://cs.uwaterloo.ca/~ddbook/index.html
- S.K. Rahimi and F.S. Haug. *Distributed Database Management Systems – A Practical Approach*. John Wiley & Sons, 2010 (optional)

Study Evaluation

Grading Method	Percentage	Group/Individual
Attendance	10%	Individual
Exercise	10%	Individual
Mid-term Projects/Exams	20%	Group/Individual
Final Examination	60%	Individual