DST 4010: Distributed Systems

Prerequisite: APT 2050 Computer Networks and Telecommunications

3 Credit Units

Course Rationale

Computer networks, multiprocessors and parallel algorithms, though radically different, all provide examples of processes acting in parallel to achieve some goal. All benefit from the efficiency of concurrency yet require careful design to ensure that they function correctly. Distributed systems are everywhere, and the field is evolving quickly, largely due to developments in technology. The Distributed Systems course studies some ideas and techniques that are helpful in understanding, designing, and implementing distributed systems, and gives some practical experience of system design and concurrent programming

Course Description

This course covers a broad range of topics related to distributed systems. Distributed systems consist of a set of PCs or workstations connected by a network, that run special software that allows for transparent sharing of the distributed computing resources and data. Topics include forms of distributed system: loosely and tightly coupled; Networks and protocols; Distributed file systems: file and directory services, concurrency control, replicated files.

Learning outcomes

At the end of the course, students will be able to:

1. Analyze the importance of distributed commuting
2. Describe issues in fault tolerance
3. Describe security issues in distributed systems
4. Design concurrent programming

Course Content

Overview of distributed systems. Communication. Naming. Synchronization. Consistency and replication. Fault tolerance. Security. Distributed system taxonomy and models. Client server computing , network protocols. Sockets programming. Google cluster architecture, google file system. Distributed file systems design. Scalability Terminology .Logical clocks. Distributed synchronization. Distributed lookup services/hash tables . Mahsup applications and group communications. Distributed shared memory and memory consistency models .Distributed transactions and controls. Authentications, protection and security. Fire walls. Serveless networking

Teaching Methodology

The primary teaching methods will be lectures and demonstrations. The student will attend lectures and demonstrations participate in discussion on assigned readings, complete assigned projects, and complete required tests and examinations

Instructional Materials/Equipment

Course text, Handouts, White board, Presentation slides, Journals

Methods of evaluation

Class assignments, take-home assignments, tests, small projects to demonstrate use of software tools

Laboratory Work	20%
Project	20%
Assignments	10%
Mid-semester	20%
Final semester exams	30%
Total	**100%**

Course Text

Distributed Systems: Principles and Paradigms (2nd Edition) Andrew S. Tanenbaum and Maarten Van Steen, 2006

Supplementary Text

Distributed systems, concepts and design (4th Edition) by Coulouris, G.F., Dollimore, J.B & Kindberg, T. 2005