espol Escuela Superior Politécnica del Litoral

Course Syllabus

DISTRIBUTED SYSTEMS

Program: Computer Science

1. Course number and name
CCPG1015 - DISTRIBUTED SYSTEMS

2. Credits and contact hours
3 credits and 4 contact hours

3. Instructor's course or coordinator's name
CRISTINA LUCIA ABAD ROBALINO

4. Text book, tittle, author, and year
*Maarten van Steen y Andrew S. Tanenbaum. Distributed Systems (3era)

a.Other supplemental materials

*Coulouris, George F. & Dollimore, Jean & Kindberg, Tim & Blair, Gordon. Distributed Systems: Concepts and Design (5th Edition) (Hardcover; 2011-05-07)

*Mukaddim Pathan & Sitaraman, Ramesh Kumar & Robinson, Dom. Advanced content delivery, streaming, and cloud services (Hardcover ; 2014)

5. Specific course information
a.   Brief description of the content of the course (catalog description)

This course introduces fundamental principles of distributed and parallel computing systems, building up on the basic concepts of concurrency and parallelism, consistency in the handling of data, and latency, studied in previous courses. Concepts of communication and coordination between processes are explored, using the models of message passing and shared memory. Under this context, the concepts of atomicity, consensus and conditional waiting are studied. It emphasizes that it is essential to use parallelism and decomposition strategies to achieve performance improvements. Design and architecture of distributed systems are studied, including implementation strategies, performance analysis and improvements (tuning). The concepts of security and fault tolerance are also studied, with an emphasis on the maintenance of a replicated state, introducing concepts that provide a link with the concepts studied under the context of data networks.

b.   Prerequisites

SYSTEMS PROGRAMMING - CCPG1008

DATA NETWORKS - TLMG1001

c.   This course is a: Required

6. Specific goals for the course
a.   Specific outcomes of instruction

1.- Understand the different concepts and technologies necessary to build medium and large-scale distributed systems.

2.- Be able to use, design and implement distributed systems, as well as understand the problems that arise during the implementation of projects based on distributed and cloud technologies.

3.- Parallelize an algorithm by applying task-based or data-parallel d̶e̶c̶o̶m̶p̶o̶s̶i̶t̶i̶o̶n̶ to re̶d̶u̶c̶e̶ t̶i̶m̶e̶

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execution time of the algorithm

    4.- Explain the tradeoffs among overhead, scalability, and fault tolerance when choosing a stateful vs. stateless design for a given service

  b. Explicity indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

    (2) Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

    (6) Apply computer science theory and software development fundamentals to produce computing-based solutions.

7. Brief list of topics to be covered

    1.- Introduction

    2.- Reliability

    3.- Parallel task decomposition and distributed computing

    4.- Inter-process communication

    5.- Design tradeoffs

    6.- Distributed systems security

    7.- Distributed systems theory