DATA COMMUNICATIONS

Degree in Computer Systems

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Code: 10303

Main Scientific Area: Hardware, Communications and Operating Systems

Lecturer: Nuno Alberto Ferreira Lopes

Language of Instruction: Portuguese

Regime: S2

Contact Hours: 61h Total Workload: 99h

ECTS: 6,0

Objectives

This curricular unit aims to advance the knowledge of the protocols used for communication between computing devices on the Internet and the protocols used by applications. The main goal is to give students the ability to understand the used mechanisms for communication in computer networks, with emphasis on TCP/IP protocol.

Furthermore, it is also a goal for students to learn how to program data communication between two applications on the Internet.

Learning Outcomes

Students that conclude this curricular unit should be capable of:
1. Understand the basic principles of computer networks, especially the fundamental concept of protocol encapsulation and layered structure.
2. To identify all the necessary protocols for achieving a correct communication between devices, namely the encapsulation principle and layer architecture.
3. To identify and understand the operation of auxiliary devices like switches and routers for data communication.

4. Planning a network architecture with security solutions.

5. Develop applications for data communications on the Internet.

Course Contents

1. Transport Protocols:

- TCP, UDP

- Multicast and Broadcast

- Flow Control and Multiplexing.

2. TCP/IP Applications:

- Name resolution (DNS);

- e-mail (POP,IMAP,SMTP);

- web (HTTP);

3. Network Security:

- Firewalls;

- Virtual Private Networks;

- NAT solutions.

4. Web Services- REST + SOAP

- WebSockets + Push Notifications

Recommended Bibliography

Boavida, Bernardes, TCP/IP Teoria e Pratica, FCA, 2012.

David B. Makofske, TCP/IP Sockets in C#: Practical Guide for Programmers (The Practical Guides). (2004) Morgan Kaufman

Andrew Lombardi, WebSocket: Lightweight Client-Server Communications. (2015) O'Reilly

Learning and Teaching Methods

The integrated and progressive approach of the UC program will allow students to develop the knowledge and skills set out in the objectives, ensuring consistency between the syllabus. The goals achieved will allow the understanding of the concepts concerning mechanisms used in computer networks communication, with emphasis in TCP/IP architecture protocols.

Assessment Methods

The assessment consists of two components: a theoretical component and a practical component. The theoretical component has a weight of 60% (that consists in two written tests), and the practical component of a weight of 40%. The practical component is made of one practical assignment which can only be delivered in the normal period and is mandatory. It is required to obtain a score of 7 to each of the components, but the final average will have to be greater than or equal to 10, for approval.