FACULDADE DE ENGENHARIA DA UNIVERSIDADE DO PORTO

Configuration and Study of a Computer Network and Development of a File Transfer Protocol Client

Alexandre Ferreira
Paulo Saavedra
Class nº7

Licenciatura em Engenharia Informática e Computação

November 9, 2025

Configuration and Study of a Computer Network and Development of a File Transfer Protocol Client

Alexandre Ferreira

Paulo Saavedra
Class nº7

Licenciatura em Engenharia Informática e Computação

November 9, 2025

Resumo

Este relatório descreve o estudo, configuração e análise de uma rede de computadores, bem como o desenvolvimento de um cliente File Transfer Protocol (FTP). A configuração da rede foi realizada através de scripts automatizados, abrangendo a atribuição de endereços Internet Protocol (IP), configuração de routing, Domain Name System (DNS) e ligação de múltiplos dispositivos (máquinas, switch e router). O cliente FTP, desenvolvido em C, implementa autenticação de utilizador, modo passivo, transferências binárias e download de ficheiros, seguindo as normas RFC959 e RFC1738. O projeto demonstra competências práticas tanto na configuração de redes como na implementação de protocolos de aplicação.

Abstract

This report describes the study, configuration, and analysis of a computer network, as well as the development of an File Transfer Protocol (FTP) client. The network setup was automated through scripts, covering Internet Protocol (IP) address assignment, routing configuration, Domain Name System (DNS), and the interconnection of multiple devices (machines, switch, and router). The FTP client, developed in C, implements user authentication, passive mode, binary transfers, and file downloads, following RFC959 and RFC1738 standards. The project demonstrates practical skills in both network configuration and application-layer protocol implementation.

Contents

List of Figures

List of Tables

List of Acronyms

FTP File Transfer Protocol

IP Internet Protocol

DNS Domain Name System

Chapter 1

Introduction

Briefly introduce the project objectives: network configuration and FTP client development.

Chapter 2

Part 1 – Download Application

2.1 Architecture of the Download Application

Describe the FTP client architecture, main modules, and protocol features.

2.2 Successful Download Report

Describe a successful file download, including a Wireshark screenshot of FTP packets

Chapter 3

Part 2 – Network Configuration and Analysis

3.1 Experiment 1 - Configure an IP Network

3.1.1 Network Architecture

For this experiment, we connected TUX3 and TUX4 through the switch and configured their IP addresses as requested in the project description.

3.1.2 Objectives

State the learning objectives.

3.1.3 Main Configuration Commands

List the main commands/scripts used.

3.1.4 Relevant Logs

Show relevant logs and outputs.

3.1.5 Analysis

Discuss the results and learning points.

3.2 Experiment 2 - Implement two bridges in a switch

3.2.1 Network Architecture

Describe the network setup for this experiment.

3.2.2 Objectives

State the learning objectives.

3.2.3 Main Configuration Commands

List the main commands/scripts used.

3.2.4 Relevant Logs

Show relevant logs and outputs.

3.2.5 Analysis

Discuss the results and learning points.

3.3 Experiment 3 - Configure a Router in Linux

3.3.1 Network Architecture

Describe the network setup for this experiment.

3.3.2 Objectives

State the learning objectives.

3.3.3 Main Configuration Commands

List the main commands/scripts used.

3.3.4 Relevant Logs

Show relevant logs and outputs.

3.3.5 Analysis

Discuss the results and learning points.

3.4 Experiment 4 - Configure a Commercial Router and Implement NAT

3.4.1 Network Architecture

Describe the network setup for this experiment.

3.4.2 Objectives

State the learning objectives.

3.4.3 Main Configuration Commands

List the main commands/scripts used.

3.4.4 Relevant Logs

Show relevant logs and outputs.

3.4.5 Analysis

Discuss the results and learning points.

3.5 Experiment 5 - DNS

3.5.1 Network Architecture

Describe the network setup for this experiment.

3.5.2 Objectives

State the learning objectives.

3.5.3 Main Configuration Commands

List the main commands/scripts used.

3.5.4 Relevant Logs

Show relevant logs and outputs.

3.5.5 Analysis

Discuss the results and learning points.

3.6 Experiment 6 - TCP Connections

3.6.1 Network Architecture

Describe the network setup for this experiment.

3.6.2 Objectives

State the learning objectives.

3.6.3 Main Configuration Commands

List the main commands/scripts used.

3.6.4 Relevant Logs

Show relevant logs and outputs.

3.6.5 Analysis

Discuss the results and learning points.

Chapter 4

Conclusions

Summarize findings, challenges, and skills acquired.

Chapter 5

References

Chapter 6

Annexes

6.1 Download Application Code

Include the source code

6.2 Configuration Commands

List scripts and manual commands used.

6.3 Captured Logs

Attach relevant logs from experiments and application runs.