Universidade de Coimbra
Faculdade de Ciências e Tecnologia

DEPARTAMENTO DE ENG. ELETROTÉCNICA E COMPUTADORES
Redes de Computadores

Project – ESF

2024/2025
(1+1+2 points out of 20)

Delivery date: The final work should be uploaded to InforEstudante until 18/05/2025.

Files to submit: The final submission should be a zip file containing all the sources of the project, a compiled version and a report in pdf. Do not forget to include the name of all the elements of the group.

Grading: The work must be defended in presentations where all members of the group must be present.

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1. Context: Engineers Without Borders (Engenheiros Sem Fronteiras – ESF)

Today's engineers are more than technical experts; they are also conscious citizens with humanitarian concerns and a profound sense of social responsibility. Recognizing the transformative role of engineering in improving quality of life, the Central Region of Portuguese Engineering Association (Ordem dos Engenheiros (OE) – Região Centro) sought to go beyond the traditional boundaries of the profession. With this in mind, it set out to launch the Engineers Without Borders project, an initiative that combines engineers' technical expertise with causes of social impact, promoting actions of solidarity, sustainable development, and support for communities in need.

The ESF platform intends to be an innovative solution by the OE-RC, designed as a web portal integrated with mobile applications. Its goal is to connect engineers and engineering students interested in volunteering with Non-Profit Organizations facing challenges in various fields of engineering. By applying their technical knowledge and leveraging their creativity, engineers can develop innovative and sustainable solutions to social and environmental problems, thereby supporting these organizations across a wide range of areas. Working as part of a team with these organizations, and with a holistic vision, engineers can act as agents of social transformation, capable of building a better future.

2. Objectives

Project Description

This project aims to utilize sockets programming to develop an experimental prototype of the ESF platform. Each group is required to implement a server using the C programming language that supports three types of users: volunteer engineers, non-profit organizations, and an administrator.
The server should be tested and accessed by telnet.

Requirements for Registered Users

Engineers: each registered engineer must provide the following information:

- Full name
- OE number
- Engineering specialty
- Institution of employment
- Student status (indicating if he/she is still a student)
- Areas of expertise
- Email address
- Mobile phone number (optional)

Non-Profit Organizations: each registered organization must provide the following information:

- Organization name
- Tax identification number
- Email address
- Address
- Description of activities
- Mobile phone number (optional)

Authentication

For every engineer or organization, the program must generate a unique login and password.

Each institution can add one or more challenges to the platform, where each challenge represents an activity that volunteer engineers can undertake in their free time. Specifically, institutions can add, delete, update, and list challenges. Each challenge must include the following details:

- Name of the challenge
- Description
- Type of engineer required
- Estimated number of hours to complete

Engineers can browse the available challenges and apply to participate. Each institution is responsible for reviewing the applications and deciding whether to accept or reject the engineers who apply to the challenges they have created.

The administrator, in turn, has access to all databases. He is also responsible for validating the acceptance of volunteer engineers and associations and have the authority to remove them if necessary.

3. Functionalities

In summary, the features you should implement are:

F1: Prepare a set of mockups of your final application.
F2: Prepare (and present) all the *Step1* reports merged in one document.
F3: The main server should send the menu options for each user (volunteers and associations).
F4: Register users (volunteers and associations).
F5: Admin functionalities
F6: Each institution can add challenges.
F7: Each engineer can consult all the challenges and apply to them.
F8: Each institution can accept or deny the engineers that applied to its challenges.
F9: Each engineer should be informed when an association accepts his/her application.
F10: Graphical and extras

4. Groups and Phases

The project will be developed in several steps according to the following rules and dates:

Step 1:

Submission of the constitution of the groups: 03/03/2025
Delivery and Defense date: 24/03/2025

For this phase, groups of 6 to 8 students should be formed. Each of these students will have tasks under his responsibility, namely:

Team manager:
- Coordinate the group and the tasks of its members.
- Prepare general and individual planning for the 3 stages of the project. Create the Gantt map.
- Make the presentation of the work in the evaluation class of task 1.

Account Manager:
- Propose and justify functional and non-functional requirements, operating diagrams, and application mockups (mokingbot, figma, …)

Software Manager:

- Propose and coordinate the management of the software team and the tools used (GitHub, Trello, etc...)
- Define the architecture.

Risk and testing manager:
- Preparing the risk, mitigation and testing plan to be carried out at the end of the work.

Quality Manager:
- Ensure the overall quality of the various modules and project reports.
- Perform a state-of-the-art analysis.

Development team (1-3 people):
- Develop the necessary software for each step

At this stage of the project, the F1, F2 and F3 should be prepared/implemented and presented.
A single report merging all sub-reports must be delivered identifying the work produced by each element of the group, and the presentation to be made on the date of the defense must be prepared.
This step has a total score of 1 value (out of 20) and each student's grade will be 50% of the group's grade and 50% of his individual grade.

Step 2:

Delivery and Defense date: 14/04/2025

In the second stage, it should be developed by teams of 3 to 4 students:

Team and software manager:
- Coordinate the group and the tasks of its members.
- Control and adjust the general and individual planning for the 3 stages of the project.
- Make the presentation of the work in the evaluation class of task 2.

Client, quality, risk and testing manager:
- Customer interface.
- Coordination of reports.
- Ensure the quality of the project as a whole and of the various modules.
- Test management.

Team of programmers – other students

In this stage of the work, functionalities F4, F5 and F6 must be implemented.

A report must be delivered identifying the work produced by each element of the group, and the presentation to be made on the date of the defense must be prepared.
This step has a total score of 1 value (out of 20) and each student's grade will be 50% of the group's grade and 50% of his assignment grade.

Step 3 (final):

Delivery date: 18/05/2024
Defense: 19/05/2024

It is intended to implement phases F7, F8, F9 and F10.
This stage will be carried out by groups of 2 students where the division of tasks is the responsibility of the students. However, these must be identified in the final report.
At this stage of the work, additional features will be valued, such as the graphical interfaces.
This step has a total quotation of 2 values (out of 20).

Important note:

- Students with worker status can deliver their work on the established dates, but may ask the professor for alternative dates for the defenses.