

Web Berry

Project Plan

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REVISION HISTORY AND APPROVAL RECORD

Revision	Date	Purpose
0	30/03/2025	Document creation
1	10/04/2025	Project Scope and goals
2	17/04/2025	Plan for the project Phases
3	20/04/2025	Cost analysis
4	21/04/2025	Final Document revision

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1. DOCUMENT SCOPE

The objective of this project is to explore the capabilities of the Raspberry Pi platform from both a software and hardware perspective. As part of the learning process, we will use external devices like LCD screens and RFID/NFC readers, which are incorporated in the initial phases of the project. These peripherals will help us gain practical experience with interfaces such as GPIO and I2C, while also reinforcing our understanding of how to set up and manage hardware components in real-world scenarios.

In addition to the hardware component, the project includes the development of a client-server application. This system will connect to a structured database and allow users to access academic information in real time—such as timetables, marks, and enrolled subjects. Through this process, we will enhance our skills in areas like backend development, JSON handling, debugging, and interfacing with external APIs. Ultimately, the project not only improves our programming and system integration abilities, but also strengthens our research habits and capacity to apply new technologies in practical ways.

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2. PROJECT GOALS

The purpose of this project is to broaden our knowledge and practical experience with the Raspberry Pi, especially in how it can be used in combination with external components like LCD displays and NFC readers. The goal is to develop a fully functional system that not only demonstrates hardware integration but also supports real-time data interaction through a client-server architecture.

The client for this project is an academic platform inspired by systems such as ATENEA, aiming to improve access to educational data through user-friendly digital tools.

The client profile includes students, faculty, and administrative staff who require secure and efficient access to key academic information.

The central objective is to build a platform that retrieves student-related data—such as grades, subjects, and timetables—by using a unique identifier. Throughout the process, we will reinforce our skills in software development by researching documentation, working with third-party libraries, identifying and solving bugs, designing robust server systems, and managing database queries. Additionally, this project will strengthen our ability to independently investigate and apply technical knowledge using trusted resources

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3. PROJECT SCOPE

This project includes ...

- The configuration and use of a Raspberry Pi system along with external components, such as an LCD screen and an NFC/RFID reader, allowing hands-on interaction with physical hardware.
- The application of core software engineering practices, such as designing and managing databases, creating server endpoints, and debugging the code to ensure functionality. All this combined to achieve this project purpose.
- The development of a backend application—hosted on a local server—that connects to a structured database to retrieve student-related information (timetables, grades, and subjects) based on a unique ID.
- A learning process focused on combining hardware and software components in a practical project using Raspberry Pi as the main platform.

This project does not include ...

- The design of advanced graphical user interfaces or complex frontend features.
- The use of cloud platforms, external web APIs, or remote services beyond the local network.
- The implementation of data processing techniques such as machine learning, data mining, or predictive algorithms.

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The Project work breakdown structure is:

//Figure 1.- Project WBS

1. Hardware Integration

- Initial setup and configuration of the Raspberry Pi
- Connection and testing of peripherals (LCD screen, NFC reader)

2. Backend and Server Development

- Local server development (Node.js or similar)
- Setup and management of the MySQL database

3. API and Query Handling

- Development of endpoints for student data retrieval
- Handling input queries via unique student identifiers

4. Testing and Troubleshooting

- Verifying proper communication between components
- Resolving errors and debugging system behavior

5. Documentation and Delivery

- Writing technical documentation
- Preparing final reports and project presentations

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4. PROJECT TEAM

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5. PLAN FOR THE PROJECT PHASES

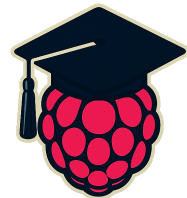
5.1. *Project phases and deliverables to the client*

- Before start
 - o Requirement Specification
 - o Project Plan
- During the Project
 - o Weekly status reports (SR)
 - o Preliminary Design Review (PDR)
 - o Critical Design Review (CDR)
- After the Project
 - o Final report (Project documentation)
 - o Regulation issues

5.2. *Work Packages, Tasks and internal deliverables*

Work Packages:

Project: Web Berry		WP ref: (WP6)
Major constituent: Raspberry with client and web page		Sheet 10 of 14
Short description: Improve our hardware and software skill, in our case through ruby and javascript.		Planned start date:27/03/2025
		Planned end date:24/04/2025
		Start event:27/03/2025 End event:20/04/2025
WP manager (HC)	WP participants (all team members):	
Internal task T1.1: That day we just finished the presentations of the puzzle2 and it was essential for the project that everyone did it right, because we would need it for the continuation of the project.		

**Internal task T2.1:**

We had a meeting where we discussed the project we were going to work on, and assigned roles to each team member. We decided to divide the tasks into three main parts—client, server, and database—so that everyone could have a different responsibility inside the project, and focus on their own part.

Internal task T3.1:

We created a new client on the Raspberry Pi, using part of the code from Puzzle 2. We added the LCD screen so we could display text messages. We also had to create a new user with a custom password, and finally, we sent the UID to the server for processing.

Internal task T3.2:

Using Java-Script and HTML, we created the server's code. Simulating a server, without the database, that has to include all the school information about a student, also known as the client, only knowing his or her UID, while having to learn those new coding languages.

Internal task T3.3:

We created the database structure using MongoDB to store all the necessary information about students, tasks, timetables, and marks.

We defined different collections with specific fields adapted to each type of data, and created a script to insert initial sample data for testing purposes.

We also learned how to use Mongoose to model the collections and how to handle database queries dynamically according to the client's requests.

Internal task T4.1:

Some of us needed help because there were errors in the code or some interpretations, we also commented on some aspects that we could improve in our project. But the main point was fixing code.

Internal task T5.1:

After we fixed the errors and improved our code we needed to synchronize the server with the client to make sure that everything is perfect.

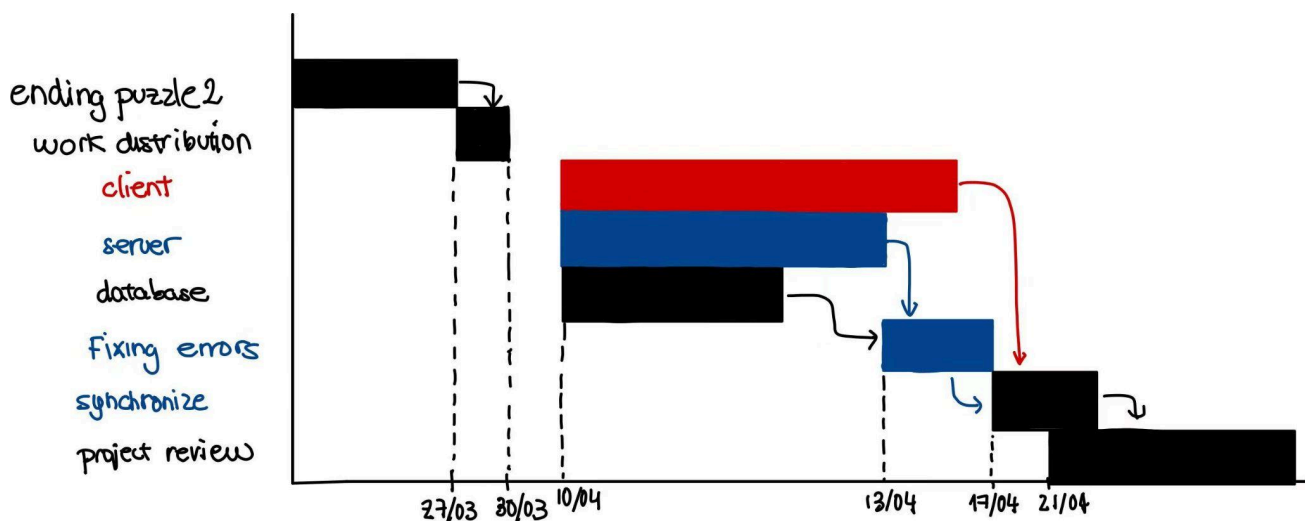
Internal task T6.1:

And for the last task we made sure that all the documents are well redacted and making sure that our code were clear and with a good format.

Work Packages and tasks summary:

WP#	Task#	Short title	Responsible	Deliverable	Date (week)
1	1.1	All members ending puzzle2	all members	puzzle2 and Design	27/03
2	2.1	Start planning the project : Web Berry	all members	Call and distribute the work	30/03
3	3.1	Client Configuration	HC and GW	Raspberry with LCD, with I2C and an correct transmtion of the UID	10/04
3	3.2	Server configuration	CM and DK	Coding the server	10/04
3	3.3	database configuration	BE	Coding database	10/04
4	4.1	Fixing code errors in server and improving client code	all team members	Resolve the doubts and the errors	13/04
5	5.1	Trying to synchronize the client with the server	all team members	Client and the server synchronized	17/04
6	6.1	Review all the documents and code.	all team members	Project Review	21/04

5.3. Time Plan (Gantt diagram)



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5.4. *Meeting and communication plan*

To ensure smooth coordination and progress throughout the project, our team agreed on the following communication strategy:

- **Weekly Team Meetings:**

We will hold weekly online or in-person meetings every Thursday(in pbe class) to discuss progress, share updates, solve issues, and plan the next steps. These meetings will last a maximum 15–25 minutes.

- **Quick Check-ins:**

For urgent issues or daily coordination, we use a group chat WhatsApp to stay in touch and ask short questions and doubts.

- **Documentation Sharing:**

Shared documents and code will be managed using a collaborative platform like Google Drive and GitHub, where we will keep updated versions of the project code and reports.

- **Task Management:**

We'll use a shared document in google documents to assign and follow tasks and deadlines

6. COST ANALYSIS

For the development of this project, we have selected several hardware components necessary to implement both the Raspberry Pi-based client and its connected peripherals. Below is a detailed breakdown of the estimated costs:

CONCEPT	QUANTITY	UNITY PRICE	TOTAL
PACK RASPBERRY PI 5	4	120€	480€
ITEAD	1	10,3€	10,3€
ELECHOUSE	1	7,4€	7,4€
RC522	1	1,5€	1,5€
LCD	1	9€	9€
CABLES DUPONT	1	3€	3€
TOTAL COST			511,2€

This cost analysis covers the core elements needed for the development and testing of the system, including all hardware modules required for NFC reading, LCD display, and Raspberry Pi setup. Since all the software used is open-source, there are no additional software licensing costs.

The Raspberry Pi 5 pack includes the board itself along with a power supply, case, and pre-installed microSD card, which simplifies the setup process and ensures hardware consistency across all team members