

Group work & demonstration

Assignment 4

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Introduction

1) *User Scenario*

Tom is a typical middle-aged man, around 40 years old. He suffers from **cardiac problems and is overweight**. These two health factors are closely related and can lead to serious complications. The person has **high blood pressure**, which is a significant risk factor for heart disease. Due to his cardiac problems and overweight, this person may **struggle to perform simple daily tasks** that may seem easy to others. Activities such as **climbing stairs, walking long distances, or even bending to pick up objects** can be physically demanding for him. This can have a significant impact on his quality of life and **overall well-being**.

The advent of connected health devices has transformed the way we approach the management of our well-being and health. These technological advances have opened up exciting new avenues for monitoring, diagnosing, preventing, and managing health-related issues by putting the power of information directly into the hands of individuals.

2) Which system is chosen ?

We chose a **connected bracelet** capable of measuring some health constants such as (cardiac frequency and blood pressure) and storing the data in a web application. The user can then view his health data and overall well-being. In addition, the user has other options, such as:

- He can see his number of steps per day
- He can see his heartbeat in average
- See his improvement with some graphs
- Recommend some daily routines based on what he did

This system is designed for individuals like Tom who have health issues and **need to be monitored**. As a result, this type of person can stay motivated for a long time during the process of improving their well-being.

Technical description

1) What do we want to demonstrate ?

Due to the technical difficulty of this system, unfortunately we are not able to create the bracelet in real life. But we are able to simulate the process of this system by a web application to see how the bracelet can deal with the patient. In this assignment, we selected to demonstrate the system's ability to collect health data and store it in a database, as well as the ability to create graphs using this data to indicate trends.

Information is presented in a clear and understandable manner, with graphs and tables to facilitate the understanding of trends and progress. The user can also access other features, such as tracking the number of steps.

We also want to show the security of this system. We want to demonstrate the system's ability to use advanced encryption protocols to protect data stored in the database. By the way, access to the data is strictly controlled, ensuring that only authorized users can access it.

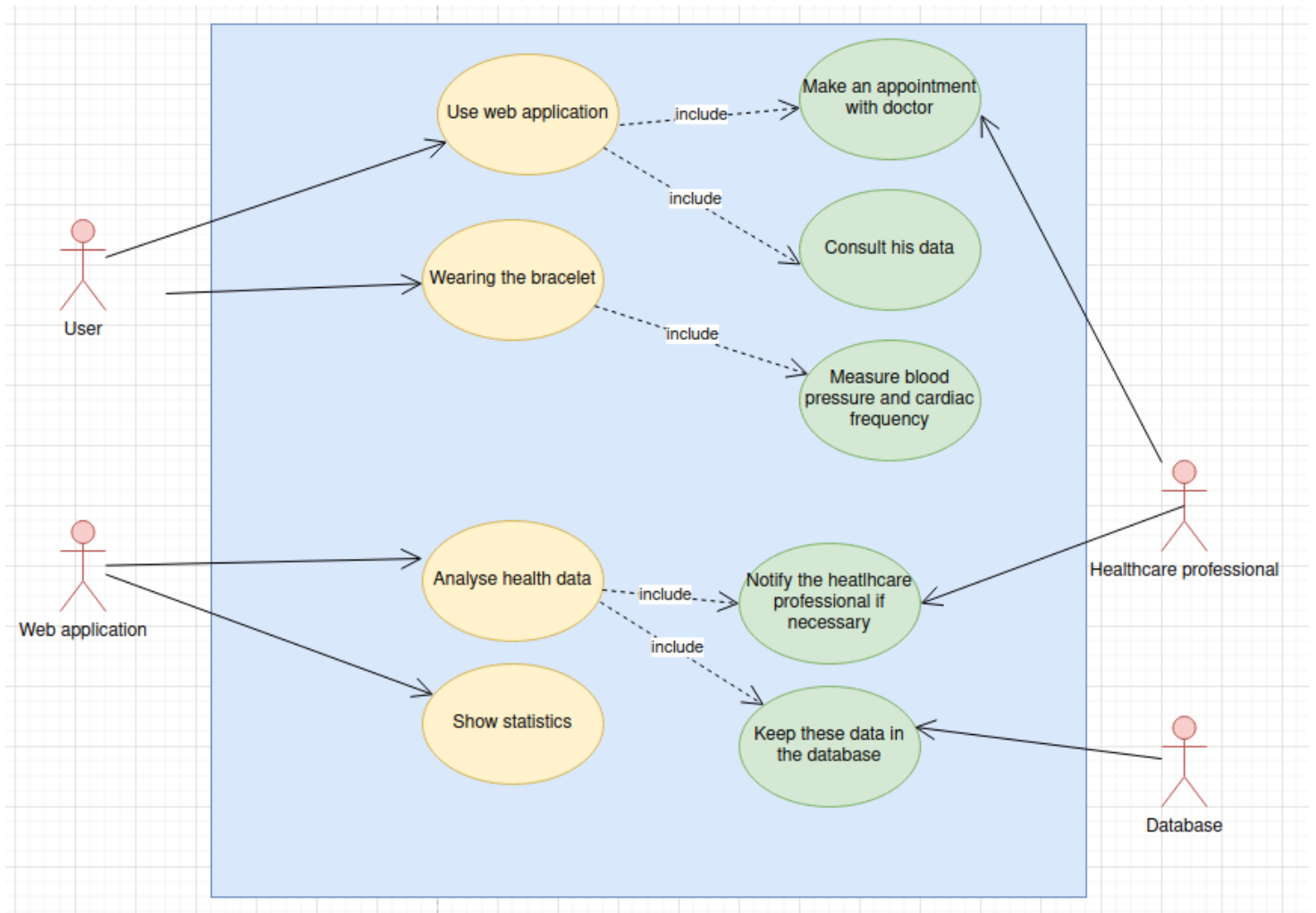
2) Technical aspects

We choose to create a web interface where the user can find all his health data. For that, the easiest way for us was to use **PHP language** and **PHPMYADMIN** for the database. Indeed, due to the database we can store the health data and recover these data by PHP to show them in the web application. We also use **Bcrypt encryption**, it is a valuable tool to use to hash and store passwords. Bcrypt is a slow-functioning algorithm that takes time to create password hashes and requires time to decrypt them, significantly slowing hacker attempts to break the Bcrypt hash.

Our system architecture centers around a PHP-driven web interface, utilizing PHPMYADMIN for database management. Health data is securely stored and retrieved through PHP, providing real-time access via the web application. To enhance security, we employ Bcrypt encryption for password hashing, adding a robust layer of protection against potential breaches.

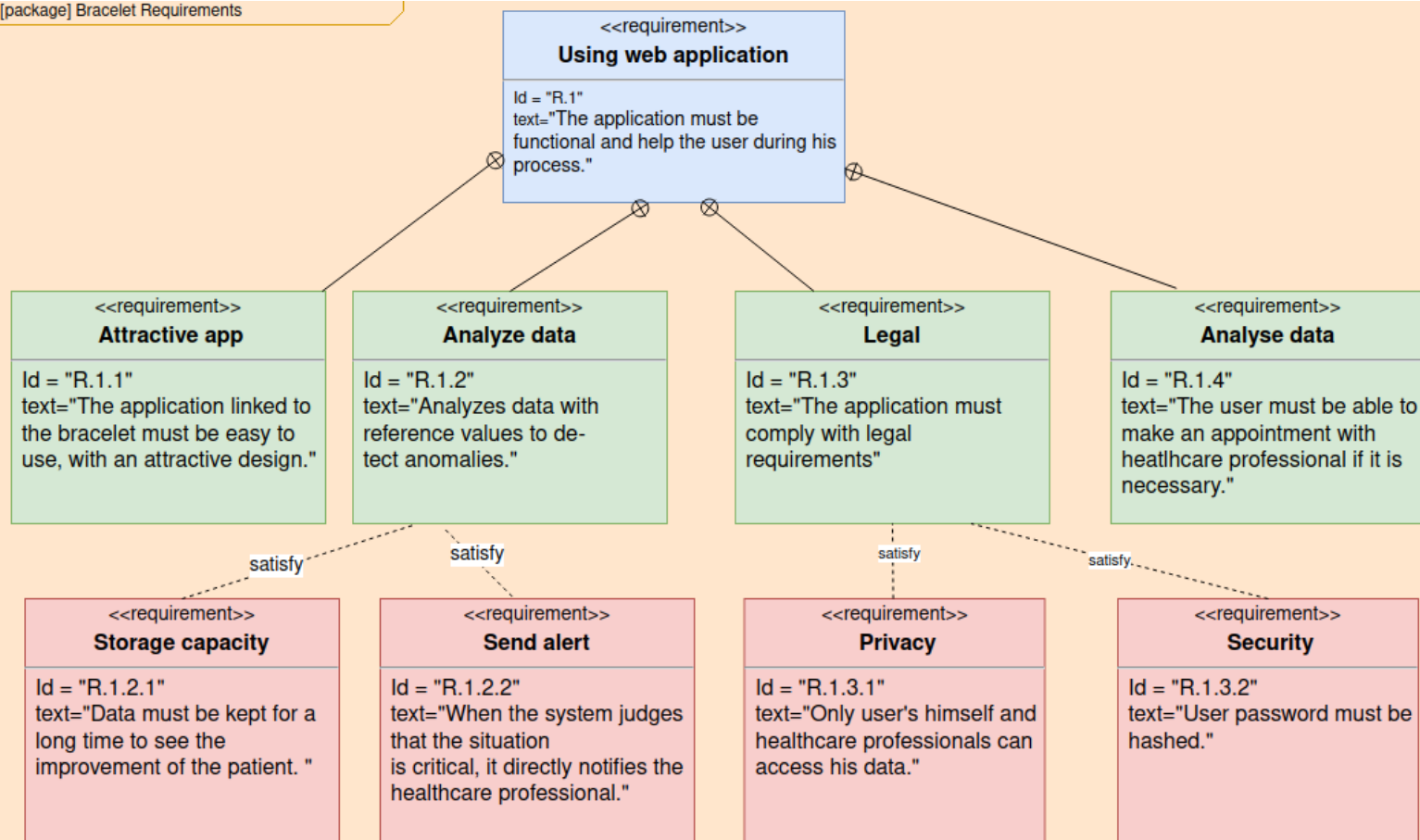
Implementation

- 1) Requirements specifications
 - a) Diagrams



Use case diagram

This **use case diagram** takes into account the specific roles of the actors, including the active role of the bracelet **in analyzing health data** and generating medical alerts, as well as user's use of the **web application** to interact with the bracelet and **access to some functionalities**.

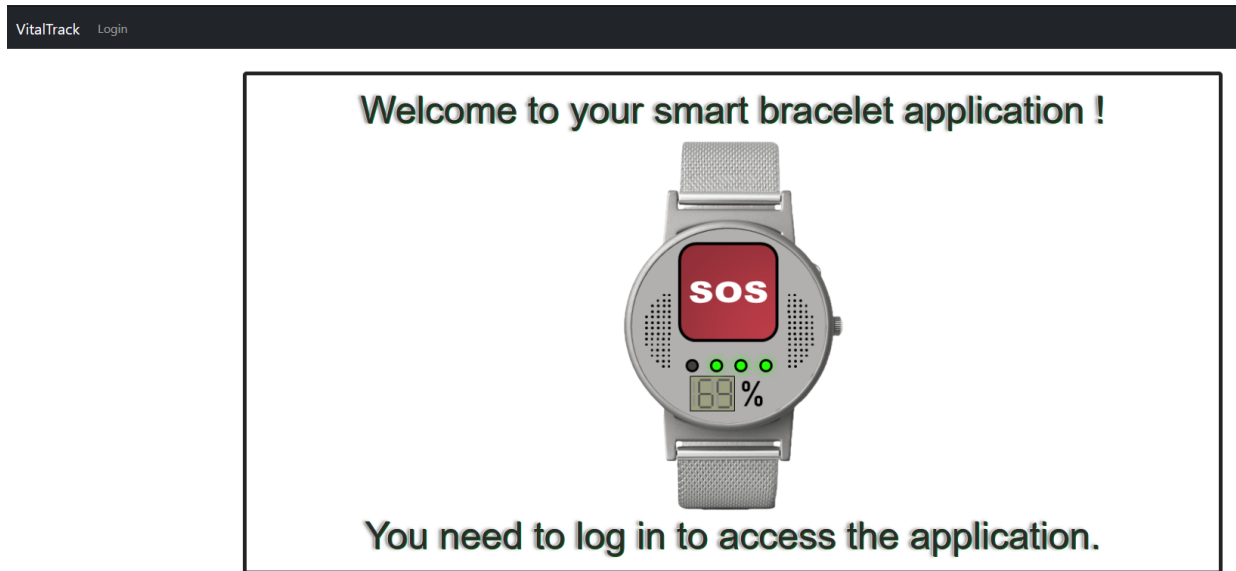


Requirements diagram

This requirements diagram outlines the essential requirements for the connected bracelet, designed to improve Tom's health. Functional requirements include **analyzing data, medical alerts, and collecting data**. Non-functional requirements cover **data security, availability, and attractive interface**.

All requirements available in this diagram will be **displayed in the demo**.

- b) Components
 - i) Frontend

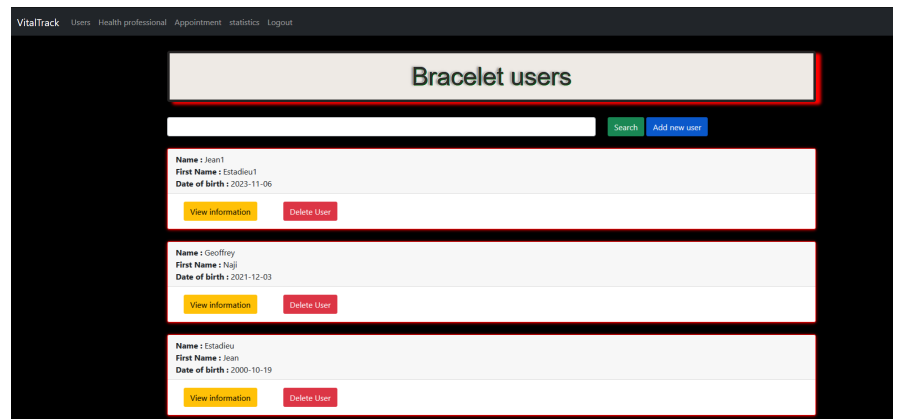


The application user must log in to access the application. They can also create an account if they do not have login credentials. If the entered credentials are not valid, they receive an error message informing them that the data is incorrect.

Pseudo

Password

Login



In the event that the user logs in with the correct credentials, they gain access to the entire application, including various pages such as 'Users,' which displays information about users, 'Health Professionals' to view available healthcare personnel in the database, and 'Appointments,' allowing users to schedule appointments.

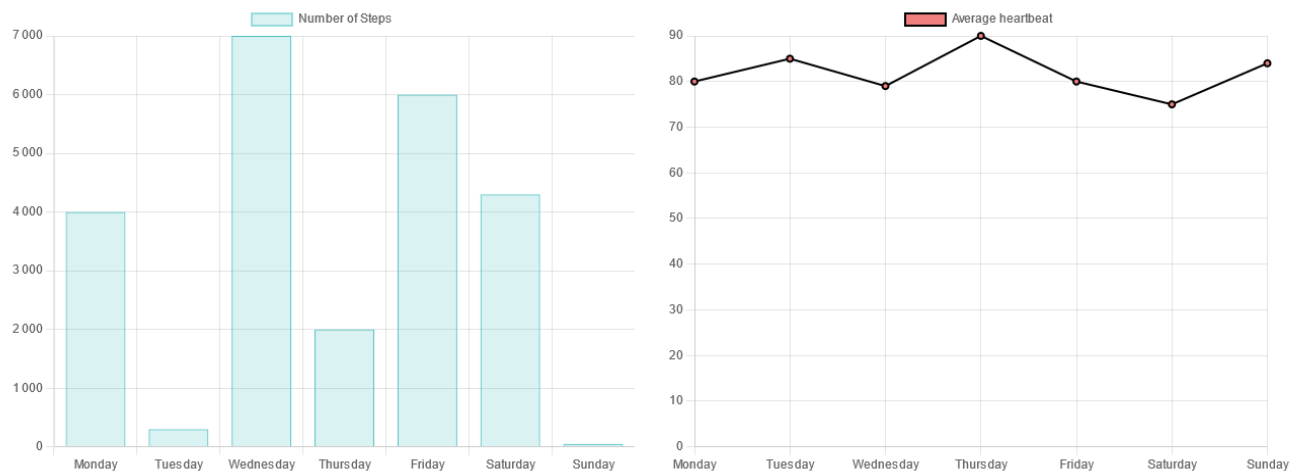
You also have the option to search for a user based on their name. If you click on 'View Information,' you can access more details about them. It is also possible to delete a user by clicking on the delete button.

SearchAdd new user

Name : Jean1
First Name : Estadieu1
Date of birth : 2023-11-06

View informationDelete User

The 'View Information' button displays a page with various charts related to the bracelet user. This page, for example, shows the number of steps the person has taken over a week, represented by a bar chart with the number of steps for each day of the week. Another graph also displays the average heart rate per day over the entire week. It should be more identical than using the table for numbers.



VitalTrack Users Health professional Appointment statistics Logout

User meetings

Search Add an appointment

Name : Estadieu **First name :** Jean
Name professional : Doc2 **First name professional :** Doc2
Appointment date : 2022-01-01 16:03:00
Duration : 30

Edit appointment Delete appointment

Name : Geoffrey **First name :** Naji
Name professional : Doc2 **First name professional :** Doc2
Appointment date : 2021-12-15 08:47:27
Duration : 30

Edit appointment Delete appointment

The 'Appointment' page has been created to allow the user to schedule an appointment with their chosen healthcare professional. The page also enables searching; for instance, if you enter 'Doc2' in the search bar, the system will display all the scheduled appointments related to 'Doc2'.

Make an appointment

Name

First Name

Name Health Professionals

First Name Health Professionals

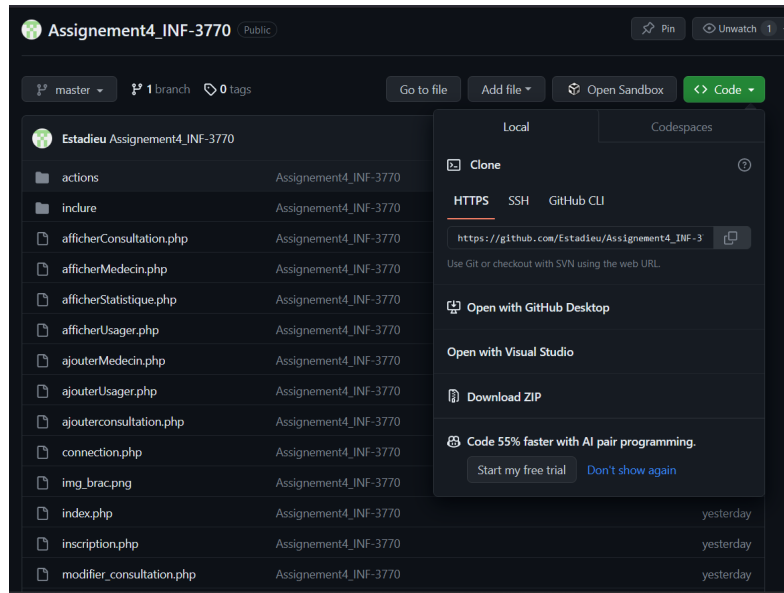
Date

Duration

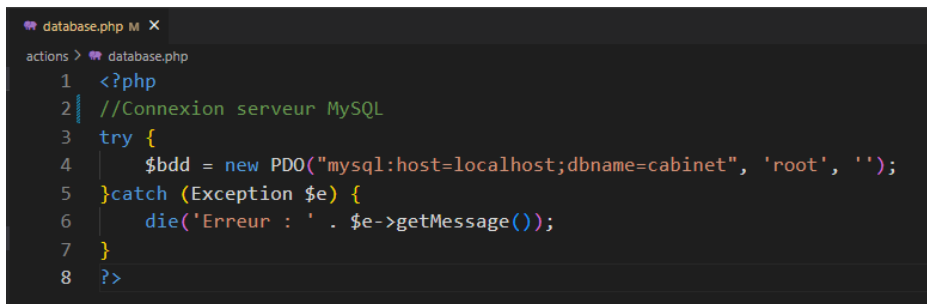
Reset Add

Users can also schedule an appointment with the healthcare professional. Additionally, if the healthcare professional is already occupied during the requested period, it will be impossible to schedule the appointment.

ii) Backend



For our group project, we decided to utilize GitHub as our version control platform. This choice has proven crucial as it facilitated seamless code sharing among team members and provided a clear overview of the project's progress. Leveraging GitHub not only streamlined collaboration but also enhanced our proficiency in utilizing Git for group projects. You can find the Git repository at the following URL: https://github.com/Estadieu/Assignment4_INF-3770



In the development of our application, we employed WampServer as a vital tool to seamlessly connect our database with the PHP code we crafted. This integration was facilitated through the implementation of a dedicated connection page, "database.php," which serves as the linchpin between our code and the database. Importantly, this 'database.php' file encapsulates the necessary configurations for establishing a connection, ensuring uniformity across all pages that interact with our database. By including this connection page in every relevant section of our application, we guarantee a robust and consistent linkage between the backend and the database, facilitating smooth data retrieval and manipulation throughout the entire system.



2) How does your system meet the core requirements ?

Usability Requirement:

- The system/service has been designed with an attractive interface, which includes intuitive navigation, clear icons, and easily understandable instructions. This is to ensure that user's, who may not be familiar with such tools, can use it effectively to manage his health.

Data Access Requirement:

- Access to user's data is restricted to only two parties: The users themselves and healthcare professionals. The system ensures this by implementing strict access controls and encryption measures to protect the privacy and security of user's data.

Compliance Criteria:

- The system allows healthcare professionals to monitor user's health data over time. They can observe how his health indicators change, such as his weight, blood pressure, cardiac frequency, number of steps per day. Based on this data, they can adapt and improve the user's treatment plan to meet his evolving needs.

Password Security:

- Passwords used to access the application are securely stored using hashing techniques. This ensures that unauthorized individuals cannot easily gain access to sensitive information.

Data security

- If we have to handle and/or store data from third parties like user feedback, consent forms, interview answers, or recordings, these will be stored on a password-secured computer. In the case of physical forms, we will keep them stored away in a locked place whenever they are not being used directly.

Project plan

This chapter gives an overview of our project and its time plan. The required tasks to complete the project are enlisted and explained. The team members and their competencies are stated in the last section of this chapter.


1) project plan overview

First of all, we will define a project plan. Then we need to look at what kinds of systems are already in the market for the patient. This will give us a chance to further refine our idea.

2) Work packages

This project has 7 main work packages which are described in more detail in this section. Every work package has a leader responsible for reviewing its progress and keeping the deadlines. The packages have an assigned time span. The time for the project can be seen below table..

	W43	W44	W45	W46	W47
Scenario					
Technical Description					
Requirements specification					
Development					
Testing					
Report					
Revision					



3) Team members

The project team consists of 3 members. All are students of computer science currently studying at UiT. This chapter will give some insight into the background and competence of each person, as well as how the tasks are gonna be distributed among them. The team is well-equipped to build a simulate system and good documentation skills for guaranteeing a well-documented project.

a) A-Young Jang

As a member of this group, her primary responsibility involves spearheading the composition of this report. In this capacity, she has been actively engaged in structuring and crafting the content, ensuring that our collective ideas and findings are presented cohesively. Her role encompasses coordinating with other team members to gather relevant information, synthesizing key insights, and seamlessly integrating individual contributions to maintain a unified narrative. She has also played a crucial role in quality control, meticulously reviewing and refining the report to meet the highest standards.

b) Geoffrey Naji

Geoffrey is the group's leader. Geoffrey's programming knowledge is invaluable in the development of the online application. His primary task is to produce and review the report, as well as to organize the conceptualization processes. As a chief, he must evaluate the application's needs and define certain particular specifications, and he may also work on the application's programming. He is also responsible for ensuring that the group cohesion is strong and that each member has a fair workload.

c) Jean Estadieu

In this group, Jean is the primary developer. With strong programming skills, he devotes a significant portion of his time to developing the application. Jean is in charge of the database, and he must ensure that communication between the database and the application is effective. Jean also communicates with the rest of the group; he must explain whether or not the defined needs are realizable and, if not, how to alter these wants.

Discussion of the application

The first step in developing this application was to define a limited access to it in order to comply with requirement 1.3.1 of the requirement diagram. We choose to use the *password_verify* function since it is straightforward to use and secure. This function allows you to compare two encrypted passwords and see if they are identical.

```
// Check if the password is correct
if(password_verify($utilisateur_mdp, $utilisateurInfos['mdp'])){
    // If the username and password match -> Session opening
    $_SESSION['auth'] = true;
    $_SESSION['id'] = $utilisateurInfos['id'];
    $_SESSION['pseudo'] = $utilisateurInfos['pseudo'];

    // Redirect the user to the homepage
    header('Location: index.php');
} else {
    $errorMsg = "Your password is incorrect";
}
```

Extract from connectionAction.php

As a result, we have also followed criterion 1.3.2 of the requirement diagram, which allows us to encrypt the user's password for security reasons.

```
$utilisateur_password = password_hash($_POST['password'], PASSWORD_DEFAULT);
```

Extracts from inscriptionAction.php

Discussion of the database

About our database, like we said previously, choose PHPMYADMIN. Indeed, this database has a lot of advantages compared to other databases.

- **Easy web interface** : PHPMYADMIN provides a user interface that simplifies database administration. Indeed, PHPMYADMIN can be quite handy for those who are unfamiliar with SQL requests.
- **Open Source and free** : This is an open source database, which means it is free to use and can be customized to meet the needs of the user. This may provide some flexibility for student projects.
- **Multi-platform support** : That database is compatible with a variety of platforms, including Linux, Windows, and Mac OS. This can provide a lot of versatility in terms of developing environment selection.
- **Extensive documentation** : PHPMYADMIN has a large documentation and a communicative community as a result of his popularity. In the event of an issue, it will be simple to conduct some study.

+ Options

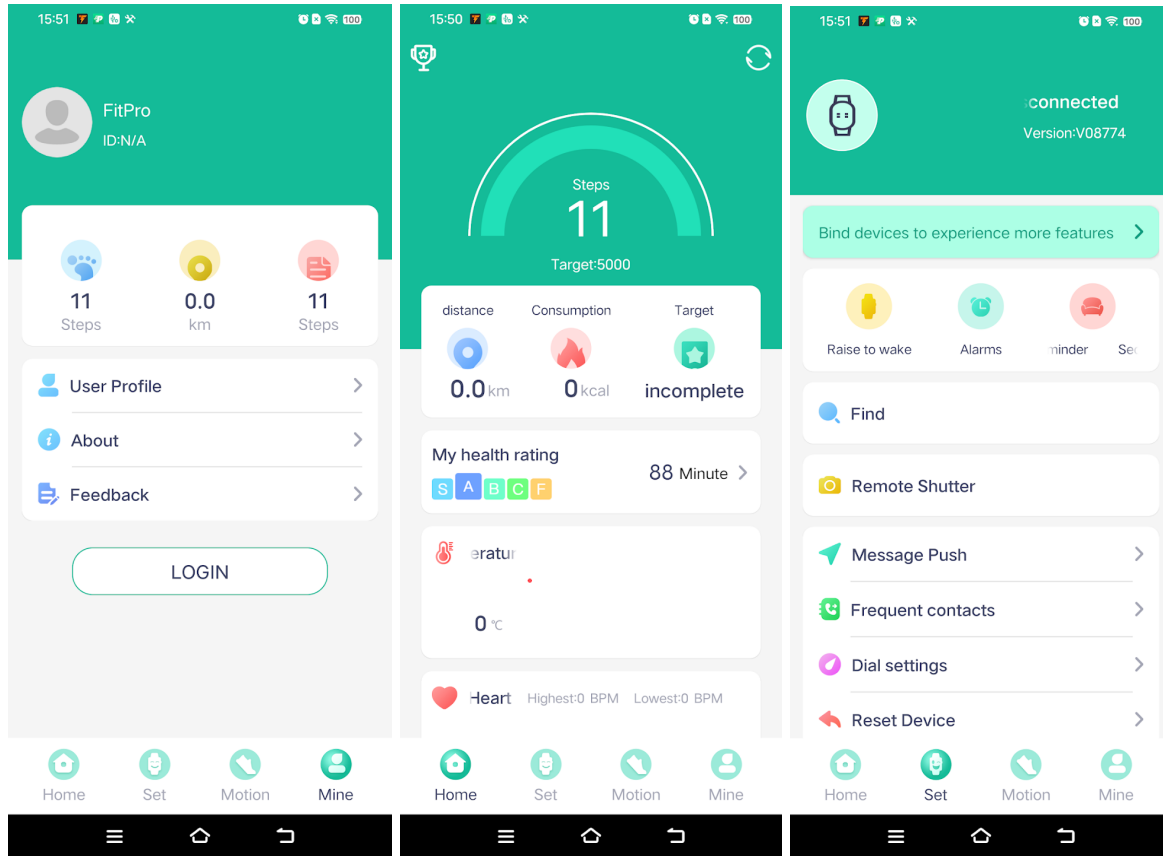
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User's table

Demonstration


1) Alternative Application



https://play.google.com/store/apps/details?id=cn.xiaofengkj.fitpro&hl=en_US

In our quest to showcase a demonstration of our application, we explored existing apps in the market and discovered several noteworthy options. Among them is 'Fitpro,' an Android application that seamlessly connects with smart bracelet devices via Bluetooth.

Fitpro stands out for its ability to detect and evaluate diverse user data, ranging from sports activities and sleep quality to heart rate and blood pressure. This comprehensive approach makes it an excellent tool for monitoring and adjusting users' daily lives conveniently.



One notable feature of Fitpro is its user-friendly interface, offering a seamless and intuitive experience. The consistent use of identifiable icons and an organized Home tab make it easy for users to navigate and check their daily metrics effortlessly.

With its array of functionalities and convenient UI/UX design, Fitpro serves as an inspiring example for applications in the health and fitness domain, aligning with our vision for an efficient and user-centric experience in our own application

But why should you choose us over another ?

There are currently many smart watch applications on the market that collect health data. Our app will stand out from the competition by offering a service that is easy to use and includes the possibility for users to make an appointment with a health professional.

2) Testing Stage

System testing

System testing can be further divided into two parts, unit testing, and integration testing.

- Unit testing

We will begin by testing individual functions and features of your app using unit testing, which allows you to test small, isolated pieces of code in order to ensure that each one is functioning correctly. we use a unit testing framework to automate this process and test your code in a controlled environment.

- Integration testing

Once we have completed unit testing, move on to integration testing. This involves testing the interactions between different components of our application to ensure that they are working together as intended. we can use automated testing tools to simulate user interactions and check that data is being transmitted correctly.

- User acceptance testing

Once our app is functioning correctly, conduct user acceptance testing with a group of real-world users. This can involve selecting a diverse group of users who represent our target audience and having them test your app in a controlled environment. However, here we are not able to create the bracelet in real life . So, we will simulate the process of

this system by a web application and collect feedback on the app's user interface, functionality, and ease of use, and we will use this feedback to make improvements.

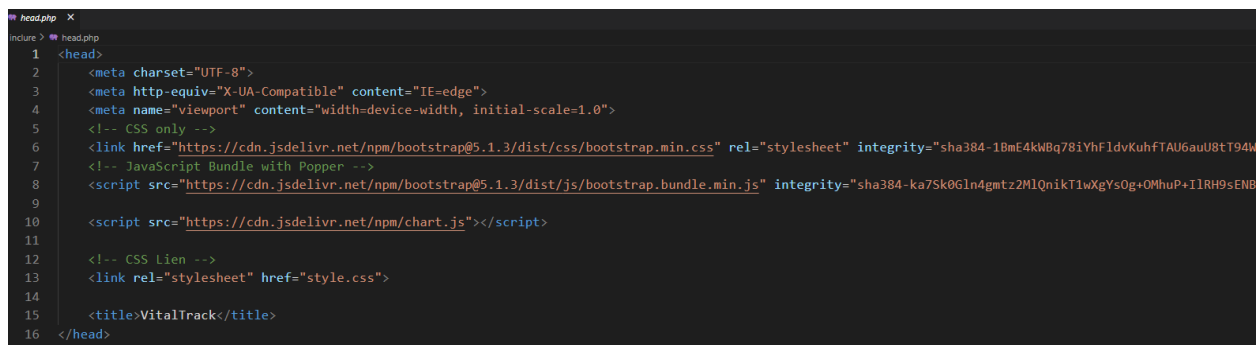
- Beta testing

We have addressed any issues discovered during user acceptance testing, and conduct beta testing by releasing your app to a larger group of users. This can involve making ours available to a limited number of users, either by invitation or through the app store. Collect feedback on the app's performance, features, and user experience

- Production testing

Finally, our app can release to the public, continue to monitor its performance, and gather feedback from users. we will use this feedback to identify and resolve any issues or bugs that arise and to make continuous improvements to the app's functionality and user experience. We have not had enough time to complete all the stages of the planned testing mentioned above. However, for this project, we have completed the unit testing and the integration testing stage.

3) Why did we choose that design ?

A screenshot of a code editor window titled 'head.php'. The code is HTML for the head section of a web page. It includes meta tags for charset, viewport, and compatibility. It also includes links to Bootstrap CSS and JavaScript bundles from a CDN, with integrity hashes. There is a comment about a CSS link and a title tag 'VitalTrack'.

```
1 <head>
2   <meta charset="UTF-8">
3   <meta http-equiv="X-UA-Compatible" content="IE=edge">
4   <meta name="viewport" content="width=device-width, initial-scale=1.0">
5   <!-- CSS only -->
6   <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.1.3/dist/css/bootstrap.min.css" rel="stylesheet" integrity="sha384-1BmE4kWBq78iYhF1dvKuhF7AUG6auU8tT94k
7   <!-- JavaScript Bundle with Popper -->
8   <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.1.3/dist/js/bootstrap.bundle.min.js" integrity="sha384-ka7Sk0Gln4gmtz2MlQnikT1wXgYsOg+OMhuP+IIRH9sENB
9
10  <script src="https://cdn.jsdelivr.net/npm/chart.js"></script>
11
12  <!-- CSS Lien -->
13  <link rel="stylesheet" href="style.css">
14
15  <title>VitalTrack</title>
16 </head>
```

In our project, the 'head.php' page serves as a centralized repository for all the libraries crucial to our application. Notably, we have incorporated Bootstrap technology to enhance the design aesthetics, providing a sleek and visually appealing interface. This strategic use of Bootstrap contributes significantly to an improved user experience, making navigation and interaction more intuitive. Additionally, our project leverages various JavaScript libraries to seamlessly integrate dynamic graphical elements.



Conclusion

To summarize, the technical architecture based on a PHP interface and database management offers a good and comfortable solution. This project prioritizes data security by hashing passwords with the Bcrypt method.

The user interface was meticulously designed, with a focus on displaying a nice layout and a plethora of straightforward functionalities that are understandable by beginners. These various sections, such as controlling the user's, healthcare professional, and appointment, demonstrate a thorough understanding of the user's needs.

This team of three persons with a wide range of complimentary talents worked on a variety of tasks, including writing and reading the report, creating the web application, and managing the database. This team had excellent communication among its members, and each member had a reasonable workload to execute this project.

Finally, this web interface offers a commendable endeavor to enhance health management by providing users with a safe and secure way to monitor their health data and collaborate with other health experts. This interface has the potential to significantly improve follow-up individual health.