Ministry of higher education and scientific research

Higher Institute of Technological Studies of Bizerte

Integration project report

Design and development of a web and mobile training management application

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Summary

Figure list

General Introduction

The "E-learning Management" has been developed to override the problems prevailing in our developed world. This application is supported to eliminate and in some cases reduce the hardships faced by this existing system. Moreover this application is designed for the particular need of the teachers and students to carry out learning in a smooth and effective manner.

The application is reduced as much as possible to avoid errors while entering the data. It also provides an error message while entering invalid data. No formal knowledge is needed for the user to use this Application. by this all it proves it is user-friendly. E-Learning Management , As described above, can lead to error free, secure, reliable and fast .

Every Teacher has challenges to overcome and manage the information of Student, Assignment, class, and question.

This app is designed to assist in planning, and will help every student and teacher to ensure that this application is equipped with the right

level of information and details for your future goals. Also, for those busy people who are

Always on the go, our application come with remote access features, which will allow you to manage

Your courses anytime, at all times.

Chapter 1: Preliminary Study

1.1.Introduction

The preliminary study is defined as being all the steps leading to the creation of a summary view of the future system.

Its purpose is to study the relationships between the actors and to develop the objectives to be achieved in order to draw up a provisional work plan.

1.2.Description of the existing

While discussing between us we noticed that there are problems at the level of management of the training in our institute, especially the training of the clubs.

Those problems will affect mediating training in order to obstruct them.

1.3.Criticisms of the existing

The institute page is a globally administrative page so publish these events in which it is not possible to ensure that they will be seen by the students.

In each event the administration does not manage to know the exact number of students who will participate and their data .

1.4.Suggested solutions

development of a web and mobile application that allows students to register and follow training.

1.5.Detailed description of the final solution

The analysis of this subject has enabled us to identify the various needs to which our application must respond.

These identified needs are classified into two categories, namely functional needs and non-functional needs.

1.6.Methodology and modeling adopted

A development methodology is a framework used to plan and structure the development of an application. To do this, it is necessary to process and model a system before it's to understand its functioning and ensure its coherence.

1.6.1. Modeling language UML

UML (Unified Modeling Language) was designed to be a common, semantically and syntactically rich visual modeling language.It is intended for the architecture, the design and the implementation of complex software systems by their structure as well as their behavior. UML has applications beyond software development, especially for process flows in industry.

The use and functionalities of UML differ from one scope to another,depending on the needs of customers and application providers.

As part of an IT project for the IS, the use of UML modeling provides many advantages that act on :

- Modularity
- Abstraction
- Concealment
- Consistent structuring of functionalities and data

1.6.2. SCRUM:

It represents the most agile approach to using existing agile approaches and is simple to understand. Scrum is a framework of rules, roles, events, and artifacts used to implement Agile projects. It is an iterative approach, consisting of sprints that typically only last one to four weeks. This approach ensures that your team delivers a version of the product regularly.

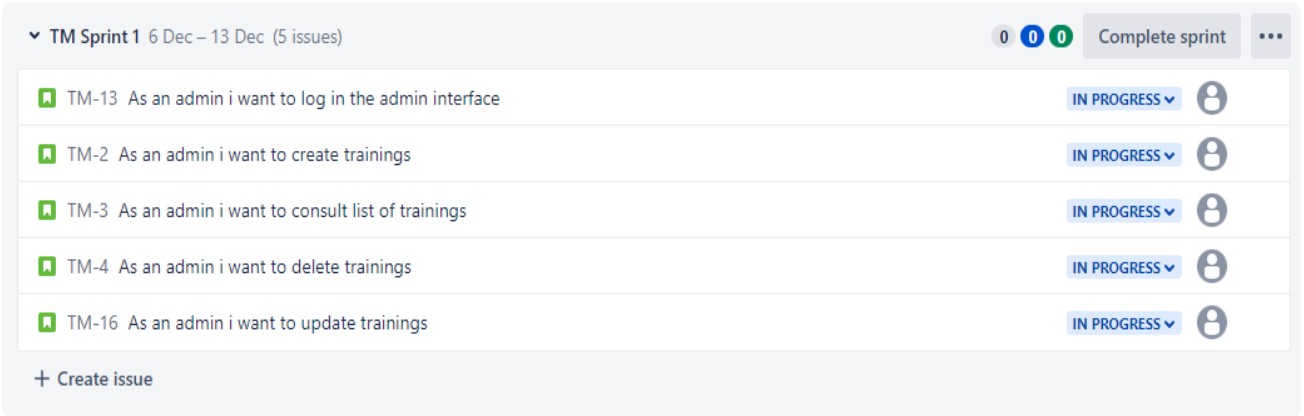


Figure 1 : Sprint 1 (JIRA)

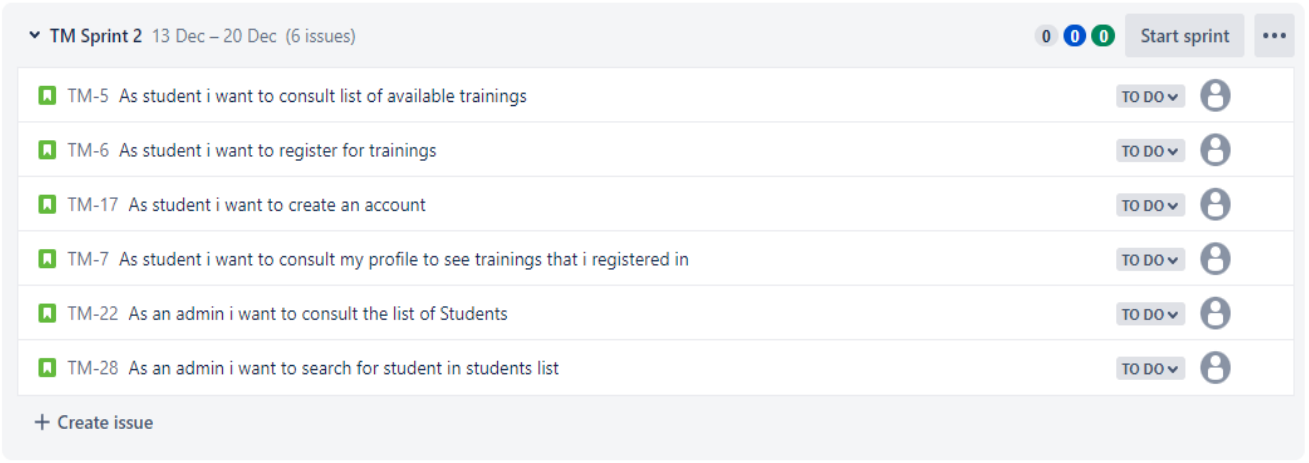


Figure 2 : Sprint 2 (JIRA)

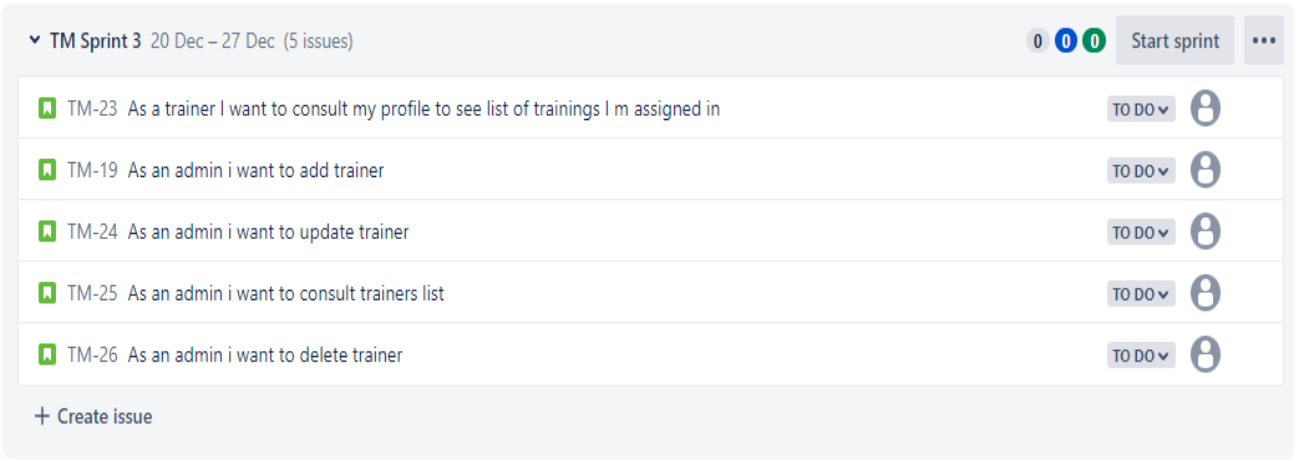


Figure 3 : Sprint 3 (JIRA)

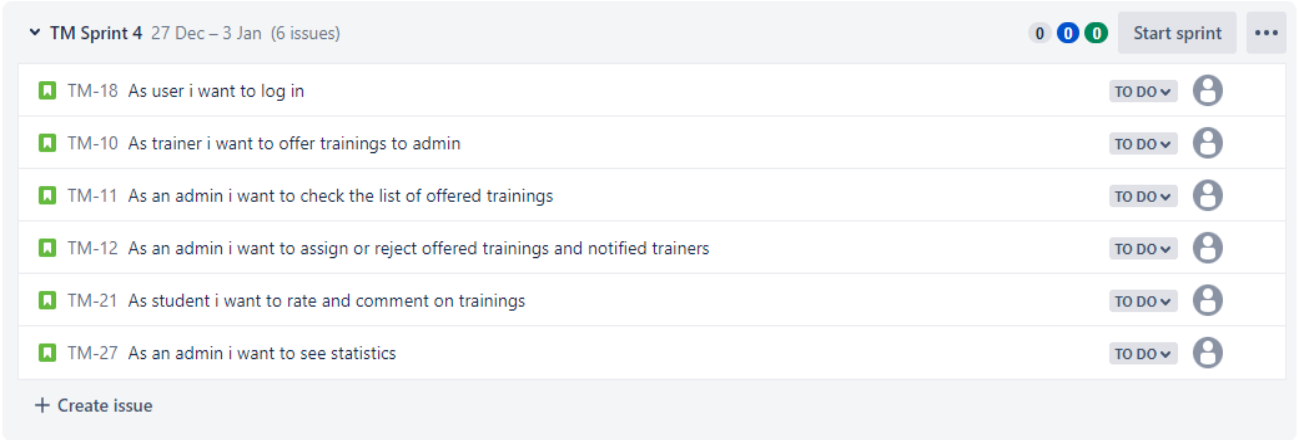


Figure 4 : Sprint 4 (JIRA)

Chapter 2: Specification of needs

2.1. Introduction

In this chapter We will explain the operating principles of the application and propose solutions for the problems found. Since the design of a computer system is a very important step that will influence the quality and reliability of any application. We will also present in this chapter different design diagrams.

2.2. Specification of functional needs

The functional needs and expectations vis-à-vis our application depend on one actor to another. For this, we have described for each actor the functional needs associated with it:

- **Admin**

log in to administration interface
manage training
manage trainer
check offered trainings
notify trainer

- **Trainer**

consult list of trainings
consult list of assigned training
log in
offer training

- **Student**

can consult list of trainings
create an account
log in
register for training
can consult list of registered training

2.3. Specification of non functional needs

These are the technical needs describing all the constraints to which the application is subject for its realization and its proper functioning.The nature of our project requires certain rules to be respected which are summarized in the following points :

• Interface ergonomics :

The interfaces of our application must be ergonomic and user-friendly. Also, they must be accessible by all users,regardless of their characteristics and their means of access to information.

• The availability :

Our application must be available at all times for use by any user, and must be easily accessible via any computer.

• Security

Our application contains personal and sensitive information, so it must comply with the rules relating to the security of computer systems.

2.4. Product Backlog

A product backlog is a prioritized list of work for the development team that is derived from the roadmap and its requirements. The most important items are shown at the top of the product backlog so the team knows what to deliver first.

	User Story	Type	Priority	Time estimate	complixty	DOD	SP
SP1	US1 : as a development team i want to learn spring boot and nodeJS microservices	TS	1	3 days	HARD	• Watching tutorials and courses • Practice examples	1 week
	US2 : as a development team i want to learn flutter		2	2 days	MEDIUM		
	US3 : as a development team i want to learn angular		3	2 days	MEDIUM		
SP2	US4 : as an admin i want to log in the admin interface	US	4	1 day	MEDIUM	• Code builds with no error • Testing : - admin can , successfully ,log in to his interface . - admin can , successfully , create , consult , update and delete trainings . • good impression on template and features	1 week
	US5 : as an admin i want to create trainings		5	2 days	HARD		
	US6 : as an admin i want to consult list of trainings		6	1 days	EASY		
	US7 : as an admin i want to delete trainings		7	1 day	EASY		
	US8 : as an admin i want to update trainings		8	2 days	MEDIUM		
SP3	US9 : as student i want to consult list of available trainings	US	9	1 day	EASY	• Code builds with no error • Testing : - Student can , successfully , register for trainings - Student can , successfully , consult list of trainings and trainings that he registred in . - Student can , successfully , create an account - Admin can , successfully , consult the list of Students - Admin can , successfully , search for students . • Good impression on template and features	1 week
	US10 : as student i want to register for trainings		10	1 day	MEDIUM		
	US11 : as student i want to create an account		11	1 day	MEDIUM		
	US12 : as student i want to consult my profile to see trainings that i registered in		12	1 day	MEDIUM		
	US13 : as an admin i want to consult the list of Students		13	1 day	EASY		
	US14 : as an admin i want to search for student in Students list		14	2 days	MEDIUM		
SP4	US14 : As a trainer I want to consult my profile to see list of trainings I m assigned in	US	14	1 day	MEDIUM	• Code builds with no error • Testing : - Trainer can , successfully ,log in to his interface . - Admin can , successfully , create , consult , update and delete trainers . • Good impression on template and features	1 week
	US15 : As an admin i want to add trainer		15	2 days	MEDIUM		
	US16 : As an admin i want to update trainer		16	1 day	MEDIUM		
	US17 : As an admin i want to consult trainers list		17	2 days	EASY		
	US18 : As an admin i want to delete trainer		18	1 day	MEDIUM		
SP5	US19 : As user i want to log in	US	19	1 day	MEDIUM	• Code builds with no error • Testing : - Student and trainer can , successfully , log in - Trainer can , successfully , offer trainings . - Admin can , successfully , check the list of offered trainings and assign or reject offered trainings - Admin can , successfully , consult the list of Students - Admin can , successfully , see some statsitics . • Good impression on template and features	1 week
	US20 : As trainer i want to offer trainings to admin		20	1 day	HARD		
	US21 : As an admin i want to check the list of offered trainings		21	1 day	MEDIUM		
	US22 : As an admin i want to assign or reject offered trainings ar		22	1 day	HARD		
	US23 : As student i want to rate and comment on trainings		23	2 days	HARD		
	US24 : As an admin i want to see statistics		24	1 day	MEDIUM		

Figure5 : Product BackLog

2.5. Overall use case diagram

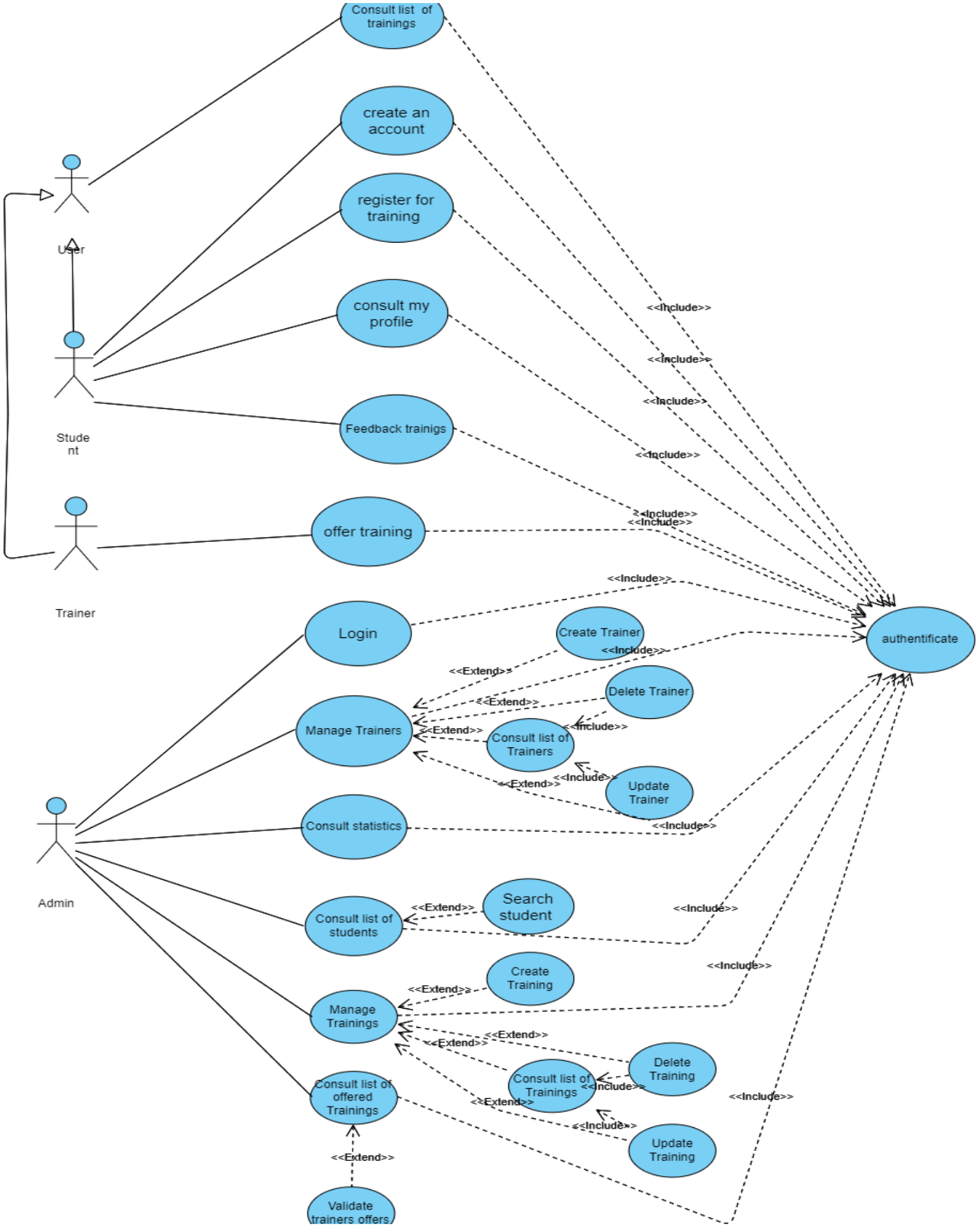


Figure6 : Use case diagram

2.6. Overall Class Diagram

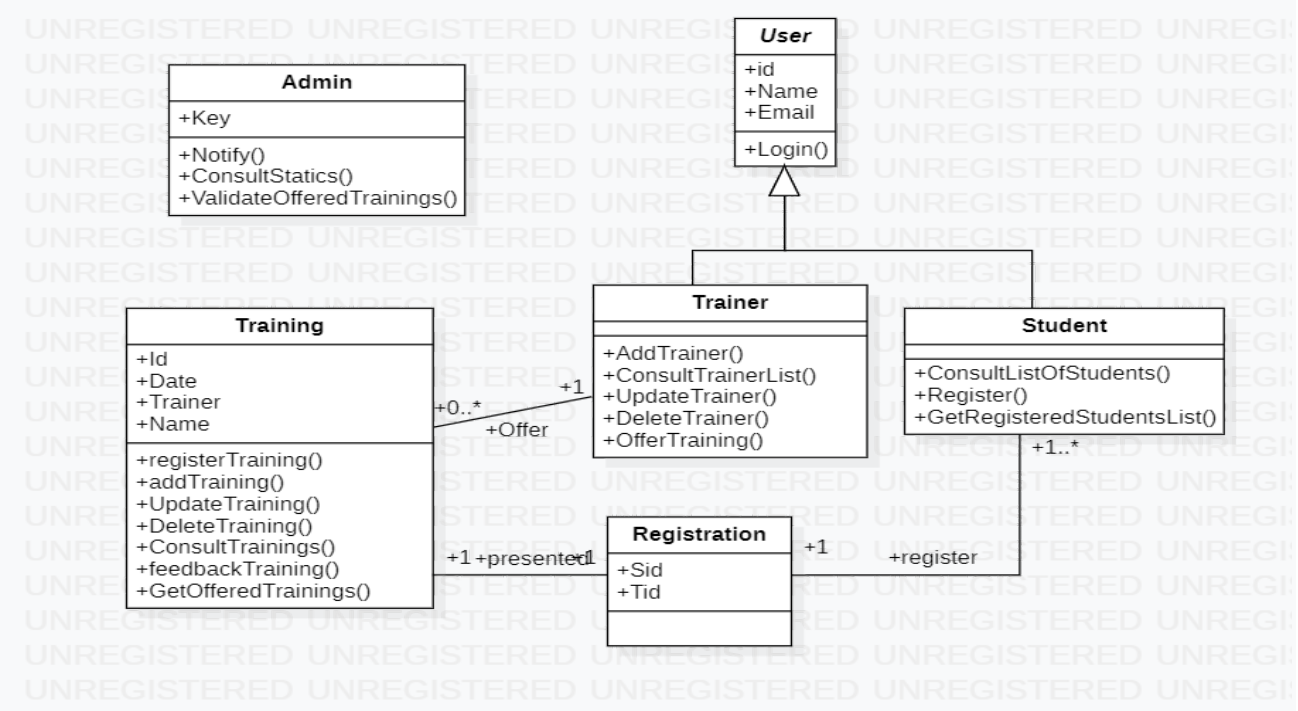


Figure7 : class diagram

Conclusion

In this chapter, we presented to you the existing one, criticized it and presented the solution proposed by us as well as the first steps followed to achieve the goal.

Chapter 3 : System design

3.1. Introduction

Systems design focuses on defining customer needs and required functionality early in the development cycle, documenting requirements, then proceeding with design synthesis and system validation while considering the overall problem consisting of: Operations. Performance. Test and integration.

3.2. Sprint 1

3.2.1 Sprint Goal

- admin can , successfully , log in to his interface .
- admin can , successfully , create , consult , update and delete training.

3.2.2. Sprint Backlog

USER STORY	TASKS	OWNER
US4 : As an admin i want to log in the admin interface	Create UML diagrams	Yesser
US5 : as an admin i want to create trainings	Add training using nodejs	Mohamed
	create admin interface with flutter	Dhia
US6 : as an admin i want to consult the list of trainings	Update Trainings using nodejs	Majid
US7 : as an admin i want to delete trainings	create necessary services with node.js and spring boot	Yesser
	Delete Training using nodejs	Mohamed
US8 : as an admin i want to update trainings	create admin interface with angular	Dhia

figure8 : Sprint 1 Backlog

3.2.3 Use case diagram

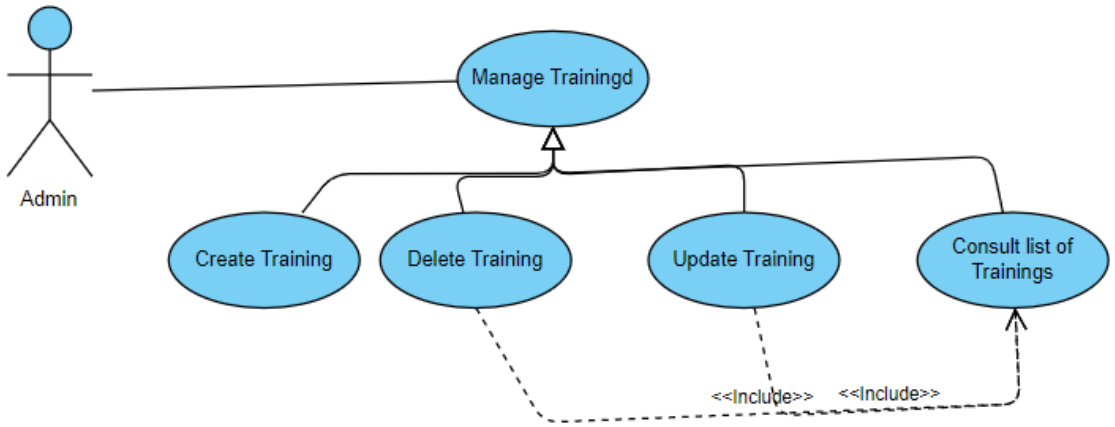


Figure9 : Sprint 1 use case diagram

3.2.4. Class diagram

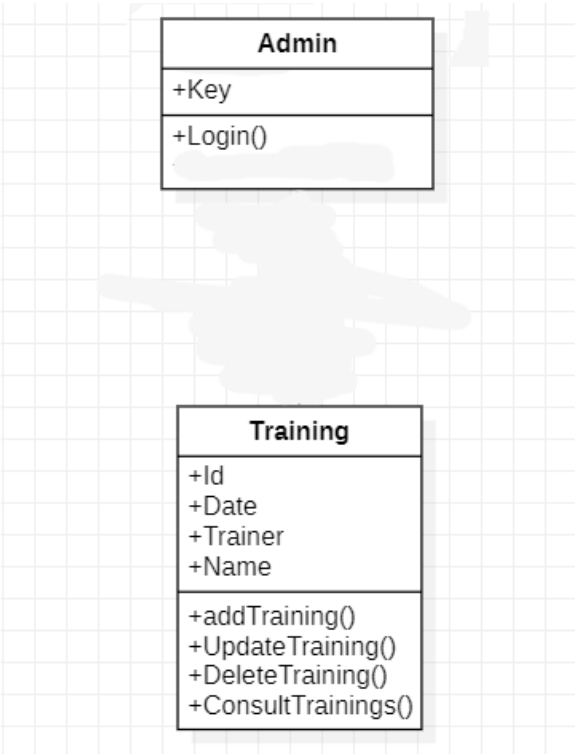


Figure10 : Sprint 1 Class diagram

3.3. Sprint 2

3.3.1 Sprint Goal

- Student can , successfully , register for trainings
- Student can , successfully , consult list of trainings and trainings that he registered in .
- Student can , successfully , create an account
- Admin can , successfully , consult the list of Students
- Admin can , successfully , search for students .

3.3.2. Sprint Backlog

USER STORY	TASKS	OWNER
US9 : As student i want to consult list of available trainings	create UML diagrams	Majid
US10 : As student i want to register for trainings	register student using nodejs for backend	Yesser
	create admin interface with flutter and angular	Mohamed
US11 :As an admin i want to consult the list of Students	get students with spring boot	Dhia
US12: as an admin i want to search for student in Students list	create student interface with Flutter	Majid
	create serach bar for student list interface with angular	Yesser
US13 :As student i want to create an account	create student registration using keycloack and spring boot	Mohamed
US14 :As student i want to consult my profile to see trainings that i registered in	create student profile with angular and flutter	Dhia
	create training registration interface with angular	Majid

figure11 : Backlog Sprint 2

3.3.3 Use case diagram

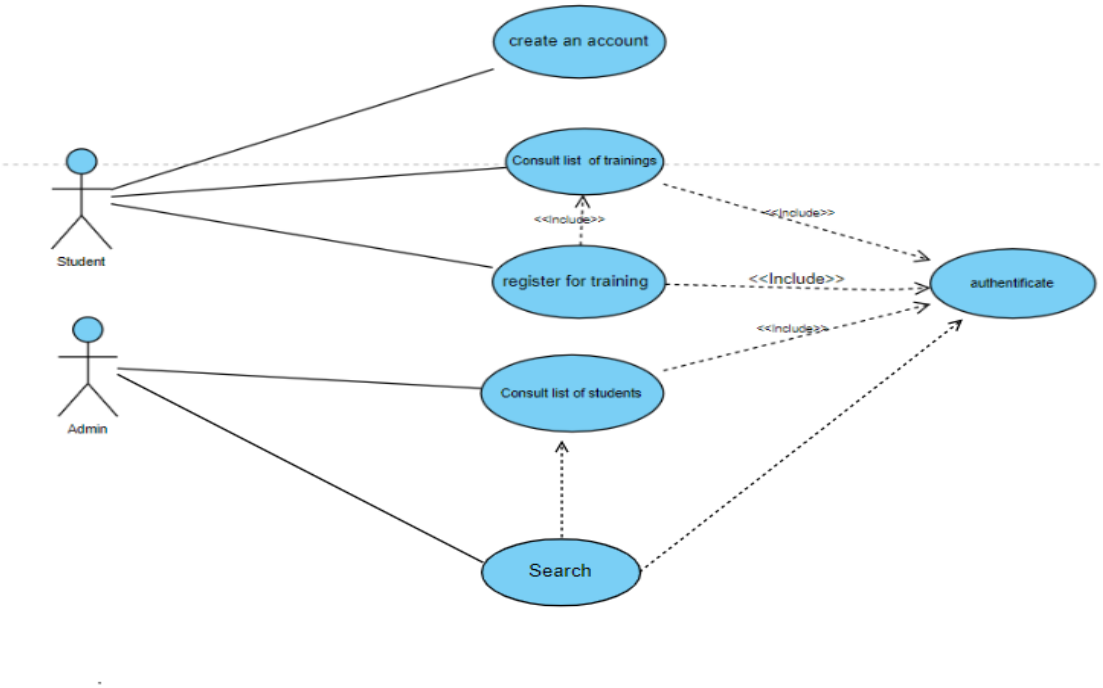


Figure12 :Sprint 2 use case diagram

3.3.4. Class diagram

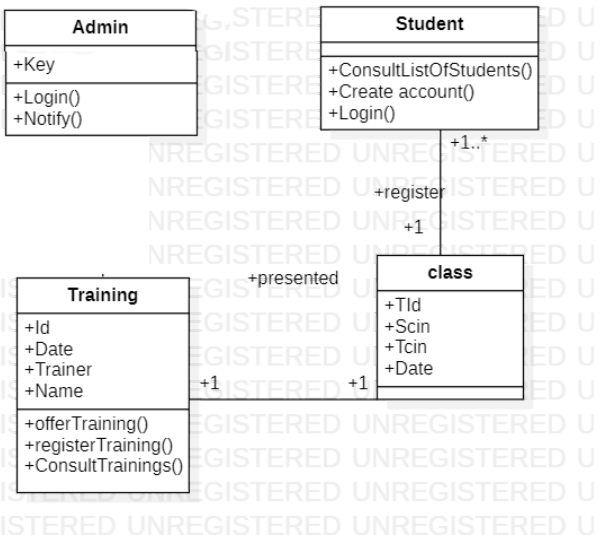


Figure13 : Sprint 2 Class diagram

3.4. Sprint 3

3.4.1. Sprint goal

- Trainer can , successfully ,log in to his interface .
- Admin can , successfully , create , consult ,update and delete trainers.

3.4.2. Sprint Backlog

USER STORY	TASKS	OWNER
US15 :As a trainer I want to consult my profile to see list of trainings I m assigned in	create trainer list interface with Angular	Yesser
US16 : As an admin i want to add trainer	Add trainer using springboot	Mohamed
	Update Trainer using Springboot	Dhia
US17: As an admin i want to update trainer	Delete trainer using springboot	Majid
US18: As an admin i want to consult trainers list	Create trainer profile with angular	Yesser
	Show trainigs trainer are assigned in using springboot	Mohamed
US19 :As an admin i want to delete trainer	Create UML diagrams	Dhia

Figure14 : Sprint 3 backlog

3.4.3. Use case diagram

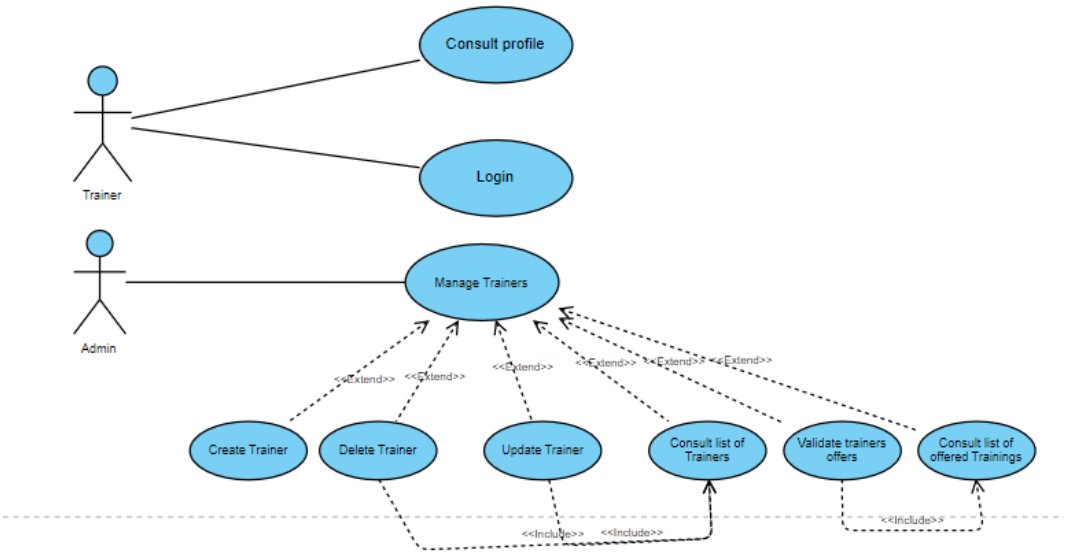
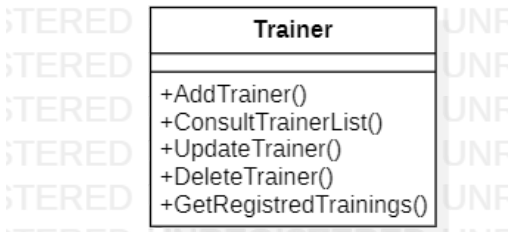


Figure15 : Sprint 3 use case diagram



3.4.4 Class diagram

Figure16 : Sprint 3 class diagram

3.5. Sprint 4

3.5.1. Sprint goal

- Student and trainer can , successfully , log in.
- Trainer can , successfully , offer training.
- Admin can , successfully , check the list of offered trainings and assign or reject offered trainings.
- Admin can , successfully , consult the list of Students.
- Admin can , successfully , see some statistics.

3.5.2. Sprint Backlog

USER STORY	TASKS	OWNER
US20 : As user i want to log in	Create UML diagrams	Mohamed
US21 : As trainer i want to offer trainings to admin	Create log in interface with flutter and angular	Majid
	user log in using keycloak	Yesser
US22 : As an admin i want to check the list of offered trainings	Create list of offered trainings with angular	Dhia
US23 : As an admin i want to assign or reject offered trainings and notified trainers	create interface for Users to give a feedback on training	Mohamed
	give the admin the possibility to validate or refuse offered trainings	Majid
US24 : As student i want to rate and comment on trainings	complete all back-end features	Yesser
US25 : As an admin i want to see statistics	Create a form for trainer to offer trainings	Dhia

Figure 17 : Sprint 4 backlog

3.5.3. Use case diagram

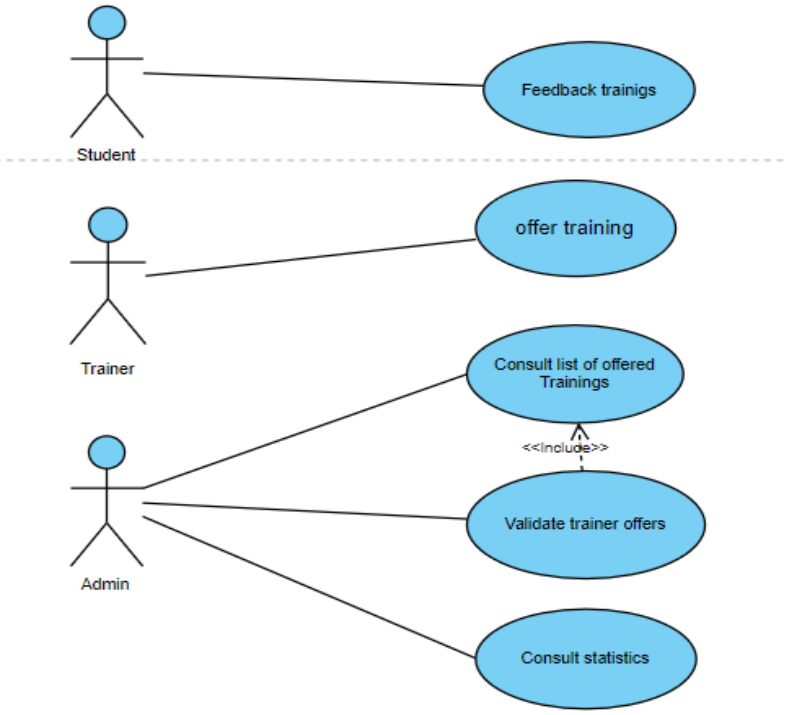


Figure18 : Sprint 4 use case diagram

3.5.4. Class diagram

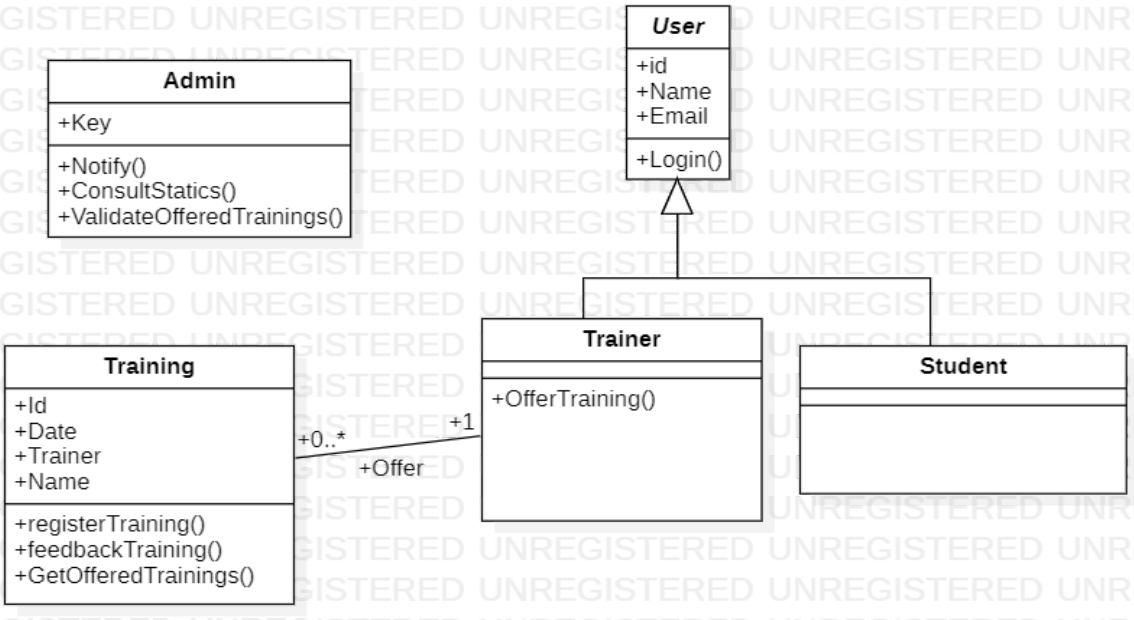


Figure19 : Sprint 4 class diagram

4. Dynamic modeling

Sequence diagrams

Add Training Sequence diagrams

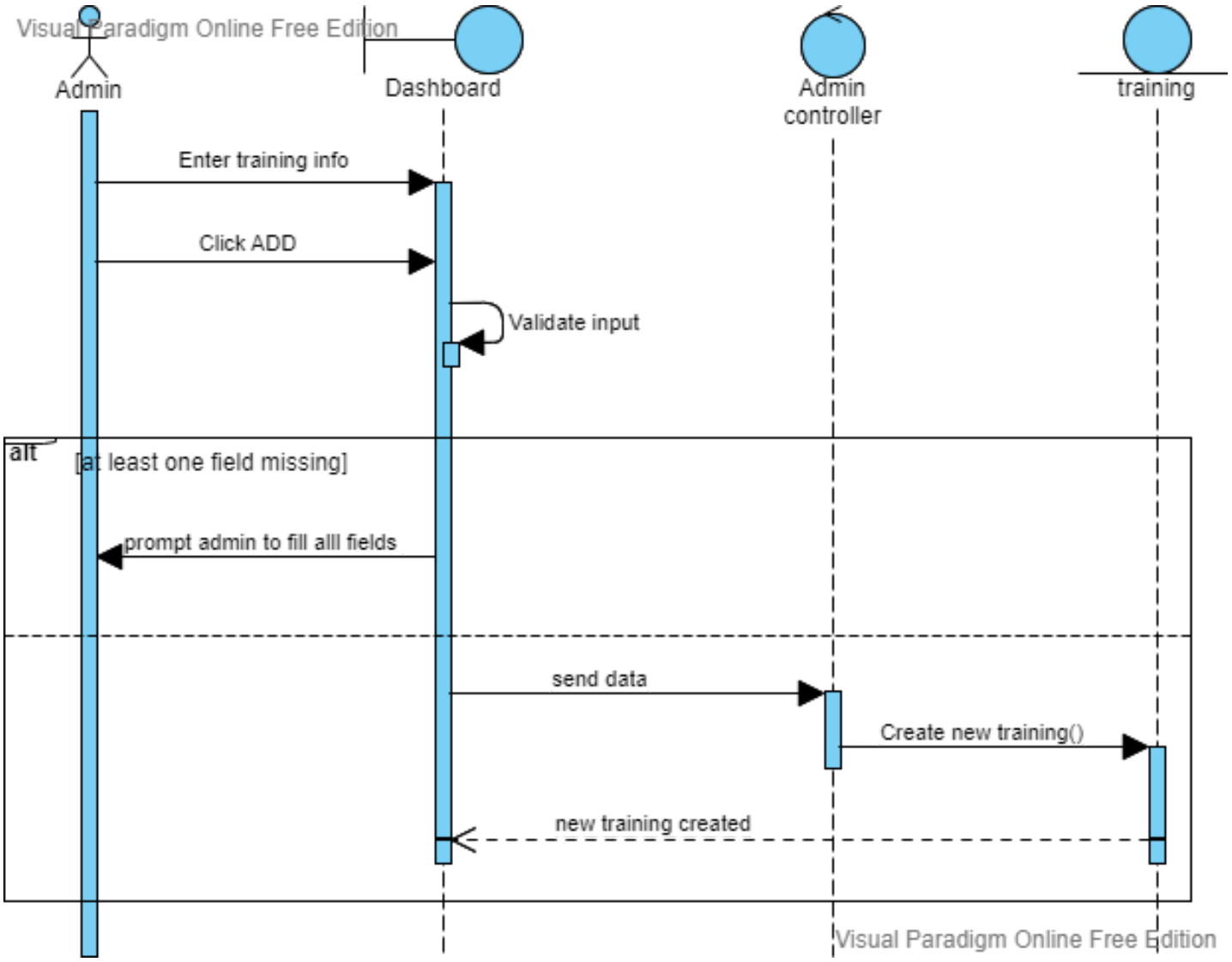


Figure20 : add training sequence diagram

Update Training Sequence diag

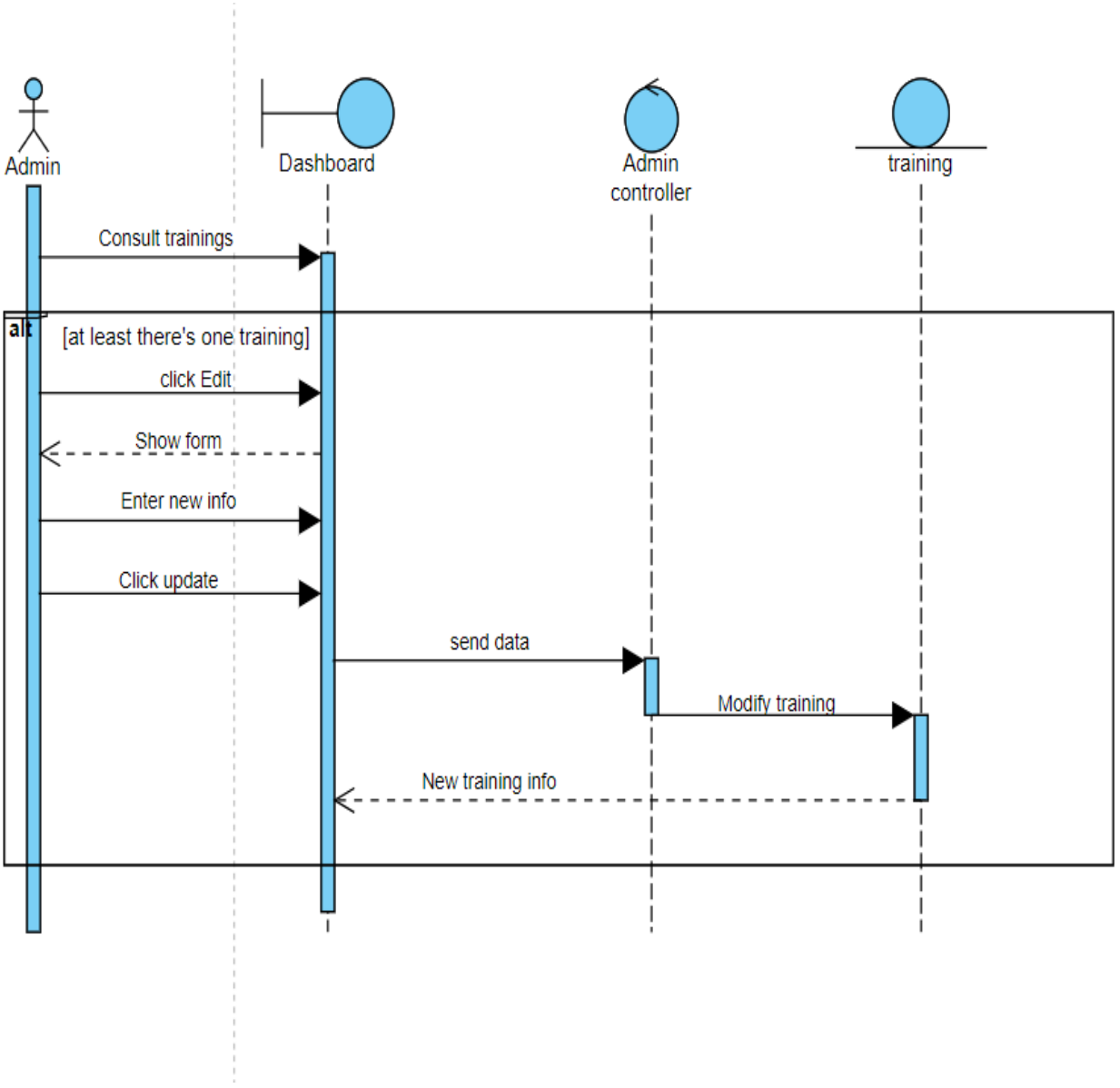


Figure21 : update training sequence diagram

Login Sequence diagrams

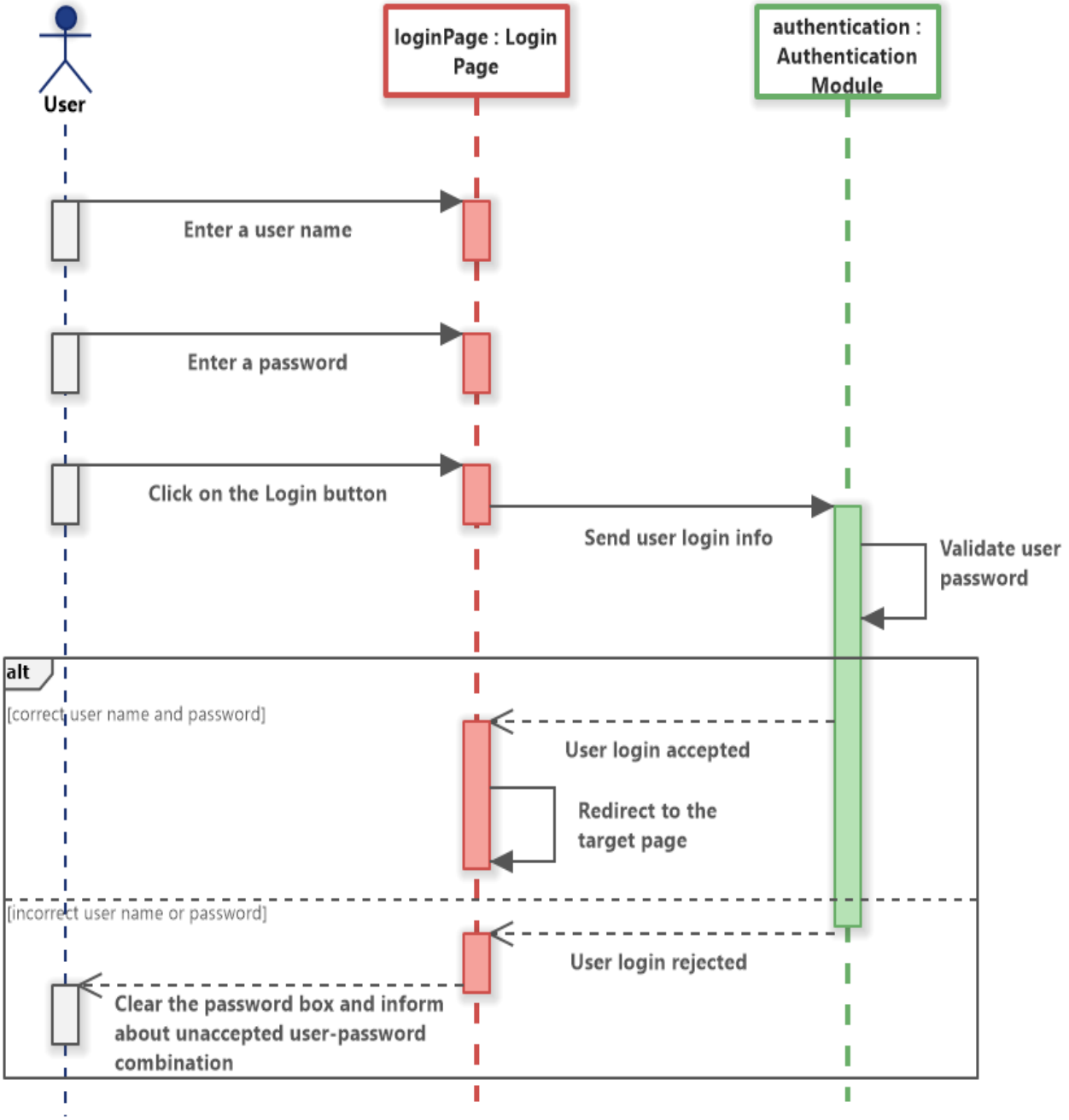


Figure22 :login sequence diagram

Student register Sequence diagrams

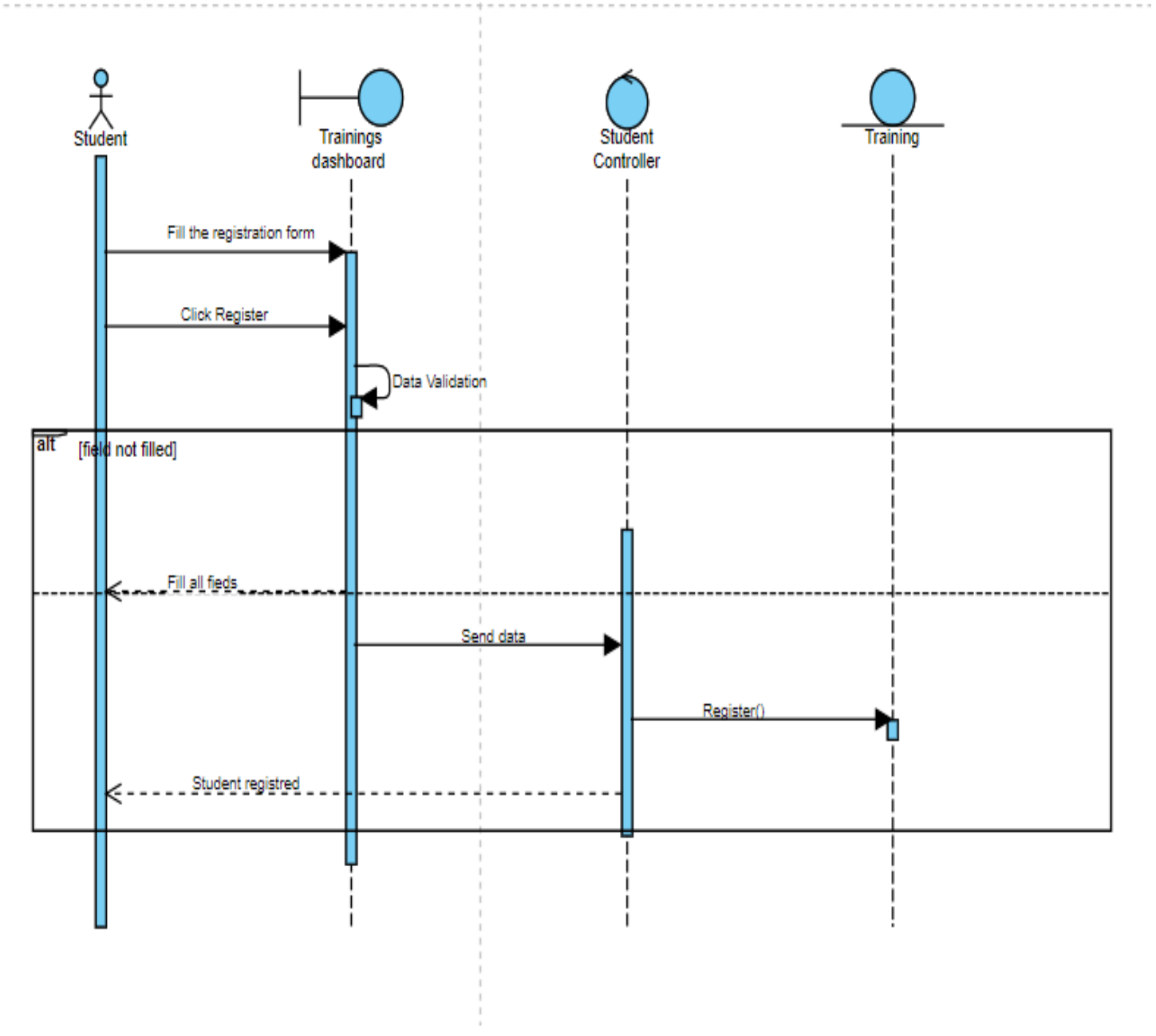


Figure 23 :student register sequence diagram

User Registration Sequence diagrams

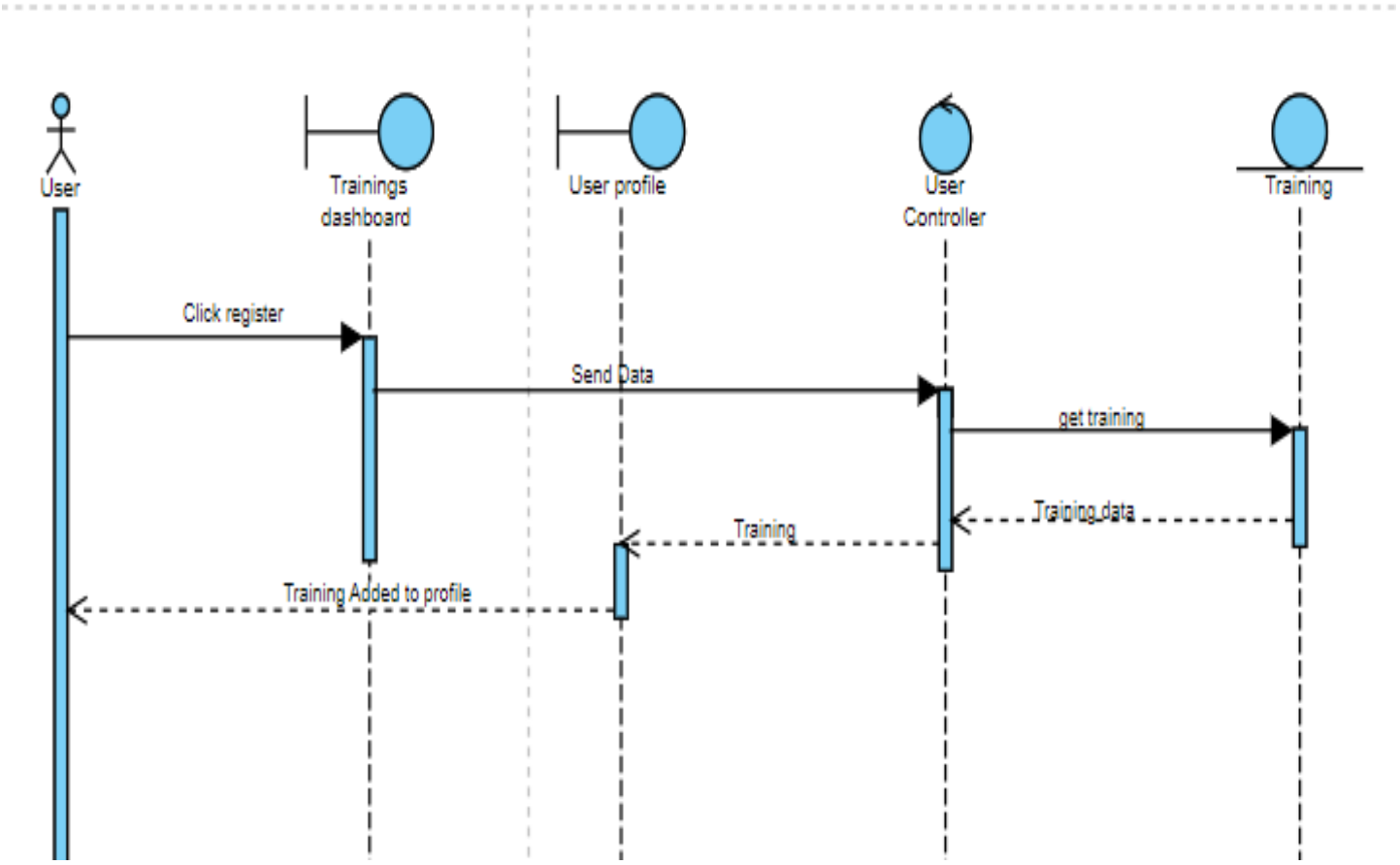


Figure 24 :register sequence diagram

Conclusion

In this chapter we presented each sprint.every sprint have a sprint goal with three diagrams:

- use case diagram
- class diagram
- sequence diagram

and finally we presented every sprint backlog.

Chapter 4 : Production

4.1. Introduction

In this chapter, we are interested in defining the work environment, hardware and software used for the realization.
We also present some interfaces made to illustrate the operation of some system activities in order to measure the performance and viability of our application.

4.2. Hardware environment

The application was coded on these laptops :

PC Lenovo ThinkPad :

- Processor : Intel Core i3-1005G1
- OS: Windows 10
- RAM : 8 Go DDR4
- Hard disk : 1 To
- Screen: 15.6" full-HD (1920 x 1080)
- Graphic card: AMD Radeon 630

Figure25 : Pc Lenovo

PC Asus :

- Processor : Intel Core i5-10500
- OS : Windows 10
- RAM : 8 Go DDR4
- Hard disk : 512 SSD
- Screen : 15.6" full-HD (1920 x 1080)
- Graphic card : GTX 1650

Figure26 : Pc Asus1

PC Asus Tuf:

- Processor : Intel Core i5-10500
- OS : Windows 11
- RAM : 8 Go DDR4
- Hard disk : 512 SSD
- Screen : 15.6" full-HD (1920 x 1080)
- Graphic card : GTX 1650

Figure27 : Pc Asus2

PC HP 15-da:

- Processor : Intel Core i5-8400
- OS : Windows 10 pro
- RAM : 8 Go DDR4
- Hard disk : 1 To
- Screen : 15.6" HD Led
- Graphic card : Nvidia GeForce MX110

Figure 28 : Pc HP

4.3. Software Environment

We will enumerate during this part the various tools used throughout this project.

4.3.1. working software

- **Visual Studio Code:** is an open-source code editor developed by Microsoft supporting a very large number of languages thanks to extensions.
  It supports auto-completion, syntax highlighting, debugging, and git commands.

Figure 29 : VSCode Logo

- **Spring Tool Suite (STS):** is a Java IDE designed for application development Spring-based enterprises. It's easier, faster and more convenient.And most importantly, it is based on Eclipse IDE. STS is free, open-source and powered by vmware.

Figure 30 : STS Logo

- **XAMPP :** is a set of software for setting up a local web server, An FTP server and an email server. It is a distribution of free software (X (cross) Apache MariaDB Perl PHP) offering good flexibility of use, known for its quick and easy installation.

Figure 31 : XAMPP Logo

- **Postman:** is an application for testing APIs, created in 2012 by Abhinav Asthana, Ankit Sobti and Abhijit Kane in Bangalore to answer a test problem shareable API.

Figure 32 : Postman Logo

- **MySQL**: is an Open Source relational database server. A server of databases store data in the form of tables. The SQL in MySQL means **Structured JQuery Language.**

Figure 33 : MySQL Logo

- **MongoDB** is a document-oriented database management system that can be distributed over any number of computers and does not require a predefined data schema. It is written in C++.

Figure 34 : MongoDB Logo

- **Keycloak** is an open-source software that introduces a unique authentication method through identity and access management. Initially developed by the JBoss teams, the project has been under the management of Red Hat since March 2018, which uses it in addition to its HR-SSO solution.

Figure 35 : KeyCloak Logo

- **Firebase** Firebase is an app development platform that helps you build and grow apps and games users love. Backed by Google and trusted by millions of businesses around the world..

Figure 36 : Firebase Logo

- **Jira** is a bug tracking, issue management, and project management system developed by Atlassian and first released in 2002. It offers solutions for both developers and non-developer stakeholders.

Figure 37 : jira software Logo

4.4. Frameworks and development environments:

4.4.1. Frameworks back-end:

- **spring boot**

Spring boot It is an open source Java Web Framework. The Spring Boot Framework creates a fully production-ready environment that is fully configurable to using its predefined code in its code base.

Figure 38 : Spring Boot Logo

- **ExpressJs**

  Express.js is a framework for building web applications based on Node.js. It is in fact the standard framework for server development in Node.js

Figure 39 : Expressjs Logo

4.4.2. Frameworks front-end

- **Angular**

  Angular is an open-source, TypeScript-based client framework co-led by the Angular project team at Google and a community of individuals and companies.

  Angular is a complete rewrite of AngularJS framework built by the same team.

Figure 40 : Angular Logo

- Flutter

  Flutter is an open-source UI software development kit created by Google. It is used to develop applications for Android, iOS, Linux, Mac, Windows, Google Fuchsia and the web from a single code base.

Figure 41 : Flutter Logo

4.4.3. UML

- **Visual Paradigm**

  it is an intelligent, online diagram editor that facilitates the creation of diagrams

Figure 42 : Visual Para Logo

4.5. Main graphical interfaces

4.5.1.Angular

- **Landing Interface**

Figure 43 : Landing page Interface

- **Login Interface**

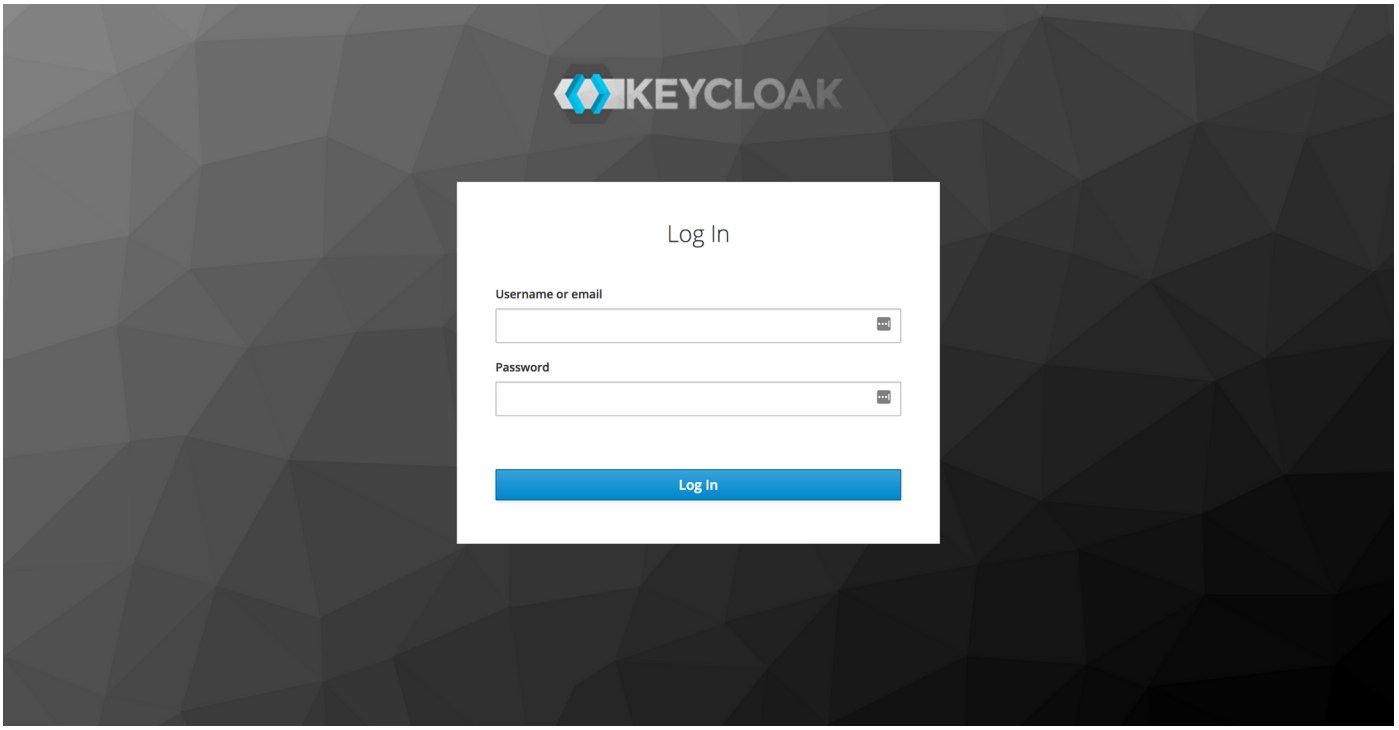


Figure 44 :Login interface1

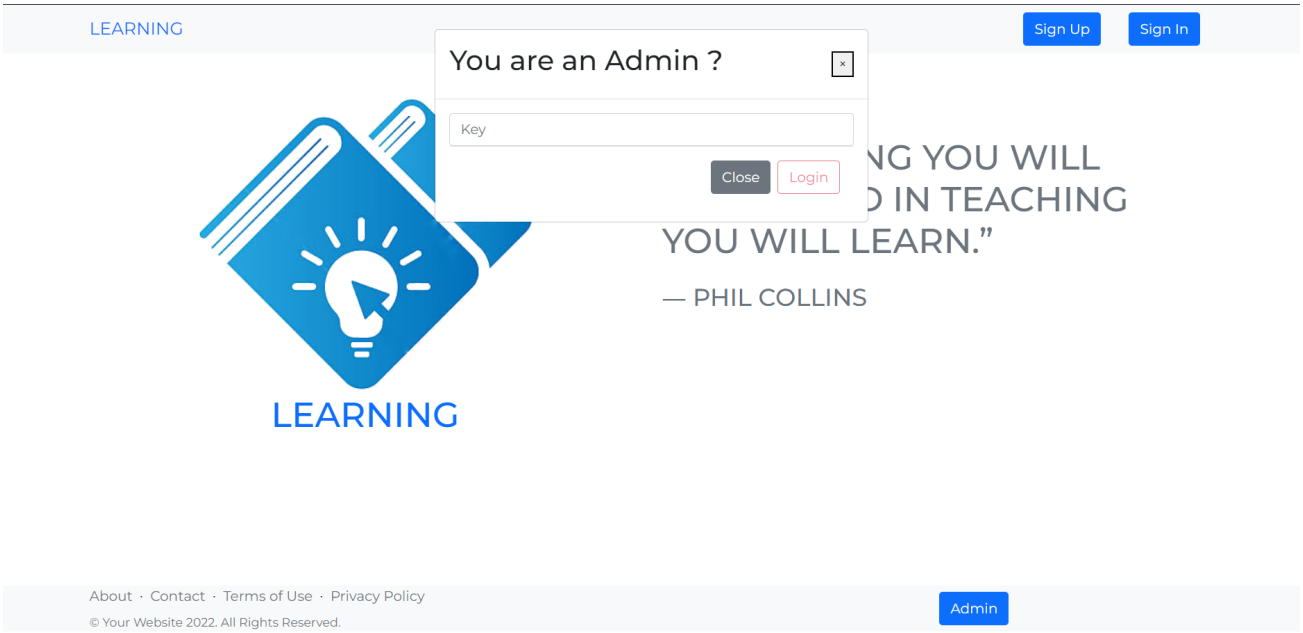


Figure45 : login interface2

- **SignUp Interface**

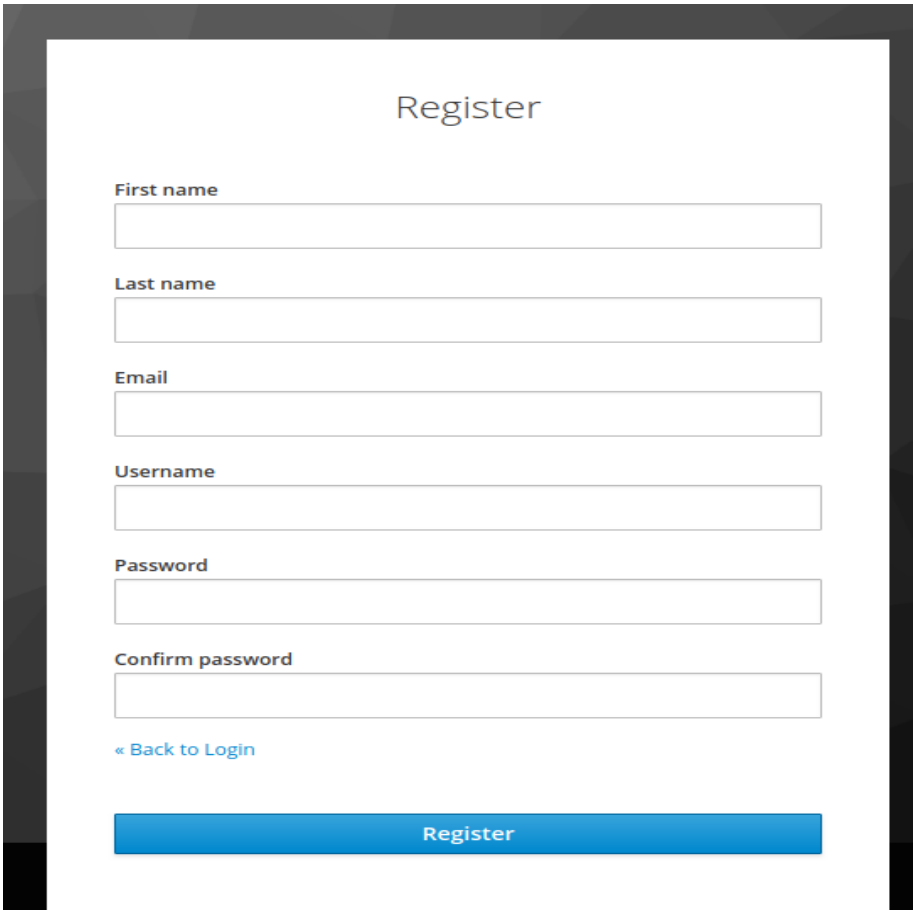


Figure46 : signup interface

- **Admin Dashboard**

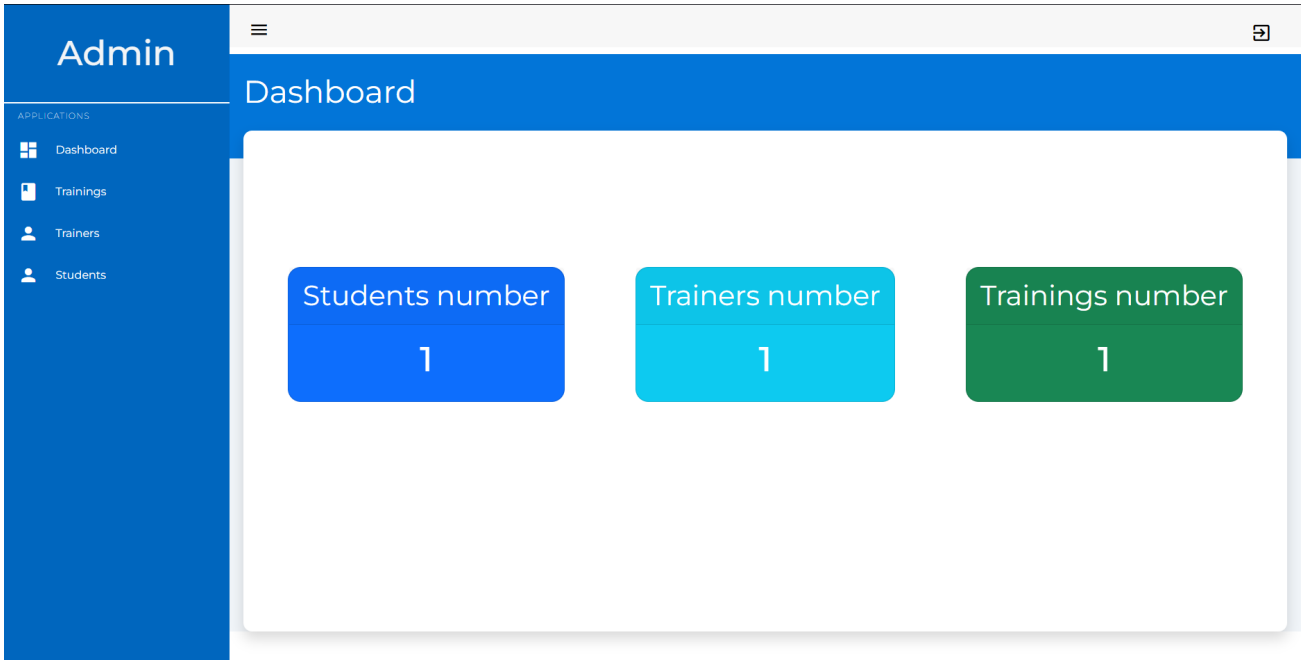


Figure47 : Admin dashboard interface

- **Trainings**

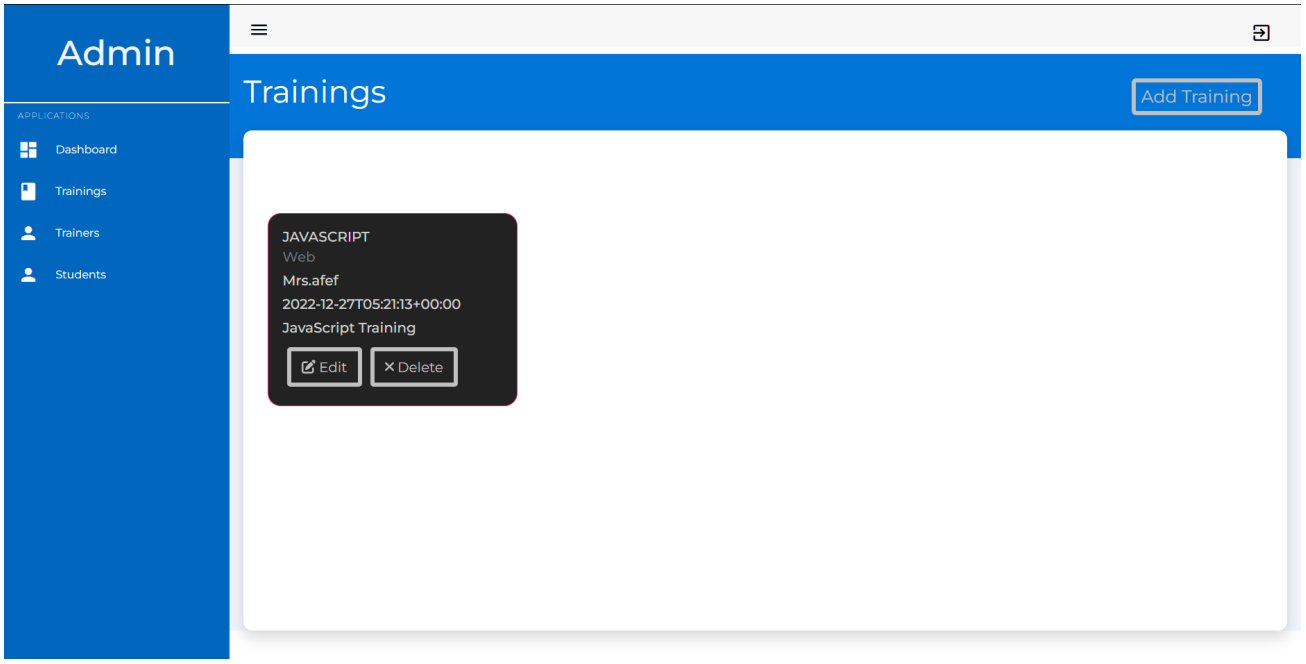


Figure48 : Trainings interface

- **Trainers**

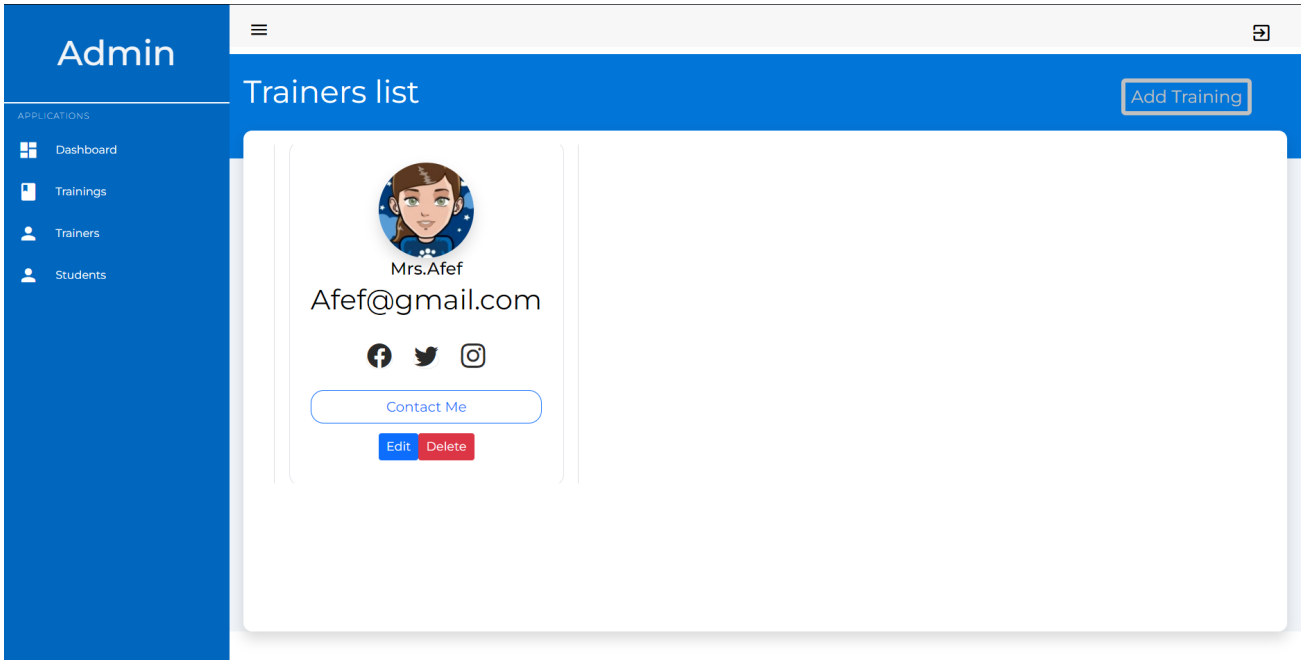


Figure49 :Trainers Interface

- **Profile User(Student,Trainer)**

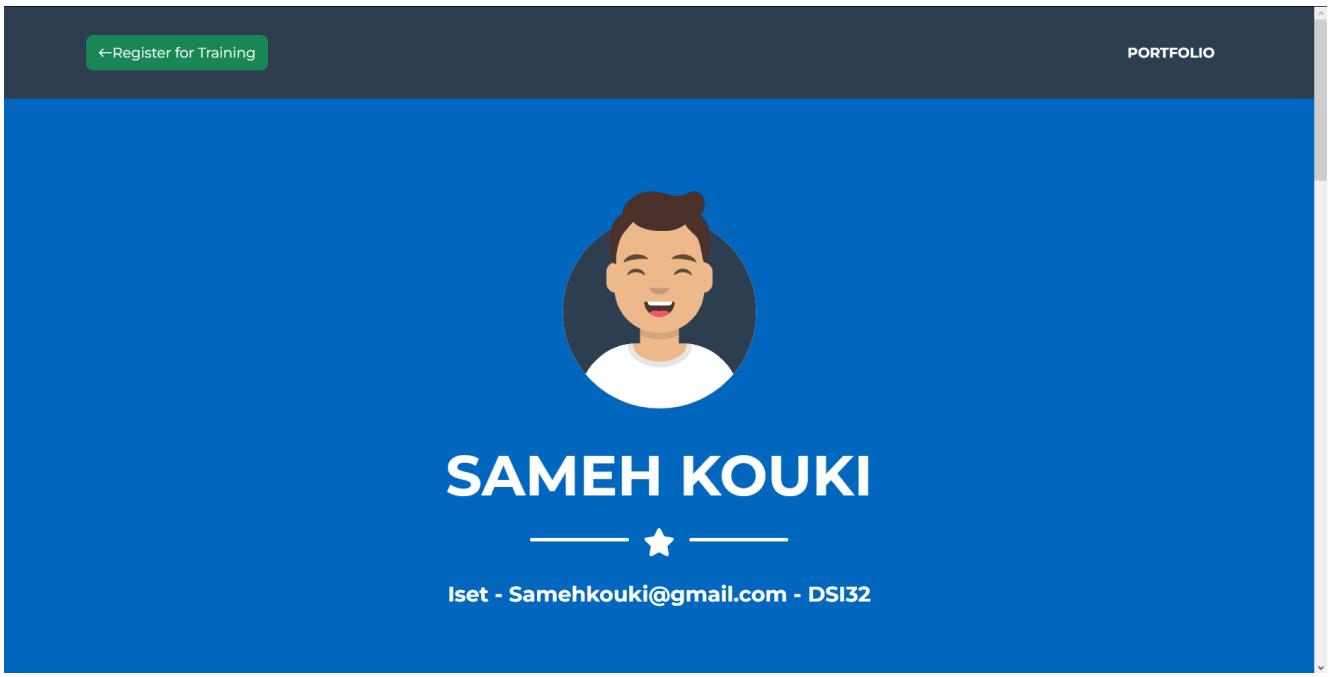


Figure50 :Profile angular Interface

4.5.2. Flutter

- **Profil Interface**

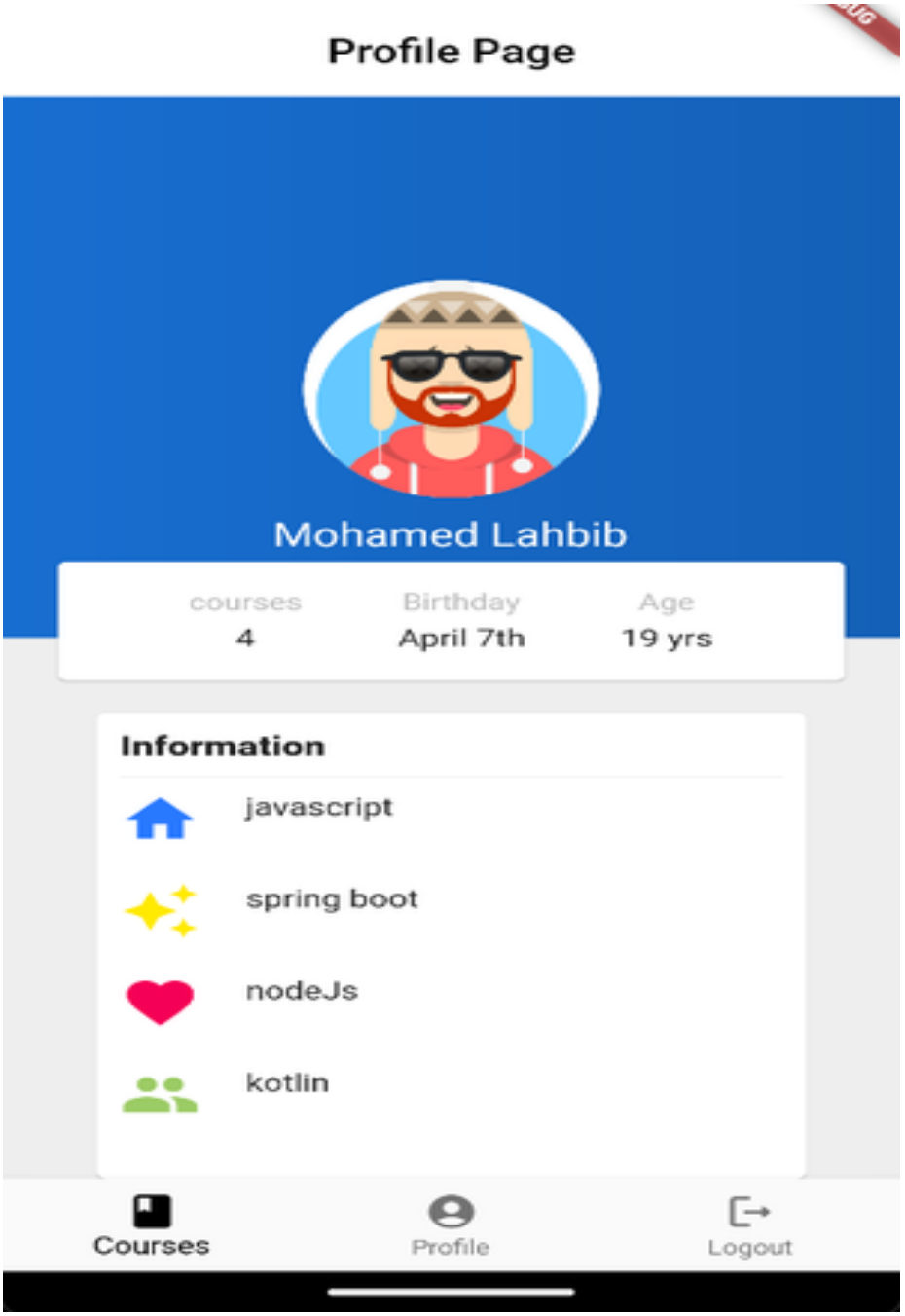


Figure51 : Profile Flutter interface

- **auth Interface**

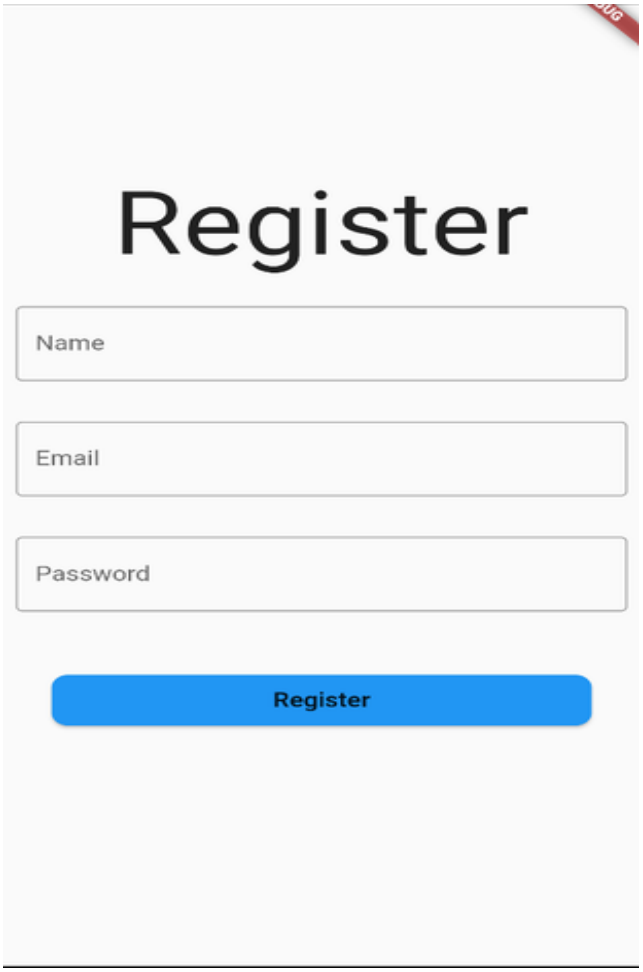


Figure 52 :Register Flutter interface

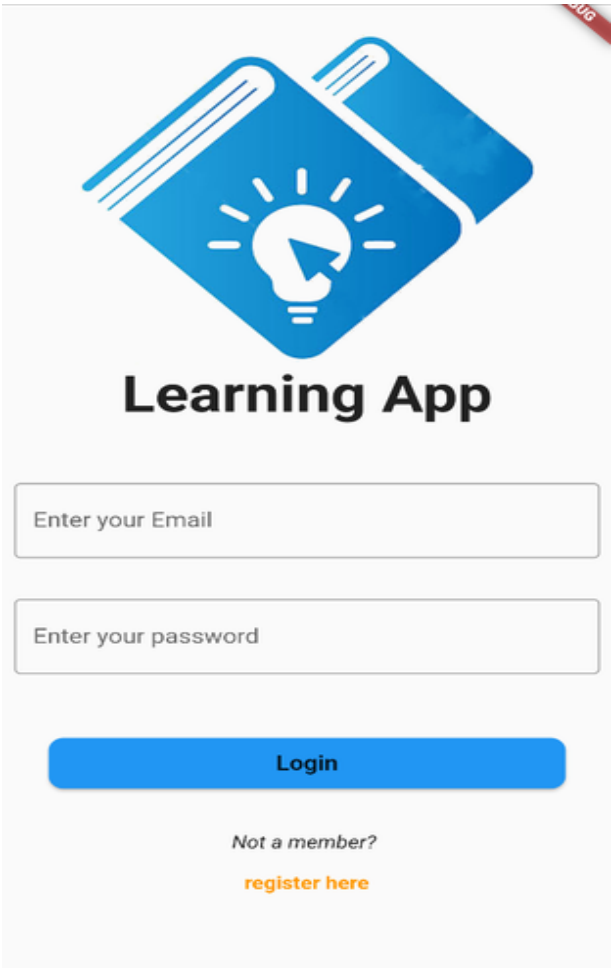


Figure 53 : Login Flutter interface

Conclusion

Through this last chapter, I presented, first of all, the material environment and software of my project, as well as the choice of the development language.

Then we illustrated some scenarios of this work through screenshots showing the different interfaces that my application contains.

General conclusion

This project offered us a very rich opportunity where we practiced our knowledge in the field of web and mobile application development using microservices architecture, uml design as well as sql and nosql database design and modeling.

Thanks to this project we learned the fundamental steps of the realization of a project in development.

Indeed, this work being a human work, is not a unique and perfect model, this is why we remain open to all criticisms and we are ready to receive all suggestions and remarks tending to further improve this study, since all computer work has always been the work of a team.

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