ASSIGNMENT 1 FRONT SHEET

Qualification	BTEC Level 5 HND Diploma in Business		
Unit number and title	Unit 30: Application Development		
Submission date		Date Received 1st submission	
Re-submission Date		Date Received 2nd submission	
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Student declaration			
I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice.			

	Student's signature	

Grading grid

P1	P2	P3	M1	M2	D1

☐ Summative Feedback:		☐ Resubmission Feedback:

Grade:	Assessor Signature:	Date:

Internal Verifier's Comments:

Signature & Date:

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Software Requirements Specifications and Software Design

Introduction

Document Purpose

In this report, we will have a requirement specification that explores the problem by a set of user and system requirements, as well as determines any risks related to the successful completion of your application by using the SRS template or modify one to complete this task. An evaluation section in which you research the use of software development tools and techniques and identify any that have been selected for the development of this application. And a design section in which you use chosen tools from the previous step to produce design diagrams for your solution based on the requirement specification.

Product Scope

As the technology is developing rapidly nowadays, FPT Co. desires to build a continuing study environment throughout the corporation. It is necessary to develop a system, which can manage the activity of "Training" for the internal training program of the company. This system could be used to manage trainee accounts, manage trainers, manage course categories, manage courses, manage topics,

assign a topic to course, assign a trainer to a topic, assign trainee to course. This is a system used by the HR department. We have four roles in this system, administrator, training staff, trainer, and trainees.

Intended Audience and Document Overview

This document is intended for developers, project managers, marketing staff, users, testers, and documentation writers. We will start with an overview of the system, and then we move to analyze the function, the requirement. In the end, we will have some diagrams, which describe how the system works such as ERD, use case diagram, class diagram, etc.

Definitions, Acronyms and Abbreviations

Term	Definition
Android	Android is the name of the mobile operating system made by American company; Google
IOS	IOS is a mobile operating system created and developed by Apple Inc. and distributed exclusively for Apple hardware.
C#	C# is a general-purpose, multi-paradigm programming language encompassing static typing, strong typing, lexically scoped, imperative, declarative, functional, generic, objectoriented (class-based), and component-oriented programming disciplines
SQL	SQL stands for Structured Query Language, translated as Structured Query Language , is a common type of computer language for creating, editing, and retrieving data from a relational database management system.. This language has evolved far beyond its original purpose of serving object-relational database management systems. It is an ANSI / ISO standard
Java	Java is a general-purpose computer programming language that is concurrent, class based, object oriented, and specifically designed to have as few implementation dependencies as possible

Overall Description

Product Overview

The system will operate in FPT as a website. This system, when the user accesses, will have a separate function in this system for the user's account type (admin, training staff, ...).
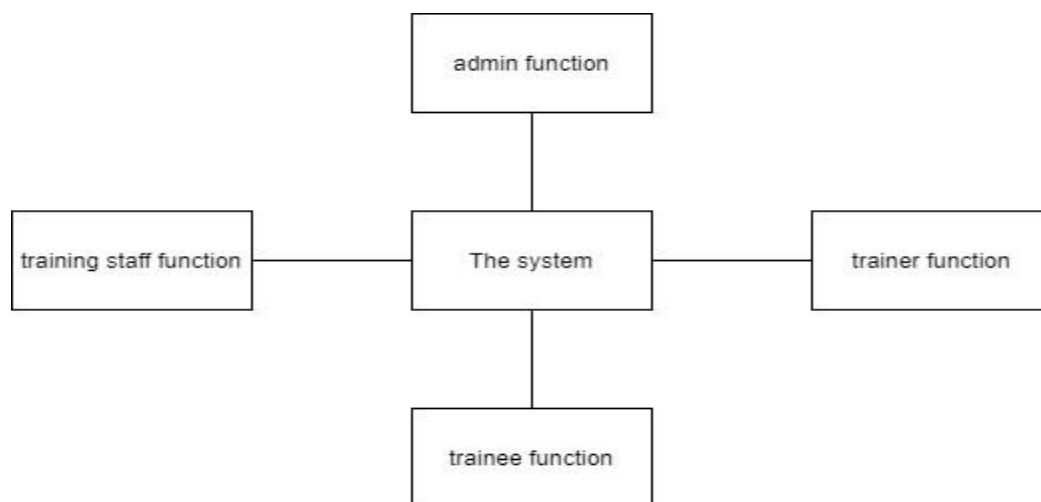
Product Functionality

Admin:

- Login
- Create/edit/delete new Trainer/Training Staff account and change (if existing user) its password

Training staff:

- Login
- Create trainee accounts.
- Search update, delete trainee accounts information.
- Search, add, update and delete course categories.
- Search, add, update and delete courses.
- Search, add, update and delete the trainer profile.
- Assign, remove, and change a trainer to a course.
- Assign, remove, and change trainee to a course.

Trainer:

- Login

- Update profile, view course

Trainee:

- Login
- Update profile, view course

Design and Implementation Constraints

The Unified Modeling Language (UML) is a general-purpose, developmental, modeling language in the field of software engineering that is intended to provide a standard way to visualize the design of a system (wikipedia.org, 2021).

Before 1990, it had been not so important to make applications with specific architecture. Since then, applications are becoming complex each and each day with protection from new threats which will exploit the appliance. Also, because the world of programming is getting bigger day by day, smart people are inventing new ways to make applications which will help us create applications fast and straightforward. there's one such architecture called MVC that was invented in 1970s by Trygve Reenskaug (Jithin, 2021).

The Model: Model works directly with the database. It doesn't need to handle the interface or handle the info within the world scenario. The View: Simply put, a View is the UI where our client / user can perform some action. It contains HTML, CSS, JS, XML or any other markup language we can use to create a nice UI. The Controller: Controllers are the part where we process data after we receive a request from a View, and before we update anything in the database with our Models. Advantages of the MVC: Application development becomes rapid. It's easy for multiple developers to collaborate and work together. Make updating the app easier. It's easier to debug because we have many levels properly written in the application. Disadvantages of MVC: It is very difficult to understand MVC architecture. There must be strict regulations on the method. There aren't many downsides to architecture. And the downsides are not so great and very easily overlooked compared to all the benefits we get (Jithin, 2021).

Assumptions and Dependencies

List of some major assumptions that significantly affect the design:

- Customer change request
- Not enough members
- Less time to implement the design
- Insufficient funds

Specific Requirements

External Interface Requirements

User Interfaces

The user interface of our application will be easy to use and understandable. It is designed for people who work and study at FPT. Moreover, the user is expected to know how to use Android or IOS mobile devices and to be able to write and read and use buttons. User interfaces are explained in details below:

- Login Interface: In this interface, there will be a button register. If the user has not registered to the application, s/he will use the register button and register to it.
- Register Interface: In this interface, the user registers to the system by giving himself information in a provided text field. There will be a button register. After the user filled the required fields with his/her related information (username, password, gender, etc.), click on the register button and be able to log in to the application.
- Admin interface: In this interface, the user can create, update, or delete any training staff and trainer account.
- Training staff interface: In this interface, the user can create, update, or delete any trainee account. They also can assign trainees and trainers to a course, manage the course, topic.
- Trainer/Trainee interface: In this interface, the user can see all the courses they had been assigned to.

Hardware Interfaces

This website works on Android, IOS mobile devices, tablets and Microsoft or Mac. No other hardware is required.

Software Interfaces

To run this application, the only required software interface for the user is the user computer need to be window 7 or higher in order to perform.

Functional Requirements

Admin:

- Can log in to the system through the first page of the application
- Can create/edit/delete a new Trainer account and change (if existing user) its password.
- Can create/edit/delete new Training Staff account and change (if existing user) its password.

Training Staff:

- Can create trainee accounts by entering details like trainee name, trainee accounts, age, and date of birth, education, main programming language, TOEIC score, experience details, department, and location.
- Can search a Trainee-by-trainee account, programming language, TOEIC score.
- Can update, delete trainee accounts information.
- Can manage course categories such as searching, adding, updating, and deleting course categories. Course category includes information such as course category name and descriptions.
- Can manage courses such as searching, adding, updating, and deleting courses. The course includes Course Name, Course Category, and Description.
- Can manage trainer profile such as adding, updating, and deleting the information: Trainer name, External or Internal Type, working place, telephone, and email address.
- Can assign a trainer to a course.
- Can remove courses from Trainer.
- Can change Trainer assigned to another course.
- Can assign trainee to a course.
- Can remove courses from Trainee.
- Can change Trainee assigned to another course.

Trainer:

- In the same system, the trainer who has been registered by the administrator can log in and can update his profile such as Trainer name, External or Internal Type, education, working place, telephone, and email address.
- Can update his / her account password.
- Can view courses, which he/she is assigned.

Trainee:

- In the same system, the trainee who has been registered by the administrator can log in and can view his/her profile.
- Can update his / her account password.
- Can see all the available courses.
- Can view courses to which s/he is assigned.

Non-functional requirement

Performance: Users should not have to wait more than 10 seconds for the page to load.

Reliability: Information about users will not be leaked.

Availability: Users can access the website at any time during the day, seven days a week. All functionalities will be available again after a day if there is an unanticipated system outage.

Maintainability: If the services become unavailable, they can be taken offline for up to three hours for maintenance.

Recoverability: If a serious problem occurs on the website, the company must take steps to restore full functionality within three days.

Capacity: The application can handle up to 600 users at a time. It is possible to store up to 1,000,000 profiles.

Security: Only users with the roles of "admin" and "training staff" have access to the applicant's verified phone number.

Data integrity: The system must preserve backups of all database updates for each record transaction to ensure data integrity.

Interoperability: The website's architecture must be service-oriented.

Usability: The website's interface must be simple and intuitive to use.

Use Case Model

Use case diagram is a graphical depiction of a user's possible interactions with a system. Use case diagram shows various use cases and different types of users the system has and will often be accompanied by other types of diagrams as well. The use cases are represented by either circles or ellipses. The actors are often shown as stick figures (wikipedia.org, 2021).

The admin function has been built based on the needs that I have examined previously. To obtain power, the administrator must log into the system. The administrator will mostly monitor and edit the trainers' and staff's accounts.
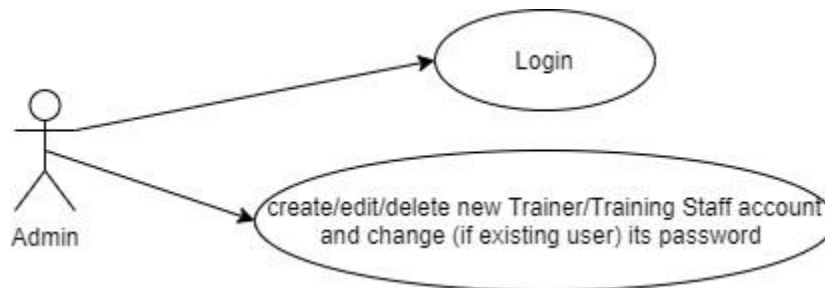
Figure 2: admin function

Training employees, like everyone else, will be required to log into the system using an account granted by the administrator. Almost every function in the system is overseen by training personnel. The training staff's responsibilities include managing courses, assigning tasks, and maintaining student and coach accounts.
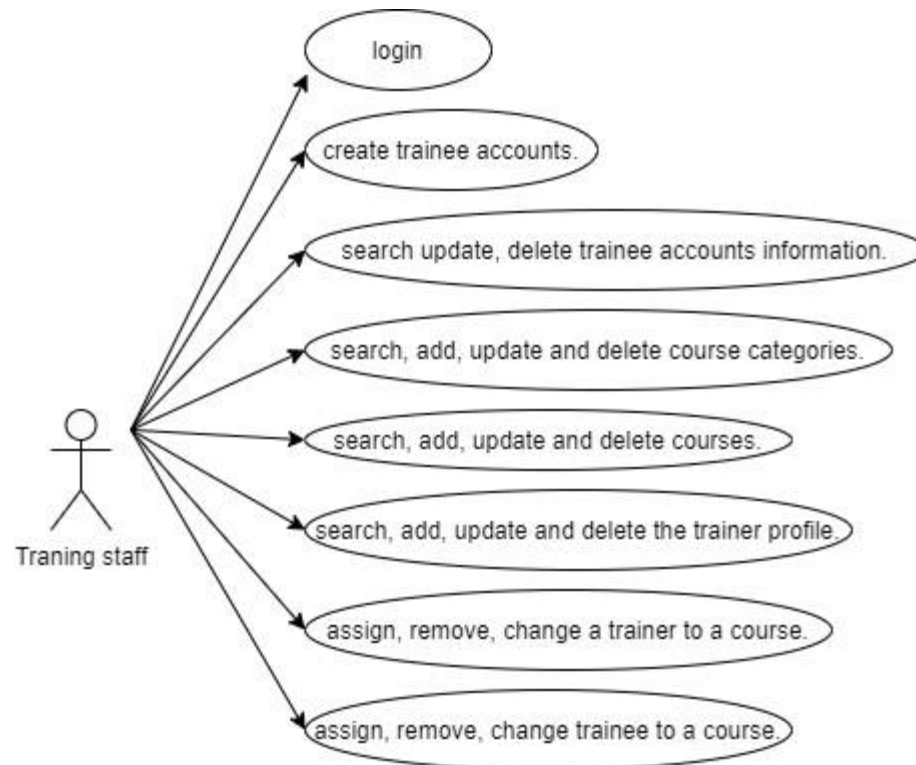
Figure 3: training staff function

The administrator or staff will also provide the trainer with an account so that he or she may log into the system. Only the courses allocated to a trainer's faculty can be viewed.
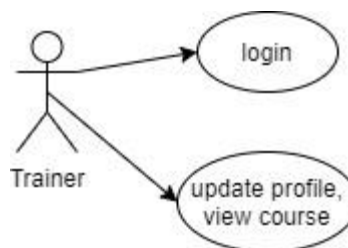
Figure 4: trainer function

Trainer and Trainee have the same action.
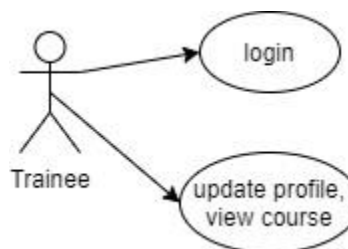
Figure 5: trainee function
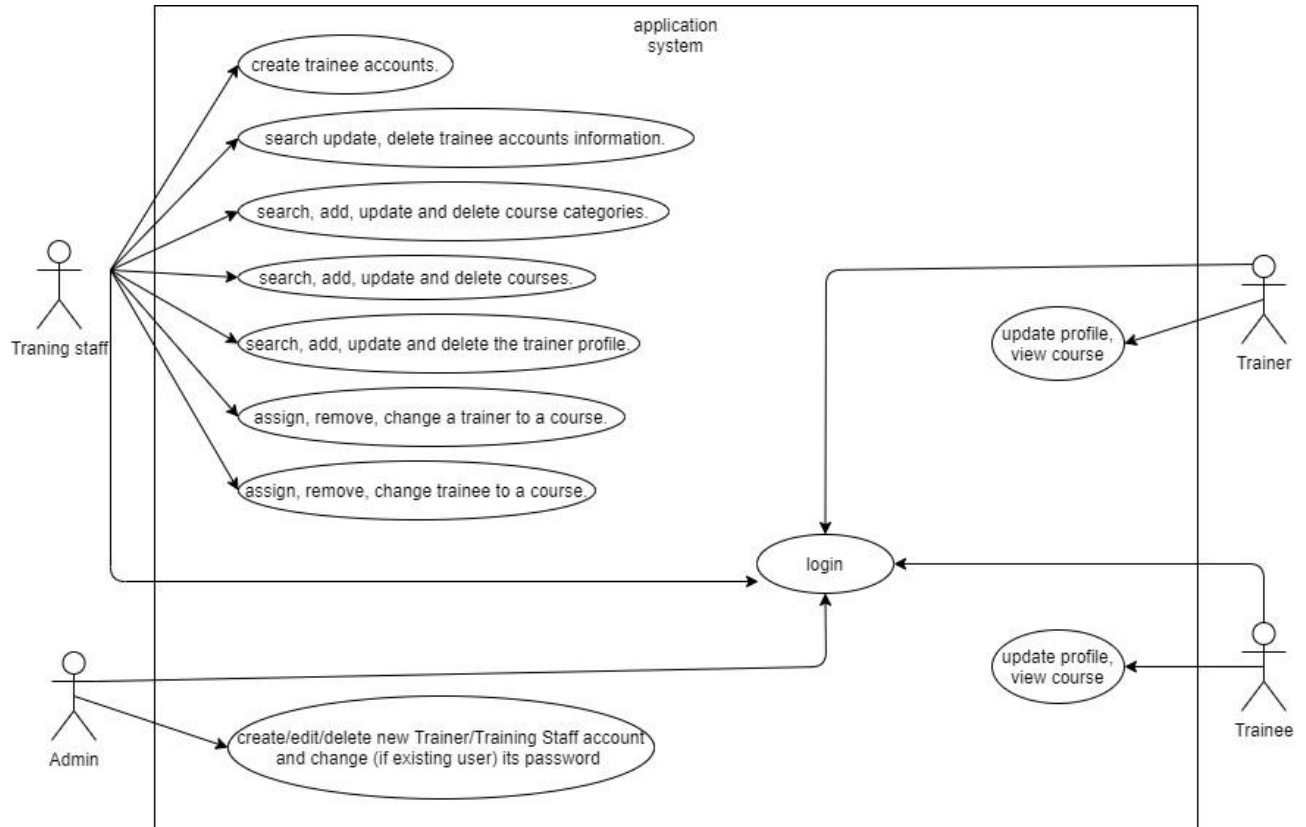
Figure 6: use case diagram

Login

Use Case ID	UC-1.1
Use Case Name	Login
Description	As a user, I want to log in to the app to use services from the app.
Actor(s)	Customer
Priority	Must Have
Trigger	Users who want to login to the Medium application
Pre-Condition(s):	User accounts already created User account has been authorized The user's device is already connected to the internet when logging in
Post-Condition(s):	User successfully logged into the application The system records successful logging in Activity Log.
Basic Flow	User accesses application. The user chooses the login method with account The user enters account and selects the login command The system authenticates the login information successfully and allows the user to access the application The system records successful logging in Activity Log.
Alternative Flow	None
Exception Flow	The system validates the login failed and displays a message. The user chooses to cancel the login. Use Case stops.
Business Rules	Users who enter incorrect login information for the 6th time in a row will have their account locked for 30 minutes.
Non-Functional Requirement	None

Table 1: UC-1.1

Assign trainer or trainee to course
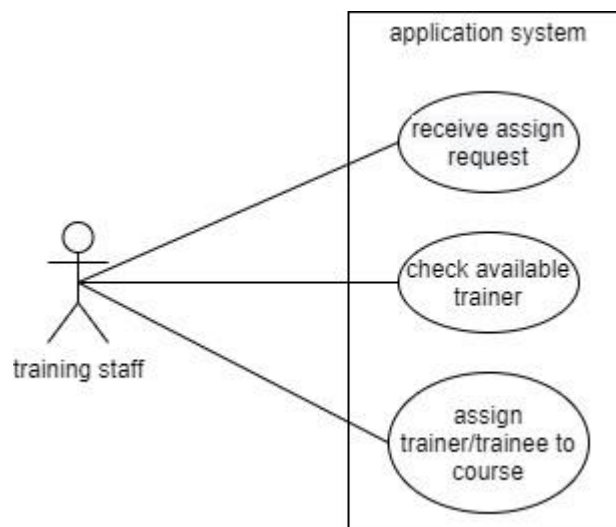
Figure 8: assign use case

Use Case ID	UC-1.2
Use Case Name	Assign an user to course
Description	Trainer and trainee need to be assign to course to start study.
Actor(s)	Training staff
Priority	Must Have
Trigger	None
Pre-Condition(s):	The account need to be training staff. Trainer, trainee or course must be real. The user's device is already connected to the internet when logging in
Post-Condition(s):	The system records successful in Activity Log.
Basic Flow	User Login application. User enter trainer or trainee id and course id. The system authenticates the information The system records successful logging in Activity Log.
Alternative Flow	None
Exception Flow	User enter wrong id, displays a message. The user chooses to stop assign. Use Case stops.
Business Rules	None
Non-Functional Requirement	None

Table 2: UC-1.2

Manage account
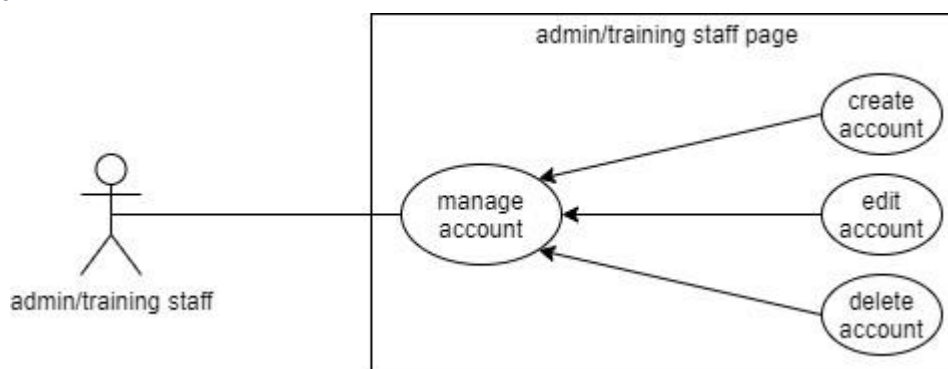
Figure 9: manage account use case

Use Case ID	UC-1.3
Use Case Name	Manage
Description	The admin and training staff will need to manage all the account of the system.
Actor(s)	Admin, training staff.
Priority	Must Have
Trigger	None
Pre-Condition(s):	User accounts must be admin or training staff. The user's device is already connected to the internet when logging in.
Post-Condition(s):	User successfully add/edit/delete account of the application The system records successful in Activity Log.
Basic Flow	User login application. The user enters account id and chooses the method add/edit/delete The system authenticates the information successfully and allows the user to continues. The system records successful in Activity Log.
Alternative Flow	None
Exception Flow	User enter wrong id, displays a message. The user chooses to stop the action. Use Case stops.
Business Rules	The account must be available when user chose to edit or delete.
Non-Functional Requirement	None

Table 3: UC-1.3

Technical Design

Screen flow Diagram
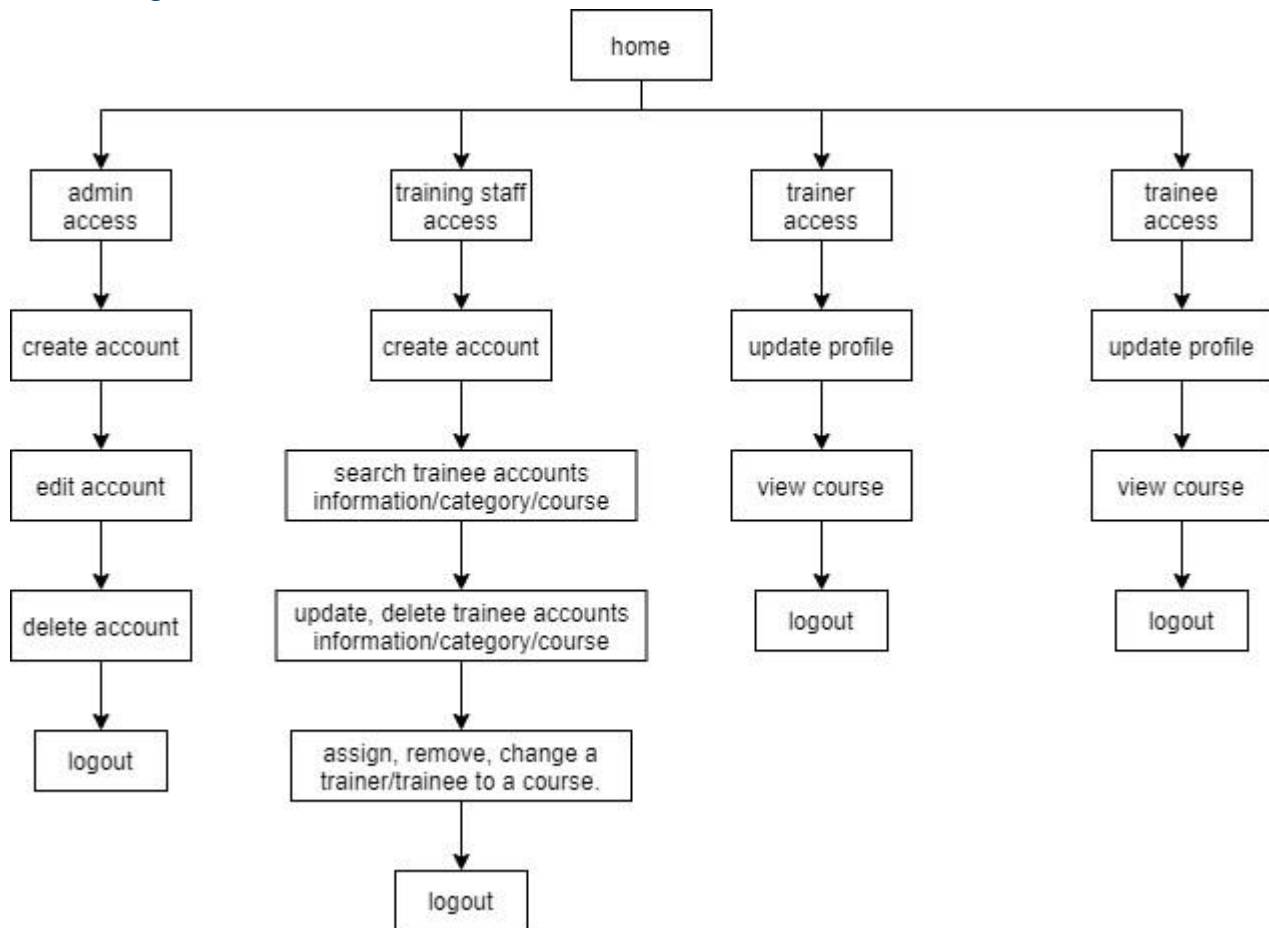
Figure 10: screen flow diagram

When use open the application, they will all start at home page. They will have to login to continues. After login successfully, they will be redirected to a page with functions that only their account is allowed to do depend on their account type.

Entity Relationship Diagram (ERD)

The ERD model is abbreviated by the word Entity Relationship Diagram, which is understood as the association entity model, also known as the associated entity. This model is also known as ER (short for Entity-Relationship model). So what is ER model? The ERD or ER model includes entities, associations, and especially attribute lists (wikipedia.org, 2021).

To draw an ERD diagram, we need to note some of the following symbols:

- Rectangle: entity representation
- Ellipse: represents the attribute, in the ellipse has the attribute name

- Rhombus: represents the relationship

A relationship between two entities shows that the two entities are somehow related to one another. A student might enroll during a course, for example. As a result, the entity Student is linked to the entity Course, and a relationship is displayed as a connector along both.

In ERD, an entity is a definable thing or notion within a system, such as a person/a role, object, concept, or event (note: the terms "entity" and "table" are interchangeable). Consider entities as nouns while determining their existence. An entity in an ER model is represented by a rounded rectangle with its name on top and its properties listed within the shape's body.

A property or characteristic of the entity that holds an attribute, often known as a column, is a property or characteristic of the entity that contains it. An attribute has a name that identifies the property and a kind that specifies the attribute's kind. It's the equivalent of varchar for strings and int for integers.
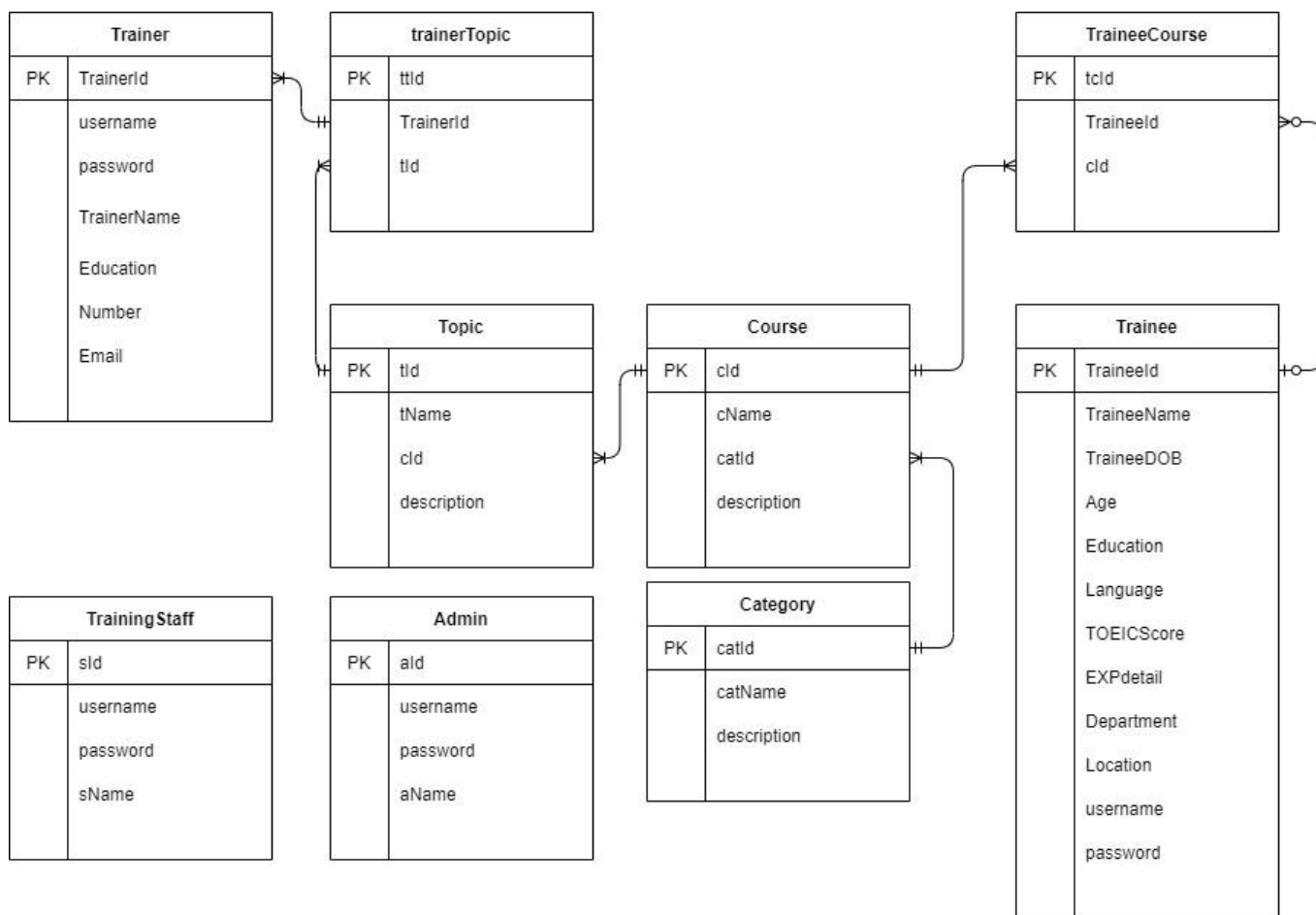
Figure 11: ERD

This diagram will show the relationship between the entity of the system. Trainer and Topic are linking by trainerTopic. We can see the Course in the Topic, Category in the Course. And the Trainee and the Course are linking by TraineeCourse.

Class Diagram

In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects (wikipedia.org, 2021).

The class diagram is the main building block of object-oriented modeling. It is used for general conceptual modeling of the structure of the application, and detailed modeling, translating the models into programming code. Class diagrams can also be used for data modeling. The classes in a class diagram represent both the main elements, interactions in the application, and the classes to be programmed.
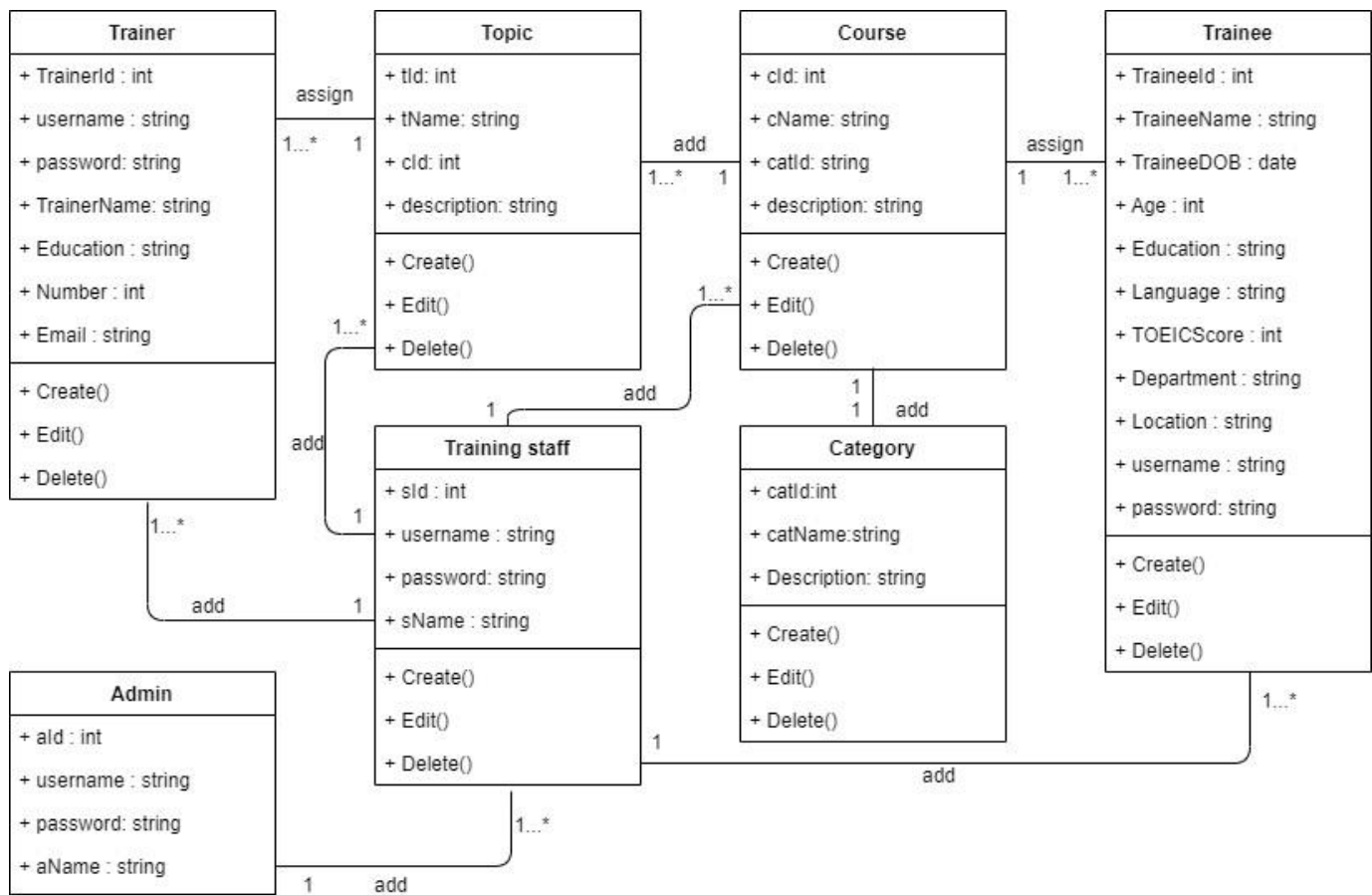
Figure 12: Class Diagram

In this diagram, each class can be added, edited, or deleted by the training staff and the admin except the admin class. Training staff will have the ability to manage many trainers, trainees, topics, and

courses. Course will be able to have many trainees, many topics, a category. Admin can manage many training staff.

Activity Diagram

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration, and concurrency. In the Unified Modeling Language, activity diagrams are intended to model both computational and organizational processes (i.e., workflows), as well as the data, flows intersecting with the related activities. Although activity diagrams primarily show the overall flow of control, they can also include elements showing the flow of data between activities through one or more data stores (wikipedia.org, 2021).

This diagrams show the sequence of activities of all objects in the system, as the name implies. If the login is successful, the subjects will have limited access permissions from the moment they log in.
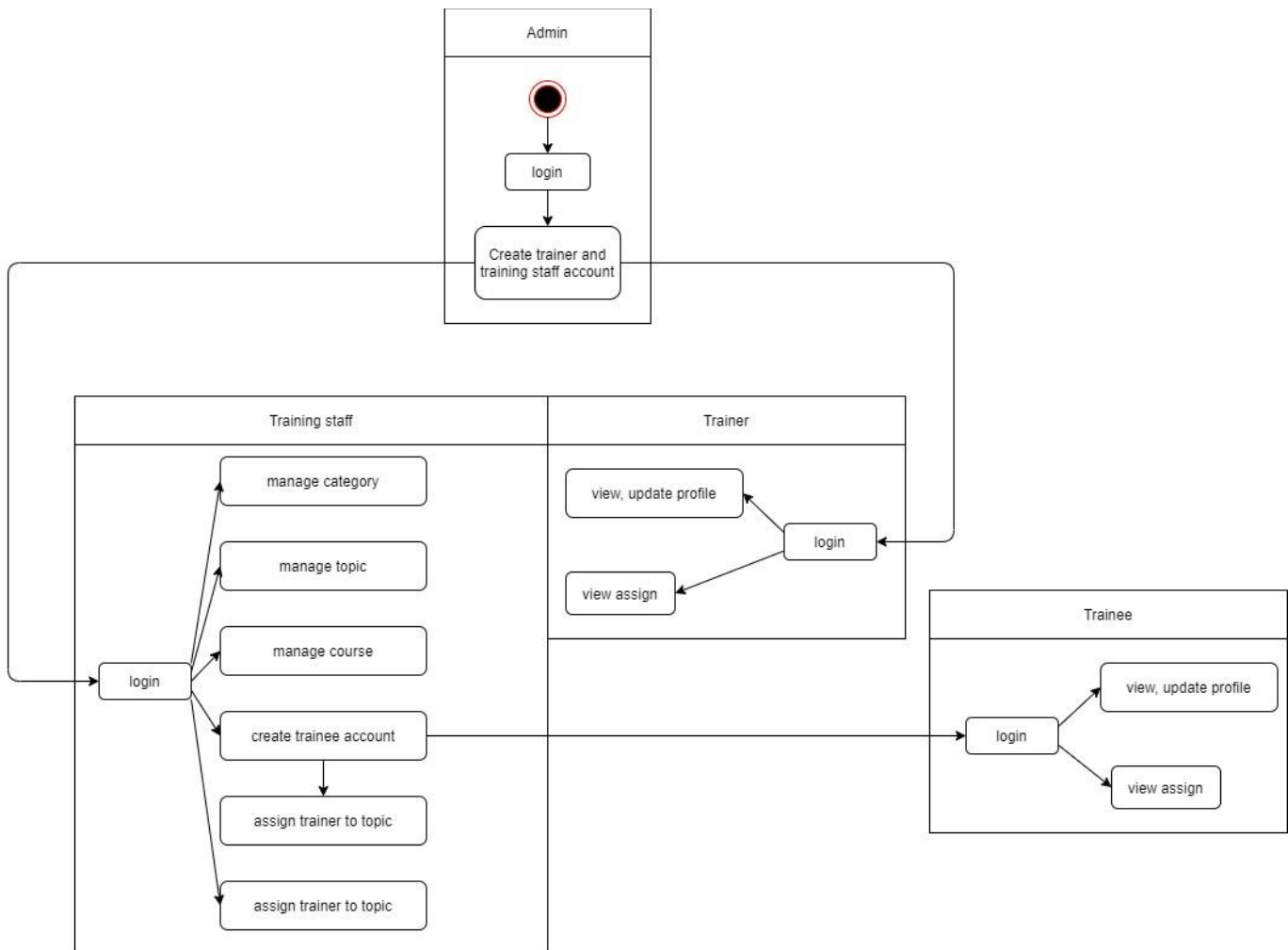
Figure 13: Activity Diagram

With the activity diagram, we can see the flow of the activity in the system. First, when the admin login, they will be able to create a training staff account or trainer account. Once the training staff or trainer account had been created, the training staff and trainer will be able to log in. In the trainer part, we can see that the trainer can view, update the profile, and view which topic they had been assign. The training staff part shows that training staff can manage category, topic, course and account, they also can create trainee account and assign trainer, trainee to any course. When the trainee account had been created, the trainee will have the ability to log in to the system. All they can do are view, update the profile, and view which course they had been assign.
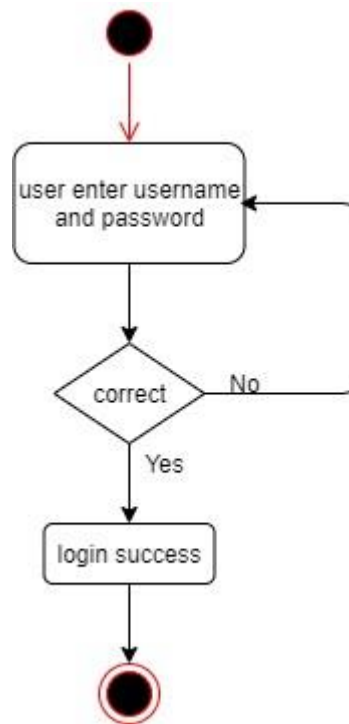
Figure 14: login activity diagram

About the login, when the user wants to log in to the system, they will have to enter their username and password, the system will check if it is correct or not. If it is not correct, the user will have to enter the username and password again. And if it is correct, the user will access the system.
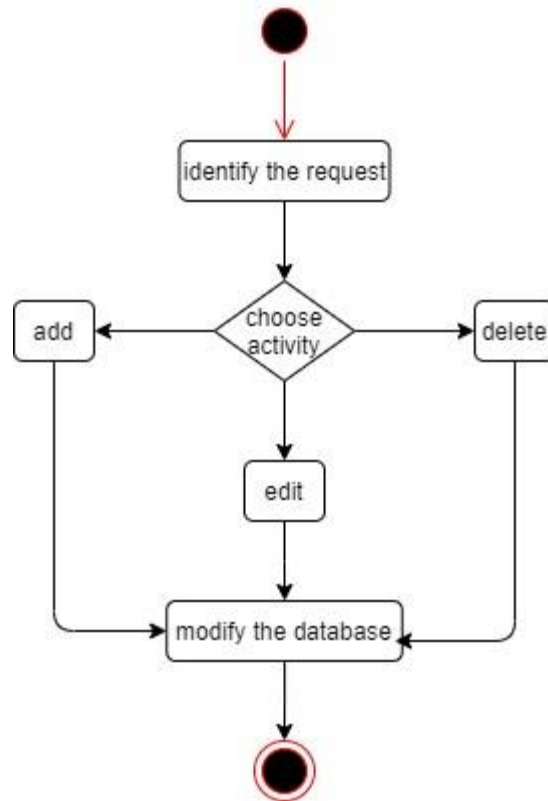
Figure 15: manage activity diagram

When the user chooses to manage the information, they will have to choose to add, edit or delete. After all that they have to add, edit or delete, it will all save and it will modify the database.
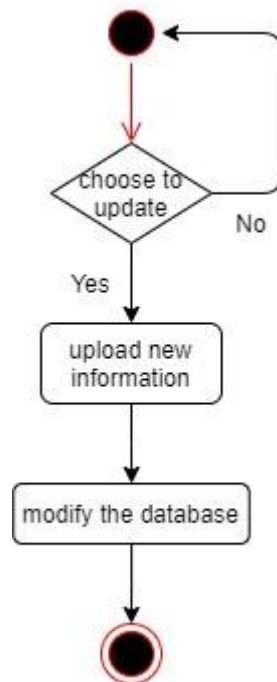
Figure 16: update information activity diagram

Just like add, edit or delete, when users want to update their information, all the things they had changed will all save and it will modify the database.

Sequence diagram

Interaction diagrams such as UML Sequence Diagrams show how operations are carried out. They capture the interaction between things in a collaborative setting. Sequence Diagrams are time-focused and visually depict the order of interaction by using the vertical axis of the diagram to represent time and the messages sent and received (visual-paradigm, 2021).
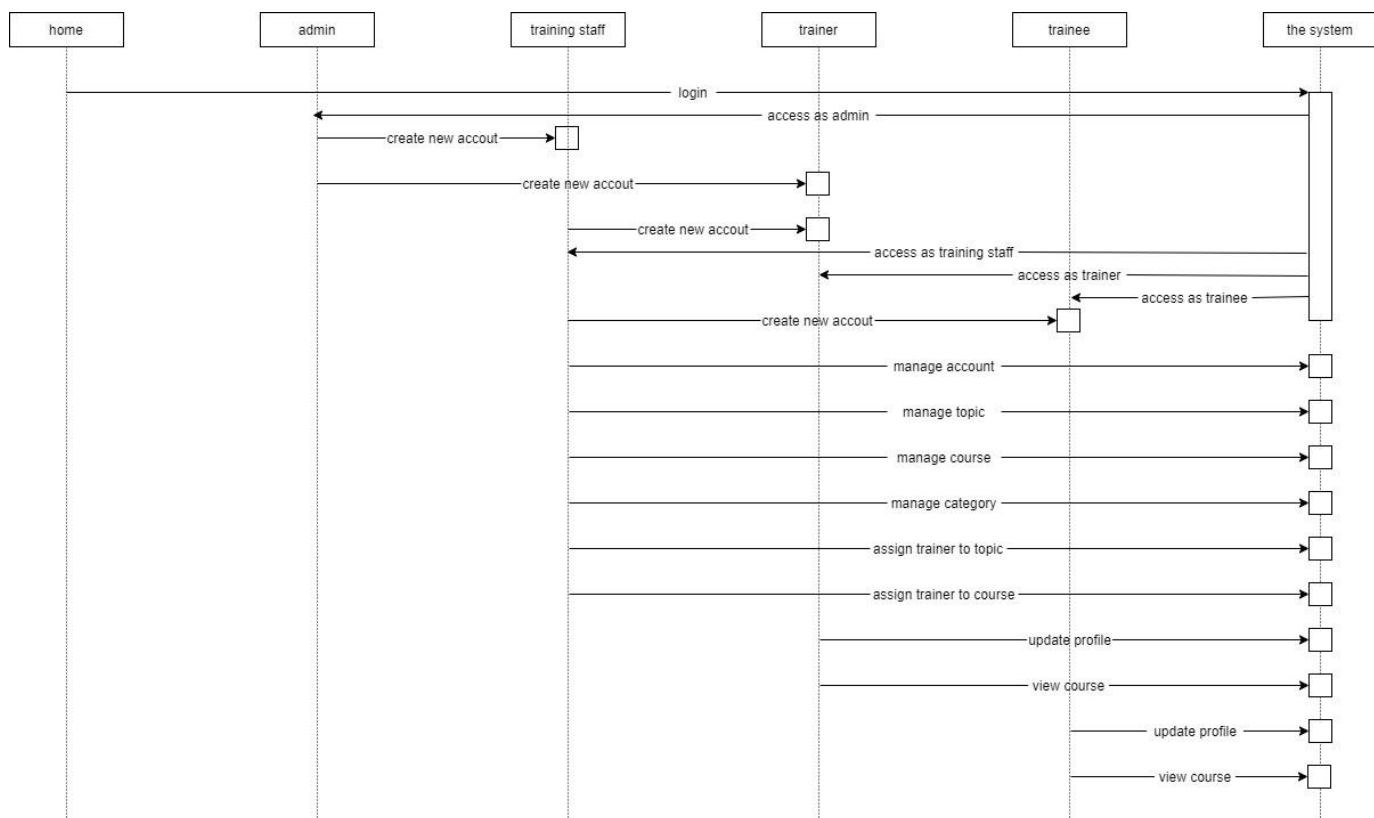
Figure 17: sequence diagram

When a user first launches the app, they are taken to the home page. They'll have to check in to continue. They will be routed to a page where, depending on their account type, they will be able to do specific duties.

Gantt Chart

Task Mode	Task Name	Duration	Start	Finish
📌	matching team to projects	1 day	Thu 03-06-21	Thu 03-06-21
📌	srs form	9 days	Sat 05-06-21	Wed 16-06-21
📌	risk form	9 days	Sat 05-06-21	Wed 16-06-21
📌	evaluation	6 days	Wed 09-06-21	Wed 16-06-21
📌	assignment 1 synthesis	3 days	Thu 17-06-21	Sat 19-06-21
📌	front-end	3 days	Mon 21-06-21	Wed 23-06-21
📌	back-end	3 days	Mon 21-06-21	Wed 23-06-21
📌	test the application	1 day	Thu 24-06-21	Thu 24-06-21
📌	assignment 2 synthesis	1 day	Fri 25-06-21	Fri 25-06-21

Figure 18: Gantt Chart

RISK MANAGEMENT MATRIX

NAME		OBJECTIVE	

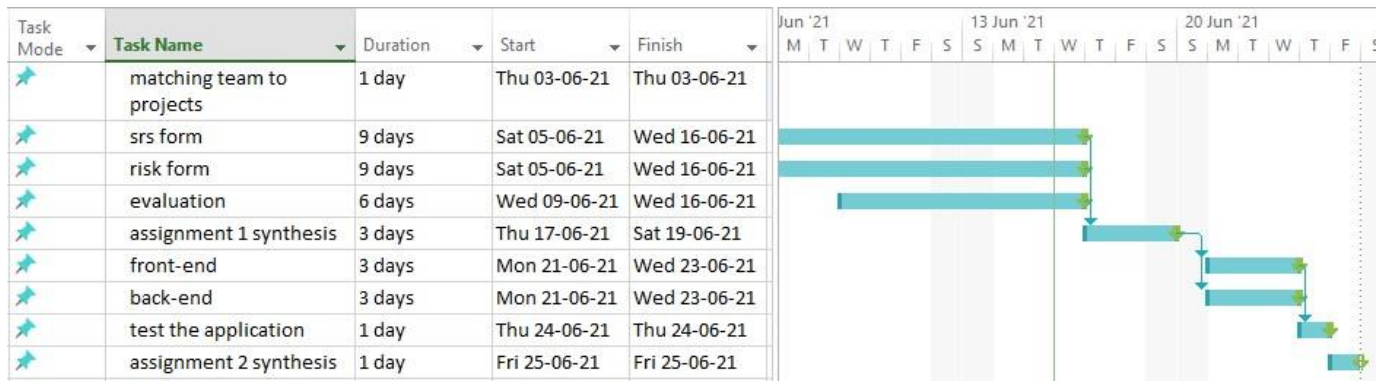| REF / ID	PRE-MITIGATION				DEPARTMENT / LOCATION	MITIGATIONS / WARNINGS / REMEDIES	POST-MITIGATION			
	RISK	RISK SEVERITY	RISK LIKELIHOOD	RISK LEVEL			RISK SEVERITY	RISK LIKELIHOOD	RISK LEVEL	ACCEPTABLE TO PROCEED?
		– ACCEPTABLE – TOLERABLE – UNDESIRABLE – INTOLERABLE	– IMPROBABLE – POSSIBLE – PROBABLE	– LOW – MEDIUM – HIGH – EXTREME			– ACCEPTABLE – TOLERABLE – UNDESIRABLE – INTOLERABLE	– IMPROBABLE – POSSIBLE – PROBABLE	– LOW – MEDIUM – HIGH – EXTREME	YES / NO
1	Lack of time	ACCEPTABLE	IMPROBABLE	LOW	Employees	It takes a lot of time for the members to complete the work. The team leader needs to have a specific plan for each phase to ensure progress.	ACCEPTABLE	IMPROBABLE	LOW	YES
2	Misunderstanding of requirements	TOLERABLE	IMPROBABLE	HIGH	Employees+ Systems	Work very carefully. Analyze the entire requirement, then divide it into sub-categories. Test thoroughly before delivery of the final product.	TOLERABLE	IMPROBABLE	MEDIUM	YES
3	Slow processing speed	ACCEPTABLE	IMPROBABLE	LOW	Systems	Need to upgrade the system to the maximum, in accordance with user needs. Expand memory, speed up transmission.	ACCEPTABLE	IMPROBABLE	LOW	YES
4	Network problem	ACCEPTABLE	IMPROBABLE	LOW	Systems	Update Network speed Improved back-end code	ACCEPTABLE	IMPROBABLE	LOW	YES
5	Disagreements among members	ACCEPTABLE	IMPROBABLE	LOW	Employees	Provide general opinions of all members. Leader analyzes the opinions and makes the final decision.	ACCEPTABLE	IMPROBABLE	LOW	YES

Figure 19: Risk matrix

1. Lack of time

The project relegated to me this time is to make a learning the executives' application for the whole company. That application incorporates full usefulness for the two clients and directors. Plus, the application should be utilitarian. With a short measure of season of around multi month making such an application is very troublesome. On the off chance that we do not have the foggiest idea how to viably oversee time, mastermind and separation the work, this undertaking cannot be finished. Each errand should be coordinated fittingly and finished inside a specific time frame. From that point, it is feasible to finish the venture step by step and bring great outcomes.

2. Misunderstanding of requirements

This undertaking is about an application that can deal with an immense number of clients, each with its own one of a kind capacity. This requires everything about be amazingly exact. This is the second danger that I face.

Misconception the solicitation will have unanticipated outcomes. Furthermore, it will cause harm on the two sides, the designer and the client. Thus, to limit hazard, it is important to work cautiously, examine the whole necessity, then, and at that point partition it. Into sub-classifications, when the sub-area is finished impeccably, the following stages will come. Rationale is a significant factor in deciding if the calculation works appropriately or not. When the application is finished, it will likewise be tried altogether before conveyance of the result. These ways can diminish misjudging or dispense with its prospects.

3. Slow processing spread

The third danger we face is moderate preparing spread. This is a far reaching project, so the quantity of workers is huge and an enormous data set is required. Simultaneously, because of the extremely short execution season of this venture, a few capacities can't be streamlined or the transmission speed is moderate, which makes it's anything but quite a while for clients to get to information. Be that as it may, we can totally improve the product in the following time frame contingent upon the preparation needs of the organization.

4. Network problem

Currently, in some locations, the internet transmission speed is very slow. This can directly affect the completion of work for some members and may cause errors when transmitting information to the internet. Therefore, the most necessary thing is to increase the internet speed through upgrading the network package to ensure the quality of the assigned work.

5. Disagreements among members

Because there is little opportunity for joint activities, there are many disagreements among the members. When members contribute ideas, many people will have many different ideas and argue and defend their opinions. At that time, the leader needs to come up with solutions to reconcile the set, give the advantages and disadvantages in each opinion and make the final decision for the members to implement.

Technologies evaluation

Design Tools

Before there has been a software program product, the programmer's first activity might be to layout the UML. Briefly explained, Unified Modeling Language is a general-cause modeling language evolved withinside the discipline of software program engineering to offer a well-known manner to visualize the layout of a system. So our group went thru a few software programs to assist in the layout of those UML diagrams.

Draw.io
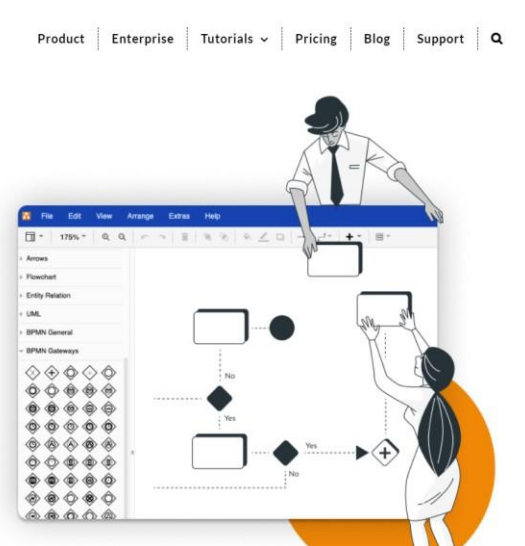
Figure 20: draw.io

Advantages:

Can pick from some of the pre-made frames to assist shorten the time (Anon., n.d.).

Create a snug body (optionally scale the body size).

Flexible adjustment.

Export and import documents easily.

Disadvantages:

Difficult to border the chart.

Not responsive (no different show layout on cellular screens).

Export as XML, HTML however encrypted.

Visual Diagram

Visual Paradigm is a sophisticated cross-platform design and management tool for IT systems which is nevertheless easy to use. Visual Paradigm delivers cutting-edge software developer platforms for quicker, better, and cheaper quality applications! It makes it easy to interoperate well with other CASE tools and most major IDEs, which shines in this one-stop shopping solution throughout the model code deployment development process (Anon., n.d.).

Advantages:

Made Easy Persistence

Development Model Driven

Generator of sophisticated mapping objects

Large coverage of the database

Resources related (Anon., n.d.)

 Disadvantages:

Some connection problems seldom occur in the SQL Server application. Resource utilization may be heavy. In the future, the solution might be more compatible. We have certain difficulties from time to time working as teams .

Selection:

We pick out Draw.io as our diagramming tool. This platform can draw diagrams of the network, electricity, cartoon the region of rooms withinside the house, or draw commercial enterprise processes, operations, production. Tech men can even love Draw.io as it permits you to attract dozens of software, hardware, and device layout diagrams. Draw.io has a totally wealthy template library so that you can get commenced faster, while not having to redraw all your own.

Tools to design User Interface

The interface layout procedure is likewise critical in supporting programmers to optimize money and time withinside the product improvement procedure. Agreeing earlier avoids confusion in coordination with different departments withinside the company.

Invision Studio:

Good design forms the interaction of humans (VALBERG, n.d.). This is frequently the difference between a product you love and one you just use – between the thriving and the lagging products. This makes designers more willing to raise their skills than ever before. Today's design tools unfortunately do not always meet designers' and their teams' demands. Furthermore, the fragmented nature of these instruments might produce a disassembled, unstructured workflow.

We know these far-reaching issues and feel that the design team must concentrate on creating outstanding digital experiences free of charge. Logo on Twitter. Therefore we have built InVision Studio, the world's most powerful tool for screen design, to push your vision and skills to new heights.
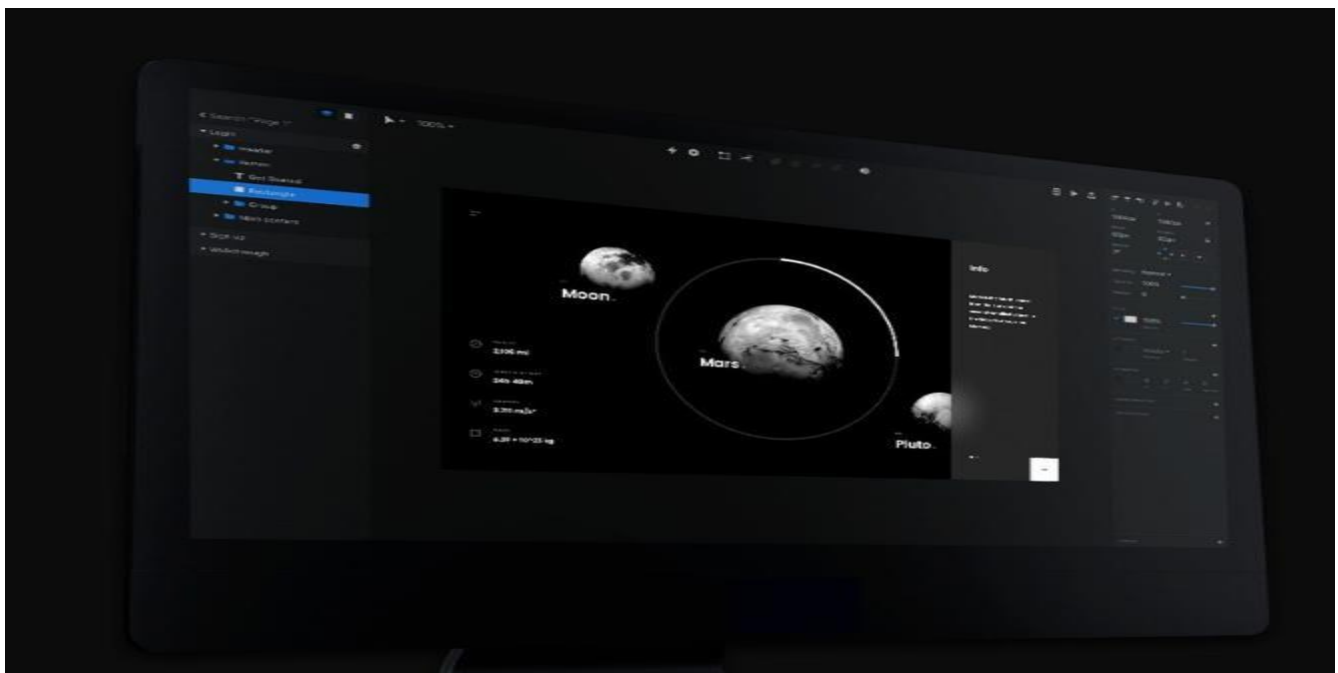
Figure 21:InVision Studio

Advantages:

Sketch integration provides as a complete design suite.

Easy prototyping and wireframing allow PMs to make fun of their thoughts.

Have sharable URLs and project management tools that speed up and reduce design changes misalignment.

Disadvantages:

The online screen design is not supported by tools. It is a little difficult to generate fresh concepts displays.

Project integration tools have no direct change tracking mechanism.

Comments can be made a bit more user-friendly.

Figma:

Figma is a device that become released in 2016 (Anon., n.d.), with its pleasant interface and simplicity of use, Figma has quickly emerged and ended up a famous person interface layout device withinside the worldwide generation community. Some large manufacturers the use of Figma till now may be stated as Microsoft, Twitter, GitHub, Dropbox ...
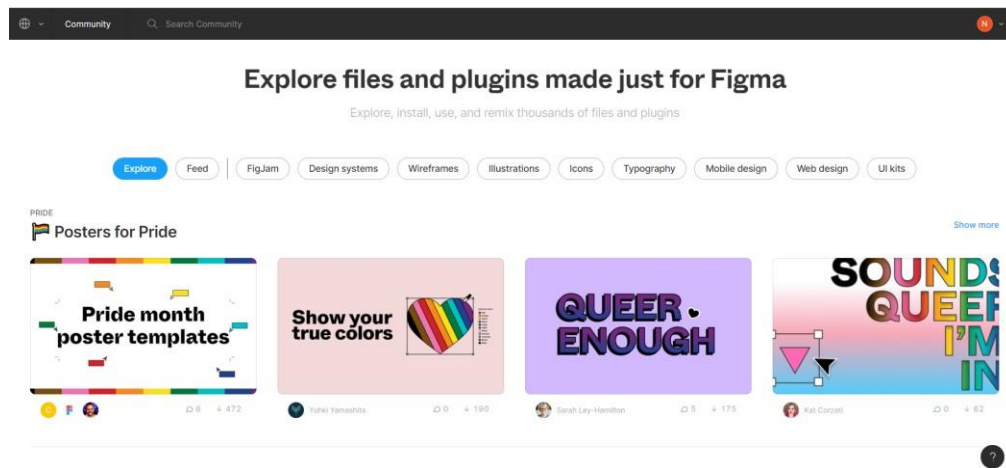
Figure 22: Figma

Unlike preceding layout gear, Figma is designed withinside the cloud. This is a device with comparable functions to Sketch, however, it helps higher teamwork.

The Advantages of Figma:

Compatibility: Figma is like-minded with all running structures with net browsers, from Windows, Linux, Macs to Chromebooks can use this device. As of now, that is the most effective layout device which could do this. All customers can share, open, or edit a Figma document without difficulty regardless of what running gadget they may be using (Anon., n.d.).

Support powerful teamwork: As a browser-primarily based totally device, all and sundry at the group can without difficulty paintings collectively just like running on Google Docs. Each group member is viewing or enhancing the document, Figma will show represented via way of means of a round avatar at the toolbar with its very own name.

Rich Plugin Warehouse: When it became first released, Figma's plugins had been now no longer as wealthy as Sketch. In 2019, however, Figma released its very own plugin repository.

Everything is saved online: With Figma, the whole thing is saved withinside the cloud. Conclude

which gear can be used for the layout of the application

Selection:

To summarize this exercise, our group will use draw.io to layout ERD, Database, ... In addition to designing the demo interface earlier than unifying and liberating the product, we select the platform Figma.

Front End technology stack

Front End Programming Language

Figure 23: JavaScript

JavaScript
Maybe JavaScript is one of the most essential and popular languages in the front end (Anon., n.d.).

With regard to the creation of the front end, a site that doesn't function without JavaScript may be worked almost impossible. The advantages of this program include one of the most popular languages owing to its capacity to build dynamic web pages. In addition to the wonderful interactive web pages for user experience, this helpful feature may also be a reward for sponsored advertising.

Advantages:

Easier to discover and accurate errors.

It may be established on a few internet web page detail or internet web page occasions along with thru mouse click on or hover. JS works cross-browser

You can use JavaScript to test the enter and limit guide checking whilst retrieving thru the database.

It facilitates the internet site have to interact higher with visitors.

It is quicker and specifically lighter than a few different programming languages.

Disadvantages:

Very clean to exploit

Can be used to execute malicious code at the user's computer.

Some browsers aren't supported.

It may be deployed in another way from tool to tool ensuing in inconsistency.

HTML/CSS etc.

Every web page – no matter how complex or novel – is built by a series of different HTML tags. Each card will represent a certain piece of content, certain functions. However, as mentioned above, HTML is only a markup language, so it cannot make a website move or be too attractive to users. This important part will be of the CSS instead. CSS gives style to businesses on the Internet and acts as a run organization. Once using this language professionally, in a short time, programmers can use CSS to make the web more eyecatching and professional (Anon., n.d.).

Figure 24: HTML & CSS

Both HTML AND CSS are the foundation of the website. It is not too difficult to use these two languages fluently. It can be said that CSS is an additional language and makes HTML more complete.

HTML

HTML is short for Hyper Text Markup Language and is a standard language markup when you create your website pages. This language is the page's structure and consists of several parts that illustrate the page's planned structure. The browser would not be sure and cannot display the material properly without this structured element. The 10 best on-front development languages for developing your website are an example of HTML. This gives the browser the title and presentation of the text (Anon., n.d.).

Advantages:

- This widely used language has lots of support resources and a huge community of users.

- Smooth to use on almost any browser.

- Open source and completely free.

- Markup is neat and uniform.

- The main web standard is operated by the World Wide Web Consortium (W3C).

- Easily integrates with backend languages like PHP and Node.js.

Disadvantages:

- Mainly used for static web. For dynamic features, you need to use JavaScript or a 3rd party backend language like PHP.

- Some browsers are slow to support the new feature.

– Difficult to control the browser's execution scene (for example, old browsers cannot render the new tag).

CSS

An addition to the front development of your website, CSS is also a popular programming langue. CSS may define the way the HTML components are shown, displayed, and presented on the screen short for cascading style sheets when coded to operate your website (Anon., n.d.).

The addition of CSS may save and minimize the number of jobs by controlling and displaying the page as planned by the developer. The layout of several web pages may all be controlled simultaneously.

Super easy not only to add but to code, you will not be able to customize and design web pages without this add-on. CSS may change the appearance of a web-colors, page's spacing, and fonts. Incorporate pictures, video, other material and create headlines and paragraphs. Without CSS there are restricted esthetic possibilities to customize your website.

Advantages of CSS:

- Save time: CSS can be first written and reused in HTML pages.
- Fast Page Loading: Using CSS means less code, which means faster download times.
- Easy maintenance: You just need to change the style and all the elements in all the websites will be automatically updated.
- Cross-device compatibility: Using the same HTML document, different versions of a website can be presented to handheld devices such as PDAs and mobile phones.

Disadvantages of CSS:

- Cross-browser issues: CSS works differently on different browsers.
- Confusing due to its many levels: Levels of CSS like CSS; CSS2; CSS3 will be more confusing.
- Vulnerability: CSS is easily accessible due to its open text-based system. Your entire web format will be interrupted if there is an accident or action with the files. It will require read/write access to the intended site to overwrite the changes.

Selection:

Regarding interface design, we deliver precedence to JS language.

Because JavaScript lets us construct interactive internet pages. JavaScript brings internet pages to lifestyles via way of means of including functionality. JavaScript is chargeable for users' elements, which

includes drop-down menus, modal windows, and get in touch with forms. It is likewise used to create such things as animations, video players, and interactive maps.

JavaScript is a general-cause programming language, this means that it runs on cross-platform, crossbrowser. Moreover, now JavaScript has extended to expand Mobile, Desktop, or even sport applications. The maximum not unusual place software of JavaScript is at the client-side (aka the frontend), however considering Node.js got here along, many humans additionally run JavaScript at the server-side (aka the backend). When used at the client-side, JavaScript code is read, interpreted, and finished withinside the user's internet browser. When used at the server-side, it's far run on a far-off computer.

JavaScript Library / Framework

AngularJS

Figure 25: AngularJS

AngularJS is a JavaScript framework open source that was launched in 2010 by Google. This is a JS front end frame that may be used for web application creation (Anon., n.d.).

It was developed to facilitate web application development and testing with an MVC and MVVM architecture foundation .

Feature:

- – Supports 2-way data binding
- – Uses directive to insert into an HTML code and provide the app with better functionality
- – Quick and easy to declare static documents
- – Its environment is readable, expressive, and fast to develop.
- – Impressive extensibility and customizability to work with

– Built-in testability and support for dependency injection **Use**
case:
  – To create applications for e-commerce.
  – Development of real-time weather update data applications
  – Example: PlayStation 3 YouTube

Ember.js framework

Figure 26: Ember JS Framework

Ember.js is an open-source JavaScript framework. Flexible for high-speed websites, increase application performance without reloading pages. There are handlebars templating libraries similar to HTML. Smaller in size than other JavaScript libraries. There is a link between two properties, when one property changes and affects the other, the remaining attribute is also updated (Anon., n.d.).

Feature:
  – Ember.js is used for creating and maintaining web applications.

- Ember.js view is created by handlebars templates so it is very convenient for front-end design.

- Automatically define routes and controllers.

- Get rid of old stereotypes and replace them with standard application architectures.

- Ember.js has HTML and CSS at the core of the development model.

- Routes are the core feature for managing URLs.

- In-depth support for many types of views.

- Ember.js uses template templates to support automatic updating of models when there are changes

Use Case:

– To create interactive, contemporary online applications.

– Used through Digital Ocean, Accenture, Square and so on.

Selection:

We choose Ember.js. Because it is an open-source JavaScript framework. Flexible for high-speed websites, increase application performance without reloading pages. There are handlebars templating libraries like HTML. Smaller in size than other JavaScript libraries. There is a link between two properties, when one property changes and affects the other, the remaining attribute is also updated.
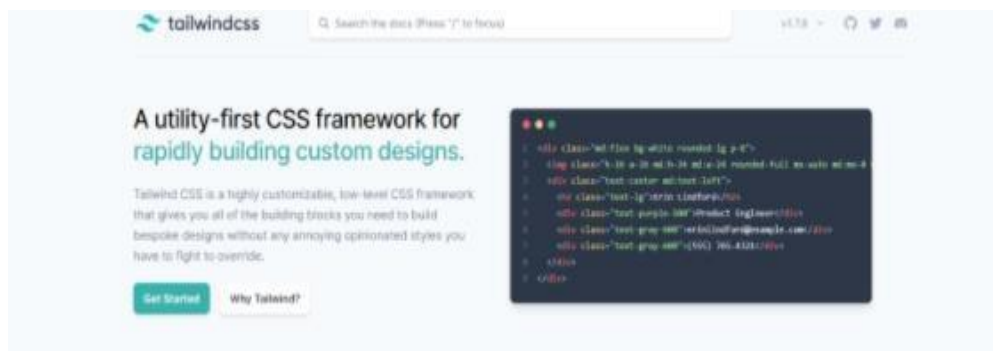
CSS Framework

Tailwind CSS:

Figure 27: Tailwind CSS

Tailwind CSS is a highly personalized CSS first tool that allows all of the building blocks you need to create in a customized way without having to override unpleasant opinion styles. It does not have pre-defined

components, unlike other CSS frameworks (Bootstrap or CSS Materialize). Rather, it works on a lower level and includes several CSS assistant classes. You can quickly build bespoke design by utilizing these classes. Tailwind CSS allows you to build a customized design of your own (Anon., n.d.).

Benefits:

- – No theme default
- – Do not impose design decisions to be reversed
- – provides a start to customization with your own personality
- – Get a menu of your site with pre-designed widgets

Materialize CSS:
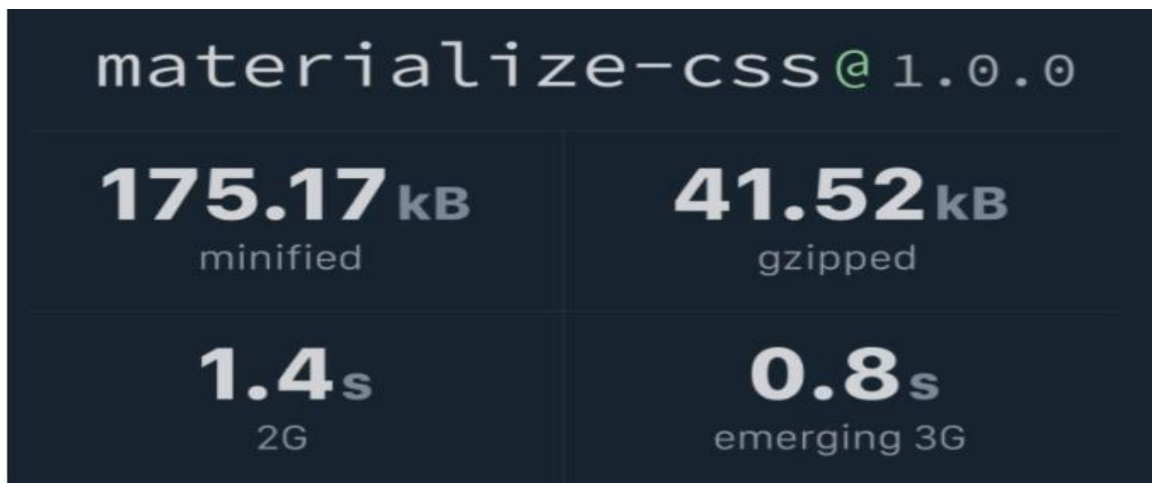
Figure 28: Materialize CSS

Materialize CSS is a responsive, material design framework with sets of UI components, which can simply be used by users. In tablets and mobile phones, materializing is completely responsive. It is straightforward to learn, together with great documentation. This framework has tremendous support and favorable feedback from the community. With CSS materialization, you may adapt choices using an incredible variety of colors.

Benefits:

- – The Materialize documentation website is highly detailed and straightforward to begin.
- – More than 3,800 contributions and 500 contributors are included in Materialize's GitHub.
- – The components page Materialize contains cards, buttons, navigation features and many other features.

Bootstrap:

Bootstrap is an open-source, framework that contains programming languages such as HTML, CSS, and Javascript, or in a word, your use of HTML, CSS, and Javascript languages in the framework that Bootstrap provides, and then will save you a lot of time, effort, and especially when you build 2 templates for PC and Mobile interfaces that are outdated, Responsive will instead help your website to be displayed at its best, makes it compatible with all screen sizes, and thanks to that, you can customize the display more on many different types of screens (Anon., n.d.).

Figure 29: Bootstrap Framework

Conclude which Front End technologies will be used for the development

To summarize, in the interface design we choose, we will use JavaScript and Ember framework to support. Next as always, design with HTML tags and use CSS combined for an eye-catching interface. With CSS, we choose Bootstrap to build the website.

Back End technology stack

Back End Programming Language

C# is a simple, modern language. At the same time, it is also quite powerful and flexible. Besides, C# is also easy to use because it has few keywords and carries all the strengths from the software it inherits like C++ or Java… Although each programming language has its own strengths. However, C# has been proving to the world that it is capable of replacing some other languages and becoming a general-purpose language (Anon., n.d.).

Figure 30: C Sharp Logo

Advantages:

- C Sharp is a simple language

- Cross-platform language

- Safe and effective language

- C Sharp is a popular modern language with few keywords and easy to understand

- C Sharp is a pure object-oriented programming language

Disadvantages:

– When you want to use the IDE, you need to pay a usage fee.

– Only bring the best effect on Windows.

– Mobile programming needs to go through Xamarin intermediary (fees).

– Use the best Database with SQL Server (Anon., n.d.).

Operating System

We choose windows for software development because this operating system has many advantages, has been developed for a long time among operating systems and is supported by Microsoft company .

Figure 31: Window operating system

Advantages of Windows operating system:

– Windows operating system is very popular and highly compatible.

Because Windows has the largest market share today, most manufacturers of applications, software, and hardware are developing towards compatibility with this operating system (Anon., n.d.).

– Easy to use

Although many versions are released, the following versions always have the inheritance of their predecessors, so users are easy to get used to when using for the first time.

– Security

Compared to comprehensive security capabilities, Windows is still not appreciated by Linux and Mac OS operating systems. However, Microsoft developers always have upgrade packages and free updates, to be able to patch security holes. This helps to ensure optimum stability of the device.

– Rich applications

Because most of the applications are written on a platform that is compatible with the Windows operating system, its application is richer than that of other operating systems.

– Touch screen support

Although the Windows 7 operating system has touch support, it is not until Windows 8 or later version is complete, and it supports well for devices with touch screens.

– Supports most games in the world

Because of the large number of Windows users, most game developers build games that are compatible with this operating system.

Web Server

Apache and Nginx are the two most popular web servers today. However, another web server program developed by Microsoft is **Internet Information Services (IIS**, formerly **Internet Information Server**). One of the advantages of IIS over other web servers is that IIS is developed by Microsoft, so some Windows features will always be included in IIS (such as the Windows Authentication mentioned above, .. .). Therefore, IIS is a web server that supports very well languages or frameworks developed by Microsoft such as ASP.NET or .NET framework. But the downside of IIS is that it only runs on Windows.
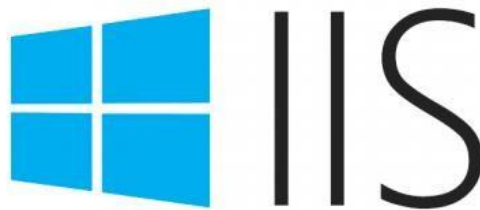

Figure 32: IIS Web Server

Feature:

IIS supports several authentication types such as Basic Access Authentication, Parametric Access Authentication, Windows Authentication, Certificate Authentication, ...; Other security features include SSL/TLS support, Server Name Indicator (SNI), FTP server security settings, and more.

With a modular design, enabling, disabling and setting some features meets the needs of the user and optimizes the performance and security of the web server. IIS is a program that comes with Windows NT versions, so if we want to use IIS, we have to pay a license fee for the version of Windows NT that comes with the corresponding version of IIS (Hilton, n.d.).

Database

We choose **SQL server** to build the data structure. Below we list some of the advantages and disadvantages of this technology (Anon., n.d.).

Figure 33: Logo SQL Server

Advantages:

– It's from Microsoft.

Microsoft has long been a leading software company in the world. Nearly all computers now run on Windows operating system, as well as popular software products such as Word, Excel, Powerpoint, etc. SQL Server language is a product used by large companies. for their database.

– Great support for large businesses

Microsoft SQL Server includes database management software for professional users and for businesses. Some competitors like MySQL have also developed similar software in recent years, but Microsoft SQL Server is easier to use and has more features. It also fully supports triggers.

– Tight integration with .Net Framework

Microsoft SQL Server software closely combines with the .Net Framework environment, a multilingual framework that effectively supports programmers, creating a huge competitive advantage that few database management software has.

Disadvantages:

– Cost

If your database system needs exceed the features available in the free version of SQL Server Express, then investing in other high-end SQL Server editions is worth considering. However, the pricing of the premium versions of MS SQL Server is not cheap, depending on the size of your business.

– Certain limitations on infrastructure

If your business has little or no Microsoft infrastructure, you will have to make additional commitments and investments in the Microsoft ecosystem to use Microsoft SQL Server. This is related to the cost constraint, where the result will be purchase commitments for Microsoft server products.

– Dependence

With investments in Microsoft's technology stack, your business will likely depend on Microsoft for any new features or enhancements your infrastructure may need. Typically, Microsoft updates a new version of SQL Server every two years, so it can be a bit difficult if your business needs certain other specific features.

Hosting
Heroku

So where will our data be stored? The answer is Heroku. What is Heroku? Heroku is a cloud platform that allows developers to build, deploy, manage and scale applications (PaaS - Platform as a service).

Figure 34: Heroku Logo

It is very flexible and easy to use, providing the simplest way to bring the product to the user. It helps developers focus on product development without worrying about running servers or hardware (Anon., n.d.).

Advantages:

- Database is completely free
- SSL is free to use
- Able to support team work
- Linkable to the simplest Github types.

Disadvantages:

- Heroku is only for users who use 550 hours/month. However, you can increase your hours to 1000 if you have a payment method installed in your account.
- After only 2 to 3 hours, if the server does not attract visitors, it will automatically go to sleep. If the server is suddenly shut down when there is no traffic, the simple way you need to do is to generate traffic for it.

Frameworks

ASP .NET

ASP.Net is a web development platform provided by Microsoft and used to create web-based applications.

ASP.Net was first released in 2002.

Advantages:

- ASP.NET has an extremely diverse and rich set of libraries, provided by Net Framework, so it has many outstanding advantages. Not to mention that this programming language is also very well supported in terms of XML and database access via ADO.net (Anon., n.d.).

- The next outstanding advantage of this programming language is its ability to work well on many applications to ensure the best and highest performance for the website. When using ASP.NET, we can separate the code and the interface into two completely separate parts to create the most interesting features for the web. In addition, thanks to that, the management and maintenance of the web during operation and use has become much easier and more convenient.

- Websites programmed by ASP.NET often operate more stable, smoother, have better page load speed than some other languages, create comfort and a higher sense of trust in users. , thereby reducing the

bounce rate and increasing the chances of customers coming back to the website in the future. The loading speed of #ASP.NET is even more appreciated by experts than PHP and JS.

- The customizability of ASP.NET is quite high, making the website easily compatible with different screen sizes and access devices.

- ASP.NET has extremely fast data access, supports large capacity storage

- Allows customization, modification and expansion easily when needed.

Disadvantages:

In addition to the persuasive outstanding advantages mentioned above, currently, ASP.NET also has some relatively large disadvantages that cannot be overcome such as (Anon., n.d.):

- Not supported for devices using Linux operating system.

- Visual studio is not supported during coding.

- Besides, because there are so many attractive advantages, ASP.NET has a high usage fee, not suitable for use by small businesses or individuals.

Conclude which Back End technologies will be used for the development

In short, in the back-end we will choose the c# language to use and ASP .NET Framework because this is the language that we are most familiar with during our schooling. Of course, it's not uncommon for the software we've chosen to develop on the Windows operating system - because of its immense popularity. Regarding Web server, we choose IIS technology because it mainly supports ASP .NET the most. Regarding the development of data structures, we chose SQL Server, because it is a familiar software that has been used many times in previous subjects. In the end, we chose Heroku to go public on the internet because it's free and easy to use.

Tools for source control management

Git, GitHub, GitLab, etc.

GitHub

GitHub is a service that provides a web-based Git source code repository for software development projects. GitHub offers both paid and free versions for accounts. Open source projects will be provided with free repositories (Anon., n.d.).

Advantages:

- The service is free, although it also has paid services.

- Very fast search in the repos structure.

- Large community and easy to find help.

- It provides practical tools for collaboration and integrates well with Git.

- Easy integration with other third-party services.

Disadvantages:

- It is not completely open.

- It has a capacity limit, as you cannot exceed 100MB in a single file, while storage is limited to 1GB in the free version.

Visual Studio

Visual Studio is known as a famous website programming software that is unique and so far no tool can replace them. Visual Studio is programmed in VB + and C# - which are programming languages that allow users to build websites easily and quickly (Anon., n.d.).

With the advantage of being built and developed directly from the big Microsoft, Visual Studio has been updated with many different versions since its birth. This allows users to freely choose the best version, with the most suitable configuration for their diverse models.

Figure 37: Visual Studio

Advantages:

- Very active development with Microsoft support. The official documentation is well maintained.
- There is very active community support with all the plugins you need. If you submit a bug on the GitHub repo, you will usually get a response within 4 days.
- For an electron application, VSCode's speed is very high, almost equivalent to the natively built ST3.

Disadvantages:

- Similar to all other electron apps, VSCode's memory and battery usage are pretty bad.
- There is no git merge, which many people expect, as ST3 and Atom are capable of doing that.
- The default shortcuts make no sense and users have to reconfigure nearly all of them.

Conclude which tools will be used for the development

In short, in the section of tools used to assist in the application development process. We choose GitHub, because it's free, the way it works enhances our team's performance. Next, the foundation for writing code and building applications will be Visual Studio, because this is a powerful IDE developed for a long time by the microsoft company, with a strong community behind.

Software Development Models

Introduce several SDLC models: Waterfall, V-model

Waterfall Model

Waterfall Model: It is a sequential model that is divided into different phases of software development activities. Each stage is designed to perform a specific activity. The testing phase in the waterfall model starts only after the software has been fully developed (Anon., n.d.).
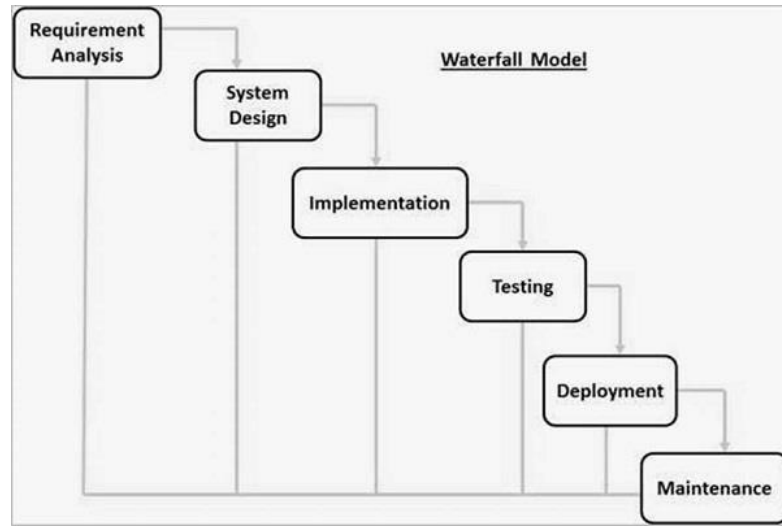

Figure 38: Waterfall Process

As you can see, testing in this model starts only after the source code is deployed.

If you are working on a large project where there are complex systems, it is easy to miss key details in the requirements phase. In such cases a completely wrong product will be delivered to the customer and you may have to start the project again OR if you manage to note the requirements correctly but make a fatal mistake in the If you design and architect your software, you'll have to redesign the entire software to fix bugs.

V-Model

V-Model is an extension of the waterfall model. Unlike waterfall model, In V-Model, there is a corresponding testing phase for each phase of software development. Testing in the V model is performed in parallel with the SDLC phase (Anon., n.d.).
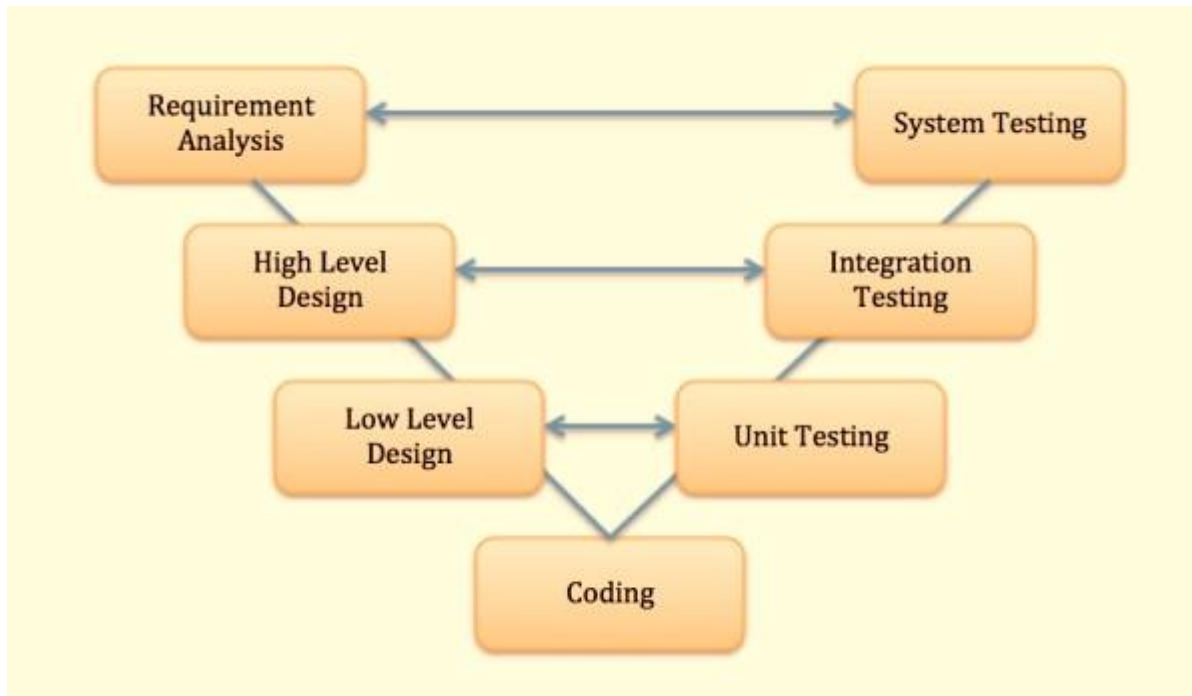
Figure 39: V-Model

The V-model is essentially a combination of the SDLC software development lifecycle on the left and the STLC software testing lifecycle on the right.

Requirement Analysis: there will be a corresponding process called System Testing: In this step we will check the overview of the entire system.

High Level Design: there will be a corresponding process of Integration Testing: In this step we will check the connection and compatibility between the components of the software.

Low Level Design: there will be a corresponding process of Unit Testing: In this step we will test at the functional level of the software.

Coding does not need a corresponding testing process, in fact, it is not necessary because at this step almost all technologies and technical platforms have been completely tested before by the manufacturer of each company before being used official use. So we don't have to double check at this step, usually it's guaranteed by Dev.

Conclude which SDLC model will be used for the development with explanations

Since this project is quite large in scale, we chose V-model to fix the problem of error handling, waiting for the product to be completed before testing will affect the performance of the whole team. Instead, we will apply V-model in the working process to achieve the highest efficiency.

Illustrate all your findings on how to use these by drawing the overview
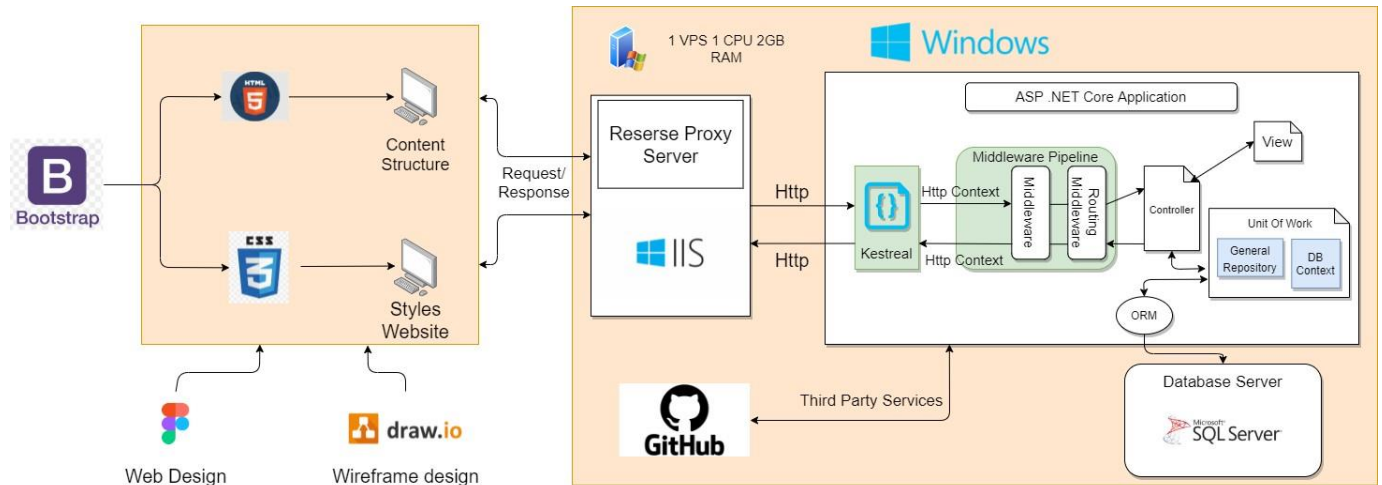

Figure 40: Drawing

Conclusion

The writer described the essential stages for completing a website, including tools, languages and software for project management support in the text. This also improves the author's team abilities, supervising and tracking the members' actions and efforts.

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