PASSPORT RECOGINATION SYSTEM

Requirements Document

Team 2
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Preface

This document represents a guide to using the project, as well as clarifying what is behind the scenes of the project, as well as the use of the project in many areas and places.

The system aims to make passport recognition and validation processes more efficient with more facilities and capabilities in order to reduce time, effort, and other resources.

The main reason for this system is to facilitate the processes of identifying the person through the passport or verifying the validity of the passport, by making these processes automated and isolated to leave most of the available space for the rest of the requirements of the place in which this system operates, whether it is a company, airport, or port... Etc., to obtain optimal use of the resources available for the place in which the system operates.

In order to have the system in its most complex form, this requires going through several versions of software development and documentation of user and system requirements to achieve customer satisfaction within the available resources and budget.

The following points explain the different visions of the system that differentiate it and distinguish it from the previous systems:

1- Using a simple and smart graphical user interface with temporary data records instead of designing and implementing the actual database through the DBMS to make things easier and simpler for the user.

2- Integrating the graphic user interface of the system with an external database located on a server of the company or place that uses the system.

3- All previous versions were based on uploading passport photos to the website for verification in this version we add a feature that the user can take a live passport photo in real time.

4- Maintaining system security and stability issues, ensuring that the system works in a normal and stable manner, and resolving errors and problems facing the system.

Introduction

There are always clear and explicit goals for any system, and the goals of this system are:

1- Recognizing and identifying a person through his passport.

2- Verify the validity of the passport.

3- Storing and managing the passports entered into the system through its own database.

The system consists of three parts, each part is complementary to the other and without any part the system will collapse, and these parts are:

1- A system based on microprocessors, and this is the hardware.

2- Web API, and this is the back end.

3- Web graphic user interface, and this is the front end.

The importance of the three parts is attributed to the interaction with the system through the web graphic user interface and the peripheral devices of the microprocessor system, and the API serves them to achieve the best performance and speed, as well as achieving the possibility of using the system in an easy way and without any complicated steps for users.

We do not forget that part of the success of any system are the tools we used to create the system ,and the tools and frameworks we used in the project are:

A-Hardware:

1-Raspberry Pi 3 Model B+.

2-Raspberry Pi 3 Official Camera Module.

B-Back End (Web API and Database):

1-MySQL 8.0.23.

2- Flask V2.0.1.

3-libraries: (Flask Restful - Flask SqlAlchemy – Werkzeug - JWT- datetime - read_mrz - PassportEye - tesseract).

C-Front End (GUI):

1-React.js.

2-BootStrap.

3-FontAwesome.

4-HTML.

5-CSS.

6-Axios.

We have selected the latest and best technology and provided an adequate toolkit for the project, to ensure effective performance and accurate results as well.

References:

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8- https://jwt.io/introduction/

9- https://mui.com/components/progress/#main-content

10- https://getbootstrap.com/docs/5.0/getting-started/introduction/

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Glossary

Expretion	Description
Graphical User Interface (GUI)	The graphical user interface (GUI) is a form of user interface that allows users to interact with electronic devices through graphical icons and audio indicator such as primary notation, instead of text based user interfaces , typed command labels or text navigation.
Database (DB)	A database is an organized collection of structured information, or data, typically stored electronically in a computer system.
Database Management System (DBMS)	A database management system (DBMS) is a software package designed to define, manipulate, retrieve and manage data in a database. A DBMS generally manipulates the data itself, the data format, field names, record structure and file structure. It also defines rules to validate and manipulate this data.
Microprocessors	A microprocessor is a component that performs the instructions and tasks involved in computer processing. In a computer system, the microprocessor is the central unit that executes and manages the logical instructions passed to it.
Web Service	Web service is a collection of open-source protocols and standards used for exchanging data between systems or applications.

Application Programming Interface (API)	An application programming interface (API) is a computing interface that defines interactions between multiple software intermediaries. It defines the kinds of calls or requests that can be made, how to make them, the data formats that should be used, the conventions to follow, etc. It can also provide extension mechanisms so that users can extend existing functionality in various ways and to varying degrees.
REST Web Service	Representational state transfer (REST) is a software architectural style that defines a set of constraints to be used for creating Web services. Web services that conform to the REST architectural style, called RESTful Web services, provide interoperability between computer systems on the internet. RESTful Web services allow the requesting systems to access and manipulate textual representations of Web resources by using a uniform and predefined set of stateless operations.
The Model-View-Controller (MVC)	The Model-View-Controller (MVC) is an architectural pattern that separates an application into three main logical components: the model, the view, and the controller. Each of these components are built to handle specific development aspects of an application. MVC is one of the most frequently used industry-standard web development framework to create scalable and extensible projects.

Software Development models	The software development models are the various processes or methodologies that are being selected for the development of the project depending on the project's aims and goals. There are many development life cycle models that have been developed in order to achieve different required objectives. The models specify the various stages of the process and the order in which they are carried out.
Web Sockets	Web sockets are defined as a two-way communication between the servers and the clients, which mean both the parties, communicate and exchange data at the same time. This protocol defines a full duplex communication from the ground up. Web sockets take a step forward in bringing desktop rich functionalities to the web browsers. It represents an evolution, which was awaited for a long time in client/server web technology.
WI-FI	Wi-Fi is a wireless networking technology that allows devices such as computers (laptops and desktops), mobile devices (smart phones and wearables), and other equipment (printers and video cameras) to interface with the Internet. It allows these devices--and many more--to exchange information with one another, creating a network.

Maintenance	The technical meaning of maintenance involves functional checks, servicing, repairing or replacing of necessary devices, equipment, machinery, building infrastructure, and supporting utilities in industrial, business, and residential installations. Over time, this has come to include multiple wordings that describe various cost-effective practices to keep equipment operational; these activities occur either before or after a failure.
Hardware	Computer hardware includes the physical parts of a computer, such as the case, central processing unit (CPU), monitor, mouse, keyboard, computer data storage, graphics card, sound card, speakers and motherboard.
Software	Software is a collection of instructions that tell a computer how to work. This is in contrast to hardware, from which the system is built and actually performs the work.
JSON	JSON (JavaScript Object Notation) is an open standard file format and data interchange format that uses human readable text to store and transmit data objects consisting of attribute–value pairs and arrays (or other serializable values). It is a common data format with diverse uses in electronic data interchange, including that of web applications with servers.

Microcontroller	A microcontroller is a small and low-cost microcomputer, which is designed to perform the specific tasks of embedded systems like displaying microwave's information, receiving remote signals, etc. The general microcontroller consists of the processor, the memory (RAM, ROM, EPROM), Serial ports, peripherals (timers, counters), etc.
System Architecture	A system architecture is the conceptual model that defines the structure, behavior, and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system.
SRS	A software requirements specification (SRS) is a document that describes what the software will do and how it will be expected to perform. It also describes the functionality the product needs to fulfill all stakeholders (business, users) needs.
JWT	JSON Web Token (JWT) is a proposed Internet standard for creating data with optional signature and/or optional encryption whose payload holds JSON that asserts some number of claims. The tokens are signed either using a private secret or a public/private key.

Camera Module	A camera module is an image sensor integrated with a lens, control electronics, and an interface like CSI, Ethernet or plain raw low-voltage differential signaling.
Functional requirements	Functional requirements define a function that a system or system element must be qualified to perform and must be documented in different forms. The functional requirements describe the behavior of the system as it correlates to the system's functionality.
Non-functional requirements	Non-functional requirements are not related to the software's functional aspect. They can be the necessities that specify the criteria that can be used to decide the operation instead of specific behaviors of the system. Basic non-functional requirements are - usability, reliability, security, storage, cost, flexibility, configuration, performance, legal or regulatory requirements, etc.
Algorithm	An algorithm is a set of instructions for solving a problem or accomplishing a task. One common example of an algorithm is a recipe, which consists of specific instructions for preparing a dish or meal. Every computerized device uses algorithms to perform its functions in the form of hardware- or software-based routines.

Framework	A framework is a structure that you can build software on. It serves as a foundation, so you're not starting entirely from scratch. Frameworks are typically associated with a specific programming language and are suited to different types of tasks.
Client-server model	Client-server model is a distributed application structure that partitions tasks or workloads between the providers of a resource or service, called servers, and service requesters, called clients. Often clients and servers communicate over a computer network on separate hardware, but both client and server may reside in the same system. A server host runs one or more server programs, which share their resources with clients. A client usually does not share any of its resources, but it requests content or service from a server. Clients, therefore, initiate communication sessions with servers, which await incoming requests. Examples of computer applications that use the client-server model are email, network printing, and the World Wide Web.

User Requirements Definition

User story

1	User can scan his passport.
2	User can display scanned passport image on screen.
3	User can see all his information and passport details.
4	User can verify the flights he took.
5	User can verify the flights he can take.
6	Admin can sign into the system by admin name and password.
7	Admins only can sign into the system.
8	Admin can access all the passport database.
9	Admin can search in passport database.
10	Admin can sort passport database.
11	Admin have authority to delete users' passports data that have no flight visa.
12	Admin can give user flight visa.
13	Admin can give permission for user to make his flight.

Users' services

User	Admin
User can scan his passport and extract the details with the ability of knowing its validity and his ability to make a reservation for a travel	Admin can access all user data and check the validity of all passports. He can also delete or copy the passport data and control the possibility of booking travels and issuing visas

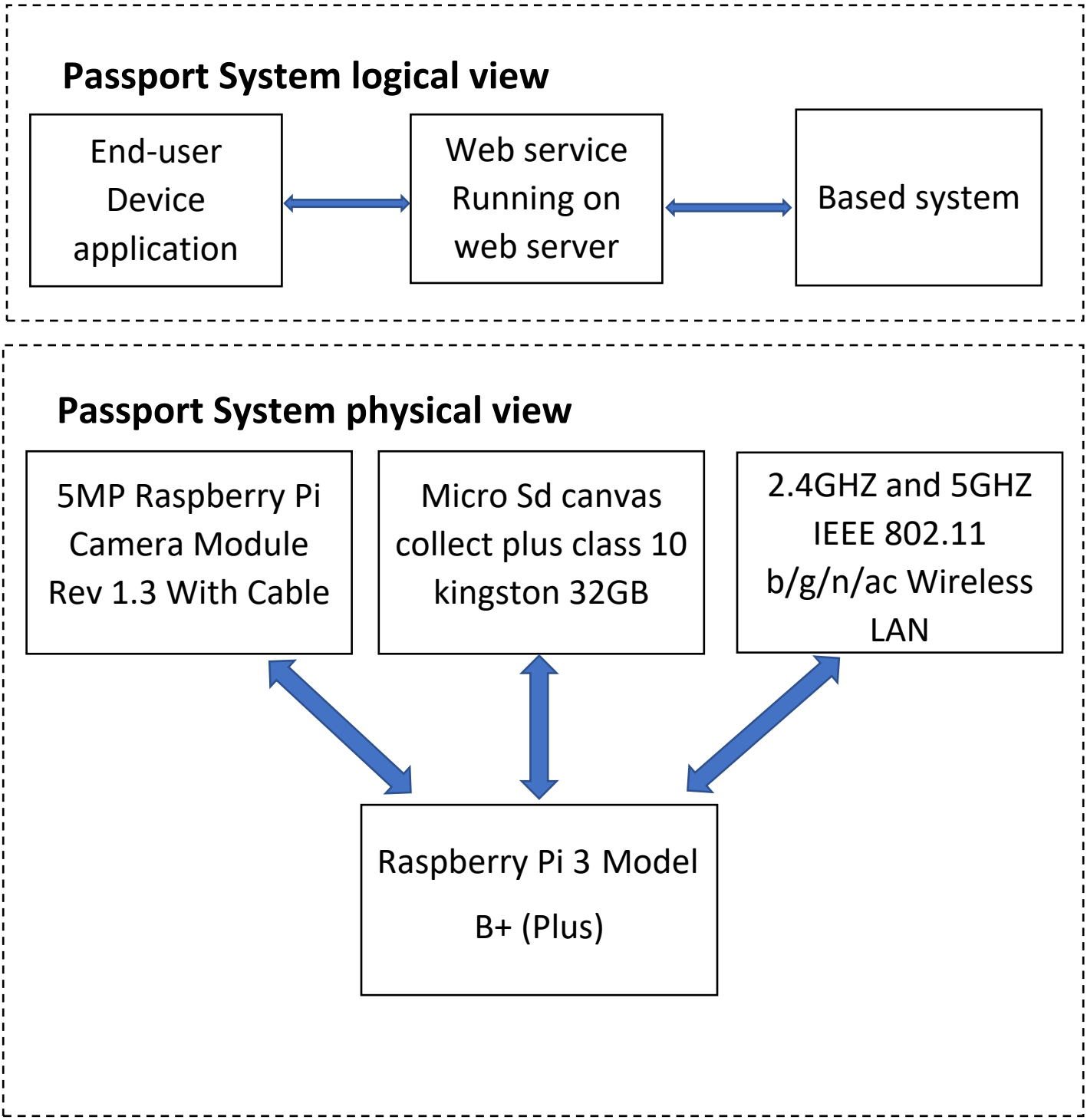
User Requirements Definition

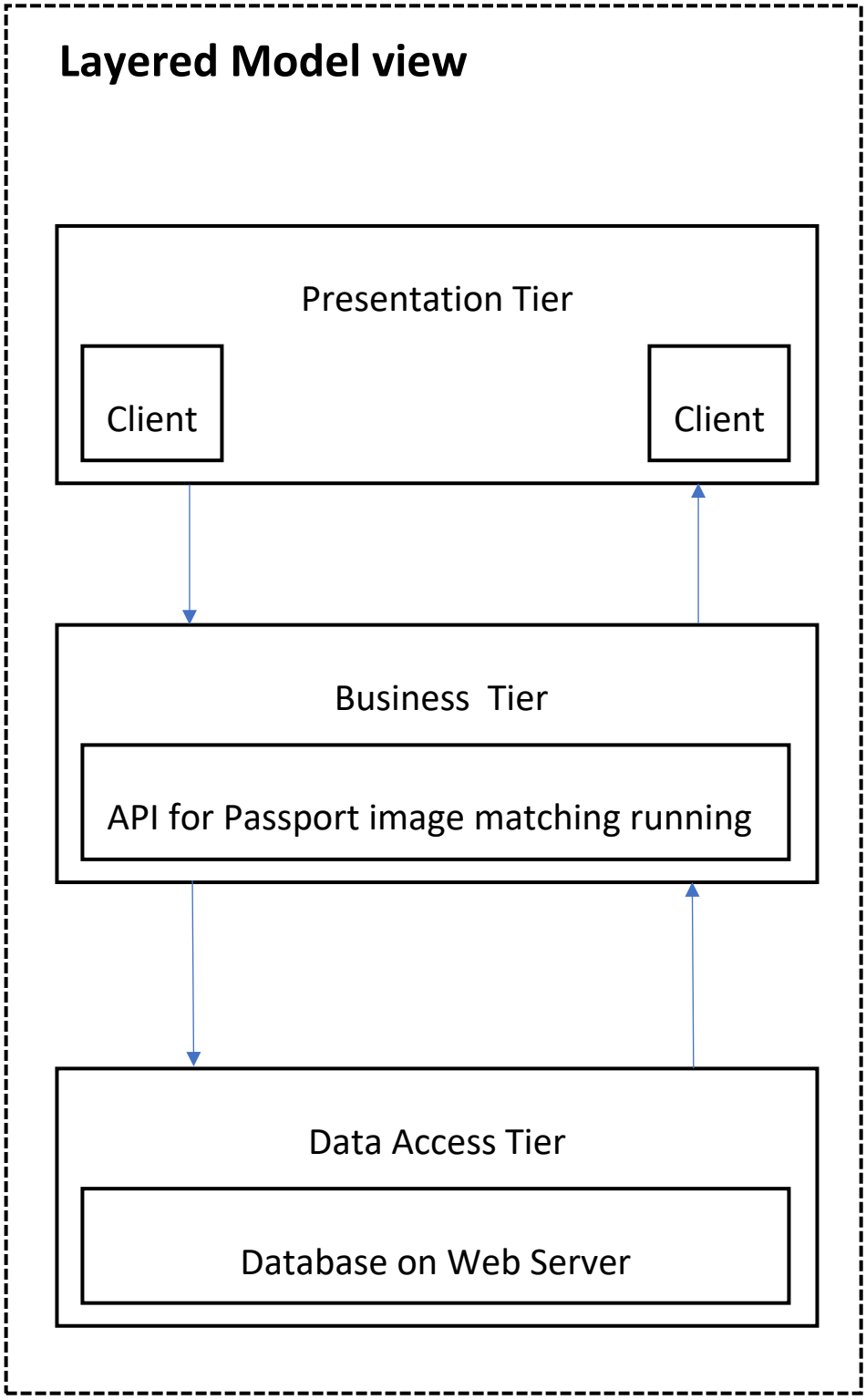
Requirement	Category	Requirement's basic attributes			Requirement Assessment Attributes
		Type	Classification	Source	priority
Uplode the passport to the system	User	functional	Availability Performance Usability	External	High
Passport recognizing	User	functional	Availability Usability	External	High
Displaying passport image	System	Non-functional	Performance Usability Security Interoperability	Internal	High

Get all passport details	User	functional	Usability Availability	External	High
Log in to the system by the admin name and password	Admin	functional	Usability Security	External	High
access all database of registered passports	Admin	functional	Security Availability	External	High
contol the database by deleting or coping passport data	Admin	functional	Availability Performance	External	High
knowing the validity and make a reservation for a travel	User	functional	Usability	External	High
Ensure that all the passport data are correct and give a travel permit to the user or book his next flight	Admin	functional	Availability Interoperability	External	High

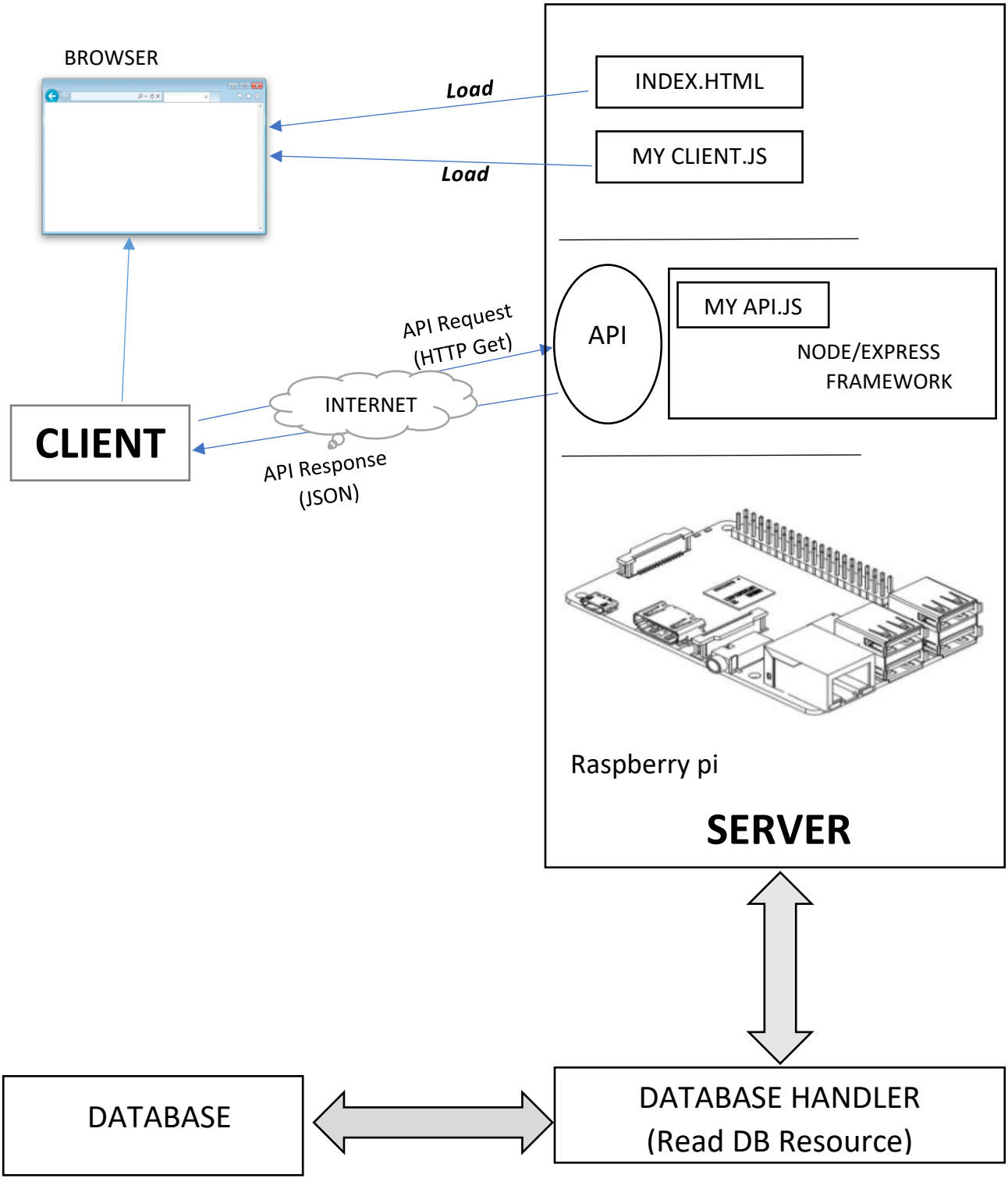
Display users' passports details	System	functional	Interoperability Performance	Internal	High
An error occurred when admin entered a wrong admin name while signed in	System	Non-functional	Security Availability	Internal	High
An error occurred when admin entered a wrong password while signed in	System	Non-functional	Security Availability	Internal	High
The slow internet doesn't slow the system	System	Non-functional	Interoperability Performance	Internal	High
An error occurred when the system can't identify the passport	System	Non-functional	Interoperability	Internal	High

System Architecture




Layered Model view
Presentation Tier
Client
Client
Business Tier
API for Passport image matching running
Data Access Tier
Database on Web Server

High-level model view



System Requirements Specification(SRS)

- Functional requirements:

1- The Camera module must take a picture of the passport and perform enhancement operations.

2- The System must process the picture was taken to validate and extract the important information of the clients to store them for later usage.

3- The System should contain a blacklist that takes the invalid, fake or expired passports.

4- All users can upload their passports to the System.

5- The System should contain a validation unit to check and filter the passports and decide whether to continue processing the passport or to put it into the blacklists.

6- The System should have an admin panel that allows admins to grant privileges to do the critical operations.

7- The admin can access the DB and see the details of any passport entered previously including the invalid passports.

8- The admin can delete any valid or invalid passport from the DB.

9- The admin can search passports by user's name, gender or country.

10- The admin can search a particular passport by its ID.

11- The System should inform the user whether the passport is valid or not and if it is not valid the system should inform him the problem.

- Non-Functional requirements:

1- The System must contain a good quality camera module that takes high quality picture of the passport.

2- The System should contain strong relational database which store all the information that taken from the entered passport.

3- the System providing the user to see his data in good looking format.

4- Admin passwords in the database are encrypted using SHA-256 algorithm to provide more security.

5- No users are allowed to access the admin's login panel or the admin page.

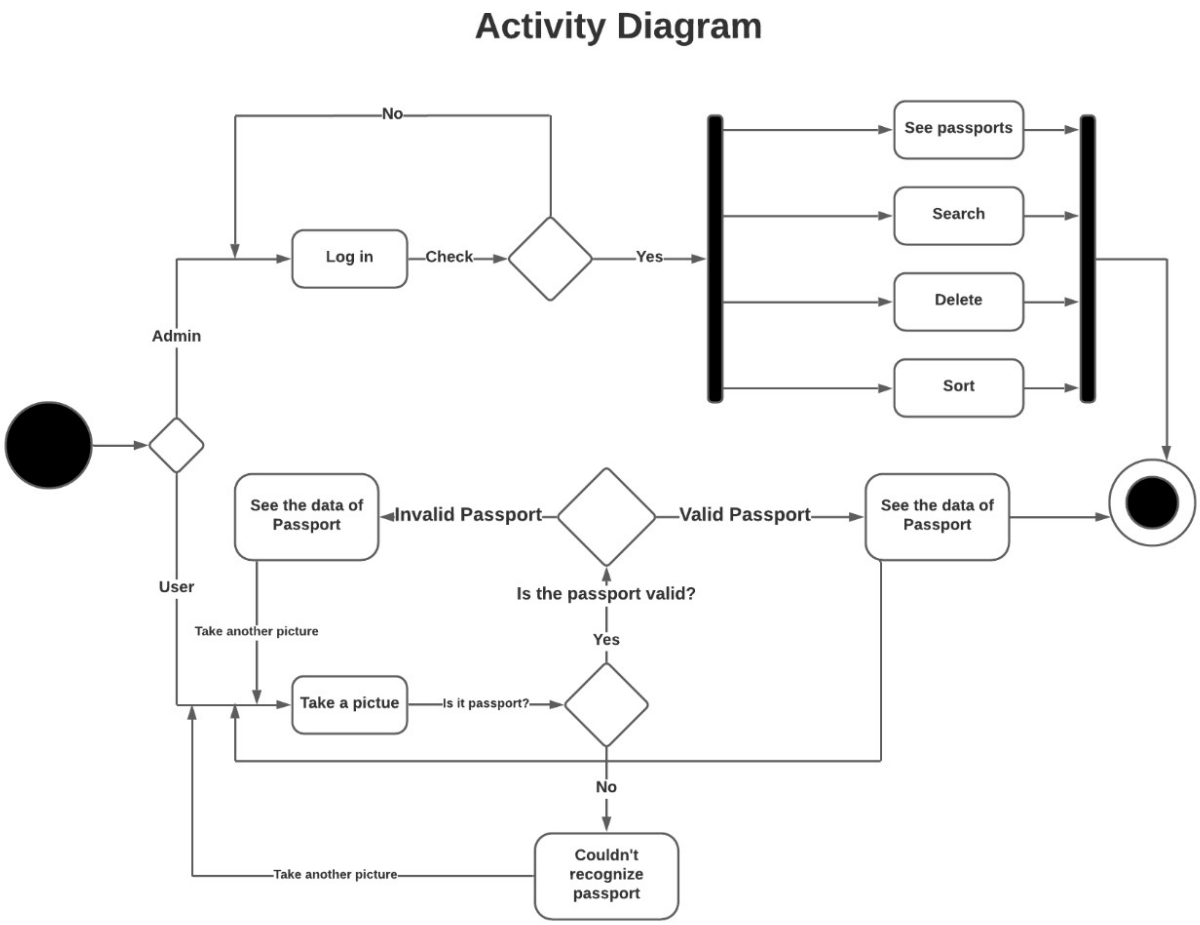
6- Admins must have a JWT token that expires after 30 minutes for extra security.

7- Using a simple and smart graphical user interface that's easy to use and requires the minimum knowledge in the tech world.

System Models

- Activity diagram

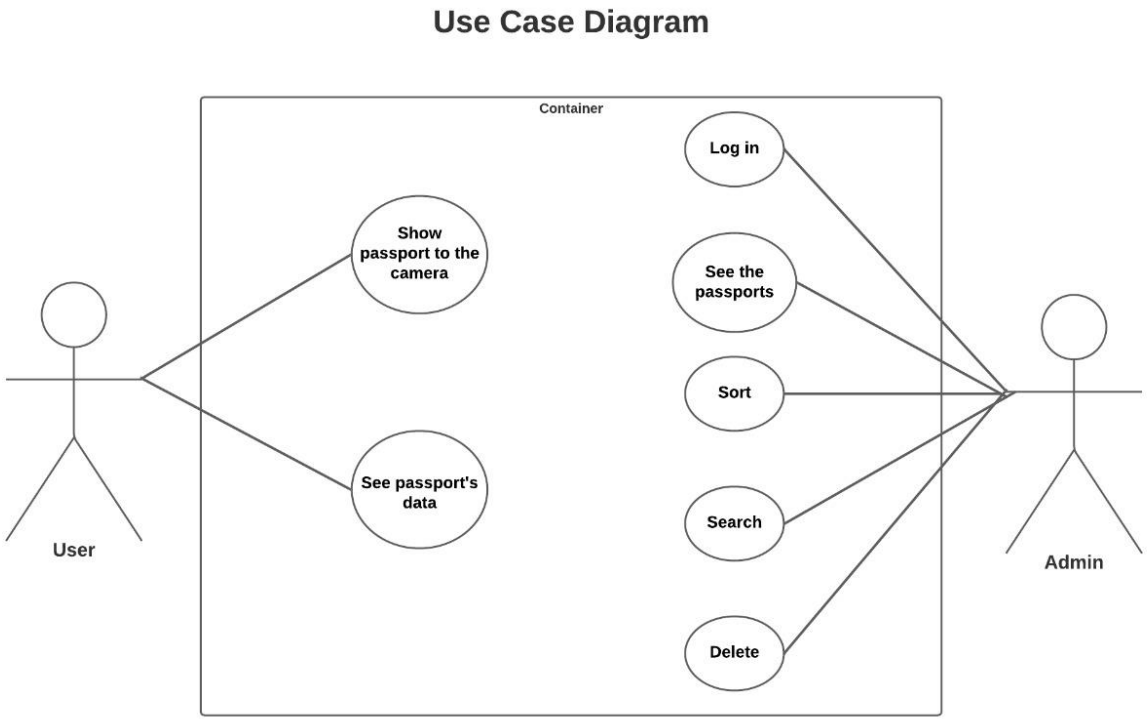
  Activity diagram is another important behavioral diagram in UML diagram to describe dynamic aspects of the system. Activity diagram is essentially an advanced version of flow chart that modeling the flow from one activity to another activity.



At the start node , you start by default as a user and you can take a picture for your passport to recognize it and to see your data of it. If you enter any picture except passport you will see a pop-up message telling you that this isn't a passport. If you enter a passport picture and it's not valid passport , you will see that the passport isn't valid. If you enter a passport and it's valid , you will see your data of passport. If you are an admin , you can go to admin panel by a different URL , and you will sign in , if the login is incorrect , you won't sign in. If you sign in correctly , you will go to admin panel and you can see the passports, delete them, sort and search for passports.

- Uase case diagram

  A UML use case diagram is the primary form of system/software requirements for a new software program underdeveloped. Use cases specify the expected behavior (what), and not the exact method of making it happen (how). Use cases once specified can be denoted both textual and visual representation.



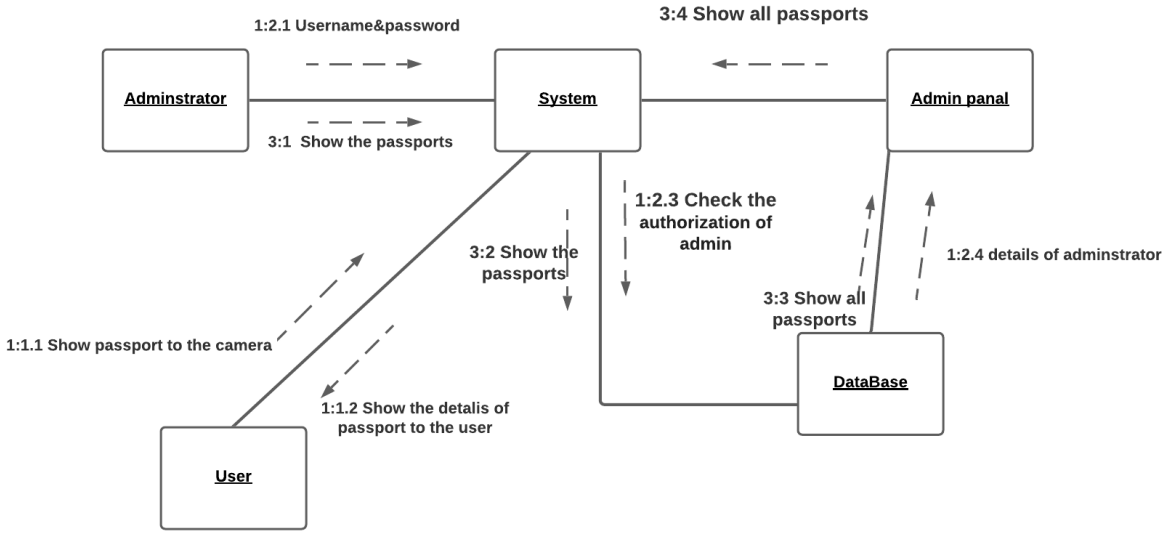
In use case diagram, If you are a user , you can put your passport in front of the camera to see your data of passport.

If you are an admin , you will login, see the passports, delete, sort, search.

- Communication diagram

  UML communication diagrams, a kind of interaction diagram, shows how objects interact. A communication diagram is an extension of object diagram that shows the objects along with the messages that travel from one to another.

Communication Diagram



In communication diagram, The user can interact with the system to show the passport to the camera then the system will reply to the user with his data.

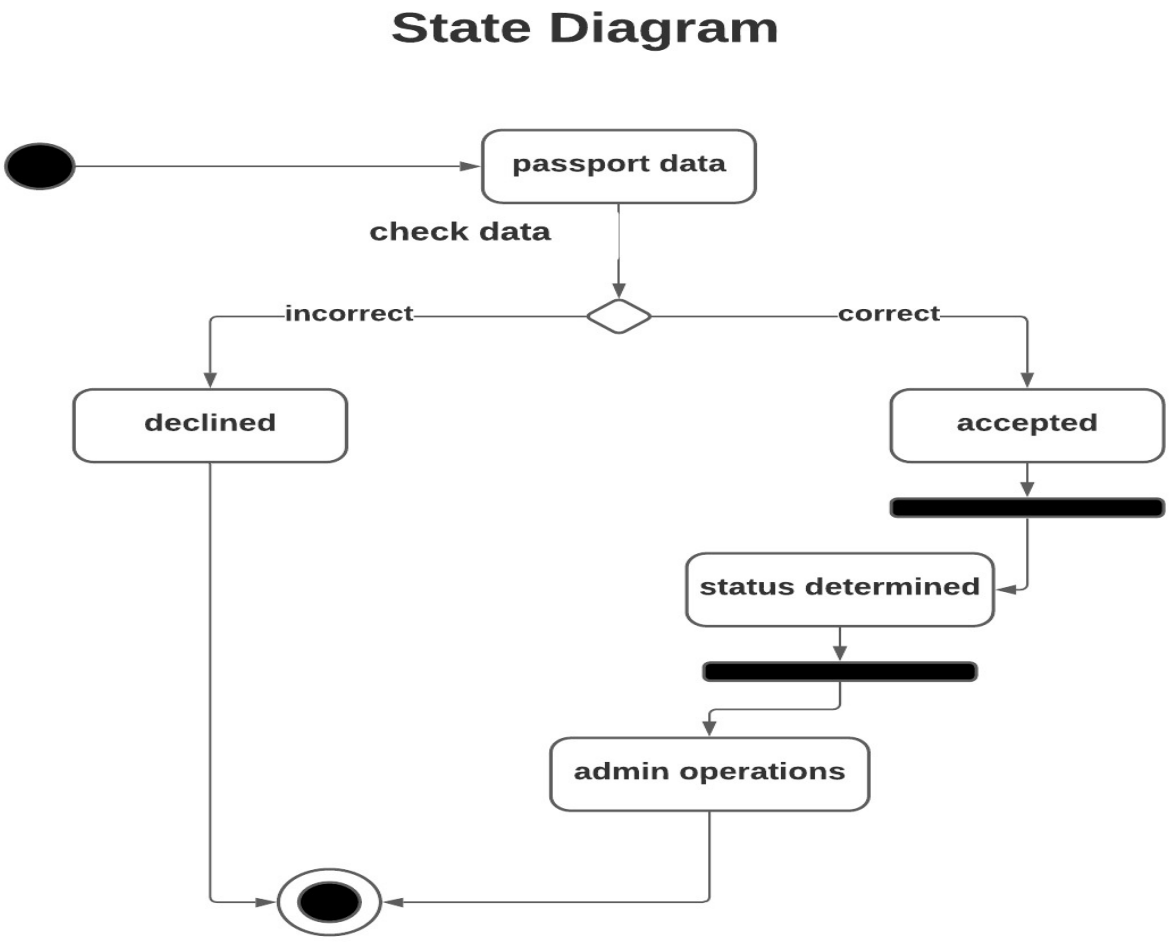
The administration will login and the system will check for authentication of admin from database and if the logging is valid the data base will open the admin panel.

If the administration need to do any process of passports will go to admin panel by the system, the system will go to database and the database will send all passports to the system on admin panel page.

That's how our project interact with each other.

- State diagram

  A state diagram is a type of diagram used in computer science and related fields to describe the behavior of systems. State diagrams require that the system described is composed of a finite number of states; sometimes, this is indeed the case, while at other times this is a reasonable abstraction. Many forms of state diagrams exist, which differ slightly and have different semantics.



In the state diagram

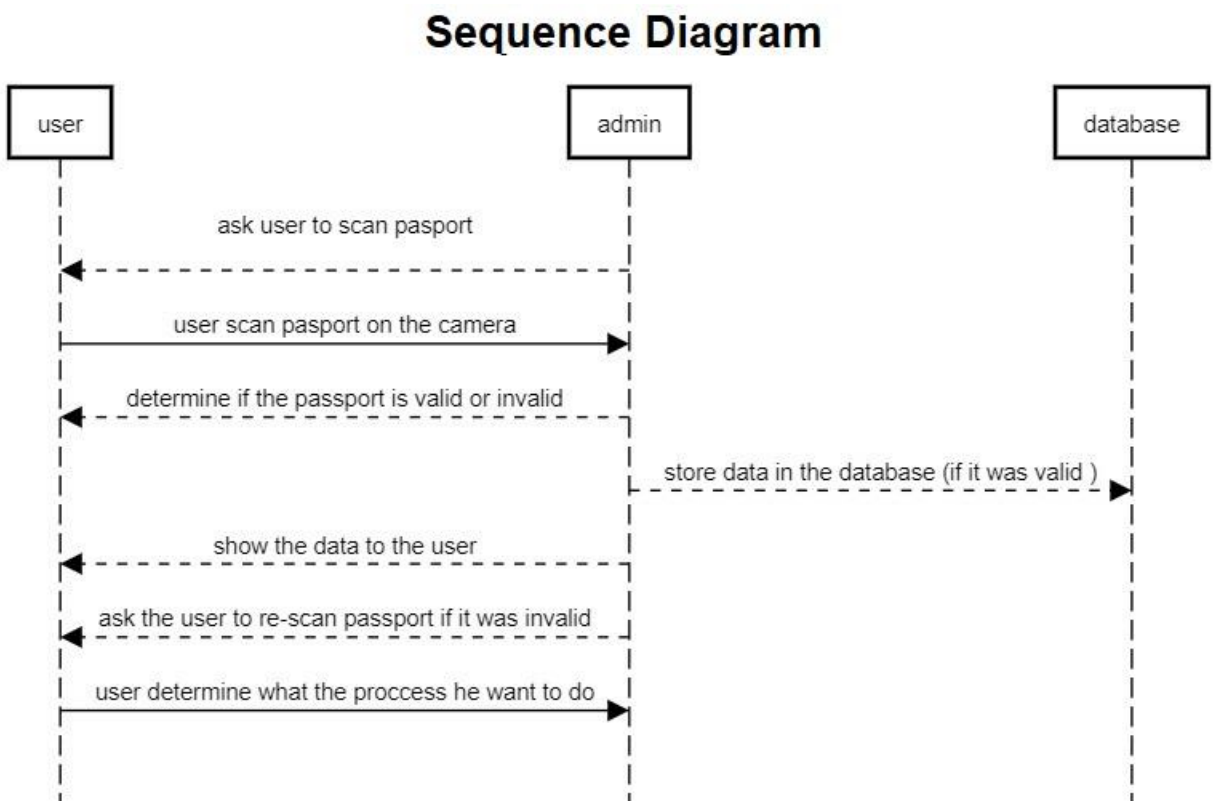
When the user enter the passport the system will check the data .

1- if it is correct then go to accept state then status determind state then admin operations state then end.

2- if it is incorrect the decline it and end.

- Sequence diagram

  A sequence diagram or system sequence diagram (SSD) shows object interactions arranged in time sequence in the field of software engineering. It depicts the objects involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of scenario. Sequence diagrams are typically associated with use case realizations in the logical view of the system under development. Sequence diagrams are sometimes called event diagrams or event scenarios.



In the sequence diagram

The user will enter the airport or whatever the place is the admin will ask him to scan his/her passport on the scanner.

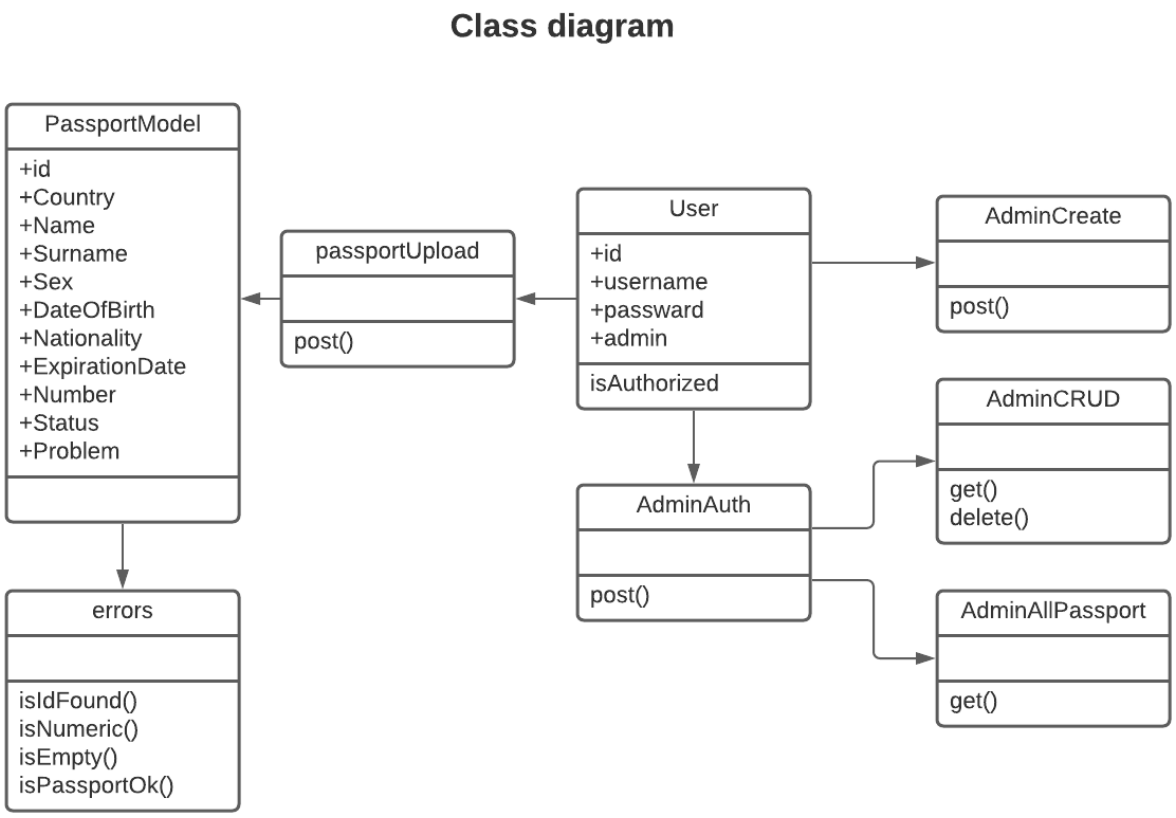
After scanning the passport the admin should be able to determine the status of the passport.

1- if the passport with valid admin will store the data in the database then the user will be able to see his/her passport data

2- if it was invalid admin will ask the user to re-scan the passport again

- 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.



the class diagram contain 8 classes

1- PassportModel class which contain all passport information.

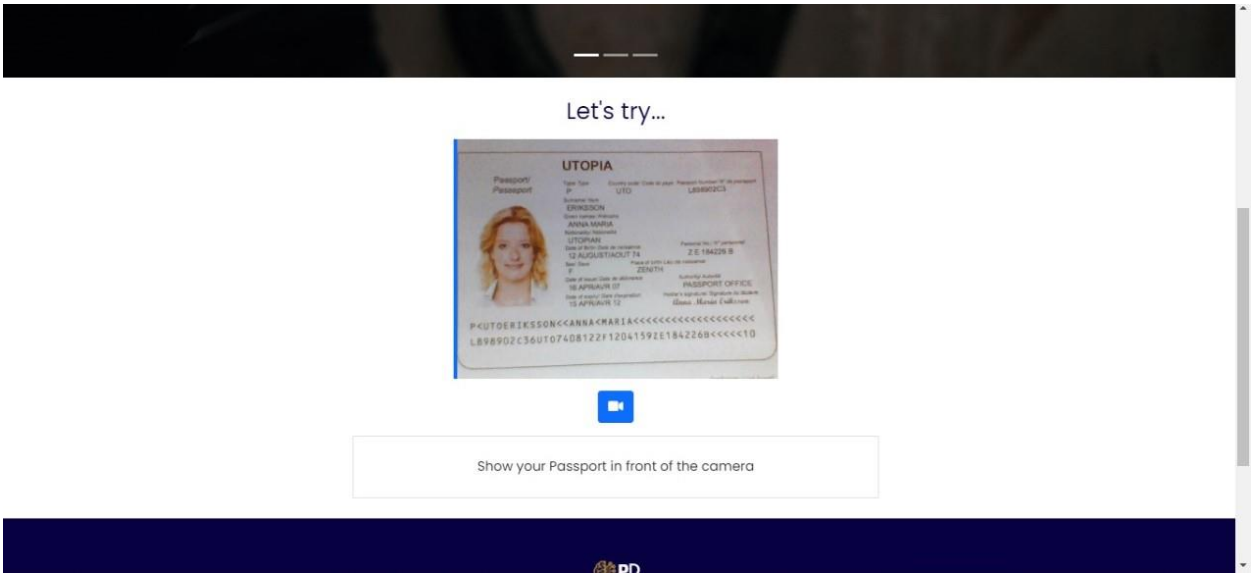
2- errors class which handle any expected error can occur.

3-passportUpload class which handle the upload of passports

4- User class contain user information and check if he is an admin.

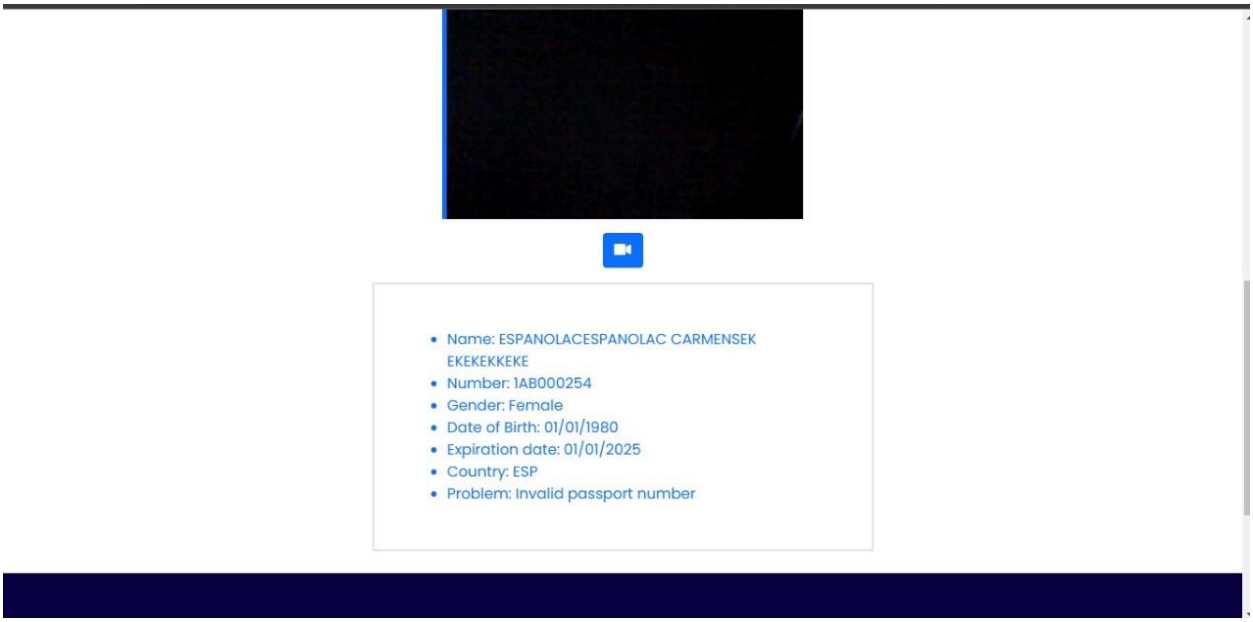
5- AdminAuth-AdminCreate-AdminCRUD-AdminAllPassports classes which handle admin controls.

Overview

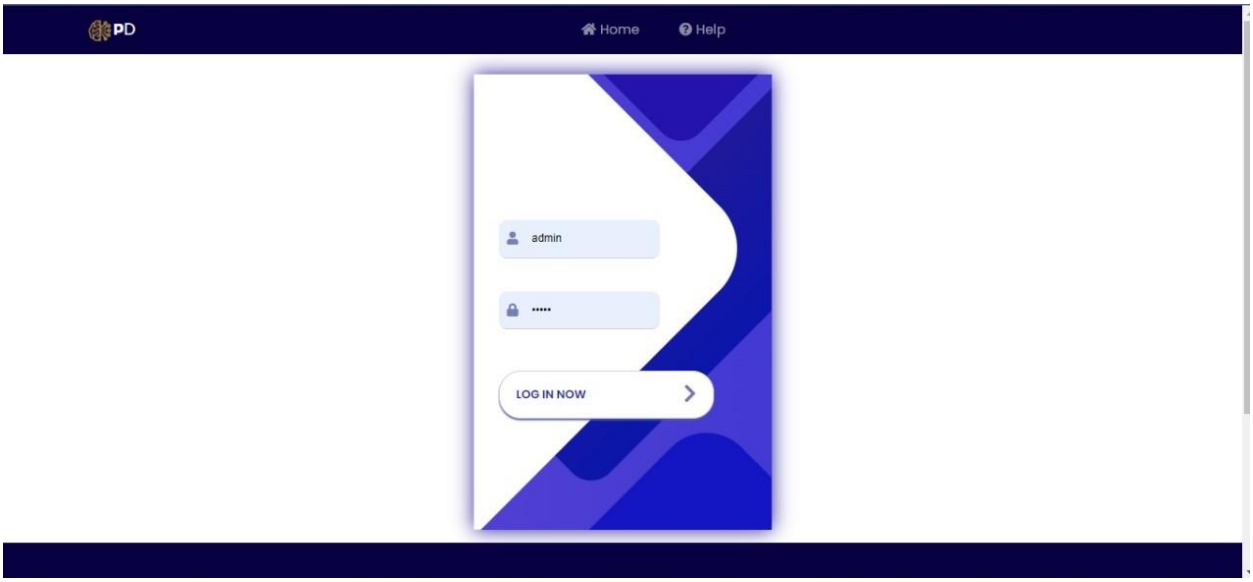


The home screen which contain information on the system and the team and the service.

The user can take an image of the passport by click on video icon and pass the passport in front of the camera.

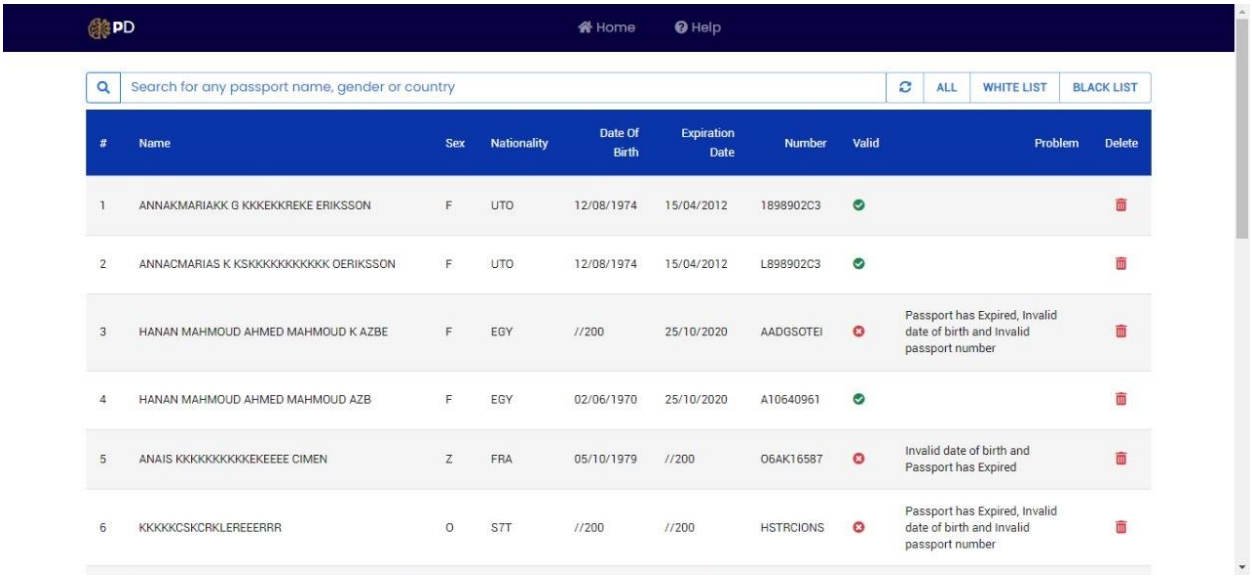


The System will recognize all passport information and display it in ordered detailed format.



The admin login screen which admins only can access.

By entering the ID and the Password we move to admin control panel screen.



#	Name	Sex	Nationality	Date Of Birth	Expiration Date	Number	Valid	Problem	Delete
1	ANNAKMARIAKK G KKKEKKREKE ERIKSSON	F	UTO	12/08/1974	15/04/2012	1898902C3	✓		
2	ANNACMARIAS K KSKKKKKKKKKKK OERIKSSON	F	UTO	12/08/1974	15/04/2012	L898902C3	✓		
3	HANAN MAHMOUD AHMED MAHMOUD K AZBE	F	EGY	//200	25/10/2020	AADGSOTEI	✗	Passport has Expired, Invalid date of birth and Invalid passport number	
4	HANAN MAHMOUD AHMED MAHMOUD AZB	F	EGY	02/06/1970	25/10/2020	A10640961	✓		
5	ANAIS KKKKKKKKKKEKEEEE CIMEN	Z	FRA	05/10/1979	//200	06AK16587	✗	Invalid date of birth and Passport has Expired	
6	KKKKKCSKCRKLEREEERRR	O	S7T	//200	//200	HSTRCIONS	✗	Passport has Expired, Invalid date of birth and Invalid passport number	

The admin control panel screen which display the admin options and the database.

All passport entered will be avallible here with all information

Extracted and wheather its valid or not and if not the problem will be displayed.

The admin can fillter or sort the data and delete any unwanted passport.

The admin can search the passports by the search bar.

The admin can access the blacklist or the whitelist passports only or can access all passports.

System Evolution

Passport recognition is an important application of Image processing owing to its use in many fields. This product will be useful to companies whose activities are related to travelers and tourists from around the world.

Maintenance and monitoring of attendance records plays a vital role in the analysis of performance of any organization.

The recognition system can be integrated into the contracting system, for example, when making travel insurance.

As a result of such integration each of these fields will be automatically inserted into the necessary contract columns in such a way that the manager or client need only check the correctness of the completion and, if necessary, make minor corrections.

The speed of processing the necessary documents is increased several times, when using the system of passports recognition.

The convenience for the manager and the client is also increased, the factor of human errors is reduced. This document recognition system is especially useful for insurance companies, tour operators, airlines, car rental services, and other travel-related companies.

The passport recognition system can be integrated into any of your systems: CRM, 1C, personal account, chat bots. Integration with a chat bot will significantly speed up the processing of incoming requests and reduce staff costs. The role of a sales manager can perform a chat bot.

Our product is completely ready and can be integrated into your system.

If necessary, we can customize it individually for your business needs.

it can be concluded from the above discussion that a reliable, secure, fast and an efficient system has been developed replacing a manual and unreliable system.

This system can be implemented for better results regarding the management of attendance and leaves.

The system will save time, reduce the amount of work the administration has to do and will replace the stationery material with electronic apparatus and reduces the amount of human resource required for the purpose.

Hence a system with expected results has been developed but there is still some room for improvement. A passport reader or passport scanner is actually a camera – a purpose-built imaging device that takes photos of the presented identity documents.

The images taken under these illuminations are used for specific image processing tasks, mainly for data reading and document verification.

How do airport passport scanners work?

When you slide your passport into the electronic gate, it scans the photo page, including the photograph of your face. The camera then takes an image of you standing there and matches the two together to check it is the same person.

The only information that the passport chip provides is information related to that passport holder.

The information only shows personal information that is in the passport itself, previous entries, and notes.

The scanner just saves the officer the effort of manually typing in the information on your passport photo page into their computer.

No other information stored on the passport is entered into the computer. Passports contain basic identifying information, including surname and given names, date of birth, type of document, document code, nationality, place of birth, sex, date of passport issuance and the passport expiration date.

What does passport recognition rate 96% mean?

This means that out of 100 passports 96 will be recognized without errors. And only in four cases there is

the possibility of one or two errors that can be quickly corrected manually. To do this, we use the manual corrections feature as a way to improve the quality and validate the entered data.

To achieve high-quality recognition of document fields, we trained the neural network in the following way: Prepared a large selection of photographs of passport abroad, prepared a neural network for recognition international passports, and launched the learning process. While teaching the system recognize photos, we made a sample of passports for people from different countries.

There were people of different ages, sex, nationality, race, with short and long hair, with/without a mustache/beard and so on.

The document recognition system rotates images made with perspective so as to improve the quality of text recognition.

Therefore, it is highly important that when loading a pass photo, the edges of the passport are not closed and fully visible.

At the same time, while taking a photo, you can whether hold the passport in your hands, or put it on the table which does not affect the recognition accuracy.

Appendices

▪ What is Raspberry Pi?

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games. What's more, the Raspberry Pi has the ability to interact with the outside world, and has been used in a wide array of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red cameras. the Raspberry Pi is being used by people all over the world to learn to program and understand how computers work.

▪ Raspberry Pi 3 Model B+

The Raspberry Pi 3 Model B is the latest version of the Raspberry Pi computer. The Pi isn't like your typical machine, in its cheapest form it doesn't have a case, and is simply a credit-card sized electronic board -- of the type you might find inside a PC or laptop but much

smaller. You can use the Pi 3 as a budget desktop, media center, retro games console, or router for starters. However, that is just the tip of the iceberg. There are hundreds of projects out there, where people have used the Pi to build tablets, laptops, phones, robots, smart mirrors, to take pictures on the edge of space, to run experiments on the International Space Station.

▪ Raspberry Pi 3 Official Camera Module

The Raspberry Pi Camera Modules are official products from Raspberry Pi. The original 5-megapixel model was released in 2013, and an 8-megapixel Camera Module V2 was released in 2016. For both iterations, there are visible light and infrared versions. A 12-megapixel High Quality Camera was released in 2020. There is no infrared version of the HQ Camera, however the IR filter can be removed if required.

▪ Back-end (Web API and Database)

Back-end Development refers to the server-side development. It focuses on databases, scripting, website architecture. It contains behind-the-scene activities that occur when performing any action on a website. It can be an account login or making a purchase from an online store. Code written by back-end developers helps browsers to communicate with database information.

Back-end Used:

1- MySQL

MySQL is a relational database management system based on SQL – Structured Query Language. The application is used for a wide range of purposes, including data warehousing, e-commerce, and logging applications. The most common use for MySQL however, is for the purpose of a web database. It can be used to store anything from a single record of information to an entire inventory of available products for an online store. The version used is MySQL 8.0.23.

2- Flask

Flask is a web framework, it's a Python module that lets you develop web applications easily. It's having a small and easy-to-extend core: it's a microframework that doesn't include an ORM (Object Relational Manager) or such features. Micro means that the Flask framework is simple but extensible. You may all the decisions: which database to use, do you want an ORM etc., Flask doesn't decide for you. Flask is one of the most popular web frameworks, meaning it's up-to-date and modern. You can easily extend its functionality. You can scale it up for

complex applications. Micro-framework is normally framework with little to no dependencies to external libraries. This has pros and cons. Pros would be that the framework is light, there are little dependency to update and watch for security bugs, cons is that some time you will have to do more work by yourself or increase yourself the list of dependencies by adding plugins. The version used is Flask V2.0.1.

- Front-end (GUI)

Front-end web development, also known as client-side development is the practice of producing HTML, CSS and JavaScript for a website or Web Application so that a user can see and interact with them directly. The challenge associated with front end development is that the tools and techniques used to create the front end of a website change constantly and so the developer needs to constantly be aware of how the field is developing. The objective of designing a site is to ensure that when the users open up the site, they see the information in a format that is easy to read and relevant. This is further complicated by the fact that users now use a large variety of devices with varying screen sizes and resolutions thus forcing the designer to take into consideration these aspects when designing the site. They need to ensure that their site comes up correctly in different browsers (cross-browser), different operating systems (cross-

platform) and different devices (cross-device), which requires careful planning on the side of the developer.

Front-end Used:

1- React.js

React (also known as React.js or ReactJS) is a free and open-source front-end JavaScript library for building user interfaces based on UI components. It is maintained by Meta (Formerly Facebook) and a community of individual developers and companies. React can be used as a base in the development of single-page or mobile applications. However, React is only concerned with state management and rendering that state to the DOM, so, creating React applications usually requires the use of additional libraries for routing, as well as certain client-side functionality.

2- BootStrap

Bootstrap is a free and open-source CSS framework directed at responsive, mobile-first front-end web development. It contains CSS- and (optionally) JavaScript-based design templates for typography, forms, buttons, navigation, and other interface

components. As of August 2021, Bootstrap is the tenth most starred project on GitHub, with over 152,000 stars, behind freeCodeCamp (Over 328,000 stars), Vue.js framework, React library, TensorFlow and others.

3- FontAwesome

Font Awesome is a font and icon toolkit based on CSS and Less. As of 2020, Font Awesome was used by 38% of sites that use third-party font scripts, placing Font Awesome in second place after Google Fonts.

4- HTML

The Hypertext Markup Language, or HTML is the standard markup language for documents designed to be displayed in a web browser. It can be assisted by technologies such as Cascading Style Sheets (CSS) and scripting languages such as JavaScript. Web browsers receive HTML documents from a web server or from local storage and render the documents into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.

5- CSS

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language such as HTML. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript. CSS is designed to enable the separation of presentation and content, including layout, colors, and fonts. This separation can improve content accessibility; provide more flexibility and control in the specification of presentation characteristics; enable multiple web pages to share formatting by specifying the relevant CSS in a separate .css file, which reduces complexity and repetition in the structural content; and enable the .css file to be cached to improve the page load speed between the pages that share the file and its formatting.

6- Axios

Axios is a library that serves to create HTTP requests that are present externally. It is evident from the fact that we may sometimes in React applications need to get data from the external source. It is quite difficult to fetch such data so that they can be normally shown on the website. Thus, it helps in retrieving the data thereby adding it to the state to facilitate the application whenever the requirement arises.

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