Faculty of Engineering and Technology

Computer Science Department

COMP433 – Group Assignment phase 3

Project Name: dental clinic system.

The project team:

Riwaa Assi 1201419

Dana Imam 1200121

Yafa Hamdallah 1200708

Dana Bornat 1200284

PHASE I

Introduction

Ramallah Dental Company is a company that provides many specialized dental care services in the center of Ramallah. It contains a team of very distinguished and skilled doctors. The clinic is characterized by a location with clean and safe air. But despite the clinic's commitment to providing state-of-the-art dental services, its current operational challenges require a transformative solution. The current system, which relies on manual methods and disjointed data storage, poses major obstacles to efficient clinic management. Therefore, the goal of this system is to improve and provide the current dental clinic system by providing effective solutions to address the problems found in the current security system and provide high-precision healthcare services. It is safe until the clinic succeeds and attracts more people to it, thus increasing the clinic's profits. The current system, as reported by customers, suffers from several problems that can be summarized as follows:

Segmented patient and clinic information:

The current system relies heavily on manual methods of storing patient information. Creating clinic reports and scheduling patient appointments Patient appointments are stored manually on paper, doctors' appointments and medical information are stored at each session, and nurses' schedule is created manually each week. This leads to fragmentation of information and the inability to collect and organize data properly. They are in dire need of a modern software system that unifies all employee data and provides the latest and most advanced technologies that can coordinate all clinic operations. Our proposed system aims to overcome these challenges.

Stock Depletion Issues:

The current system has challenges with inventory management, which can embarrass the clinic if it goes unnoticed. In addition, there may be a delay in purchasing supplies to replenish stock, and the company could be destroyed because of this, so they must make plans for this problem to prevent it, and when an application is created, it will replace manual writing and typing. This will save huge amounts of money for the clinic, as these amounts could go into inventory.

Creating time-consuming reports:

There are problems in writing reports, as their creation takes a very long time, and the data is distributed among employees in various formats such as Excel Papers, MS Access, and hard copies, which leads to increased time, effort, and data loss. Here, it is necessary to

build a system that unifies the storage method to prevent this chaos and waste of time, because this method of storing data makes it less secure, less scalable, chaotic, and increases the risk of data and the possibility of its loss.

Ineffective Recruitment Organization:

The current system faces a problem in organizing appointments because the information is not in one place. When a doctor cancels his shift due to an emergency, it's a big problem. They need to do something about it, such as reschedule patient appointments or find another doctor for help. This takes a lot of time and effort. If our proposed system automates appointment management, it will automatically address this issue. When an appointment is invalid, patients are notified that the appointment was invalid for some reason, and are shown available appointments to book instead.

Manual patient registration process:

Patients face spending time manually filling out their details when going to an appointment, and this has become quite annoying these days; due to the advancement of technology. It is also possible that the patient does not know how to write or read, and this may cause him embarrassment. Instead, the proposed system provided a streamlined patient registration process, reducing data entry through innovative methods such as audio recording.

Contact and appointment reminders:

Ineffective communication between departments and the absence of appointment reminders contribute to increased operational challenges and this creates a problem if there is no electricity or the phone is dead or busy. The proposed system addresses this problem by facilitating effective communication and sending automated appointment reminders to patients, and if a circumstance arises, they are notified immediately. This saves time, effort and money.

Discounts and family management:

The current system usually uses installment payment methods, and the clinic wants to offer discounts to family members, which is not possible with them. The reason for the current system is that because the data is not organized, it is difficult to know who the patients and their relatives are. Our proposed system centralizes patient information, making it easier to identify family members and implement discounts, thus increasing patient retention.

Communication and privacy:

There is a disaster which is the lack of effective communication between departments. The available method is just talking, and this constitutes a lot of time and effort, and loss of information as well. The proposed system integrates all patient data, ensuring secure and authorized access to relevant information.

By integrating interconnected tables to reduce errors and protect patient information, the proposed system will completely transform clinic operations. The system will handle inventory and be notified when needed, notify users immediately of appointments, and produce accurate weekly and monthly reports with an emphasis on efficiency. Patients will also be able to access special offers and enhanced communication tools, as well as adding features to the system such as giving our clients a diet to maintain their teeth, giving them periodic reports on it, and staying up to date with their personal trainer, which strengthens Ramallah Dental Company's position as a leading company in The field of contemporary dental care.

We will examine the features, capabilities, and implementation strategy of the proposed system in the following sections, focusing on its competitiveness in meeting the special requirements of Ramallah Dental Company.

System Features

Our software System has many features that will solve the problems suggested by the customer, and they are;

1. **Mobile App**: A mobile app has been created to make it easier for members and trainers to use. each user can access features based on their role.

2. **Database for patients:** in our system, there will be a table for the patients that has their information, such that: The patient's name, age, phone number, Health status, and IDs oh family members exist. This feature can be accessed only by doctors and nurses. Since doctors and nurses have the accessibility to the patient's information, they can modify and document the last given treatments and medicines.

3. **Database for each entity in the system:** By adding this feature, we will make tables for employees; that will determine the work hours, and how the work will be coordinated between them. And if an Employee, such as a doctor or a nurse, had a contingency, he/she would be suggested by other names of free employees to compensate for their work. This feature can be accessed by reception employee.

4. **Appointment management:** this feature is dedicated for sending notifications for the patients who have a near appointment; such that a message will be sent to their phone number, this message will ask the patient if they want to verify their appointment by logging in their emails, and verify their appointment in the verification sent email. Moreover, the patients can set their first appointment with particular doctor, while keep preserving no conflictions in that doctor's appointments with other patients. Furthermore, the patient can enter his\her account, and modify the date of the appointment if they want to. The system should be able to handle any intersections and conflicts in appointments. This feature can be accessed by doctors, nurses and reception employee.

5. **Inventory management:** there will be a database for the inventory, that contains the categories and the mass in the container of the clinic. A notification will be sent to the inventory employee when a category in the inventory container is running out; In order to refill it. This feature also will suggest names of companies and their locations that the clinic can buy the missing supplies from them. This feature can only be accessed by the inventory employee.

6. **Members Profiles:** Each member in the clinic will have a personal file, which includes general information about them.

7. **Treatment records:** each patient will have his own records of the treatment, such as last attendance, given medicines, treatment bill, and etc. The doctor may have the ability to access some of this information.

8. **Choice of Personal Doctor*:*** Patients are free to choose their doctor to track their treatment.

9. **Calendar*:*** The app contains a calendar that allows members and trainers to view their scheduled classes.

10. **Online doctor ChatBox:** The new system provides a service for patients to answer their questions via the website to provide Emergency aids to them if something bad happens until they reach the clinic. They can contact with the patient via chatting or recording audios.

11. **Maps:** The application includes a map that shows the Clinic locations.

12. **Membership Registration/Renew:** in case that a new patient wants to register in the clinic for the first time, a form will appear while signing up. The patient can fill up his information, either by writing them, or by recoding an audio to be sent to the reception. This for, will ask the patient to fill in his/her personal information, such as: name, age, phone number, email-address and health status. This information will be directly added to the patient's table in the database. Notice that the clinic manager has the accessibility for all of the previous mentioned features, except for the patient's database, in order to provide privacy for the patients.

13. **Paying methods:** in this feature, we will have a database that contains the patients' IDs, their payment method, either by cash or by credit card, their previous payments, their debt, and the number of their family members that are registered in this clinic if exist; such that a discount that is decided by the Clinic manager will be given to this patient; according to the number of the family members that are registered.

14. **Payment Tracking:** Members will have the ability to track and view their payment history as request receipts, for their payments. By tracking, they can process and confirm their payment processes. Receptionists and Accountants will also be able to access the payment history and outstanding dues for all members.

15. **Promotions:** The new system provides offers and discounts for family members to use.

16. **X-ray cloud:** this cloud will save the x-ray results for each patient; by connecting them with a patient's ID. By this, we will assure that the x-ray results will not be lost. Furthermore, the doctor or the nurse can have this x-ray results easily. This feature can be accessed only by doctors and nurses.

17. **Monthly reports' generator:** monthly reports That compute the clinic earnings and payments will be generated. This report can only be generated for the clinic manager. Moreover, reports that explains the employee salary will be generated. Also, we can change the date reports for each patient; such that these reports will explain the given medicine, health status, debt if exist, and the paying method. These reports can be accessed by doctors and nurses.

18. **Complaints and feedback:** Users should have the ability to submit their complaints and provide feedback, for review.

19. **Sign in and security:** Users should be able to sign in to the app or secure their data using fingerprint or face ID whether they are using the mobile app.

20. **Emergency aids**: initial steps as emergency aid, by explaining to the patients what they should do, until they arrive to the Clinic, for the sake of safety and to reduce the pain, if exists. This could be by written instructions or by videos.

21. **Send and receive message:**
    The system provides the feature of sending and receiving messages between the dental clinic staff.

Nonfunctional features

1. **Security:** each entity of the clinic has its own limit to access the information in our system. If an entity wants to access a special database, this entity needs to have a special username and password for this database. They are given to this entity, after a given approval from the clinic manager. We set secure methods for each database in the way that only the aimed specific entity can access.

2. **Usability:** our website can be used easily, for different age groups. There will be the log in interface that includes the clinic's address and contact number. The interface asks first if the user is an employee or patient, and then according to the entity that logged in, an interface will be shown with the access limit it.

3. **Maintenance:** our website can be easily modified, since we are going to follow the incremental development model with your clinic, so if there would be a bug inn an aspect, we would detect and repair it. Also, we expect that this clinic will be growing by the time, so more and more expected employees and patients will be added to this clinic.

4. **Availability:** The system should be available 99.9% of the time during normal business hours.

5. **Speed:** The movements are made quickly, such as the successful payment and saving process takes two second.

Software development process

In order to develop the clinic and achieve satisfactory results for the client, we follow the following steps:

First, we need to break tasks into smaller parts to solve problems faster. We Take customer feedback on each task, even if it requires modifications. This ensures ease of modifications without complications, which ensures the customer’s interest and satisfaction.

Second, focus on critical priorities and issues, such as meeting patients' needs more quickly in meetings. Third, we deliver the sections as they are ready and not all at once. This allows the clinic to benefit from early development and reduce risk, as continuous feedback can be obtained.

Our approach involves implementing tasks one by one, starting with the most important aspect of the project: patient records, bookings, add-ons, etc. Before starting the job, we create a mock-up design for the client to understand. We test soundness of concept, ease of use and adaptability. We evaluate its long-term viability and anticipate potential future problems. We maintain constant communication with the client, presenting results every three weeks for quick feedback and adjustments.

Release Strategy:
In each release there is a new development and a new feature. The first release focused on patients in terms of booking or canceling their appointments electronically, which results in the patient not needing to attend the clinic. It also makes things easier for the manager and reduces his working hours. In the second release, we will take care of the schedules of employees and doctors, as through the new system they can schedule their appointments, and in the event of one of theme's absence, the other party will know, and thus they will solve the problem faster than by hand. The third release will provide reminders to the patient about scheduled appointments, thus avoiding forgetfulness and problems with his schedule. release 4 remotely monitors patient status, staff status and inventory. In the latest release, we will take care of family discounts and installments, so there is no need for the patient to come to the clinic, allowing for better financial management and providing incentives for family-oriented patient care.

We will test each version to ensure its quality and ease of use as well. One copy will be delivered every 3 weeks, allowing the clinic to get started and benefit from it. If there is something they don't like or want to add something, we change it immediately.

Phase II

Use Case Diagram and Description

➢ User

This actor corresponds to a generic user who has the generic permissions shared between all users (manager, patients, doctors, accountants, nurses, inventory employee).

1. Login:

The system shall authenticate users when logging in. The system asks the user to enter the email and password, or using Face ID to enter the system.

2. Submit Feedbacks:

Users should be able to submit complaints and feedback for both the mobile app and the clinic. App feedback should be forwarded to the technical supervisor to be solved. While the clinic feedback should be reviewed by the clinic management.

3.Manage profile:

Each member in the clinic will have a personal file, which includes general information about them, each member can modify his/her general information.

➢ Patient

1. **Register:**

   Patients can sign up their Dental clinic membership using the mobile app with the help of the receptionist.

2. **Manage Profile:**
   The system shall create Patients profiles, and also allow the Patients to manage the profile and customize the editable sections

3. **Choose a doctor:**
   The patient can choose any suitable doctor, through the doctor profile, and their treatment images for the patient, while keeping the patient information private.

4. **View maps:**

   Patients will have access to a map that uses Google Maps to view the location of Dental Clinic.

5. **View and manage calendar**

   Patients shall be able to view their scheduled appointments on the calendar.

6. **Set an appointment**

   The system allows the patient to set one appointment or more as long as they don't conflict with his/her doctor, nurse or X-ray doctor.

7. **Track payment**

   The members will be able to check their dues and follow their payment history through the system. They can pay and confirm paying process through the system, as well as receive their payment receipt.

8. **Contact with chat Box:**

   Patient can communicate with the doctor through it, either by writing or recording voice.

9. **View emergency instructions and videos:**

   Through the system, educational videos are developed to raise awareness of how to deal with the injury.

10. **View the given treatments:**

    The patient should have the ability to access the treatment details.

11. **Reminders and notifications:**

    The system can send notifications to the patient, reminding them with their next appointment, or with their debt pay off necessity.

- **Doctor**

1. **View and manage calendar:**

   Doctors shall be able to view/manage their scheduled appointments on the calendar and will not accept appointment confliction.

2. **View maps:**

   Doctors will have access to a map that uses Google Maps to view the location of Dental Clinic.

3. **Access patient profile:**
   The system shall allow the doctors to access patient profile and view previous treatments.

4. **Manage patient information:**
   The system shall allow the doctors to access patient profile and manage it; by adding recently treatment, and medicines, if needed, and the results of each session.

5. **Reminder and notification:**
   A message will be sent about the scheduled and canceled appointments.

6. **Access X-ray data:**
   The system shall allow the doctor to access patient X-ray, if exists**.**

7. **Manage reports:**
   The system allows the doctors to generate reports related to the patient's health condition, medications prescribed to him, the number of doses, examinations, and general information such as his name, age, and marital status.

8. **Share medical videos:**
   The system must allow the doctors to provide the system with treatment videos for patients to view, to use it as a reference to do the specific treatment correctly.

9. **Contact Through chatbox:**

   Doctor can communicate with the patient through it, either by writing or recording voice.

9. **Send and receive message:**
   The doctor can communicate with the rest of the clinic's staff, including receptionists, other doctors, X-ray, manager, and nurses. As for patients, the method of communication is through chatbox.

➢ Nurse

1. **View and manage calendar:**

   Nurses shall be able to view/manage their scheduled appointments on the calendar and will not accept appointment confliction.

2. **View maps:**
   Nurses will have access to a map that uses Google Maps to view the location of Dental Clinic.

3. **Access patient profile:**

   The system shall allow the doctors to access patient profile and view previous treatments.

4. **Manage patient information:**
   The system shall allow the nurses to access patient profile and manage it; by adding recently treatment, and medicines, if needed, and the results of each session.

5. **Manage reports:**
   The system allows the nurses to generate reports related to the patient's health condition, medications prescribed to him, the number of doses, examinations, and general information such as his name, age, and marital status

6. **Contact with patient online:**
   Patient can communicate with the nurses through it, either by writing or recording voice.

7. **Reminder and notification:**
   A message will be sent about the scheduled and canceled appointments.

8. **Send and receive message:**
   The nurse can communicate with the rest of the clinic's staff, including receptionists, other doctors, X-ray, manager, Inventory Employee, and nurses. As for patients, the method of communication is through chatbox.

➢ Manager

1. **Manage report:**
   The system must enable the manager to view and manage financial reports related to the clinic and employees.

2. **Manage inventory:**

   The manager oversees the inventory management of the dental clinic and the systematic handling of dental supplies, equipment, and materials needed for patient care, treatments, and daily operations.

3. **View feedback and comments:**
   The system allows the manager to see all the comments and feedback from patients and the clinic staff to improve them and continue their progress.

4. **Send and receive message:**
   The manager can communicate with the rest of the clinic's staff, including receptionists, other doctors, X-ray, inventory employee, manager, and nurses. As for patients, the method of communication is through chatbox.

➢ Receptionist:

1.View patient profile:

The receptionist can access the patient's general information, such as name, age, email, number, place of residence, and other general matters other than the medical condition.

2.View/manage payments:

The system should allow the receptionist to view and manage patient payments and debts.

3.Reminder and notification:

The system allows the receptionist to send reminders to remind patients of their appointment.

4. Send and receive message:

The manager can communicate with the rest of the clinic's staff, including receptionists, other doctors, X-ray, inventory employee, manager, and nurses. As for patients, the method of communication is through chatbox.

➢ Inventory Employee

1. **Reminder and notification:**
   The system sends alert messages to inventory employees if a shortage or problem occurs in the inventory.

2. **Manage inventory report:**
   The system can generate detailed reports on the resources in the clinic's warehouse (their names, production date, expiration date, remaining quantity, quantity that must be available, and price).

3. **Send and receive message:**
   The manager can communicate with the rest of the clinic's staff, including receptionists, other doctors, X-ray, manager, and nurses. As for patients, the method of communication is through chatbox.

- **X-Ray specialist**

1. **Manage patient information:**
   The system shall allow the X-Ray specialist to access patient profile and add X-Ray results.

2. **Reminder and notification**
   A message will be sent about the scheduled and canceled appointments.

3. **Send and receive message:**
   The manager can communicate with the rest of the clinic's staff, including receptionists, other doctors, X-ray, inventory employee, manager, and nurses. As for patients, the method of communication is through chatbox.

- **Inventory Supplier**

1. **Reminder and notification:**

   The system allows Sending messages to inventory supplier for date and quantity of orders.

2. **View inventory report:**

   Inventory suppliers can access reports related to demand for specific medical supplies.

- **Excel**
  This corresponds to Microsoft Excel Software. It is integrated with the system to give the ability for editing reports

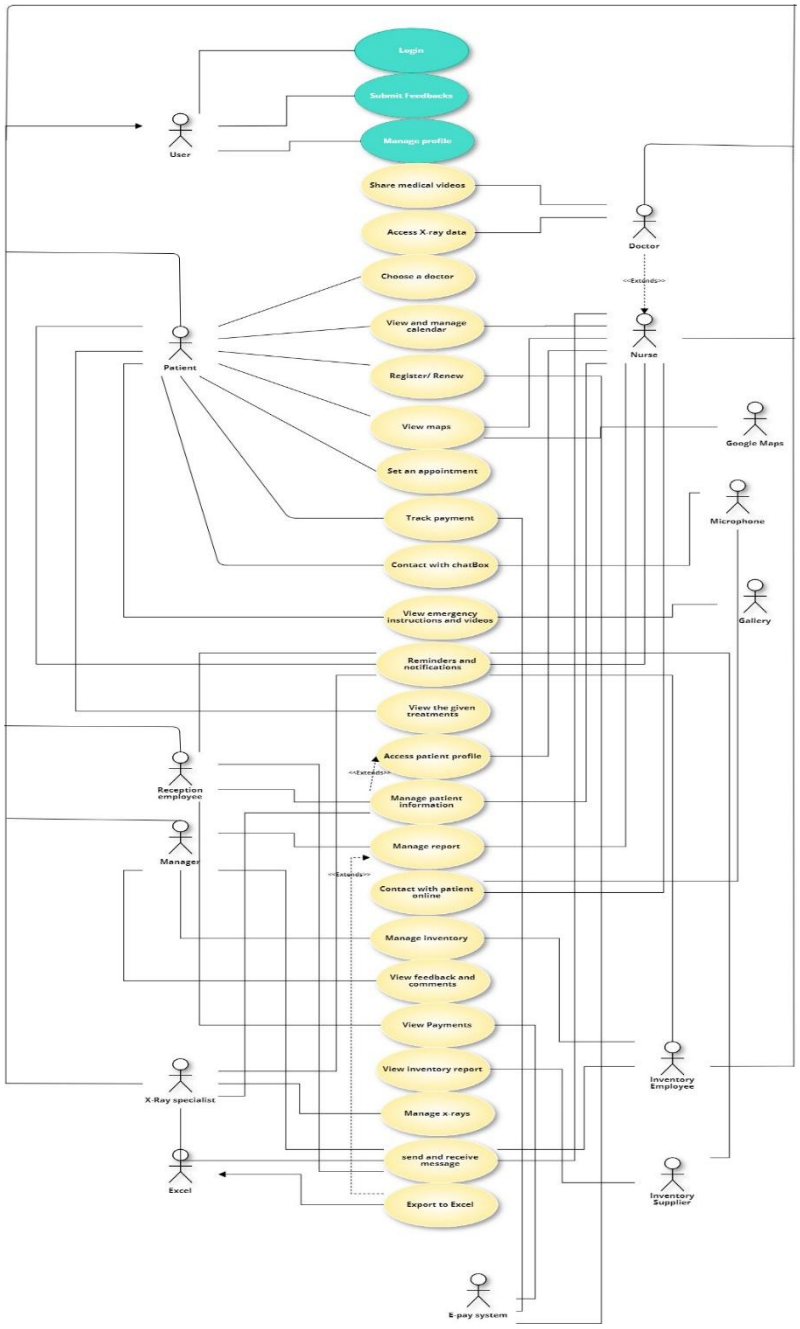
- **Maps on Google**
  This is in line with the web mapping tool from Google. The ability to view the location of the dental clinic is connected with the system.

- **E-pay system**
  This is consistent with the system in charge of the electronic payment procedure. Credit cards, PayPal, PalPay, and Jawwal Pay are all included in this. The system for managing the purchase procedures is integrated with it.

- **Gallery**
  This matches the built-in photo gallery on mobile devices. It is incorporated into the system to facilitate the application's access to films and photos that are stored.

- **Microphone**
  This relates to the built-in microphone on mobile phones. It is incorporated into the system to assist the application in obtaining the patient's voice recording.

➢ Use case Diagram



- ✓ https://cacoo.com/diagrams/4LEUMoD7tHO1vqU7/CBEFE
- ✓ https://cacoo.com/diagrams/4LEUMoD7tHO1vqU7-CBEFE.png

➢ Inventory management

prepared by Yafa Naji - 1200708

1. The clinic's storage containers' inventory management and matching amounts will be kept up to date in a database by the Inventory Management System. It will have features like supplier recommendations, low stock alerts, inventory tracking, and restricted access for inventory staff members.

   1.1. accurately store and manage inventory classifications, quantities, and related data, create a robust database structure.

   1.2. Put in place systems that guarantee scheduled or real-time adjustments of inventory levels in response to replenishment or consumption operations.

   1.3. Maintain data integrity and consistency in the inventory database by using appropriate error-handling and validation procedures.

   1.4. Triggers should be created that, when inventory numbers drop below pre-set limits, automatically send alerts or notifications to inventory staff.

   1.5. Provide a conversational chatbox interface with interactive responses and quick information retrieval for inventory inquiries to make notifications easier to understand.

   1.6. Maintain an up-to-date database containing information about suppliers, such as company names, addresses, telephone numbers, and product catalogs.

   1.7. Provide safe login and authentication procedures so that employees in inventory can access the system.

   1.8. For security and accountability reasons, actions taken by inventory staff should be tracked within the system by maintaining an audit trail or logs.

   1.9. Ensure that inventory data and system processes are accurate and reliable, by performing quality checks and validation procedure.

   1.10. Track and manage inventory items and make updates to prevent shortages or out-of-stocks.

1.11. To make the system interface easier to use and enhance the user experience, make constant improvements based on user feedback.

1.12. In the case of a system failure or error, create routine automated backups of the inventory database and system configurations to guard against data loss.

1.13. The system must have usability and flexibility of use for storage management employees.

➢ Sign in and security:

prepared by Yafa Naji – 1200708

2. The system should allow users to encrypt their data using a password, PIN, face ID, or fingerprint. (mobile application).

2.1. With just his email address and password, the user ought to be able to log in to the system.

2.2. When it is discovered that the user is not registered, the system takes him directly to the registration page or asks him to register. A notification banner or a dedicated page may be used.

2.3. Provide a "Forgot Password" or "Reset Password" option on the login page so users can click it if they can't remember their password.

2.4. enabling seniors to log in with their fingerprints instead of needing to learn passwords.

2.5. The administrator of the registration process can access a secure dashboard or administrative panel that allows him to reset the user's security method.

2.6. The user receives an email from the system with explicit instructions requesting him to confirm the legitimacy of his request within a certain amount of time by sent a code or mobile phone entering the verification code.

2.7. The system resets or activates the security method when the user successfully validates their request using the provided link or verification code within the allotted period.

2.8. Within the program, there will be a thorough user manual or guide that offers precise instructions and direction on how to use different security features, handle login credentials, and guarantee a secure user experience.

2.9. provide continued defense against changing security threats, the system will undergo regular security audits and updates to find and fix any potential weaknesses or security gaps.

2.10. Notify users of security incidents instantly via mobile app notifications or email alerts.

2.11. Give users access to in-app articles, educational materials, or newsletters to stay up-to-date on security best practices and emerging risks.

2.12. The system must have usability and flexibility of use for clinic staff and patients.

➢ Members Profiles:

prepared by Riwaa Assi-1201419

3. Each member in the Dental clinic will have a personal file, which includes general information about them And Show the accessibility for each one .

3.1. Before users can view their profile they need to log into the system. If a user doesn't log in they won't be able to see their profile.

3.2. The profiles are designed for everyone working in the Dental clinic including doctors, nurses, X ray service operators, receptionists, patients and inventory managers, so the system should recognize the user.

3.3. The members shall be able to put an avatar for the profile.

3.4. Members should have access, to their information, including their identification number, name, email address, phone number, residential address, date of birth and membership plan. This information should be presented in a format that was agreed upon with the designer.

3.5. The system must have logs page show all transaction on the system for example if the doctor edit anything or visit any page must be show in the logs .

3.6. The profile should show birthday greetings to all members of the Dental clinic, patients and staff.

3.7. The system should have a public page contain a general information and certificate for the Dental Clinic staff .All members can access it.

3.8.The system enables members to update general information in their profile example(name, email address, phone number, residential address).

3.9. The patient profile must include the following features:

3.9.1 The Patients should have the ability to access the treatment details in their profile. They are not allowed to make changes to it. The responsibility of editing the treatment information lies with the doctor who is overseeing their case. All patients have Treatment plan from the doctor the patients can see it from button called ‘‘show Treatment plan’’.

3.9.2 The patient should have the ability to see all his invoices, with the ability to pay unpaid invoices through electronic payment channels or cash.

3.9.3 The Patients should be able to see the attendance history listed as a calendar view checked every day that the member attends the Dental Clinic .The attendance history should be in the same profile page.

3.9.4 each part of treatment plan are marked as done by the doctor after patient visit and this confirmed on patient profile the patients can see all this info on "show treatment plan" button.

3.9.5 The patient must see the schedule of medicines provided by the doctor (their profile must contain the schedule of medicines and the times of taking them and can be seen by selecting "Show medicines plan" button` and if the doctor does not provide medicines, it must appear when selecting "Show medication plan" A message to the patient "The doctor has not assigned medicine for you". Just doctor can have access to edit the medicines for patient , also the nurse can edit the medicines just if the doctor give them approved or access must be logs file to show the action on the system.

3.9.6 The patient profile must have page with all doctor with their certificate and experience and they can see this on social(see 3.10.2....).

3.9.7 The patient's profile must contain the (Map ,Calendar ,choice the personal doctor , online doctor chatbox ,Emergency aids , Complaints and feedback Send and Receive message, set appointment)buttons mentioned previously in the system features.

3.10. The Doctor profile must include the following features:

3.10.1 The doctor's profile must contain the information mentioned in 3.4 point in addition to his scientific and practical certificates in the field of dentistry.

3.10.2 The doctors must be able to share their file link on social networking sites, but the data allowed is (avatar image, general information, attendance record, and their practical academic certificates, in addition to photos & Videos of their treatment of patients while maintaining the patient’s privacy).

3.10.3 The doctor should see the patient attendance record .

3.10.4 Doctors must have all access to modify patients’ treatment data, such as medication and treatment method, also the nurses can update if they have approved from the doctor.

3.10.5 The Doctor's profile must contain the (Map ,Calendar ,online doctor chatbox ,Emergency aids , Complaints and feedback , Send and Receive message, Report to the patients , set appointment)buttons mentioned previously in the system features.

3.11. The Nurse profile must include the following features:

3.11.1 The system must provide the nurse with the opportunity to provide his personal file with his certificate and experience.

3.11.2 The nurses can be able to share their file link on social networking sites, but the data allowed is (avatar image, general information, attendance record, and their practical academic certificates).

3.11.3 the nurses should have access (see and edit) the patient treatment plan but they must have approved from the Responsible doctor.

3.11.4 The Nurse's profile must contain the (Map ,Calendar ,online doctor chatbox ,Emergency aids , Complaints and feedback , Send and Receive message , set appointment)buttons mentioned previously in the system features.

3.12. The Inventory Manager profile must include the following features:

3.12.1 The Inventory manager's profile must contain a page show the existing quantities of the Dental clinic's medical materials and tools.

3.12.2 The numbers of each type of medical materials and tools for the clinic must be shown in a graph and updated automatically from the system.

3.12.3 The Inventory Manager should show all medical material info as expiry date and material type …

3.12.4 Just the Inventory Manager must be can edit the quantities for these medical material and tools.

3.12.5 All request for medical material and tools from all Dental Clinic staff must be appear on The Inventory Manager profile.

3.12.6 The Inventory manager have the ability to add new material and tools on the system by button called "Add medical material OR Tools".

3.12.7 The Inventory Manger have the ability to delete medical material or tools if the dental clinic they don't use this material or they want to replace it to another.

3.12.8 The system must support a mechanism for sending requests for materials and tools to the dental clinic.

3.12.9 The Inventory Manager's profile must contain the (Map ,Calendar ,Emergency aids , Complaints and feedback , Send and Receive message, Report to the Inventory)buttons mentioned previously in the system features.

3.13. The X-ray specialist profile must include the following features:

3.13.1 The X-ray specialist profile must contain the dates of patient reservations and the times which this section is empty (without reservations).

3.13.2 Have the ability to make (update, Add, delete) on the dates of patient reservation, If the patient contact with them.

3.13.3 The X-ray specialist can order medical material or tools from Inventory Manager (show as request form fill by X-ray specialist).

3.13.4 The X-ray specialist have ability to see or show the X-ray report of the patient and be able to send the report to patient and doctor.

3.13.5 After the patient token X-ray the system should mark the date as done.

3.13.6 Must be able to generate invoice to the patient, such that the patient should be able to pay through electronic payment method.

3.13.7 The X-ray report must be store in the system and they can retrieve them in the next time.

3.13.8 The X-ray specialist profile must contain the (Map ,Calendar ,Emergency aids , Complaints and feedback , Send and Receive message, Report to the X-

ray patients ,set appointment)buttons mentioned previously in the system features.

3.14. The Reception Profile must include the following features:

3.14.1 The Reception Profile must be able to see all working hours for all members (doctor, laboratory, …).

3.14.2 The system must provide the receptionist with the ability to suggest an appointment for the patient with another doctor in the event that his doctor is absent for some reason.

3.14.3 The system shall provide the receptionist to make an edit to the appointment of all members of the Dental clinic, and this edit reaches members in the form of a notification to them.

3.14.4 The Reception Profile have ability to see the invoices without any editing on it just be able to pay if the patient want pay from Reception.

3.14.5 The reception must know all services price the dental clinic provide it.

3.14.6 The Reception's profile must contain the (Map ,Calendar ,Emergency aids , Complaints and feedback , Send and Receive message, , set appointment)buttons mentioned previously in the system features.

➢ Complaints and feedback:

prepared by Riwaa Assi-1201419

4. Users should have the ability to submit their complaints and provide feedback, for review.

4.1. Before the user can write complaints and provide feedback, he must log in. If a user doesn't log in they won't be able to write feedback.

4.2.The system must contain a side box called Complaints and feedback.

4.3. All complaints and feedback from other users should appear to the only Manger and sorted by time submitted.

4.4.All users of the Dental clinic system can submit complaints and feedback to the manager.

4.5. Each user has the opportunity to add a review in any language by typing or using the voice-to-speech technique that the system provides.

4.6.User will see his complaints and his feedback as the first one, and he can update it, delete it or add a new one.

4.7.As soon as the user submits the complaints and feedback, the system should upload the feedback and complaints into the server within 1 second maximum.

4.8.The manager can see all the complaints and feedback that were submitted by users according to the time of submission (that is, the oldest message appears first) along with showing the day and date of submitting this complaint or feedback.

4.9.The manager can click on the reviewer's username to access any user profile.

4.10. Manager can comment or react on any Feedback or complaints.

4.11. The system provides the manager with the ability to display Feedback from patients to the public (this raises the reputation of the clinic) And Users can react or comment on other users' Feedback.

4.12. The manager can see the total number of complaints and feedback by users and the total number of users who sent complaints and feedback.

4.13. The system must provide the manager with a percentage for negative complaints and a percentage for positive feedback , so that the manager can act to maintain and improve the clinic’s progress.

4.14. When the manager requests statistics, such as (the number of complaints, the number of users, or the percentages of complaints and feedback), the system must respond in a period not exceeding 2 seconds.

4.15. The system must detect any complaints containing bad language, delete them, and mark the user name to make it easier for the manager if he wants to review it.

4.16. The manager can choose to print the feedback and statistics results represented by percentages ratios and number of users, or export them to an Excel sheet.

4.17. System should provide complaints and feedback translation from any foreign language to the language the user/manager chooses and update it within 1 second max.

➢ Membership Registration

prepared by Dana Bornata – 1200284

5. Patients can register at the clinic through the mobile application or by visiting the clinic so that the receptionist (accountant) can register them.

5.1. Patients should have no trouble registering, supplying personal data, and choosing a payment option to interact with the system.

5.2. His ID number, name, birthdate, phone number, email address, residential address, and any illnesses—especially chronic ones—that he may be suffering from are among his details.

5.3 The system will ask the patient to pay the treatment fees with cash or credit cards

5.4. The system verifies that all of the data is accurate and comprehensive. For instance, the way the birthdate is written is accurate, and so forth. Should a defect exist, the procedure won't be finished.

5.5. After verifying the information, the system sends a code to the patient's number or email to confirm registration to ensure the confidentiality and security of the information.

5.6. After registration, patients will be able to access their pages via phone number or email with a password, it is possible to access them through writing or voice recording, and it is also possible to log in through facial recognition.

5.7. When registration is completed, there will be a short introductory video about the patient's page, such as the correspondence box, map, choosing a doctor, reminders, and alerts, and who will see his information. All this information will be known to the patient when he registers his membership.

5.8. The patient can choose any suitable doctor, through the doctor's profile, and his treatment photos of the patient, while maintaining the privacy of the patient's information.

5.9. The system notifies the patient of his appointment and updates any pertinent information two days before each clinic visit.

5.10. Patients receive a reminder to see their doctor for routine examinations every six months.

5.11. The system allows canceling or modifying the appointment by the patient’s schedule and the doctor’s schedule, and it must also be at least one day before the canceled visit, and personal information, and the system will send a notification when the process is completed successfully.

5.12. The patient's account contains health awareness sections and videos so that he can understand his health condition and deal with it better.

5.13. There is a chat box on the patient page for communication between the patient and the doctor about the patient’s condition and if he wants to inquire about his medical condition and emergency health matters.

5.14. There is a map display on the patient's page to know the clinic's location in more than one way.

5.15. A report is prepared on the patient’s personal and medical information, and to protect this information, specific people are allowed to view and modify the information with different powers.

5.16. Doctors can create reports related to the patient's health condition, prescribed medications, number of doses, examinations, and general information such as his name, age, and marital status.

5.17. Nurses can access reports that show the patient's health condition, treatment plans, and general information such as his name, age, and marital status.

5.18. The patient's financial history, including debts and payments, is accessible to the manager.

5.19. Other than the patient's medical condition, the receptionist can access the patient's basic information, including name, age, email, phone number, and place of residence.

5.20. The nurse will take the patient's height, weight, and blood pressure at each visit to the clinic.

5.21. At every visit, including during an examination, the nurse should update the patient's record.

5.22. During each visit, patients should be able to access their pages and update their information if any, or through the receptionist.

5.23. To ensure that people of all ages can use the user interface, it needs to be made clear and simple.

5.24. The system must be designed to accommodate an increasing number of patients without compromising performance.

5.25. To safeguard patient data, all sensitive information needs to be encrypted and security mechanisms need to be in place.

➢ Monthly reports' generator

prepared by Dana Bornata – 1200284

6.1. Clinic earnings and payments reports:

The system should enable the manager to view and manage financial reports relating to the clinic and staff:

6.1.1. The system allows the manager to open the reports page and has two options: whether he wants to go to the ready-made reports page or whether he wants to create new reports.

6.1.2. The system should allow the manager to create reports and give him options to specify the type of data (numeric, text, ordinal, cross-sectional).

6.1.3. The system must then display all the tables in the database in text form to determine which tables will be included in the new category.

6.1.4. After selecting the tables, the new category created will be added to the report.

6.1.5. The manager can issue reports, but the system must first ask him what the purpose of the report is (inform, document, analyze) and what the format of the report is (graphs, tables).

6.1.6. The manager must be able to save reports on any device in different and clear formats (PDF, CSV, LSV, EXCEL, WORD).

6.1.7. Reports can be viewed from different devices (phone, iPad, computer).

6.1.8. Reports are arranged chronologically (most recent at the top).

6.1.9. The system must allow the generation of a monthly/annual/daily report based on the clinic's profits and payments.

6.1.10. The report must include the distribution of profits from various services (consultations, advertising, prescriptions, medical examinations, and support from third parties).

6.1.11. The manager must be able to add and delete reports.

6.1.12. The manager must be able to create reports showing the salaries of employees (doctors, nurses, receptionists, radiologists, warehouse staff).

6.1.13. Salaries must include basic salary, bonuses, and deductions.

6.1.14. The system should provide an intuitive and easy-to-use interface for the reporting page.

6.1.15. The design should facilitate easy navigation and interaction with different functions.

6.2. Patient reports:

The system contains patient reports to store his personal, medical, therapeutic, and financial information, and this information is available to specific people within certain limits:

6.2.1. Patient reports must include personal information, details of health conditions, prescribed medications, debts, and payments.

6.2.2. Details of the health condition should include previous and current diseases and treatments so that the doctor specializing in the condition can know his medical history

6.2.3. It must include details of the medications and their doses prescribed by the doctors.

6.2.4. Debts and payment information must be detailed in terms of time, date, and method of payment (through the program or the receptionist).

6.2.5. The patient's report must include his or her clinic attendance times and upcoming scheduled appointments.

6.2.6. Different roles within the clinic (doctor, nurse, manager) should have access to specific patient reports to maintain patient privacy.

6.2.7. Doctors can create reports related to the patient's health condition, prescribed medications, number of doses, examinations, and general information such as his name, age, and marital status.

6.2.8. Nurses can access reports that show the patient's health condition, treatment plans, and general information such as his name, age, and marital status.

6.2.9. The manager can access the patient's financial history such as payments and debts.

6.2.10. The receptionist has access to the patient's general information, such as name, age, email, number, place of residence, and other general matters other than medical condition.

6.3. Inventory manager Report:

6.3.1. Users with inventory management roles should be able to access the dedicated reporting section.

6.3.2. There must be a detailed report on the resources in the clinic's warehouse (names, production date, expiration date, remaining quantity, quantity that must be available, price, and place of import).

6.3.3. Each resource must have its detailed name in Arabic and English, its code, and its image.

6.3.4. The date each resource entered the warehouse, its expiration date, its expiration date, and its location in the warehouse must be detailed.

6.3.5. Each supplier should have the quantity the clinic needs and the quantity remaining in the clinic so that inventory suppliers can know how much of a resource the clinic needs.

6.3.6. The clinic's consumption of each resource must be calculated per day, month, and year.

6.3.7. The system generates expiration reports that highlight products that are close to their expiration dates

6.3.8. Inventory suppliers can access reports on demand for specific medical supplies.

6.3.9. The reporting interface should be designed clearly and user-friendly to enable users to access information quickly and effectively.

6.4. Export to Excel:

6.4.1. The system must allow the enhanced reports to be exported to Excel format to be able to be analyzed and stored securely.

6.4.2. Excel imports must maintain the structure, format, accuracy, and clarity of the original reports.

6.4.3. All roles with access to reports must have the ability to export reports to Excel.

➢ Appointment Management

prepared by Dana Imam 1200121

7. With appointment management feature, the system sends appointment reminders to patients via text; asking for verification through email. Furthermore, patients can schedule their initial appointments with specific doctors, without conflicting with existing appointments. They can also modify appointment dates in their accounts, with the system managing any scheduling conflicts. Patient's appointments are accessible to doctors, nurses, X-ray specialists and receptionists, too.

   7.1. When the patient clicks on 'set appointment' option, for the first time after registration, the system shall allow the patient to set the appointment with any doctor, nurse or X-ray specialist they want, by providing the desired one's profile and available time on the calendar.

   7.2. The system also shall allow the already registered patients to do what is previously mentioned in (1.1); in case that the appointment is for the first time with that doctor, nurse or X-ray specialist.

   7.3. The system does not allow any authorized member that can set appointments to set a conflicting appointment, either with other registered appointments, or conflicting with doctors' days-off on the calendar.

   7.4. The authorized members that that the system allows to set appointments for the patient are: doctors, nurses, X-rays specialists and receptionist, in addition to the patient with the previous explained cases that the patient can set an appointment.

   7.5. The system allows to the patient to set an appointment either with the help of receptionist, who can access the patient calendar and set an appointment for the patient, or by using the mobile app.

   7.6. The system does not allow neither employees nor patients to set appointments on already registered time for another appointment

   7.7. In case the patient has many sets of treatments with specific doctor, or nurse, the system allows only that doctor or nurse to set the next treatment set for the patient, while preserving no conflicts in their schedule.

7.8. The system sends a notification to the patients that have appointment, before two days of that appointment, to remind them about it.

7.9. The system sends a verification message to the patients that have appointment, before the day of that appointment.

- 7.9.1. If the patient did not verify the appointment, it will be cancelled after 12 hours of sending the verification message.
- 7.9.2. If the appointment was cancelled due to not verifying it, the patient can no longer set an appointment again on the same time as the time of cancelled appointment.
- 7.9.3. If the patient verifies the appointment, a message will be sent to the doctor, nurse or X-ray specialist, who the patient has an appointment with.

7.10. The system allows the patient to modify his appointment time on the calendar by clicking on 'Modify appointment', which opens interface that contains a calendar.

- 7.10.1. The calendar shows the patient's appointments as long as his doctor, nurse or X-ray specialist reserved times.
- 7.10.2. The patient can modify the time of appointment, as long as there are no conflicts with his calendar and doctor's, nurse's or X-ray specialist's calendar.
- 7.10.3. The system allows the patient to modify the appointment until the day before appointment time, in other words, until 24 hours before the appointment day; such that the patient can not modify the appointment on the same day of its time.
- 7.10.4. If the patient modifies the appointment time, this modification will appear on patient calendar, as more as the doctor, nurse or X-Ray specialist calendar.
- 7.10.5. If the patient modifies the appointment time, the system will send a message to the doctor, nurse or X-ray specialist in charge.

7.11. No one of the authorized members, except the patient, can modify the appointment time, either the patient knows or does not know about that. If anyone of them wants to modify the appointment time, the patient must accept this request.

i. The system provides two ways for the patient acceptance on the modification: either by patient ID and patient password, or by verification message.

ii. If the patient is in the clinic, and the doctor wants to make an appointment modification via their account, they can ask the patient to enter their ID and Password to submit the request of appointment modification. Or they can send request message via system to patients, to modify the appointment via patient account.

iii. If the patient is not at the clinic, the doctor has to send the request message that is built-in the system to the patient.

7.12. If the doctor, nurse or X-ray has a contingency in a day, and had to leave the clinic that day, while another doctor, nurse or X-ray specialist takes his appointments that day, the system gives the patient the choice to attend the appointment, or set it on another day. This will be through a special message that is sent in these cases.

7.13. More than one member can set or modify the appointment at the same time; since applying the set or modification on the appointments does not take more than two seconds.

➢ Paying Methods

prepared by Dana Imam 1200121

8. The feature of Paying methods in the clinic system includes a database with patient IDs, payment methods (cash or credit card), past payments, debts, and the number of registered family members in the clinic. The Clinic manager determines discounts based on the number of registered family members, offering customized discounts to adequate patients.

    8.1. The system must allow only the receptionists and patients to view the member's payment details.

    8.2. The patient can pay for the treatment set via cash or via visa card.

    8.3. When the patients register in the clinic, the system allows them to assign their default paying method with their preferable one.
        8.3.1. The patient can set the default paying method as cash or credit card.
        8.3.2. If the patient default paying method was credit card, he/she must fill in the information of the credit card In the system in advance, in other words, while registering.

    8.4. In every paying process, the system shall ask the patient whether to pay via the default way or the other way.
        8.4.1. If the patient default way was cash, and want to pay in the clinic, then the system shall give the patient two options: via cash or via credit card.

            8.4.1.1. If the patient chooses credit card, the system shall require the credit card information to be filled, and shall ask for paying verification.

            8.4.1.2. If the patient chooses cash, then the system shall give message to the available receptionist in the clinic, with the patient ID and the bill value, to complete the paying process.

        8.4.2. If the patient default way was credit card, then the system shall give the patient three options to pay: either by the default credit card, or by different credit card, or by cash.

            8.4.2.1. If the patient chooses default credit card, the system shall only ask for paying verification.

8.4.2.2. If the patient chooses different credit card, the system shall require the credit card information to be filled, and shall ask for paying verification.

8.4.2.3. If the patient chooses cash, then the system shall give message to the available receptionist, with the patient ID and the bill value, to complete the process.

8.5. The system shall send a message of the payment bill to the patient, with its amount of money, time of paying, and the name of the receptionist, if the paying method was via cash.

8.6. If the patient wants to pay via credit card, and there was a problem related with paying process, like false data or not enough money in the credit card, the system must print the error message, and return the patient to the beginning of the paying process.

8.7. The system shall clarify the currency that is transacted in the payment tab.

8.8. Whether paying by cash or by credit card, the system shall move to a verification page with the bill information and paying method.

8.9. If the patient has members of family that are also registered in the clinic, the system makes a customized discount on the bill, that will be shown in the verification page for the patient while paying.

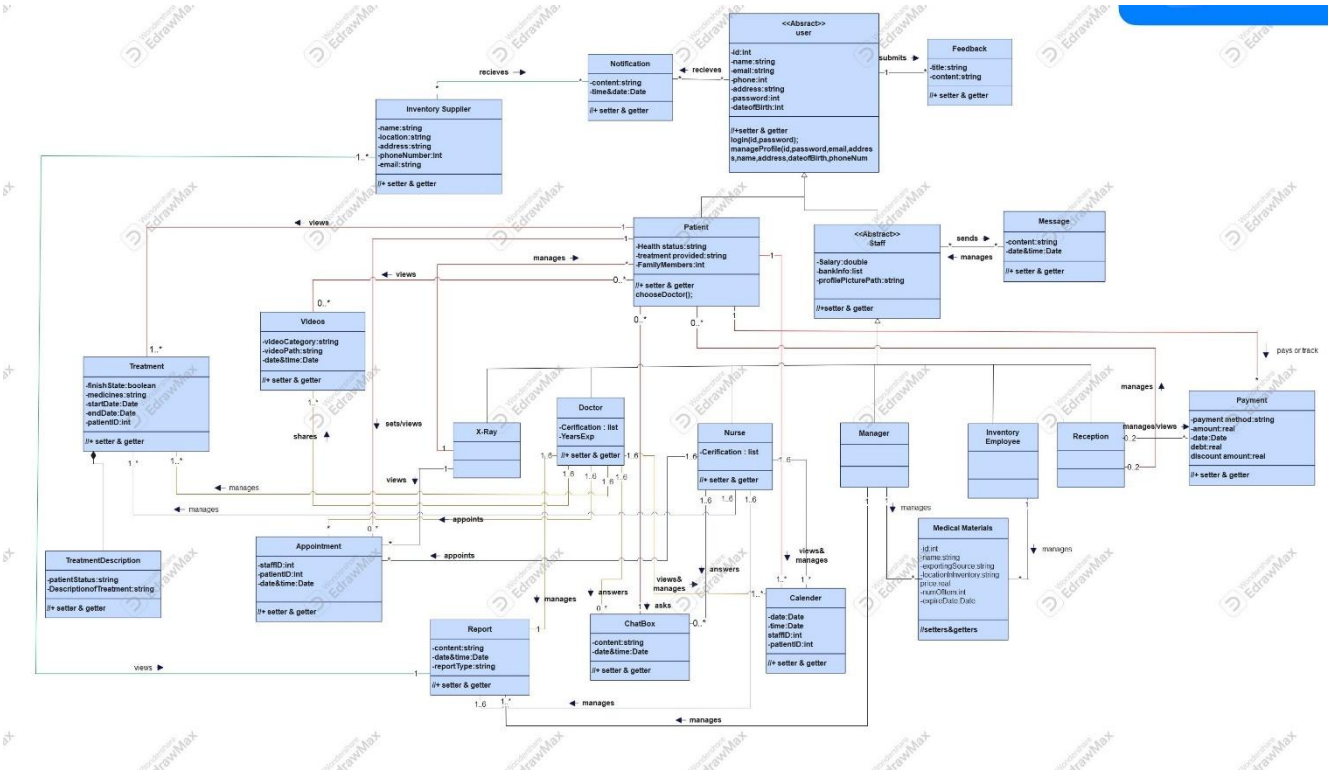
8.10. Paying process is easy and flexible to deal with, such that no need for instructions to explain paying way; since paying process is organized through well-organized user Interfaces.

8.11. Inserting money into the system clinic and modifying patient's payment data do not take that much time, at most 2 seconds are needed for the process to be fully completed.

PHASE III

In this phase, the detailed conceptual class diagram of the system is presented using UML notations. Moreover, the basic flow of four sample system requirements, from the ones explained previously in phase II, are demonstrated using sequence diagrams, based on single responsibility design principle. The conceptual class diagram offers a comprehensive depiction of the system's functional roles and the relationships between its various elements. Together, these visual representations contribute to a nuanced understanding of the system's structure and operational details.

- Detailed conceptual class Diagram



➢ Use-Case Specification :*Track Payment by Patient Use Case*

Document Prepared by: Dana Imam_1200121

1. Brief Description

This use case allows the Patient to track his/her payments in the clinic system. It includes processing payments, viewing the treatment bills and existing debts, changing the payment method, and managing failed payments.

The actor for this use case is the Patient.

2. Flow of Events

The use case begins when the patient selects the "track payments" activity from the Main Form.

2.1 Basic Flow – *Process Payments.*

1. The Patient selects " process payments"
2. The system displays a page of each red checked treatment session.
3. The system shows each treatment session bill.
4. The system displays a check box beside each session; for selecting which sessions to pay.
5. The patient selects the desired sessions to pay.
6. The system shows the total amount of money to be paid, and the paying method to be used.
7. The system displays the final bill after discount if exist.
8. The system displays a confirm verification dialog confirming the paying.
9. The patient selects "accept."
10. The system validates the money withdrawing. If it is accepted, the payment process information will be saved.
11. The debt is reduced by the amount of money paid.
12. The date of the paying process is saved.
13. In a box at the receipt page, the paid amount for the current process, the currency used in paying, the new value of debt after reduction, and the date of the current paying process are all displayed.
14. The system sends notification to the patient on his/her email and phone number with the paying process information in point 13.
15. When the patient finishes paying for the selected sessions, the use case ends.

2.2 Alternative Flows

2.2.1 *Change payment method*

1. The patient selects "change payment method"
2. The system displays the payment methods, as ‘default’ or ‘new credit card’.
3. The patient chooses the desired paying method, as a cash if the current method is a default credit card, or by filling in the data if a new credit card is chosen.
4. The system retrieves the payment method information and displays it on the screen for the patient.
5. When changes are complete, the patient selects "save."
6. The system validates data, then updates the patient paying methods.
7. When choosing the desired paying method is done, the use case ends.

2.2.2 *View bills and debts*

1. The patient selects "view bills and debts".
2. The system displays a page that contains a history of each treatment session, the date of it, and the bill needed for it.
3. The page shows a checkbox beside each treatment session, with green indicating a paid session and red indicating an unpaid session.
4. At the bottom of the page, there is a box showing the total paid money for treatments, the paying method/s used and the debt amount.
5. The system shows a percentage beside the debt amount, that is calculated according to the number of family members registered in the clinic.
6. In the box at the bottom of the page, the system displays the amount of debt after applying a discount based on the percentage mentioned in point 5.
7. Once the patient has reviewed his/her payment information and no further actions are required, the use case can be considered as concluded and ended.

2.2.3 *Manage unsuccessful payments*

If, in the “confirm payments” sub-flow, the patient’s payment method was default as cash, a message is displayed “Please go to the receptionist to complete your paying process.” The patient can either change the paying method to credit card and fill its data; to complete the paying using the system itself, or go to the receptionist at which point the use case end.

2.2.4 *Credit Card Not Valid*

If, in the “select payment method “or “confirm payments” sub-flows, the patient’s payment method was as a new credit card, but with wrong data inserted about it, the system displays an error message: “Credit Card Not Valid or Not Exist”. The patient can then re-enter the card information again, choose the default payment method, or cancel the operation at which point the use case ends.

3. Special Requirements

The system shall load the payment history page within 4 seconds. Furthermore, all payment transactions and sensitive data must be encrypted during transmission. In addition to that, the system shall integrate with the clinic's existing patient information database; to fetch relevant treatment and payment data.

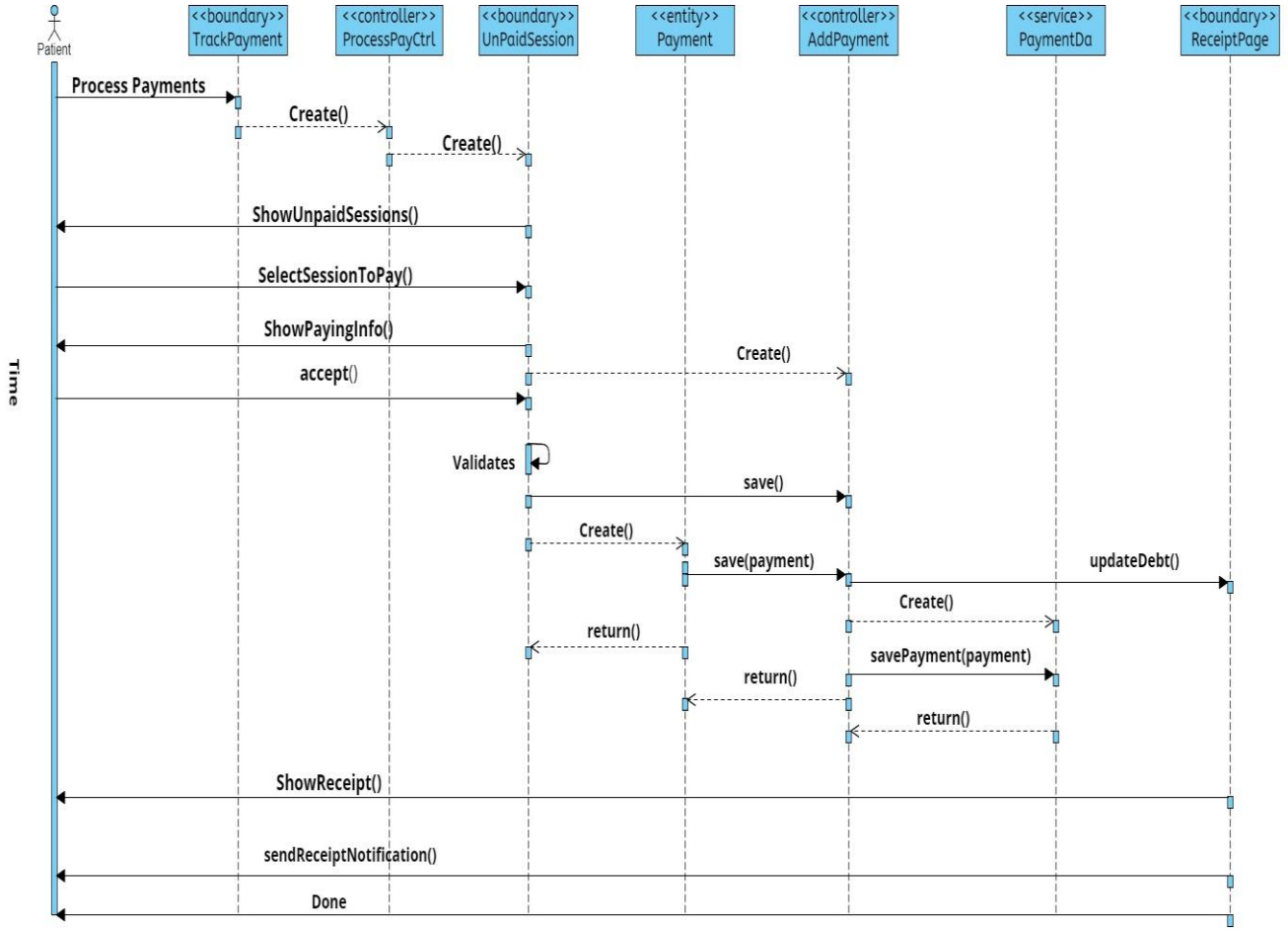
4. Entry Conditions

4.1 Log In

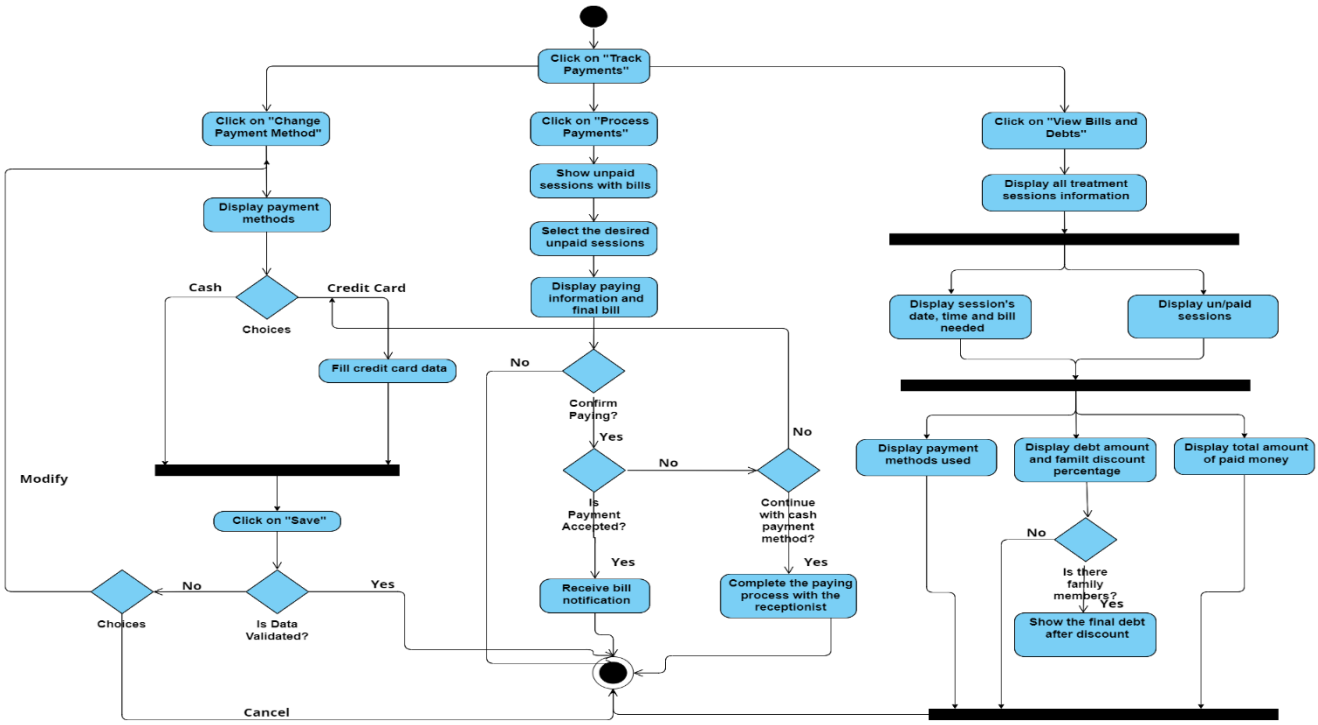
Before this use case begins the Patient has logged onto the system.

5. Exit Conditions

There are no postconditions associated with this use case.



Activity diagram: Dana Imam



Inventory management:

System requirement specification document prepared by Yafa Naji – 1200708

1. **Brief Description:**

   This use case focuses on an inventory manager's ability to check the availability of in-stock items. It is designed to enhance the decision-making process by providing additional details, facilitating report generation, and ensuring efficient record keeping for future reference.

2. **Flow of Events:**

   The use case begins when the inventory manager chooses to check inventory through the “Check Availability” option, enters the name of the item or scans its barcode, retrieves the information in real-time, and provides detailed availability status.

❖ **Actor**: Inventory Manager.

2.1. Basic Flow – Check Item Availability:

1. The Inventory Manager initiates the process by selecting the "Check Availability" option from the main menu.
2. The system presents a search interface where the Inventory Manager can input the item name or scan the item's barcode.
3. The Inventory Manager enters the item name or scans the barcode and clicks the "Search" button.
4. The system retrieves real-time information from the inventory database and displays the availability status, including the current quantity, location, and last restock date.

5. If the item is in stock, the system provides additional details such as shelf location and supplier information.
6. In case the item is not in stock, the system prompts the Inventory Manager with options for reordering or checking alternative suppliers.
7. The Inventory Manager has the option to print a detailed availability report or generate a PDF for future reference.
8. The system records the inventory check, updating any relevant timestamps for reporting purposes.
9. The Inventory Manager is redirected to the main Inventory Management Form, where they can proceed with other inventory-related tasks.

2.2. Alternative Flows:

2.2.1. Reordering Option Selected:

If the Inventory Manager chooses the "Reorder" option when the item is not in stock:

1. The system prompts the Inventory Manager to confirm the reorder.
2. Upon confirmation, the system generates a reorder request, updating relevant inventory data.
3. The backup service is triggered again to capture the changes in the inventory database.
4. The Inventory Manager receives a confirmation message and is redirected to the main Inventory Management Form.

2.2.2. Alternative Suppliers Option Selected:

If the Inventory Manager chooses the "Check Alternative Suppliers" option when the item is not in stock:

1. The system displays a list of alternative suppliers for the selected item.
2. The Inventory Manager selects a new supplier.
3. The system updates the supplier information for the item in the inventory database.
4. The Inventory Manager receives a confirmation message and is redirected to the main Inventory Management Form.

2.2.3. Print Report Option Selected:

If the Inventory Manager chooses the "Print Report" option:

1. The system generates a detailed availability report for the selected item.
2. The report is sent to the designated printer.
3. The Inventory Manager receives a confirmation message and is redirected to the main Inventory Management Form.

2.2.4. Generate PDF Option Selected:

If the Inventory Manager chooses the "Generate PDF" option:

1. The system creates a PDF document containing detailed availability information for the selected item.
2. The Inventory Manager receives a link to download the PDF.
3. The Inventory Manager can download the PDF for future reference and is redirected to the main Inventory Management Form.

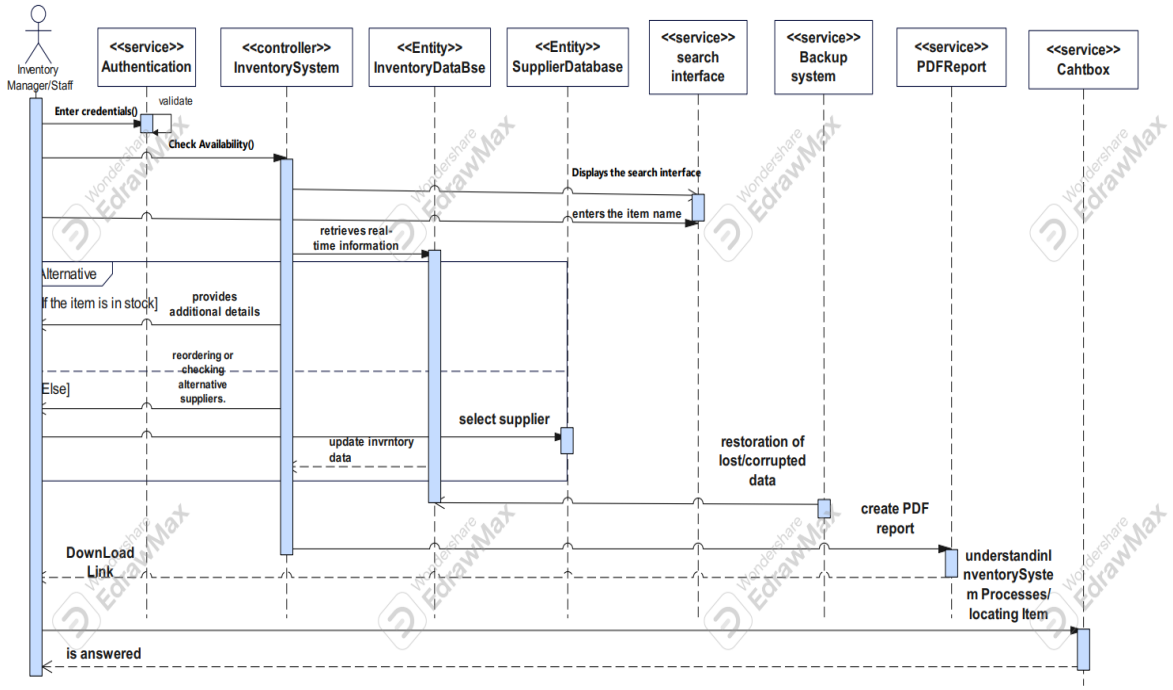
3. **Special Requirements:**
    1. The system should retrieve real-time inventory information within 3 seconds.
    2. Report generation (print or PDF) should not take more than 5 seconds.
    3. All system messages, including chat box interactions, must appear within 2 seconds during the item availability check process.
4. **Entry Conditions:**
    - **4.1. Log In:**

      Before this use case begins, the Inventory Manager must have successfully logged into the system.

    - **4.2. Access to Inventory System:**

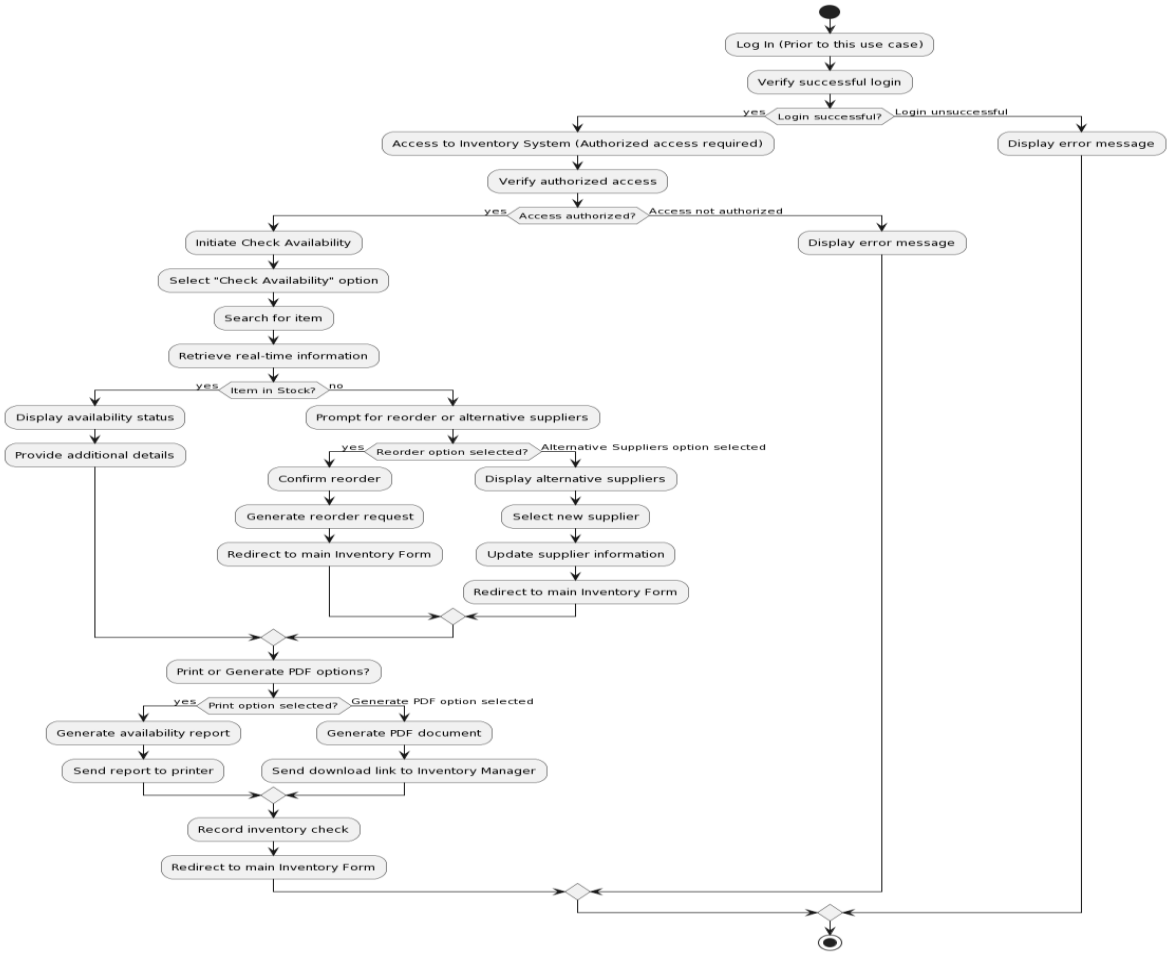
      The Inventory Manager needs authorized access to the Inventory Management module.
5. **Exit Conditions:**

   There are no post conditions associated with this use case. The Inventory Manager is redirected to the main Inventory Management Form after completing the check for item availability and any selected alternative flows.



Activity diagram:

Yafa Hamadalla


Log In (Prior to this use case)
Verify successful login
Login successful?
yes
Login unsuccessful
Access to Inventory System (Authorized access required)
Display error message
Verify authorized access
Access authorized?
yes
Access not authorized
Initiate Check Availability
Display error message
Select "Check Availability" option
Search for item
Retrieve real-time information
Item in Stock?
yes
no
Display availability status
Prompt for reorder or alternative suppliers
Provide additional details
Reorder option selected?
yes
Alternative Suppliers option selected
Confirm reorder
Display alternative suppliers
Generate reorder request
Select new supplier
Redirect to main Inventory Form
Update supplier information
Redirect to main Inventory Form
Print or Generate PDF options?
Print option selected?
yes
Generate PDF option selected
Generate availability report
Generate PDF document
Send report to printer
Send download link to Inventory Manager
Record inventory check
Redirect to main Inventory Form

➢ Use Case Specification: Membership Registration

Document Prepared by: Dana Bornata-1200284

1. Brief Description

The procedure for patients to register at the clinic and become members is explained in this use case. When registering, users must provide personal information, choose a payment method, and gain access to the system's capabilities.

Actor: Accountant (receptionist), patient

2. Flow of Events

The use case starts when the registrant selects the “Membership Registration” activity from the main form.

2.1 Basic flow

2.1.1. The registrar selects the “Add Patient” option from the system interface.

2.1.2. The system displays the blank membership form so that the user can enter the information required by the system to register successfully, and He has two options for entering data: voice or written.

2.1.3. The patient initiates the registration process by either visiting the clinic for in-person registration, where the receptionist assists in data entry, or by utilizing the mobile phone application for self-registration.

2.1.4. The patient enters personal data in the form which is:

-Patient ID

-Full Name of the Patient

-Date of Birth

-Patient's Phone Number

-Patient's Email Address]

-Patient's Home Address

-Information about any chronic conditions the patient may have (if applicable)

Then chooses the “Save” option.

2.1.5. The system checks that the data entered is genuine, that it is formatted correctly, and that no information is missing. If everything is as it should be, the system shows a confirmation message and moves on to the next phase.

2.1.6. After verification, the system sends a confirmation code to the patient’s number or email, as the patient chooses.

2.1.7. The patient enters the confirmation code, which consists of 4 numbers Within a 2-second.

2.1.8. The system allows the patient to choose the language he wants to be the system language, which is either Arabic or English.

2.1.9. Once confirmed, the system creates a new patient record and assigns the patient a membership number. It gives the patient access to various features within the system such as: scheduling appointments, choosing a doctor, reminders for routine examinations, canceling or modifying appointments, and accessing personal and medical information.

2.1.10. As part of the onboarding process, the system presents a short introductory video. This video provides an overview of the patient's page, explaining features such as the messaging box, map, doctor selection, reminders, alerts, and details about who can access their information. This ensures that the patient is well-informed during the registration of their membership.

2.1.11. The system displays a confirmation message, such as "Thank you for joining us," to acknowledge the successful completion of the registration process.

2.1.12. The entire process can be repeated for each new membership, allowing for the registration of multiple patients within the system.

2.2 Alternative Flows

2.2.1 Patient Already Exists

If, during the registration process, the system identifies an existing patient with similar information (e.g., same name and birthdate):

The system displays an error message: "Patient Already Exists."

The system provides the patient with the following options:

I. Change the provided information.
   The patient can change the contradicting information on the membership form using the system.
   Before permitting the user to proceed with the registration after amending, the system double-checks the changed data.

II. Proceed with a new registration if the patient has the same name.
   The system distinguishes between distinct patients with the same name through extra verification processes (such as ID number, date of birth, phone number, and email).
   The procedure of registering new patients is monitored by the system. The registration process is meticulously monitored to ensure a seamless experience for both new and existing patients.

III. Cancel the operation.
   The current registration process is terminated by the system.

2.2.2 Technical Error

If a technical error occurs during the registration process, the system displays an error message and the patient is given the option:

I. retry the process

The patient is prompted by the system to re-enter information.

II. Contact the clinic for assistance (the receptionist (accountant) can help and can be contacted through (contact number, email, or visit the clinic)).
The receptionist's (the accountant's) contact information is provided by the system.
A phone number, email address, or an invitation to visit the clinic could be included in the contact details.

2.2.3 An incorrect format was entered

While in the “Request Registration Request” sub-flow if the patient enters a file

The format is invalid in any field, and the system will display an "Invalid format" error message. This field will be marked.

Incorrect formatting includes:

I. The patient enters the alphabet in the ID card number fields or enters more or less than 9 numbers.
II. The patient entered the alphabet into the phone number fields.
III. Patient entered incorrect date of birth, gender, and email

The system will give the registrant several options:

- Re-enter the marked data so that he can save the data and continue the process successfully.
- Cancel the operation: The current registration process is terminated by the system.

2.2.4. Confirmation Code Expiry:

Triggered when the system detects that the patient has not entered the confirmation code within the specified time limit.

-Time Limit Exceeded(2second):

The system checks the elapsed time since the confirmation code was sent to the patient.

If the specified time limit is exceeded without code entry, the system recognizes that the code has expired.

Prompt for New Code:

The system prompts the patient with a message indicating that the confirmation code has expired and requests them to request a new code.

1.Code Resending:

The patient has the option to request a new code. Upon the patient's request, the system generates a new confirmation code and sends it to the patient's chosen contact method (phone or email).

2. Cancel the operation.

The current registration process is terminated by the system.

3. Special Requirements

3.1 Data Security

3.1.1. The system must ensure data security through encryption.

3.1.2. Access to patient data should be restricted based on user roles and permissions.

3.1.3. The system should have robust measures in place to prevent unauthorized access, data breaches, and malicious attacks.

3.1.4. In a proactive stance against potential vulnerabilities, password security is crucial. Passwords adhere to a secure format, including a minimum length of 8 characters, and a combination of letters, numbers, and symbols, which enhances the strength of security.

3.1.5. Users should receive notifications for any password changes or recovery attempts to alert them to potential unauthorized access.

3.2 User Experience

3.2.1. The user interface should be user-friendly for people of all ages.

3.2.2. users should encounter clear instructions and visual cues during the registration steps.

3.2.3. The system should ensure that the password delivery process takes no more than two seconds, with the reset link or code expiring after a specified time to ensure security.

3.2.4. Acknowledging the need for promptness, the payment request, from initiation to completion, is designed for efficiency, with the entire process seamlessly concluding within one second.

3.3 Availability

The system should be available 99.9% of the time during normal business hours.

4. Entry Conditions

The membership registration process begins when the individual expresses his desire to register in our system. The patient retains the autonomy to choose between visiting the clinic for a personal experience or using the mobile application for a convenient self-registration process.

5. Exit Conditions

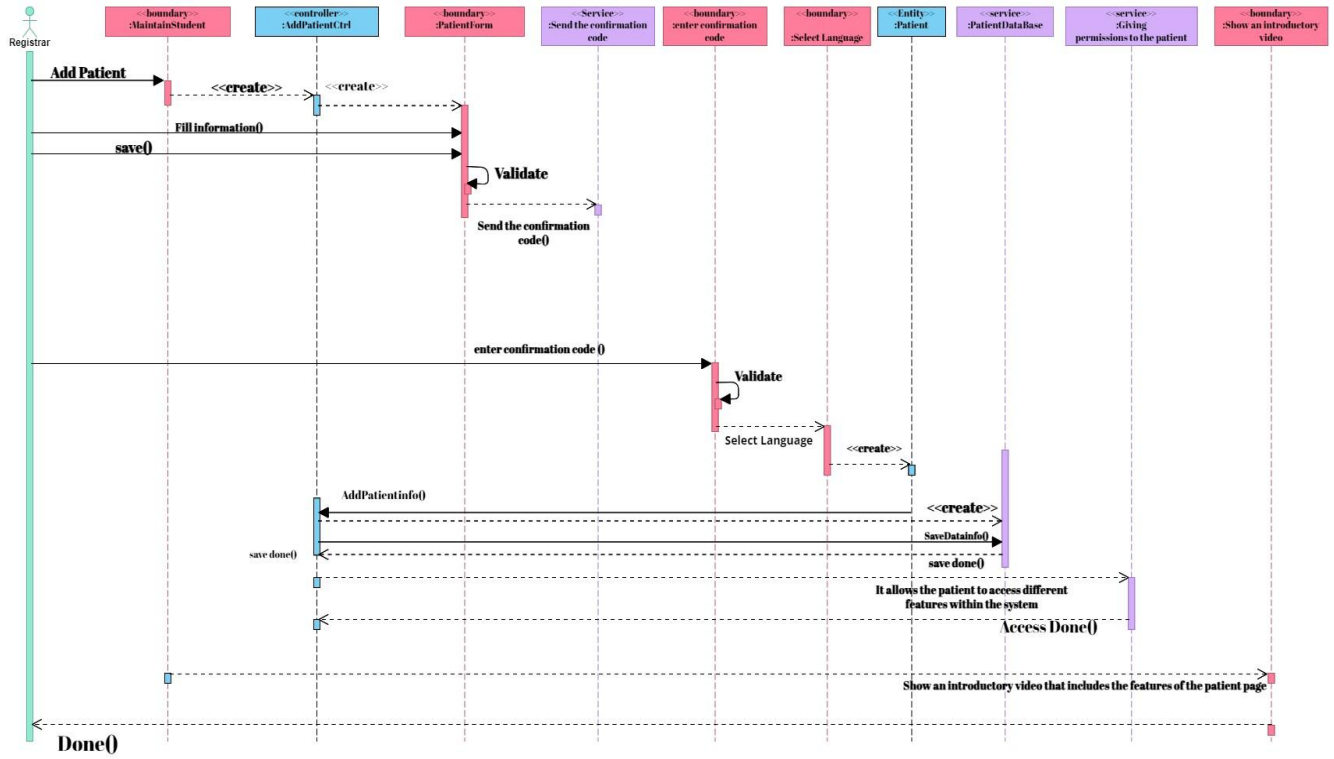
The patient has successfully completed the membership registration, and his information is stored securely in the system. Therefore, the patient has joined the system and has been successfully registered and can then use and see all of its features that it provides to him.

Or the patient chose to cancel the registration process for some reason.

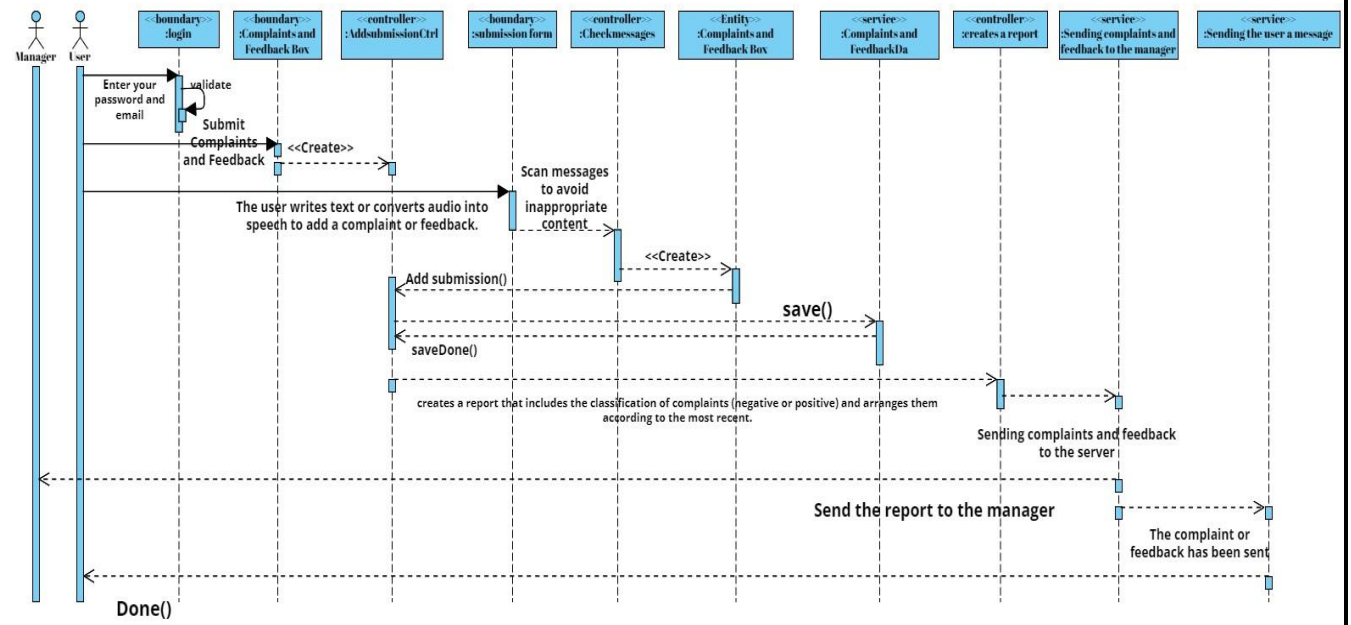
Sequence diagram: *Prepared by: Dana Bornata-1200284*

1. **Actor:**
    - Registrar
2. **Boundary Objects (UI) (Views):**
    - Maintain Student
    - Patient Form
    - enter confirmation code
    - Select Language
    - Show an introductory vide
3. **Entities (Model):**
    - Patient
4. **Controller:**
    - Add Patient Ctrl
5. **Service:**
    - Send the confirmation code

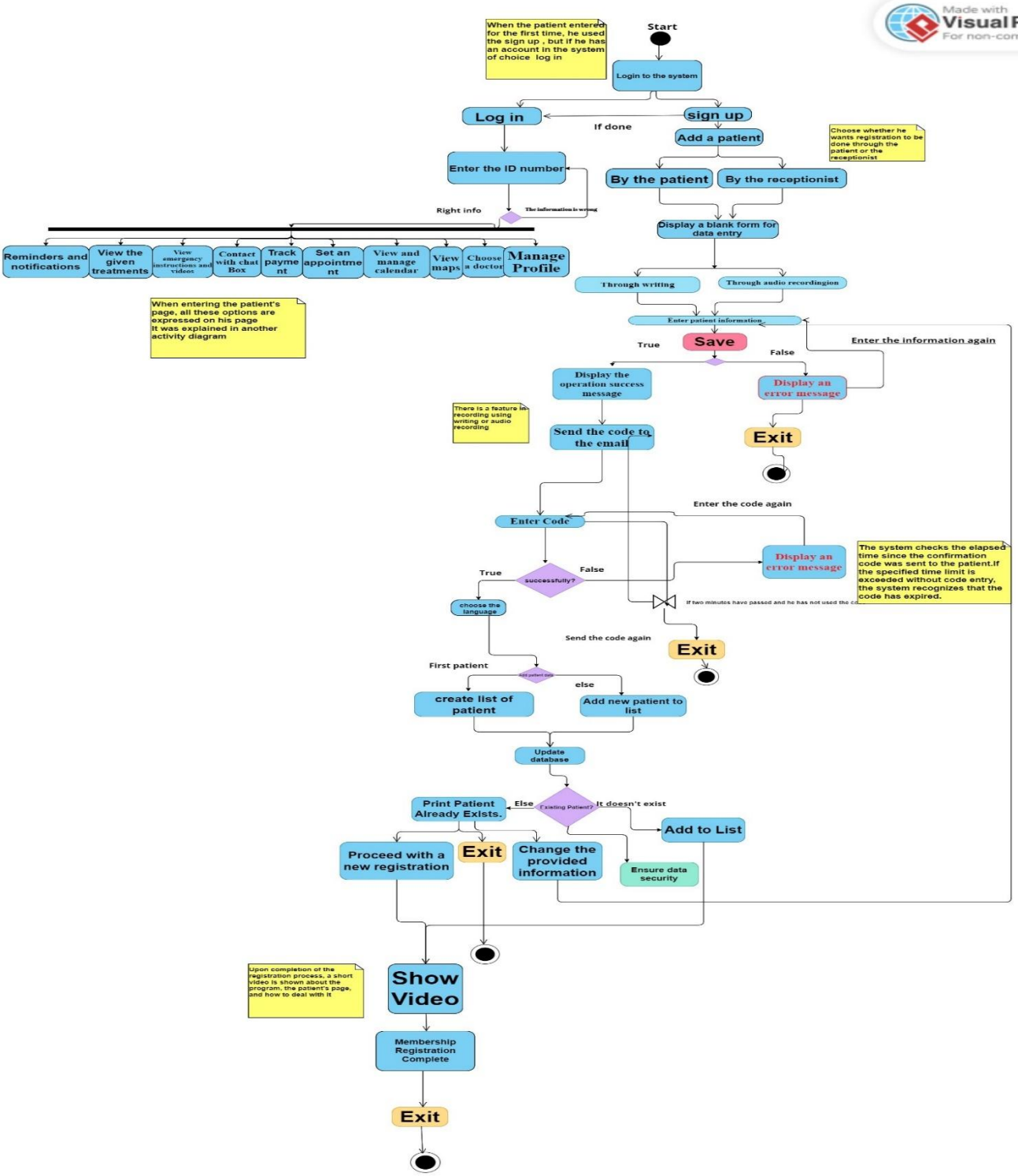
- Patient Data Base
- Giving permissions to the patient



Complaints and feedback



Activity diagram: Dana Bornata



Appointment management Patient use case

Document Prepared by:Riwaa Assi 1201419

1. Brief Description

This use case demonstrates the ability of patients to book and manage their appointments, as well as the ability to modify and delete bookings under specific conditions.

2. Flow of Events

The use case begins when the Patient selects the " Set Appointment " from the Main Form in User Profile .

- ***Actor : Patient***

2.1 Basic Flow –Booking Appointment

1. The patient selects " Set Appointment "option.
2. The system displays set appointment Form.
3. The patient will choose from the Appointment Form The following information: the Name of the doctor for reservation. (*for example check box or radio button*) .
4. The system then displays the calendar with the available times for this chosen doctor.
5. Then the patient chooses the suitable time for which time he wants to the reservation.
6. The system displays a confirmation message contain "Doctor Name with reservation date " with submit like button .
7. Then the patient click "ok" on the submit button to confirm the reservation. If The patient click "X" go to →point 13.
8. The system displays a calendar with patient reservation time and the send a SMS notification with patient Id and email to the patient and chosen doctor .
9. The patient must confirm the reservation from the email link within 12 hours.

10. if the patient not do point 9 , then the system will be canceled the reservation and send a SMS notification to the patient and chosen doctor .

11. in point 4 if the doctor doesn't have any empty time the system will display message "This doctor not available please choose another doctor".

12. Then the patient click "OK" on the submit message.

13. The system return display set appointment Form.

14. After exiting the " Set Appointment " Form , the system displays a form containing the personal appointment .

15. Steps 2 to 12 are repeated for each patient who wants to set appointment.

2.2 Alternative Flows

2.2.1 Booking Appointment for X-Ray

1. The patient selects " Set Appointment "option.

2. The system displays set appointment Form.

3. The patient will select the following information from the appointment form: "Book an X-ray appointment".

4. The system then displays the calendar with the available times for the X-ray room.

5. Then the patient chooses the suitable time for which time he wants to the reservation.

6. The system displays a confirmation message contain " X-ray administrator Name with reservation date " with submit like button .

7. Then patient click "Yes" on the submit button to confirm the reservation. If The patient click "X" go to →point 4.

8. The system displays a calendar with patient reservation time and the send a SMS notification with patient Id and email to the patient and X-ray administrator.

9. The patient must confirm the reservation from the email link within 12 hours.

10. if the patient not do point 9 , then the system will be canceled the reservation and send a SMS notification to the patient and X-ray administrator.

11. After exiting the " Set Appointment " Form , the system displays a form containing the personal appointment .

12. Steps 2 to 12 are repeated for each patient who wants to set appointment for x-ray

2.2.2 Modify Appointment

1. The Patient selects "modify Appointment." option.
2. The system displays patient calendar appointment.
3. The patient choose which reservation date he wants to modify.
4. The system will verify the appointment data, if it has more than 24 hours remaining, if Yes (more than 24 hours remaining) go to point →5 ,if No go to point→ 10.
5. The system display calendar Box to edit the reservation date.
6. The patient enters the date and time of the new reservation.
7. When changes are complete, the Patient selects "save."
8. The system verifies the validity of the data, and then updates the reservation date on patient calendar.
9. The system sends an SMS notification with the patient ID and email to the patient and the selected doctor or to the X-ray administrator, depending on the type of appointment that has been modified.
10. The system display message "you can't modify the reservation date because the remaining time is less than 24 hour".
11. Steps 2 to 10 are repeated for each patient who wants to modify his appointment. When the modifications are complete, the use case ends.

2.2.3 Delete Appointment

1. The patient selects "delete Appointment " option
2. The system displays patient calendar appointment.
3. The patient choose which reservation date he wants to delete.
4. The system will verify the appointment data, if it has more than 24 hours remaining, if Yes (more than 24 hours remaining) go to point →5 ,if No go to point→ 10.
5. The system displays a verification message to confirm the deletion. Contents "Do you really want to delete the appointment?"
6. The patient click "Yes" on verification message .
7. The system remove the reservation date from the patient and doctor calendar .
8. The system send a SMS notification with patient Id to the patient and chosen doctor or X-ray administrator, depending on the type of appointment that has been deleted..
9. If the patient click "NO " on verification message .
10. The system does not make any changes to the Calendar appointments .
11. Steps 2 to 7 are repeated for each patient who wants to delete his appointment.

2.2.4 Appointment already booked

If the system finds in “Set Appointment” or “modify Appointment for another Appointment” an existing appointment with the same date and time, an “ Appointment already booked” error message will be displayed. The patient can either change the date and time, or cancel the operation at which point the use case ends.

3. Special Requirements

1. When searching for an appointment, the system retrieves the appointment calendar within no more than 3 seconds.
2. Modifying the member's appointment calendar does not take more than a 3 seconds.
3. All messages that appear to the member while he is in the process of booking an appointment, modifying an appointment, or deleting an appointment appear within a period of no more than 2 seconds.

4. Entry Conditions

4.1 Log In

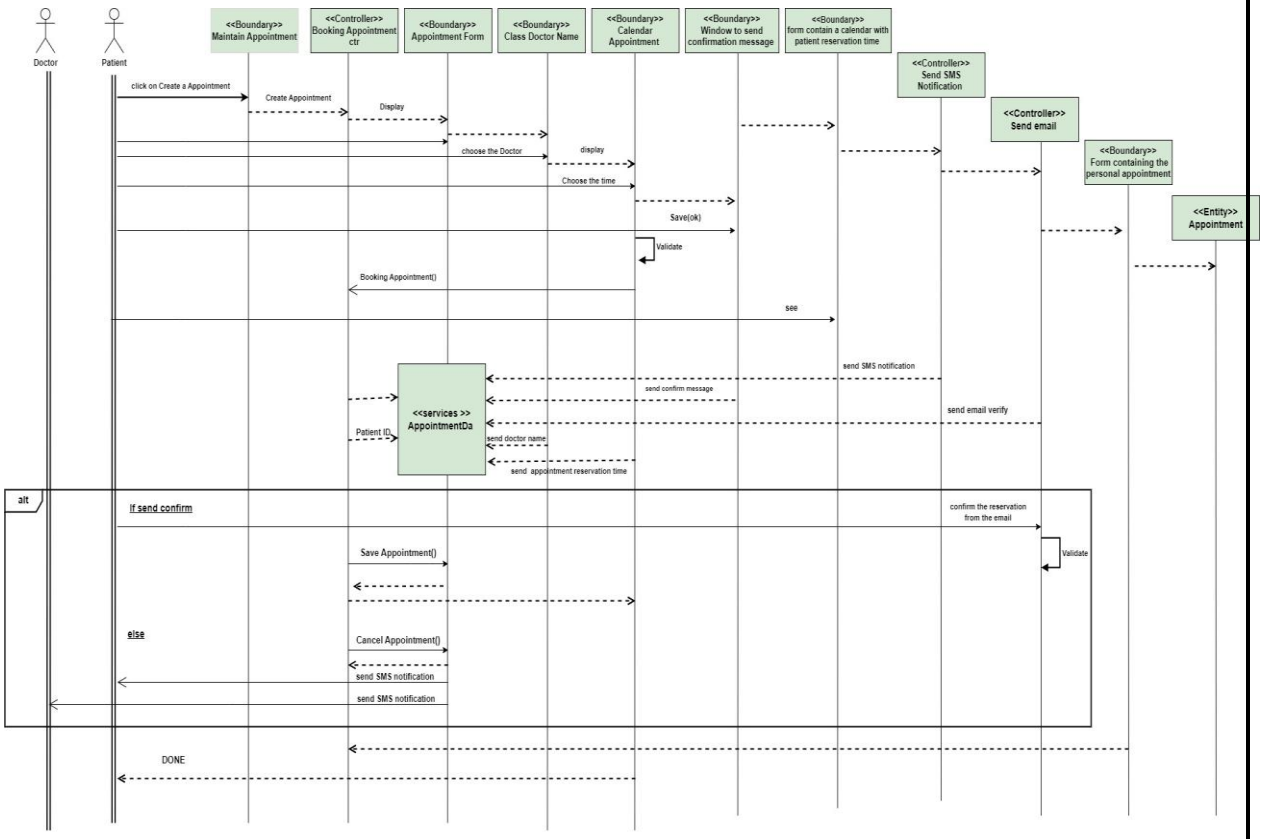
Before this use case begins the Member has logged onto the system.

4.2 Registration at the clinic

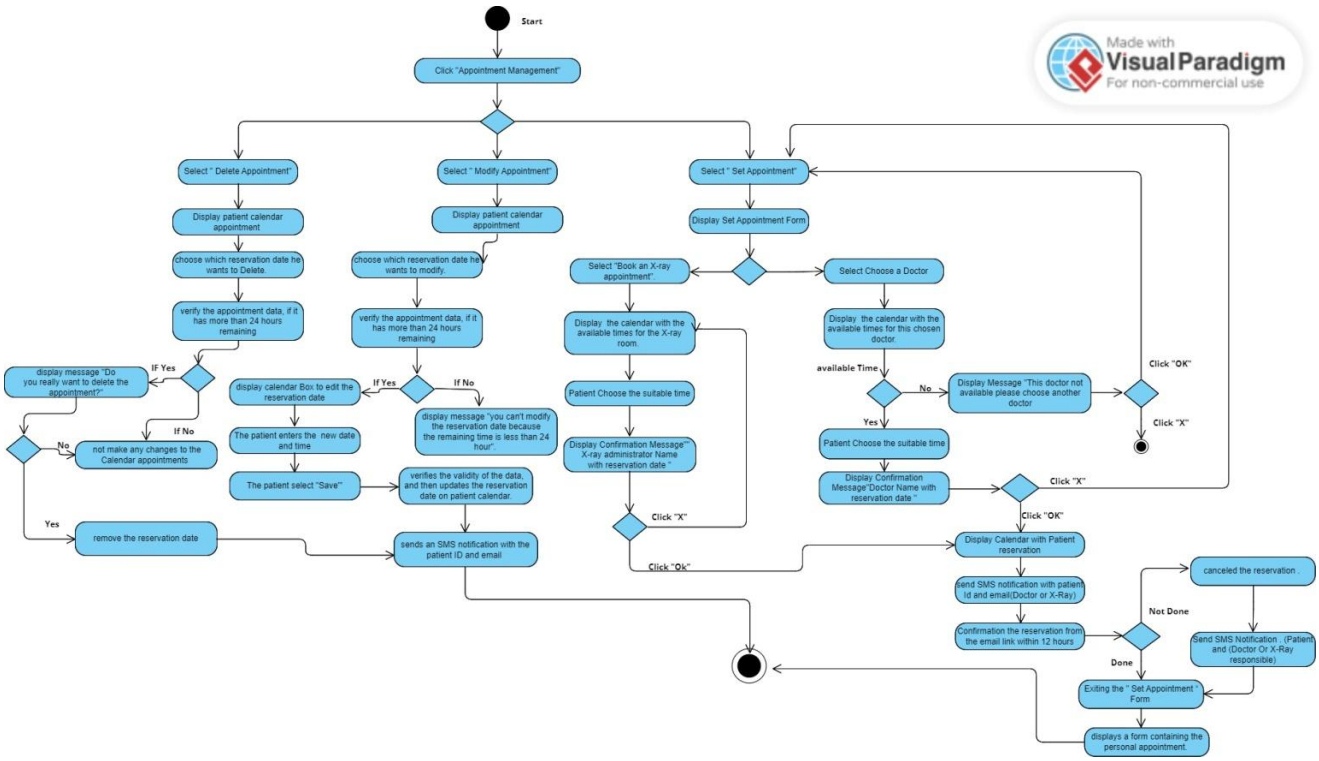
Before this use case begins, the Member registered with the Dental clinic.

5. Exit Conditions

There are no post conditions associated with this use case.


Doctor
Patient
<<Boundary>> Maintain Appointment
<<Controller>> Booking Appointment ctr
<<Boundary>> Appointment Form
<<Boundary>> Class Doctor Name
<<Boundary>> Calendar Appointment
<<Boundary>> Window to send confirmation message
<<Boundary>> form contain a calendar with patient reservation time
<<Controller>> Send SMS Notification
<<Controller>> Send email
<<Boundary>> Form containing the personal appointment
<<Entity>> Appointment
click on Create a Appointment
Create Appointment
Display
choose the Doctor
display
Choose the time
Save(ok)
Validate
Booking Appointment()
see
send SMS notification
send confirm message
send email verify
<<services >> AppointmentDa
Patient ID
send doctor name
send appointment reservation time
alt
If send confirm
confirm the reservation from the email
Validate
Save Appointment()
else
Cancel Appointment()
send SMS notification
send SMS notification
DONE

Activity diagram: *Riwaa Assi*



Phase IV

1. List of software architecture design goals:

❖ General Goals:

Our system aims to achieve specific design objectives that prioritize maintainability and flexibility. The key goals can be summarized as follows:

- High Cohesion:

The system emphasizes high cohesion by organizing related classes and methods together. This ensures that functionalities with shared purposes are grouped, contributing to a more organized and understandable codebase.

- Low Coupling:

The system is designed with low coupling in mind, utilizing independent models. This means that components operate independently of each other, and any changes made to one component have minimal impact on others. This promotes a modular and adaptable system architecture, facilitating easier modifications and updates.

❖ Specific Goals

We have chosen the three goals that we focus on most in our system (ease of use, security, and maintainability), but there are many other goals such as scalability, reliability, flexibility, availability, and speed that we talked about in section Nonfunctional features.

➢ Security:

Goal: Protect the system, its data, and its users from unauthorized access, data breaches, and other security threats.

1. Authentication and Access Control:

- We have implemented a strong login mechanism using users' email addresses and secure passwords, and enforce a secure password policy

(minimum length of 8 characters with a combination of letters, numbers, and symbols).

- We've given registration administrators access to a secure dashboard to reset users' security methods.
- We notify users immediately of any password changes or recovery attempts to ensure awareness of the possibility of unauthorized access.
- We have put in place strict procedures to prevent unauthorized access, data breaches, and malicious attacks.
- We will monitor and review the system regularly for potential vulnerabilities, and address security issues promptly.

2. Patient data security:

- We have used strong encryption protocols to protect all sensitive patient information.
- We have implemented access controls based on user roles and permissions to restrict unauthorized access to patient data.
- We have put in place comprehensive measures to prevent unauthorized access, data breaches, and malicious attacks.

1. We encrypt all payment transactions and sensitive data during transmission.
    - We conduct periodic security assessments, including penetration testing and vulnerability assessments, to identify and address potential system vulnerabilities.

3.Backup and restore data:

2. We have developed a robust data backup and recovery strategy to ensure that critical data is restored in the event of data loss or system failure.

4.Incident response plan:

3. We have created a comprehensive incident response plan that outlines the steps to be taken in the event of a security incident, ensuring a rapid and coordinated response to quickly resolve the issue.
4. We will conduct regular security audits: We schedule periodic security audits to maintain the security of the data in our system.

- **Maintainability:**

The goal: Make it easy and cost-effective to keep a system running smoothly, update it when needed, and make changes throughout its life easily, quickly, and with high quality.

1. Modularity:
    - We designed the system so that we can change or update one part without affecting the entire system.
    - Keeping each part separate and independent for easy and uncomplicated adjustments.

2. Documentation:
    - We created clear, detailed documentation of the code, how the system is built, and the processes it follows to help solve problems, better understand the system, and facilitate future updates.

3. Standardization:
    - We Made sure everyone followed the same rules so the code was uniform, to ensure consistency and ease of understanding

- **Usability:**

The goal: is to enable all users to deal with the program with great ease and not face any problems, because the program is for all ages.

1. We developed an intuitive, easy-to-navigate, and visually attractive software interface, through an increase in images, so that all ages can understand and deal with the program and not get bored.

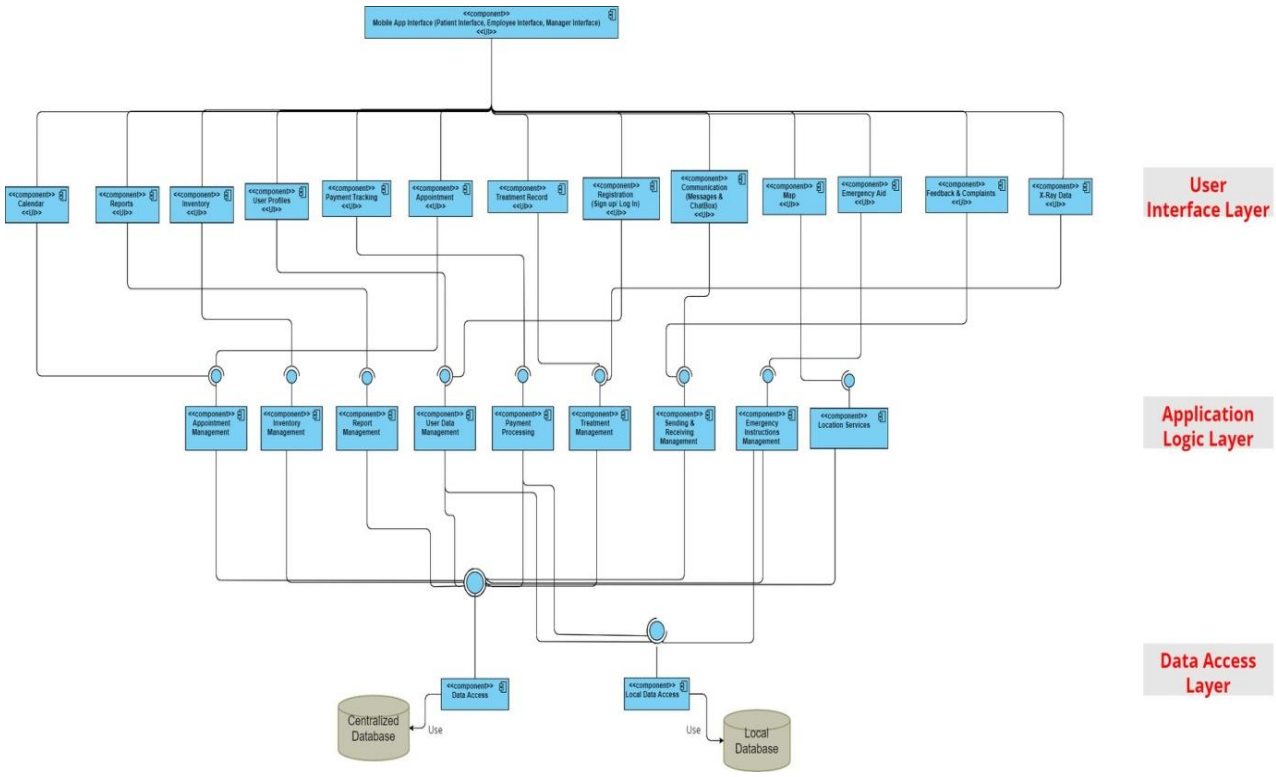
2. We improved the interaction design to reduce the number of steps required for common user tasks by simplifying the workflow and reducing clicks by thoughtfully placing features and functions so that users can interact easily and without getting bored when there are many steps.
3. We made sure that the program is responsive and adaptable to different devices and screen sizes so that users can use the program with any device they have, such as a laptop, phone, or iPad.

4. We implemented a feedback process to keep users informed of their actions and the status of the system by including visual and audio signals to indicate actions, errors, or successful system operations and sending them clear messages to understand quickly and without difficulty for any group.

5. We have enhanced the ability to enter data by recording voice and writing. This is for people who do not know how to write because the program is for all age groups.

6. We conduct usability testing regularly by collecting user feedback about their experience using our system.

2. UML Component diagram, with brief description of each component and the services it provides:



1. *UI(User Interface) Layer:*

- Calendar :

  Appears when setting Appointment.

- Reports :

  a. payments reports:

  The system should enable the manager to view and manage financial reports relating to the clinic and staff .

  b. Patient Reports:

  The system contains patient reports to store his personal, medical, therapeutic, and financial information, and this information is available to specific people within certain limits .

c. Inventory Manger Report:

The Inventory Manager Report streamlines clinic inventory management, providing detailed insights on resources, supplier information, and consumption calculations. Its user-friendly interface ensures quick access to crucial data, optimizing resource utilization and fostering effective communication with suppliers.

- Inventory

  This UI allows the inventory employee to track the medical materials in stock, add and delete items.

- User Profiles

  This UI allows the users to view their profiles and updating them .

- Payment Tracking :

  Allows the patient to pay using the application, view debts and bills , change payment methods and so on.

- Appointment:

  It allows the patient , doctor or nurse to set suitable appointment, whenever it was acceptable .

- Treatment Record :

  Allows the patients to view their record of sessions, bills given and date and time of each sessions.

- Registration(Sign up/login) :

  This UI for either new or old member in the clinic, to sign up as a new member or login to the clinic system, according to their positions as employees or patients.

- Communication(Messages & ChatBox) :

  A special UI for communication between employees on side, or between patient and doctor or nurse on the other side in the chatbox. Notice that communication UI design differs according to the member account; if patient then only the chatbox appears. However, if employee, both messages between employees and the chatbox(only for doctors and nurses) appear.

- Map

  This UI show the clinic location for any member.

- Emergency Aid

  It shows steps for many emergency incidents, and some videos explaining precautions and steps for specific incidents.

- Feedback and complaints :

  this UI is only for the manager account, it shows patients and employees feedback and complaints according to the clinic issues.

- X-Ray data :

  this UI shows the X-Ray results for the patient, notice that this interface is for patient, doctor, nurse and x-ray specialist.

2. Application Logic Layer:

In this layer, We set the logic, Operations and algorithms for the user Interfaces described above , So each one of the following component manages at least one connected user interface from the diagram, As the following:

- Appointment Management
- Inventory Management
- Report Management
- User Data Management
- Payment Processing
- Treatment Management
- Sending & Receiving Management
- Emergency Instructions Management
- Location Services

3. Data Access Layer

- Data Access
- Local Data Access

3.UML Deployment diagram :