DELIVERABLE 2

EMR SCHEDULING SYSTEM

Ali Akcin

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Processes

1. Maintain Patient Account Creation

1.1 Create Patient Account - The patient will prepare the needed information like their name, contact information, medical history, etc. to begin onboarding the patient.

1.2 Account Verification - The patient's information will be verified.

1.3 Update Patient Account - The patient's information can change to update their account information.

1.4 Manage Confirmation - The patient will receive a notice that their account information has been verified and processed.

2. Maintain Medical Specialist Account

2.1 Manage Medical Specialist Account Information -

2.1.1 Create Medical Specialist Account - The medical specialist will prepare the needed information like their name, contact information, specialization, etc. to begin onboarding them onto the system.

2.1.2 Update Medical Specialist Account - The medical specialist can update their existing account information.

2.2 Verify Account - Here is where the medical specialist's account information will be verified.

2.3 Manage Confirmation - The medical specialist will receive a notice that their account information has been verified and processed.

2.4 Manage Availability Time Slots

2.4.1 Create Availability Time Slots - The medical specialist records the times they are available.

2.4.2 Update Availability Time Slots - The medical specialist updates the times they are available.

2.5 Send Availability Time Slots Confirmation - The medical specialist gets notice of their Time Slots available.

3. Maintain Appointment Scheduling

3.1 Schedule Appointment - The patient will pick an appointment time slot. That slot will be closed after the appointment is booked.

3.2 Reschedule Appointment - The patient can select an appointment time slot that overrides the current one they have scheduled.

3.3 Cancel Appointment - The patient can cancel their appointment. The time slot will be open again.

3.4 Share Appointment Status - The patient will receive an appointment status update to confirm their bookings.

4. Maintain Reminders

4.1 Patient Appointment Reminders - The appointment reminder system will send the patient an appointment reminder.

4.2 Medical Specialist Appointment Reminders - The appointment reminder system will send the medical specialist an appointment reminder.

4.3 Record Patient Appointment Reminder - The appointment patient reminder is stored into the reminder record datastore.

4.4 Record Medical Specialist Appointment Reminder - The appointment medical specialist reminder is stored into the reminder record datastore.

4.5 Update Required Alert - The appointment reminder system alerts patients of required updates to their account information, such as contact details, insurance, or medical history.

4.6 Health Reminders - The system sends health reminders to patients, including vaccinations, screenings, and check-ups.

5. Maintain Virtual Waiting Room

5.1 Provide Waiting Room Features - Within our virtual waiting room designed for health clinics, patients have access to various features aimed at enhancing their waiting experience while also providing valuable information.

5.2 Maintain Check-in Notice - Keep patients informed instantly with our Check-in Notice feature, updating them on appointment readiness. Through automated notifications, we provide real-time updates, helping patients plan their arrival for a smoother clinic experience

5.3 Maintain Check-in - Simplify patient arrivals with our Maintain Check-in feature, enabling seamless electronic check-ins for appointments. Effortlessly integrated with our scheduling system, it ensures efficient patient flow and minimal wait times

Entities

- **Patient** – Individuals who utilize the Electronic Medical Record (EMR) services for managing their healthcare information and appointments.

- **Medical Specialist** – Healthcare professionals who provide medical services and interact with the EMR system to access, update, and manage patient records.

- **Appointment Reminder System** – A system designed to send automated reminders about upcoming appointments to both patients and medical specialists, helping reduce missed appointments and improve scheduling efficiency.

Datastores

- **D1: Patient Account Datastore** – Stores all patient-related information, including names, contact details, and medical history.

- **D2: Medical Specialist Account Datastore** – Contains account information for medical specialists, such as their names, contact details, and areas of specialization.

- **D3: Appointment Booking Datastore** – Maintains data related to appointment time slots and scheduling details.

- **D4: Check-in Record Database** – Stores check-in records for both patients and specialists. This data is essential for future verification and auditing purposes.

- **D5: Reminder Record Datastore** – Holds records of appointment reminders sent to patients and medical specialists.

Dataflow

1. **Maintain Patient Account Creation**
   Inputs
   1.1 Account Creation Data includes personal information to create an account.
   1.2 New Patient Account includes created new patient account
   1.3 Account Creation Alert sents after patient successfully creates an account
   Outputs
   1.1 Valid Patient Data when the system verifies the patient info is accurate.
   1.2 Patient Information includes candidate patient information
   1.3 Patient Account update includes updated patient account data.

2. **Maintain Medical Specialist Account**
   Inputs
   1.1 New specialist account stored into database, contains specialist information.
   1.2 Registration notification sent to the specialist indicating successful registration
   Outputs
   1.1 Valid specialist data indicates that specialist credentials have been validated.
   1.2 Specialist registration data is needed to create a medical specialist account.

3. **Maintain Appointment Scheduling**
   Inputs
   1.1 Appointment request data is from patient to schedule appointment
   1.2 Reschedule request data is from patient to reschedule appointment
   1.3 Cancellation Request is from patient to cancel appointment
   Outputs
   1.1 Booked appointment date get stored in the booking datastore
   1.2 Updated new appointment data get stored in the booking database

4. **Maintain Reminders**
   Inputs
   1.1 Patient appointment data gets all the necessary appointment data for reminder.
   1.2 Appointment statues get checked from patient for reminder

1.3 Medical specialist appointment data gets all the necessary appointment data for reminder.

Outputs

1.1 Patient reminder record and Medical specialist reminder gets stored in reminder record database

1.2 Patient appointment reminder gets sent to the patient

1.3 Specialist appointment reminder gets sent to the medical specialist

5. **Maintain Virtual Waiting Room**

Input:

1.1 Check-in Ready Notice reminds the patient that the check-in is ready.

1.2 Check-in Record is the data stored when the patient checks-in which indicates that patient checked-in time and any other related information.

1.3 Check-in confirmation is sent to Patient after successful check-in

Output:

1.1 Waiting Room Features includes the necessary data to provide patients while waiting for their appointments. Such as health related information.

1.2 AppointmentID necessary data for the patient to access the waiting room content.

REQUIREMENTS DEFINITION

Functional Requirements (Providers):

1. **Create Medical Specialist Profile:**

Process-oriented

1.1 Allow medical specialists to create their accounts.

1.2 Capture essential details such as name, education, specialization, and contact information during profile creation.

2. **Insert Appointment Slot:**

Process-oriented

2.1 Enable medical specialists to insert their available appointment time slots.

2.2 Specify available time slots, dates, and specialization of the medical specialist for each available slot

3. **Update Appointment Slot:**

Process-oriented

3.1 Provide functionality for medical specialists to modify existing appointment time slots.

3.2 If the appointment has been taken, the patient will receive a notification for rescheduling.

4. **Appointment Reminders:**
   Information-oriented
   4.1 Send appointment reminders to medical specialists 48 hours before scheduled appointments.
   4.2 Include relevant details such as time, date, and patient information.

Functional Requirements (Patients):

5. **Create Patient Profile:**
   Process-oriented
   5.1 Allow patients to register and create their accounts.
   5.2 Capture essential details such as name, contact information, and medical history during profile creation.

6. **Schedule Appointments:**
   Process-oriented
   6.1 Enable patients to schedule appointments with medical specialists.
   6.2 Provide options to filter open appointment slots based on the department or specialization needed.

7. **Appointment Reminders:**
   Information-oriented
   7.1 Send appointment reminders to patients 48 hours before scheduled appointments.
   7.2 Include relevant details such as time, date, and medical specialist information in the reminder.

Non-Functional Requirements:

1. **Performance:**
   1.1 The system should be responsive and handle concurrent user interactions efficiently.
   1.2 Appointment scheduling and management processes should occur without significant delays.

2. **Security:**
   2.1 Ensure data privacy and confidentiality of patient and medical specialist information.

2.2 Implement secure authentication mechanisms to prevent unauthorized access to user accounts.

3. **Reliability:**
   3.1 The system should be available and accessible to users at all times.
   3.2 Minimize system downtime and ensure timely resolution of any technical issues.

4. **Usability:**
   4.1 Provide a user-friendly interface for both medical specialists and patients to navigate and interact with the system easily.
   4.2 Include clear instructions and prompts to guide users through the appointment scheduling and management processes.

5. **Scalability:**
   5.1 Design the system to accommodate potential growth in the number of users and appointment scheduling activities.
   5.2 Ensure scalability to handle increased data volumes and user traffic effectively over time.

USE CASE ANALYSIS

Use Case Name: Create Patient Account	**ID:**UC-1	**Priority:** High
Actors: Patient, EMR System		
Description: This use case involves the process of creating a new patient account within the EMR system.		
Triggers: A new patient seeks to establish an account within the healthcare system.		
Type: ☒ External ☐ Temporal		
Precondition: The system is accessible and operational. The patient or administrator initiating the account creation process has necessary permissions.		

Normal Course:	**Information for Steps**
1.0 Patient requests to create a new account.	=> Patient's personal information, medical history
1. System retrieves account creation request	<= Account creation data
2. System validates the patient's data.	=> Patient ID, medical history etc.
3. System verifies the data	<= Valid patient data
3.1 Systems stores the new patient account.	=> New patient account record
4. System sends confirmation upon successful valid account creation.	<= Account creation alert
5. For each patient account updates	
5.1.Patient updates his accounts	=> Patient's new personal information, medical updates
5.2 System verifies update request	<= Patient's updated records
5.3.System stores updated account to the database	<= Updated patient account
5.4 System sends a successful update notification to the patient	=> Account update confirmation

Postconditions: New patient record/account is successfully created in the EMR system.			
Summary Inputs	**Source**	**Summary Outputs**	**Destination**
Patient info, medical history	Patient	Account creation data	EMR system
	EMR system	Valid patient data	EMR system
Patient account update	Patient	Updated account data	Patient record datastore
Patient new account record	Patient	Updated account record	Patient record datastore
	EMR system	New patient account	Patient record datastore
	EMR system	Account creation alert	Patient

	EMR system	Account update confirmation	Patient

Use Case Name: Medical specialist management	**ID:** UC-2	**Priority:** High	
Actors: Patient, EMR system, Medical specialist			
Description: Allows specialists to create accounts and input availability slots.			
Triggers: The trigger for specialists to create accounts and input availability slots arises when they join a healthcare facility or when a new scheduling system is introduced			
Type: ☒ External ☐ Temporal			
Precondition: The precondition for specialists to create accounts and input availability slots is their enrollment in a healthcare facility or the adoption of a new scheduling system within the organization.			

Normal Course:	**Information for Steps**
1.0 Medical specialist management 1.1 System retrieves account creation data 1.2 The system validates the specialist's credentials 1.3 System verifies the data	=> Specialist personal data <= Account Registration Details => Specialist ID <= Valid specialist data
2. The system stores the newly created specialist account.	=> New specialist account record <= Account Registration Notification
3. Upon successful validation and creation, the system sends a confirmation.	=>Available Appointment Times
4. The medical specialist inputs their available time slots.	
5. The medical specialist can make changes to their availability as needed. 5.1 System stores new availability to the specialist appointment datastore.	=>Updated Availability Status

Postconditions: Specialists' integration into the scheduling system allows patients to book appointments based on their real-time availability after creating accounts and inputting slots			
Summary Inputs	**Source**	**Summary Outputs**	**Destination**
Medical specialist personal data	Medical specialist EMR system	Registration Details Valid specialist data	EMR system EMR system

	EMR system EMR system Medical specialist	New specialist account Registration notification Available appointment times	Med specialist datastore Med specialist Appointment schedule datastore

Use Case Name: Schedule Appointment	**ID:** UC-3	**Priority:** High	
Actors: Patient, EMR system			
Description: This use case aims to streamline the appointment scheduling process for patients by providing account related information.			
Triggers: The patient makes an appointment through a website or over the phone.			
Type: [X] External [ ] Temporal			
Precondition: The patient has to be registered in the EMR system.			
Normal Course: 1.0 Schedule Appointment 1.1 Information provided by a patient to schedule a new appointment with a medical specialist. 1.2 System receives appointment request 1.3.System makes the appointment and stores details in the booking appointment datastore. 2. Patient reschedule an appointment 2.1. System receives appointment data 2.2 System stores the new appointment data to the booking appointment datastore 3.Information submitted by a patient to cancel an appointment, including appointment details and reasons for cancellation. 4. System receives the cancellation request data and makes the necessary adjustments in the database. 5. System notifies the patient for changes in his appointment status.		**Information for Steps** => Account ID, patient info <= Appointment request data => Appointment data => Rescheduling request data <= New appointment data => Booked appointment data => Cancellation request data => Updated appointment data => Appointment status notification	
Postconditions: Appointment is scheduled and a confirmation of the appointment is sent to the patient and added to the healthcare provider's schedule.			
Summary Inputs	**Source**	**Summary Outputs**	**Destination**

Account ID, patient info Rescheduling request data	Patient EMR System Patient EMR System EMR System	Appointment request data Appointment data Rescheduling request data New appointment data Cancellation Request data App status notification	EMR System Booking datastore EMR System Booking datastore Booking datastore Patient

Use Case Name: Appointment Reminder System	**ID:** UC- 4	**Priority:** Low
Actors: Appointment Reminder System, Medical Specialist, Patient		
Description: The EMR system appointment reminders feature sends timely notifications to patients for confirming or rescheduling appointments, while also providing consultation and follow-up appointment reminders to medical specialists, streamlining workflows and enhancing patient care coordination		
Triggers: Scheduled appointment time approaches		
Type: ☒ External ☐ Temporal		
Precondition: The EMR system appointment reminders are initiated by the proximity of scheduled appointments or consultations for both patients and medical specialists, prompting automatic generation and delivery of reminders to ensure timely notifications		

Normal Course:	**Information for Steps**
1.0 EMR system appointment reminder	
1.1 The system sends timely notifications to patients, providing options to confirm or reschedule their Appointments.	=> patient appointment reminders
1.2 System stores notification records including recipient, content of the notification, and the timestamp	<= notification log datastore
2. The system sends notifications to medical specialists, reminding them of upcoming consultations and providing relevant appointment details.	=> Medical specialists appointment reminders
2.1 System stores notification records including recipient, content of the notification, and the timestamp	<= notification log datastore
3. The system alerts patients of required updates to their account information, such as contact details, insurance, or medical history.	=> update required alert
4. The system sends health reminders to patients, including vaccinations, screenings, and check-ups	=> health reminders

Postconditions: System ensures successful delivery of notifications/alerts to patients and medical specialists and records the notification in the system.

Summary Inputs	Source	Summary Outputs	Destination
	App System App System App System App System App System	Appointment reminders Patient reminder record Specialists appointment Specialist reminder record Health reminders	Patient Notification log datastore Medical specialist Notification log datastore Patient

Use Case Name: Virtual waiting room management	**ID:** UC- 5	**Priority:** Medium
Actors: Patient, Virtual room system		
Description: This feature provides patients with instant updates and allows them to check in online for appointments.		
Triggers: When a patient's appointment status changes (e.g., rescheduled or canceled), an automated notification is triggered to inform the patient, along with a prompt for online check-in for the updated appointment.		
Type: ☒ External ☐ Temporal		
Precondition: A patient has a scheduled appointment in the EMR scheduling system.		

Normal Course:	**Information for Steps**
1.0 Virtual waiting room management	
1.1 Patient receives a notification indicating their appointment time and the option to check-in.	<= Check-in notification
1.2 Patient selects the check-in option and enters identification details	=> Appointment id
1.2 System receives the check-in request	<= Check in ready status
1.3 System validates the provided information and confirms the patient's check-in, updating their Status	=> Check-in successful notice
2. System stores the check-in status to the datastore	=> Check-in record
3. Virtual room system provides user-friendly interface access to various features and resources within the virtual waiting room.	<= Waiting room features
4. EMR system continuously updates the virtual waiting room interface with real-time information about the changes or progress	<= Appointment details

Postconditions:.

Summary Inputs	Source	Summary Outputs	Destination

Appointment id	EMR system Patient EMR system EMR system Virtual room system EMR system	Check-in notification Check in ready status Check in successful notice Check-in record Waiting room features Appointment details	Patient Check-in datastore Patient Check-in datastore Patient Patient

INTERVIEW

Interviewee/Position: Dr. Salih Urper, Specialist Doctor of Physical Medicine and Rehabilitation.
Contact info: drurper@gmail.com

Interviewer: Ali Akcin

Interview Purpose/Goals:

- Evaluate the candidate's understanding of performance measures in the context of EMR system implementation.
- Assess the candidate's awareness, perception, and concerns regarding EMR systems.
- Determine the candidate's expectations, preferences, and insights regarding EMR system features and functionalities.
- Understand the candidate's perspective on the impact of EMR systems on patient care, data security, and confidentiality.

Behavioral Issues to Expect: Given his active engagement on social media and support for improvements, it's reasonable to expect him to continue demonstrating supportive behavior during the interview process. He may actively share insights and updates about the project on social media platforms, showcasing his enthusiasm for enhancing the Electronic Medical Record (EMR) system.

Interview Topics and Outline:

- Introduction to Electronic Medical Record (EMR) Systems
- Preferences and Requirements for EMR Systems
- Concerns and Reservations about EMR Implementation
- Ideal Features and Functionalities of EMR Systems
- Privacy Measures and Safeguards for Patient Data in EMR Systems

List of Questions:

Introduction to EMR Systems:

- Do you have any knowledge about Electronic Health Record (EMR) systems, and if so, what kind of tasks do you use them for?

Preferences and Requirements for EMR Systems:

- Do you have any specific preferences or requirements in mind for the Electronic Medical Record (EMR) system that you would like to see in order to enhance your hospital experiences or improve healthcare services?

Concerns and Reservations about EMR Implementation:

- Do you have any concerns or reservations regarding the implementation of Electronic Medical Record (EMR) systems in healthcare services?

Ideal Features and Functionalities of EMR Systems:

- What features or functionalities would you expect in an ideal Electronic Medical Record (EMR) system?

Privacy Measures and Safeguards for Patient Data in EMR Systems:

- What are your thoughts on the measures or safeguards that should be implemented to ensure the privacy of patient data in an Electronic Medical Record (*EMR*) system?

Summary of Interview:

During the interview, the participant demonstrated a commendable understanding of Electronic Medical Record (EMR) systems, mentioning their utilization of an EMR program. Their emphasis on the ease of data entry and cross-device accessibility reflects a user-centric approach, prioritizing efficiency in healthcare workflows. Furthermore, their concerns about the security of cloud computing technology and data leakage risks are valid, highlighting the importance of robust security measures in EMR systems. As for their expectations of user-friendliness and customization for patient data, these align with industry standards aimed at enhancing healthcare delivery. Additionally, the participant's expectation for EMR programs to collaborate with national security agencies underscores the need for comprehensive security protocols. However, their uncertainty about whether their current program meets these expectations raises awareness of potential gaps in security and collaboration. Overall, the participant's insights provide valuable perspectives on the critical aspects of EMR systems and underscore the need for continuous improvement in ensuring data security and user satisfaction.

Date & Time: Saturday, March 2, 2024 | 9:20pm