youSoftware Requirement Specification

Group members	Kannan Venkateswaran
	Kiet Huynh
	Mezmure Dawit
	Christopher Lee
	Ayush Upadhyay
	Syed Ibad Rehman

1. Project Description

<<add here 1 or 2 paragraphs presenting a overall view of your project>>

A healthcare organization called Med-X is implementing a Medication Adherence System to improve patient outcomes by ensuring all patients can take their medications as prescribed. The platform sends automated reminders to patients to alert them to take their medications. The system also allows patients to confirm and track medication intake. Healthcare providers can access these adherence trackers, making sure that the patients are taking their meds as prescribed, helping to prevent non-adherence complications. This program will be beneficial for managing conditions in which consistent medication adherence is vital for preventing exacerbations and improving quality of life.

2. Functional Requirements

FR01	The software must enable the system to send patients automated medication reminders via SMS, email, and in-app notifications.
FR02	The software must enable the system to track medication and dosage logs, including the time and amount taken by the patient, and allow healthcare providers to access the logs within two seconds.
FR03	The software must enable the system to send automatic alerts to healthcare providers if a patient misses a scheduled dose and log all missed doses and provider mentions
FRN	Generate reports on medication adherence and history for both providers and patients

3. Non-Functional Requirements

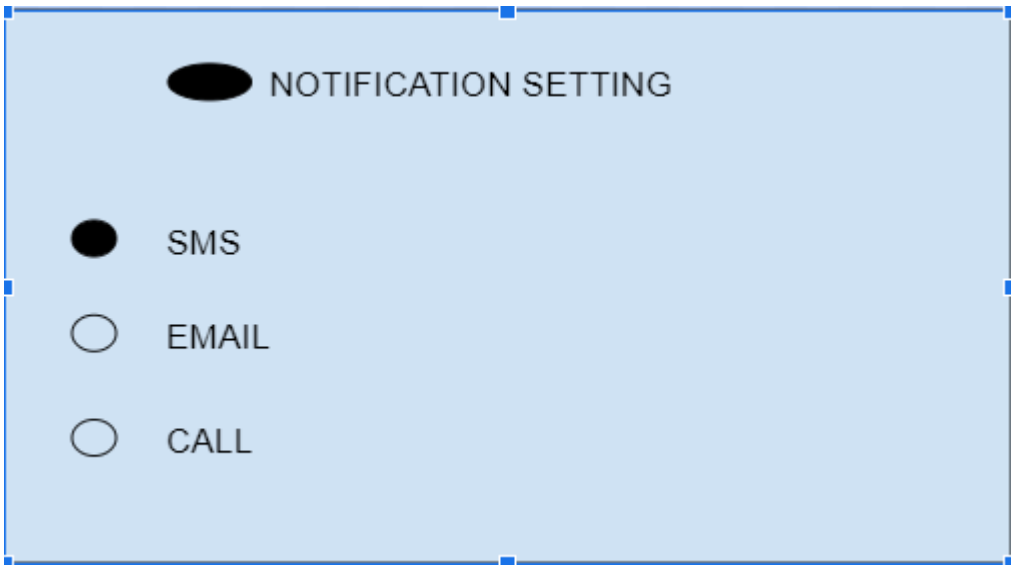
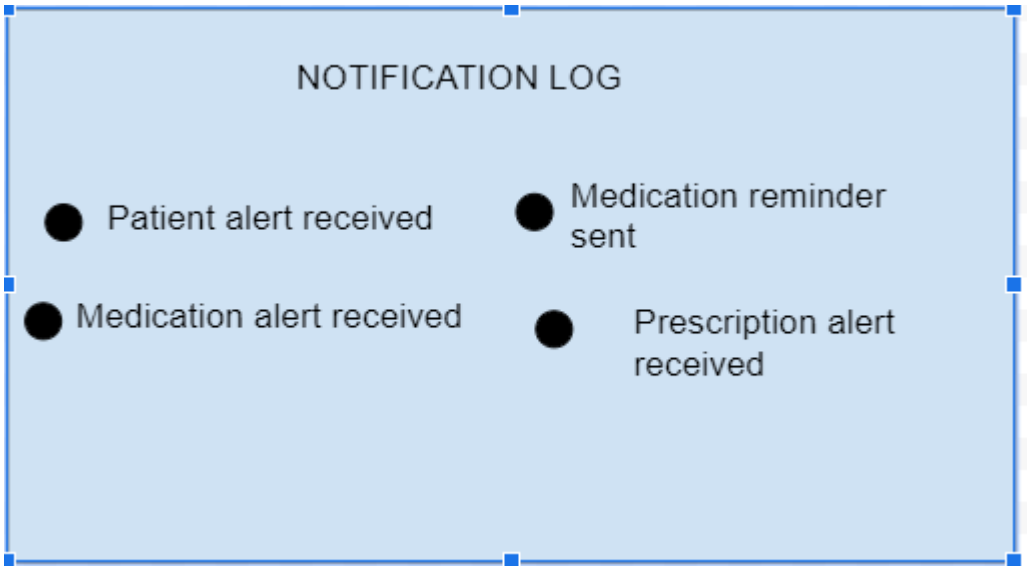
NFR01	System Performance and Scalability: The system must handle up to 1,000 concurrent users without a noticeable degradation in performance. Response times for key operations (such as loading patient adherence logs, sending notifications, and updating medication confirmations) must be less than two seconds. The system must be scalable to support a 20% increase in the number of users and data volume per year.
NFR02	Data Security and Privacy: The system must comply with HIPAA regulations to ensure the confidentiality and security of patient data. This includes using encryption for data at rest and in transit, implementing role-based access controls (RBAC), and ensuring multi-factor authentication (MFA) for healthcare providers accessing sensitive patient information. Data access logs must be maintained and retained for a minimum of 5 years for auditing purposes.
FRN	Under normal conditions (defined as up to 500 concurrent users, with a response time of under 2 seconds and uptime of 99.9%), the app should confirm patient records and med logs within 5 sec.

4. Use Case Specification

*<< Select **three** functional requirements and describe them in detail using use cases.>>*

UC01 Name:	Automated Medication Reminders
Description:	This use case describes how the Med-X System sends automated medication reminders to patients, allowing them to set preferences for notification methods (SMS, email, in-app). It also covers how the system logs successful or failed reminders.
Actor:	Patient, System
Entry condition:	● The patient is registered in the system, and their medication schedule is set ● The patient is configured with notification preferences.
Basic path:	1. The system checks the patient's medication schedule 2. The system sends a reminder via the patient's preferred notification method (SMS, email, in-app) 30 minutes before the scheduled time.**[A01]** 3. The patient receives the notification and marks it as read in the system.**[A02][BR01]** 4. The system logs that the notification was successfully sent and marked as read. 5. The system presents screen for entering patients information:**[PRO01][PRO02]** a. username b. password c. confirm d. back
Alternative paths:	**[A01]: Patient changes notification preference:** 1. The patient Modifies their notification preferences (e.g. switches from SMS to email)**[BR01]** 2. The system updates the notification method for future reminders. **[A02] : Multiple Notifications enabled:**

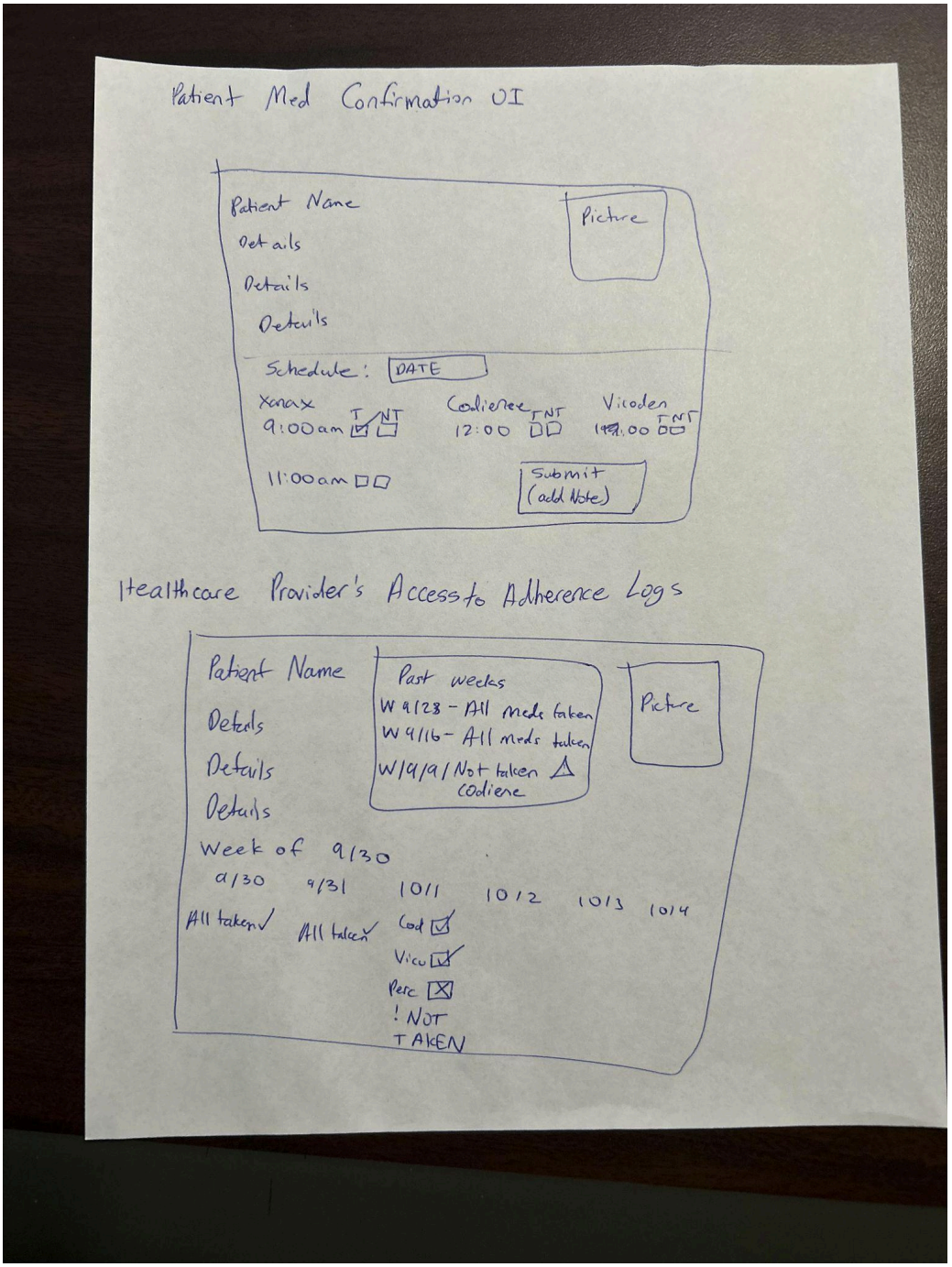
<table>
<tr><td></td><td>1. If the patient has enabled more than one notification method (e.g., both SMS and in-app), the system sends notifications to all enabled methods.[E01]</td></tr>
<tr><td>Exception paths:</td><td>[E01] Notification Failure:
1. If the reminder fails to send, (e.g, due to network issues) the system logs the failure and retries after 5 minutes.
2. If the second attempt fails, the system notifies the healthcare provider to follow up manually.</td></tr>
<tr><td>Business Rules:</td><td>[BR01] : Patients can select up to 3 notification accounts a time (SMS, email, in-app)
[BR02] : Healthcare providers must have access to the notification logs.</td></tr>
<tr><td>Data description</td><td>
<table>
<tr><th>Name</th><th>Type</th><th>Length</th><th>Mask</th></tr>
<tr><td>Patient_ID</td><td>str</td><td>10</td><td>N/A</td></tr>
<tr><td>Med_Name</td><td>str</td><td>50</td><td>N/A</td></tr>
<tr><td>Not_Method</td><td>str</td><td>15</td><td>N/A</td></tr>
<tr><td>Not_status</td><td>str</td><td>10</td><td>N/A</td></tr>
<tr><td>Not_Time</td><td>time</td><td>N/A</td><td>N/A</td></tr>
</table>
</td></tr>
</table>

Prototype:	**[PRO01]: Notification Preference Settings UI for Patients**  **[PRO02]: Notification log UI for healthcare providers.** 

UC02 Name:	Medication Adherence Tracking
Description:	This use case describes how Med-X's MAS (Medication Adherence System) tracks patient medication intake, and dosage logs, and confirms adherence. Patients are reminded to take their medication, and they confirm when the medication is taken. Healthcare providers have real-time access to these logs to monitor patient adherence.
Actor:	Patient, Healthcare Provider
Entry condition:	1. The patient has been prescribed Medication 2. Medication Schedule has been uploaded to the System
Basic path:	1. The system sends an automated reminder to the patient for the medication intake. 2. The patient confirms med intake by logging the time and dosage through the system interface.**[A01]** 3. The system stores the confirmation in real time in the medication log.**[E01][BR01]** 4. The healthcare provider accesses the patient's medication adherence logs through the system.**[A02]** 5. The healthcare provider reviews the logs and provides feedback if necessary.**[BR02]**
Alternative paths:	**[A01]: Patient Modifies Log** 1. The patient modifies the medication log entry (corrects time or dosage if entered incorrectly). 2. The system updates the logs and notifies the healthcare provider of the change.**[PR01][PR02]** **[A02]: Healthcare Provider adds a Note** 1. The healthcare provider adds a note to the medication log (e.g., advising on dosage requirements). 2. The system stores the note with the medication entry.
Exception paths:	**[E01] Network Issue**

<table>
<tr><td></td><td>1. If there is a network issue, the system provides the patient’s confirmation locally and syncs once the connection is restored.</td></tr>
<tr><td>Business Rules:</td><td>[BR01]: Only authorized healthcare providers can modify the patient’s medication log.
[BR02]: Patients can view but cannot delete past medication entries.</td></tr>
<tr><td>Data description</td><td>
<table>
<tr><th>Name</th><th>Type</th><th>Length</th><th>Mask</th><th></th></tr>
<tr><td>Patient_ID</td><td>Str</td><td>10</td><td>N/A</td><td></td></tr>
<tr><td>Med_Name</td><td>Str</td><td>50</td><td>N/A</td><td></td></tr>
<tr><td>Dosage_Amt</td><td>Float</td><td>N/A</td><td>N/A</td><td></td></tr>
<tr><td>Intake_Time</td><td>Time</td><td>N/A</td><td>N/A</td><td></td></tr>
<tr><td>Healthcare_ Provider</td><td>Str</td><td>50</td><td>N/A</td><td></td></tr>
</table>
</td></tr>
<tr><td>Prototype:</td><td>[PRO01]: Patient Med Confirmation UI

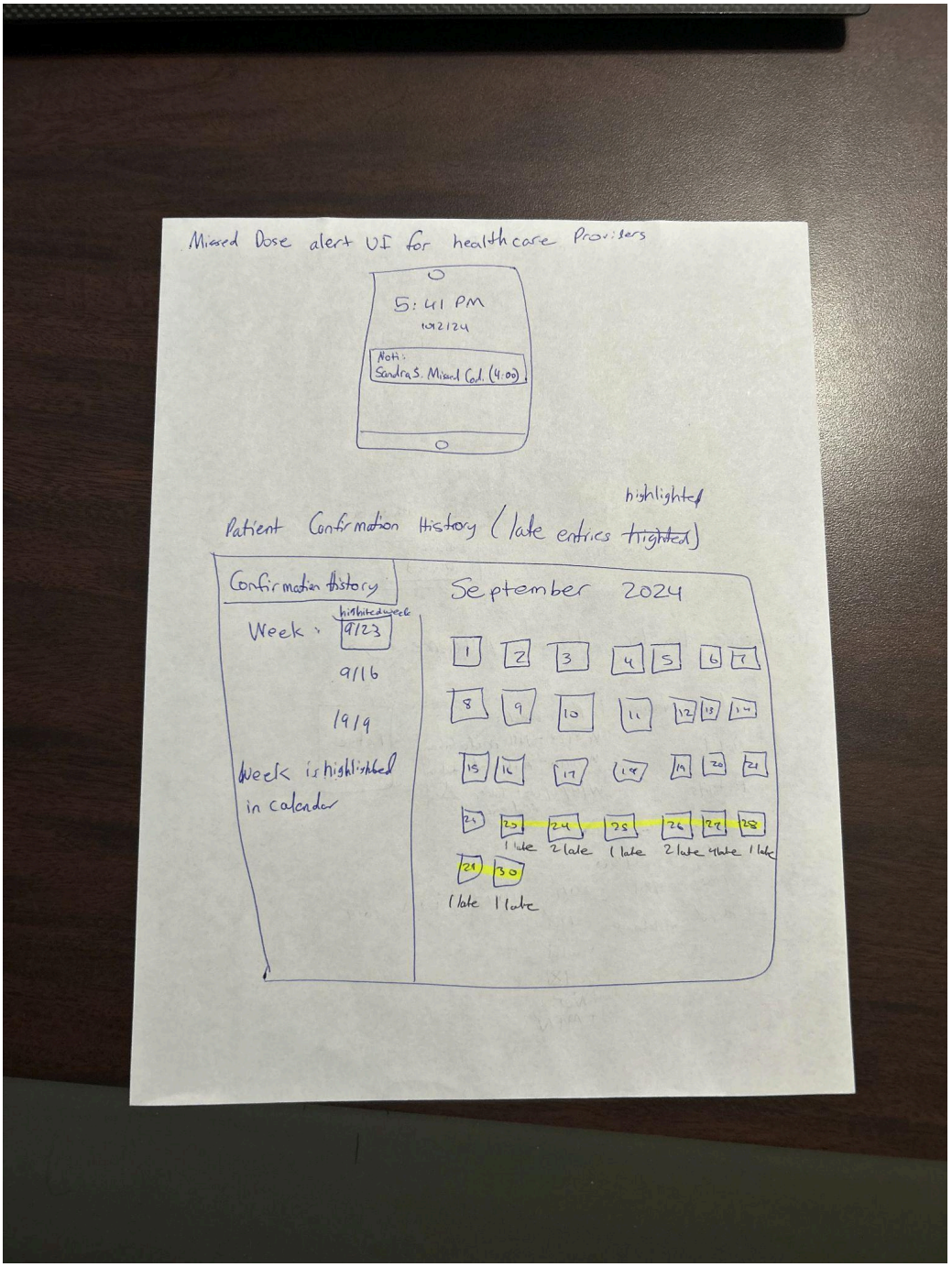
[PRO02] Healthcare provider's access to adh. logs UI</td></tr>
</table>


Patient Med Confirmation UI
Patient Name
Details
Details
Details
Picture
Schedule: DATE
Xanax
9:00am T NT
Codiene
12:00 T NT
Vicoden
T NT
11:00am
Submit
(add Note)
Healthcare Provider's Access to Adherence Logs
Patient Name
Details
Details
Details
Past weeks
W 9/23 - All meds taken
W 9/16 - All meds taken
W 9/9 / Not taken
Codiene
Picture
Week of 9/30
9/30
9/31
10/1
10/2
10/3
10/4
All taken
All taken
Cod
Vicu
Perc
! NOT
TAKEN

UC03 Name:	Missed Doses Alerts
Description:	This use case outlines how the system detects and handles missed medication doses. If a patient does not confirm medication intake within one hour of the scheduled time, an alert is sent to the healthcare provider for follow-up.
Actor:	Patient, Healthcare Provider, System
Entry condition:	● The patient has a set medication schedule in the system. ● The patient fails to confirm medication intake within one hour of the scheduled time.
Basic path:	1. The patient receives medication but does not confirm medication intake within one hour.**[A01][A02]** 2. The system automatically generates an alert and sends it to the healthcare provider.**[E01]** 3. The healthcare provider receives the alert and checks the patient's logs.**[PR01][PR02]** 4. The provider follows up with the patient if necessary. 5. The system logs both the missed dose and the provider's intervention. **[BR01][BR02]**
Alternative paths:	**[A01]: Patient Confirms after 1-hour window:** **1. If the patient confirms the medication intake after the 1-hour window, the system records it as late but updates the log.** **2. The healthcare provider still receives the alert for review.** **[A02]: Patient confirms medication before alert:** **1. If the patient confirms the medication intake before the system triggers the alert (within the 1-hour window), no alert is sent to the healthcare provider.**
Exception paths:	**[E01] : Healthcare Provider Unavailable** **1. If the healthcare provider cannot receive the alert (e.g., off-duty or unresponsive), the system escalates the alert to another on-call provider.**

<table>
<tr><td>Business Rules:</td><td>[BR01]: Alerts must be sent to the primary healthcare provider within 1 hour of a missed dose.
[BR02]: The system must log all alerts and provider responses for future auditing.</td></tr>
<tr><td>Data description</td><td>
<table>
<tr><th>Name</th><th>Type</th><th>Length</th><th>Mask</th></tr>
<tr><td>Patient_ID</td><td>Str</td><td>10</td><td>N/A</td></tr>
<tr><td>Med_Name</td><td>Str</td><td>50</td><td>N/A</td></tr>
<tr><td>Sch_Dose_Time</td><td>Time</td><td>N/A</td><td>N/A</td></tr>
<tr><td>Missed_Dose_Alert</td><td>Boolean</td><td>N/A</td><td>N/A</td></tr>
<tr><td>Provider_Response</td><td>Str</td><td>100</td><td>N/A</td></tr>
</table>
</td></tr>
<tr><td>Prototype:</td><td>[PRO01]: Missed Dose alert UI for healthcare providers

[PRO02]: Patient confirmation history with late entries highlighted.</td></tr>
</table>


Missed Dose alert UI for healthcare Providers
5:41 PM
10/2/24
Noti:
Sandra S. Missed Col. (4.00)
highlighted
Patient Confirmation History (late entries highlighted)
Confirmation history
Week:
highlighted week
9/23
9/16
9/9
Week is highlighted in calendar
September 2024
1 late
2 late
1 late
2 late
4 late
1 late
1 late
1 late