

MED-X AI

Thorax Disease Detector

BY: Med-X (Team 1)
CS691
May 2024



MED-X AI

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Team Roles and Responsibilities



Ronaldo Simbaña
Scrum Master | Developer



Marla Capistran
Team Leader | Database Admin



Filippo Zallocco
Developer

Team Roles and Responsibilities



Christopher Ospina
Developer



Anthony Muñoz
*Quality Assurance / Tester
Developer*



Leanna Machado
Developer

Team Roles and Responsibilities



Rahul Nayanegali
Developer



Prithvi Raimangya
Designer | Developer

Improvements

- Renamed Sprint 4 Workload to Sprint 4 Backlog (slides 61 - 63)
- Provide Explanations for the Burndown Charts (slides 73 - 75)
- Include Assignee for each task / user story (slides 39 – 55, 57, 59, 61 – 63)
- Improved order of conducting the Retrospective

Star indicates an improvement made





Problem Statement

Currently, x-ray machines are widely available; however, clinical chest x-ray images can be challenging to read and diagnose. Furthermore, x-rays are not a priority for radiologists, as they tend to focus more on CT images and MRIs. CT scans are both harmful and expensive, in addition to being time consuming.



Project Description

- A web app that has a highly trained deep learning model that classifies x-ray images, reducing the need for a radiologist to examine them
- Intended for medical professionals and patients who upload x-ray chest images
- Uses a deep-neural network models that will detect common health issues
- Our application will reduce the time it takes for a patient to receive their diagnosis using AI



MED-X AI

Project Description

Product Description	
Project Name:	Med-X AI
Team:	Med-X
Project Description:	<p>The Common Thorax Disease Detector is a web app that has a highly trained deep-learning model that classifies X-ray images, reducing the need for a radiologist to examine them.</p> <p>For medical professionals and patients who upload x-ray chest images the Med-XAI app is an application that uses a deep neural network model that will detect common chest health issues rather than having to wait for a radiologist to examine X-ray images that are not a priority for them our application will reduce the time it takes for a patient to receive their diagnosis by using AI</p>
Benefit Outcomes:	
	<ul style="list-style-type: none">• Faster physician response rate to patients.• Cost-effective solution by reducing the need to hire more professionals.• Utilize AI to reduce human errors and efforts.• Partially automating the chest x-ray review process.• More accessibility to the patients.• Improve physician workflow.
Github Link:	https://github.com/htmw/2024S-Med-X

Team Working Agreement

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Team Working Agreement

To ensure the smooth and successful completion of the Computer Science Capstone Project, the Med-X team must comply with the following expectations. As a team, we will commit to being transparent and accountable with our project responsibilities, be honest and straightforward when it comes to project plans, timeline, and progress, be proactive in trying to foresee and avoid difficulties, take initiative in tasks where a member's skills are capable, prioritize the overall success of the project, and follow through to the end.

Terms of Agreement:

Communication

The team will communicate with each other through various methods. For weekly meetings for meaningful team discussions, zoom meetings will be used. All team members are encouraged to keep their cameras on in order to build trust between the team and reflect transparency.

Comments, questions, quick discussion, and emergencies are to be communicated through a Whatsapp messenger group chat.

To share the final deliverables, share resources, and take notes, Google Docs will be used where all the team members can edit the document. Files and other resources that are not suitable to be posted on Google Docs will be uploaded on OneDrive. This includes recordings of weekly team meetings, Microsoft Word documents and PowerPoints.

A platform called ClickUp will be used to keep track of tasks, assignment due dates, and scheduled meetings. Members are assigned to tasks, where the status can be changed to show progress and viewed as a timeline. This platform assists in project management efficiency.

In all discussions within the team, members are expected to actively listen, remain focused on the topic at hand, and utilize visuals to help with the conversation.

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Work Division and Participation

The entire project work should be divided into equal parts, and equal responsibilities should be given to all the team members. Members are expected to select and contribute to tasks in which their skills are best fit.

Each team member should complete their division of work before the class deadline and by the team's scheduled date. If work is unable to be completed on time, that hinders the performance of the entire team. In any case a team member is facing difficulty or issues with completing tasks, they are expected to share it with the team so that they can help each other and complete the work before the deadline.

All the team members are expected to attend the scheduled meetings promptly. All members should show respect, share feedback and suggestions, and share skills and knowledge that would assist in the progress of the project.

Absence during multiple meetings will affect the team's performance and efficiency. The team member can discuss beforehand with the team if he/she is going to miss the meeting. Meetings will be recorded, therefore members who miss a meeting are expected to watch the recording.

Work is divided between members of the group voluntarily. However, if members lack participation, the team leader is permitted to assign necessary tasks to absentee members.

Meetings

All the team members will meet on zoom virtually every week. Meetings will occur 3 times a week on Mondays, Wednesdays, and Fridays at 5 pm. Exact dates and times are verified in the previous meeting. This ensures flexibility to accommodate everyone's schedules and a greater likelihood that all members can attend. All the team members must be present, unless for exceptional cases that are communicated to the team.

The team leader would be responsible for initiating and monitoring project tasks and assignments. The scrum master is expected to lead and monitor sprints and daily scrums.



Team Working Agreement

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The status of tasks and meeting notes on ClickUp will be added and updated after every meeting to keep track of the project and its progress.

Every team member is expected to come up with ideas, participate in the discussion, and give an update on their progress for their part of the work.

In case a member is absent during a meeting, that member pledges to support whichever decision is approved during that meeting. They are also expected to watch the recording of the meeting and ask any questions to clarify what they have missed.

Respect

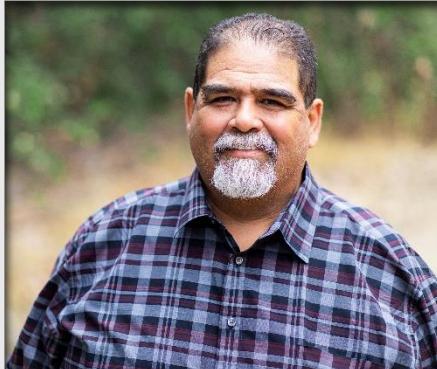
It is essential that all members have a chance to share their opinion and make any suggestions without judgment. The project is a team effort where all members work together, taking advantage of our collective knowledge to come up with solutions and confront problems that may arise. Data will be used to inform our decisions whenever possible.

All members agree to respect each other's personal schedules and listen to each other's perspectives with an open mind.

Team Member	Email
Marla Capistran	mc08144p@pace.edu
Leanna Machado	lm77202p@pace.edu
Anthony Munoz	am15943n@pace.edu
Rahul Nayanegeali	rn06857n@pace.edu
Christopher Ospina	co05453n@pace.edu
Prithvi Raimangya	pr21243n@pace.edu
Ronaldo Simbana	rs77853p@pace.edu
Filippo Zallocco	fz46756n@pace.edu

Patient Persona

Harold Castillo



Age: 55

Gender: Male

Occupation: Restaurant Owner

Location: Red Bank, NJ

Harold gets regular check-ups for a man his age but has trouble scheduling due to his job. It'd be great if he could just view his results and get an idea of what they mean and potential next steps without having to keep going in person.

Goals

- View reports/results online
- Able to connect with doctor about results online
- Simple site for ease of use

Challenges

- Making it to follow-ups for results
- Understanding the results, even after a consultation
- Time taken to receive results

Radiologist Persona

Sandro Cuccigno



Age: 50

Gender: Male

Occupation: Radiologist

Location: Manhattan, NY

Hospital: NYU Langone Medical Center

Has been in the practice for 20 years. His team is understaffed and under equipped. Is often exhausted from reviewing x-rays and informing people they have a serious illness.

Goals

- Process chest images fast
- Help hospital tend to patients
- Improve workflow for his team

Challenges

- Increasing patient volumes
- Burnout from long shift and nature of the job
- Facility cutting funds
- Spends many hours reviewing x-rays

Doctor Persona

Dr. Bryce Ruiz



Age: 34

Gender: Male

Occupation: Doctor

Location: Fresno, Ca

Hospital: Albuquerque Medical Center

A 34-year-old medical professional from Fresno. Has been working at Albuquerque for over 10 years and has recently been promoted to Cardiology to conduct x-rays

Goals

- Build a strong reputation with patients
- Explain to patients what they have in a clear manner

Challenges

- Large volume of patients
- Limited time for consultations
- Patients are often confused about their diagnosis



Product Discovery

The image displays four distinct views of a medical AI application's user interface, illustrating the product discovery process from initial wireframes to final design prototypes.

Wireframe 1: A simple landing page with a central placeholder for an X-ray image. It includes a "Status Bar" at the top, a "UPLOAD XRAY HERE" button, a "SUBMIT" button, and a "FINDINGS" section below containing a diagnosis ("Pneumonia") and a detailed description of the condition.

Wireframe 2: A user profile view for "John". It shows a greeting ("Good morning John!"), a file upload area ("Drag files to upload or Browse Files"), and a progress bar ("In Progress", "Under Review", "Reviewed"). The main content area displays the diagnosis ("Pneumonia"), description ("A respiratory infection that affects the lungs by filling up the small sacs with pus and fluid"), and a doctor's message ("February 6, 2024: John your next steps are ... Please visit the clinic this week").

Wireframe 3: A simplified version of the previous screen, focusing on the "Med X AI" logo and a "Upload X-Ray Image" section with a "Browse Files" button. It also includes a progress bar and a "Result" section with a "Description" field containing placeholder text about "Thorax Disease".

Dark Mode Prototype (Left): The Med-X AI dashboard in dark mode. It features a sidebar with icons for users, reports, and settings. The main area has sections for "Date Range" (set to "This Month"), "Type of Scan" (set to "MRI"), and "Filter View" (set to "Line Chart"). A large button at the bottom says "Upload a new Scan".

Dark Mode Prototype (Right): An X-ray overview screen in dark mode. It shows a sidebar with "Patients Information" (Age, ID) and "Upload X-ray image" options. The main content area displays an "X-ray Overview" (dated 02/08/2024), "X-ray Findings" (last checked 2 days ago, inverted triangle body shape), and "Doctors Opinion" and "Doctors Information" sections. A "Results Status" bar at the bottom indicates "In Progress, Reviewed".



Final Product Design

A screenshot of the Medexer mobile application. The top navigation bar includes a search bar, a notification bell icon, and a user profile picture. The main header displays the app name "Medexer" and an X-ray ID "#234456". A prominent purple-to-green gradient bar indicates the status as "Reviewed". Below this, the word "Results" is displayed next to a chest X-ray image showing a diaphragmatic hernia. To the right, a timestamp "03/31/2024 4:30 pm" is shown. The diagnosis "Hernia" is bolded in purple. A detailed description follows: "Descriptions: Identification of a diaphragmatic hernia noted on the chest X-ray. The presence of abdominal contents protruding through the diaphragm into the thoracic cavity is observed. This herniation appears to be located hemidiaphragm. Clinical correlation and further imaging modalities may be warranted for comprehensive evaluation and management." Below the description, under "Doctors Comments:", is a placeholder text "Horem ipsum dolor sit amet. consectetur adipiscina elit." with a timestamp "03/31/2024 4:30 pm". At the bottom are two buttons: "Download Report" and "Upload New Scan".

Search

Medexer

X-ray ID: #234456

Reviewed

03/31/2024
4:30 pm

Results

Hernia

Descriptions: Identification of a diaphragmatic hernia noted on the chest X-ray. The presence of abdominal contents protruding through the diaphragm into the thoracic cavity is observed. This herniation appears to be located hemidiaphragm. Clinical correlation and further imaging modalities may be warranted for comprehensive evaluation and management.

Doctors Comments:

Horem ipsum dolor sit amet. consectetur adipiscina elit.

03/31/2024
4:30 pm

Download Report

Upload New Scan

- Dashboard
- Medexer
- Reports
- Connect
- Settings
- About Us
- Terms & Conditions



MVP Design

A screenshot of the MED-X AI mobile application interface. At the top left is the app's logo. The main title 'Report' is displayed prominently. Below it is a large thumbnail image of a chest X-ray showing the lungs and heart area. To the right of the image, the word 'Results' is followed by the diagnosis 'Hernia'. A timestamp '18th January 2014 4:30pm' is also present. At the bottom of the screen are two navigation icons: 'Dash Board' and 'Medxer'. The overall background is dark.

A screenshot of the MED-X AI mobile application interface showing the file upload screen. The top half of the screen is identical to the report interface, featuring the logo, search bar, and user profile. The bottom half contains a large dashed rectangular area for file upload. Inside this area is a cloud icon with an upward arrow, indicating where to drop files. Below the cloud is the text 'Drag & Drop to Upload Chest X-ray'. Underneath that is a 'Browse File' button. At the very bottom, a note states 'Supported File formats: .png, .jpeg, .svg'.



Technologies & Algorithms

Programming Languages and Frameworks



HTML5



CSS



JavaScript



React



Node.js



Flask



Python



Tailwind
CSS

Algorithms



TensorFlow



CNN



Keras

Database



Firebase



Figma



VSCode



Docker



GitHub



Insomnia



Technologies Explanation



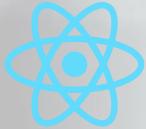
HTML5



CSS



JavaScript



React



NodeJS



Tailwind
CSS

MedX app leverages HTML, CSS, JavaScript, React, Node and Tailwind CSS for the dynamic user interface



Flask



Python



Firebase

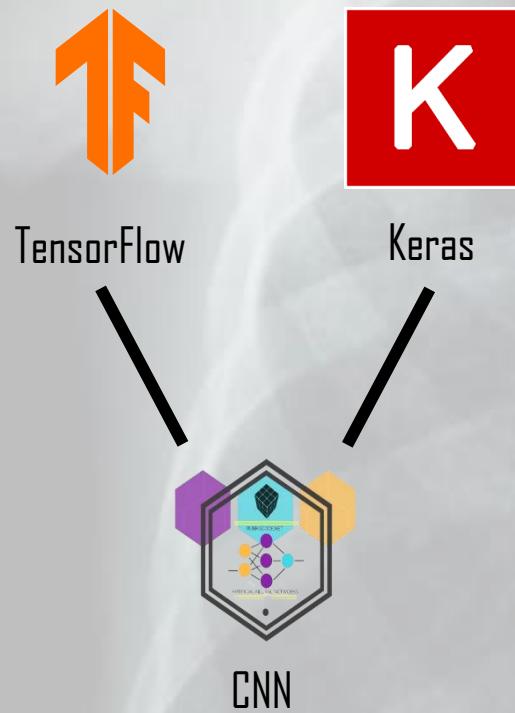
Python's micro framework Flask is used to render the chest x-ray findings on the user interface by calling the trained model

Firebase is used to store the uploaded image and provides an endpoint URL to call the API

Technologies Explanation



Figma, VSCode, and GitHub are tools used for efficient collaboration. Figma enables a seamless contribution for the overall development. VSCode is the chosen code editor. GitHub allows remote version control and collaborative development. Docker simplifies deployment across all platforms. Insomnia is a tool used to test the APIs.



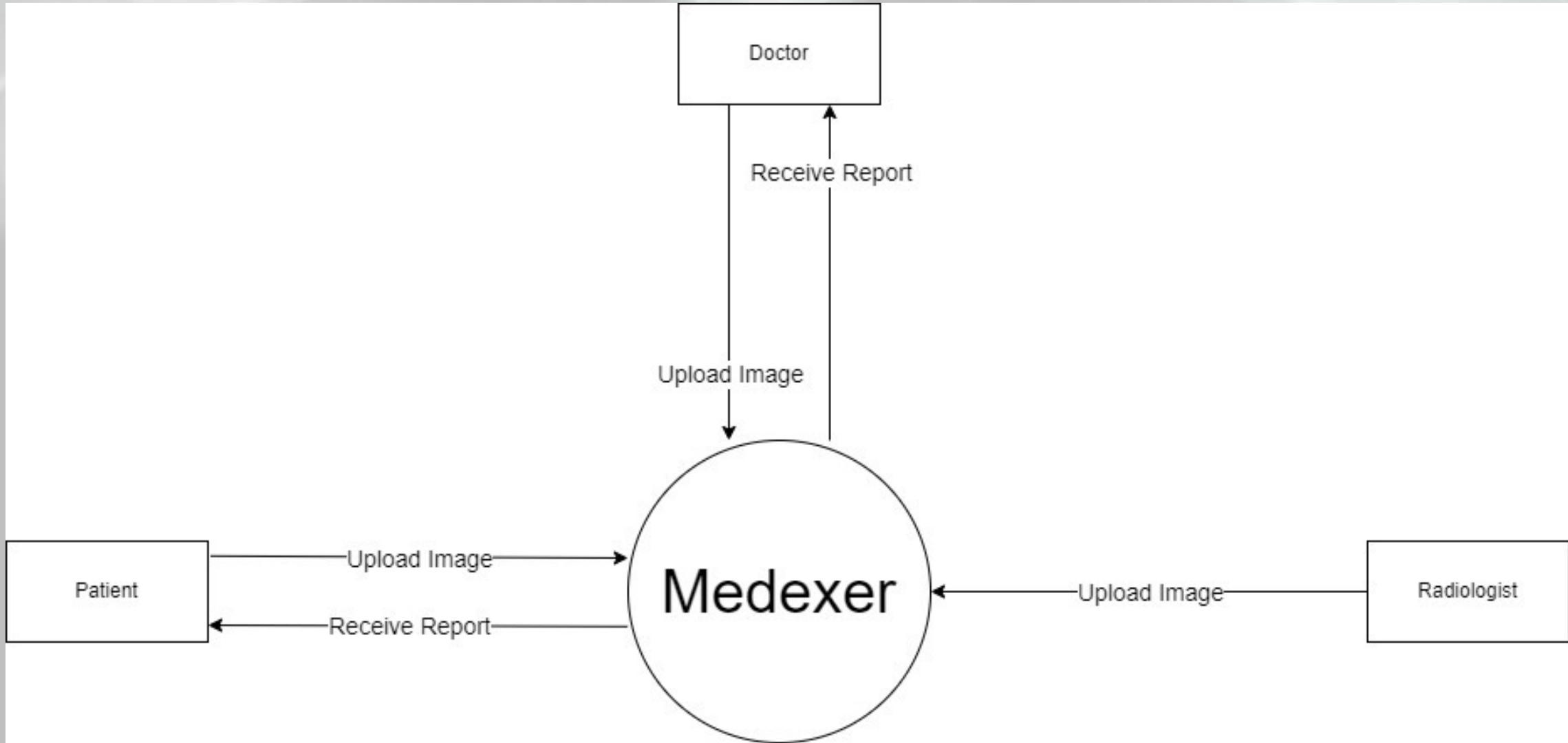
Algorithms Explanation

TensorFlow's Keras API is used for building and training our Convolutional Neural Network, which classifies x-ray images for diagnosis. The deep learning model integrates different layers.

- Convolutional Layers
- Batch Normalization
- Dropout
- Regularization

We optimized training with the Adam algorithm

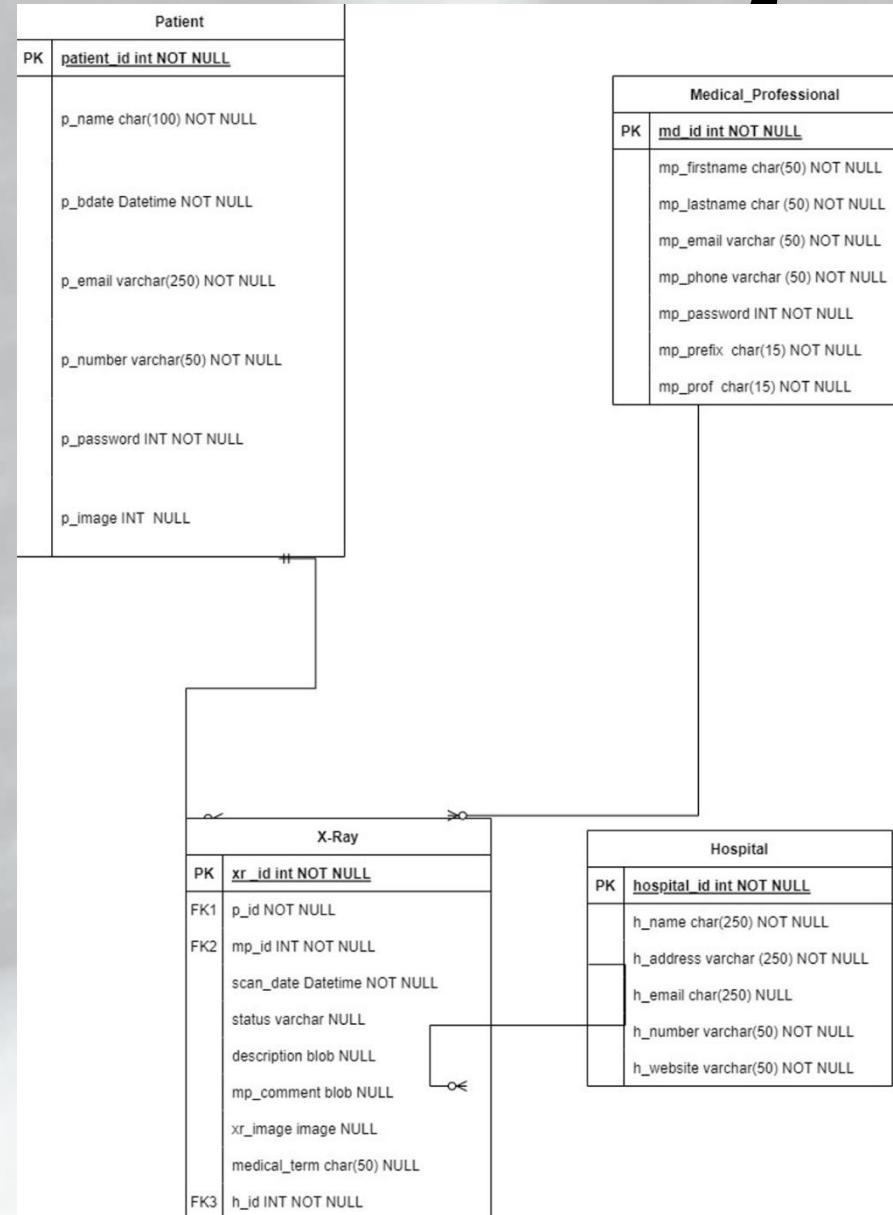
Context Diagram





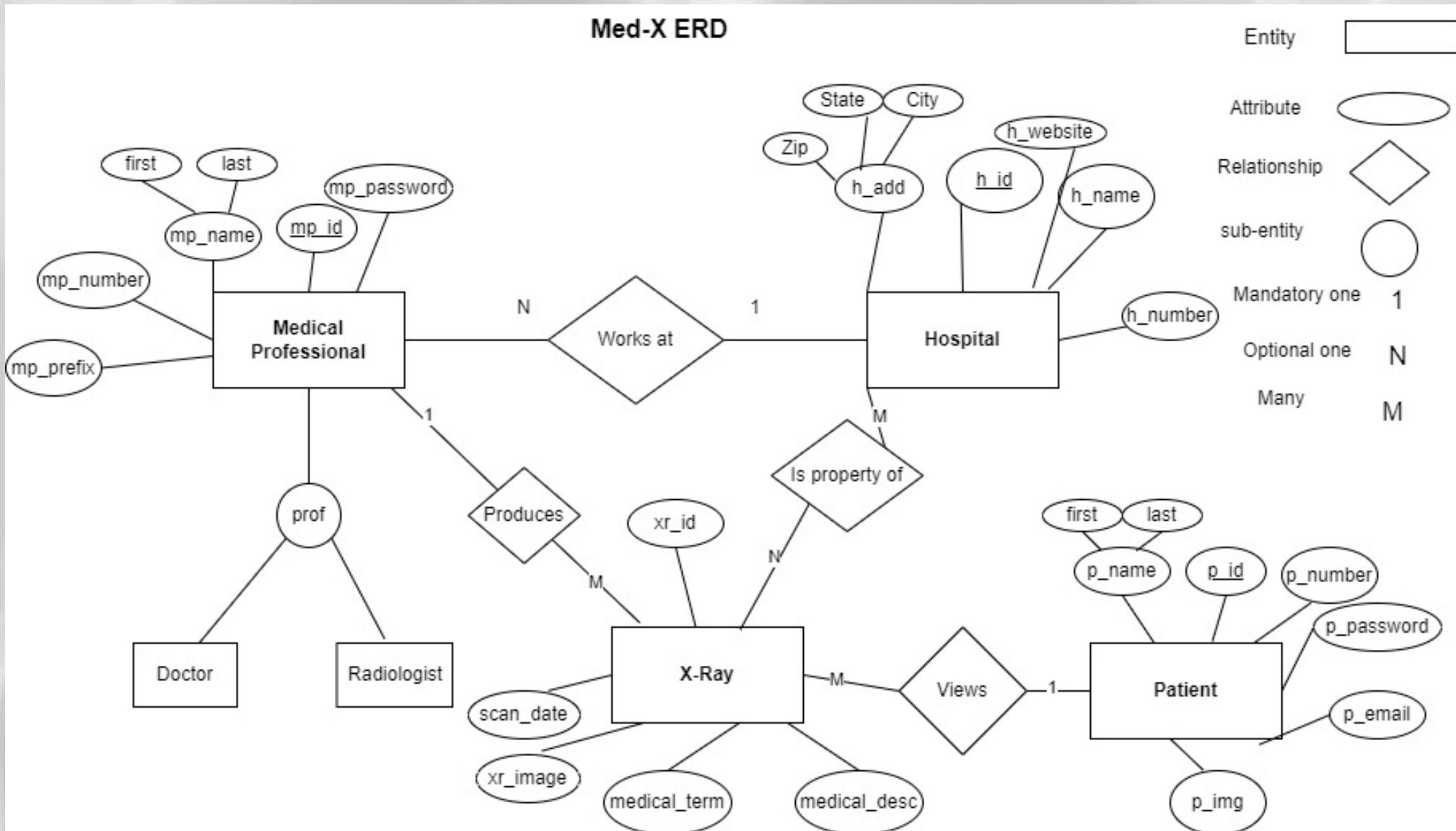
MED-X AI

Class Diagram



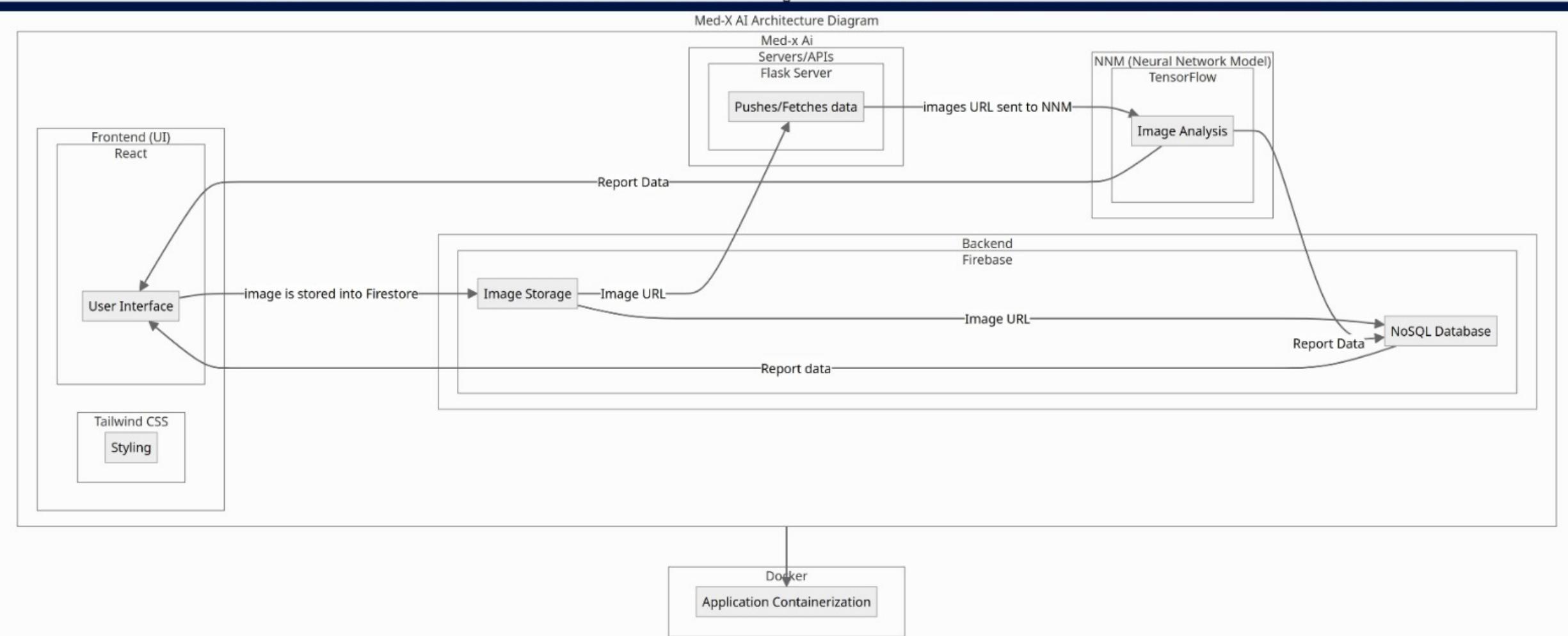


ER Diagram



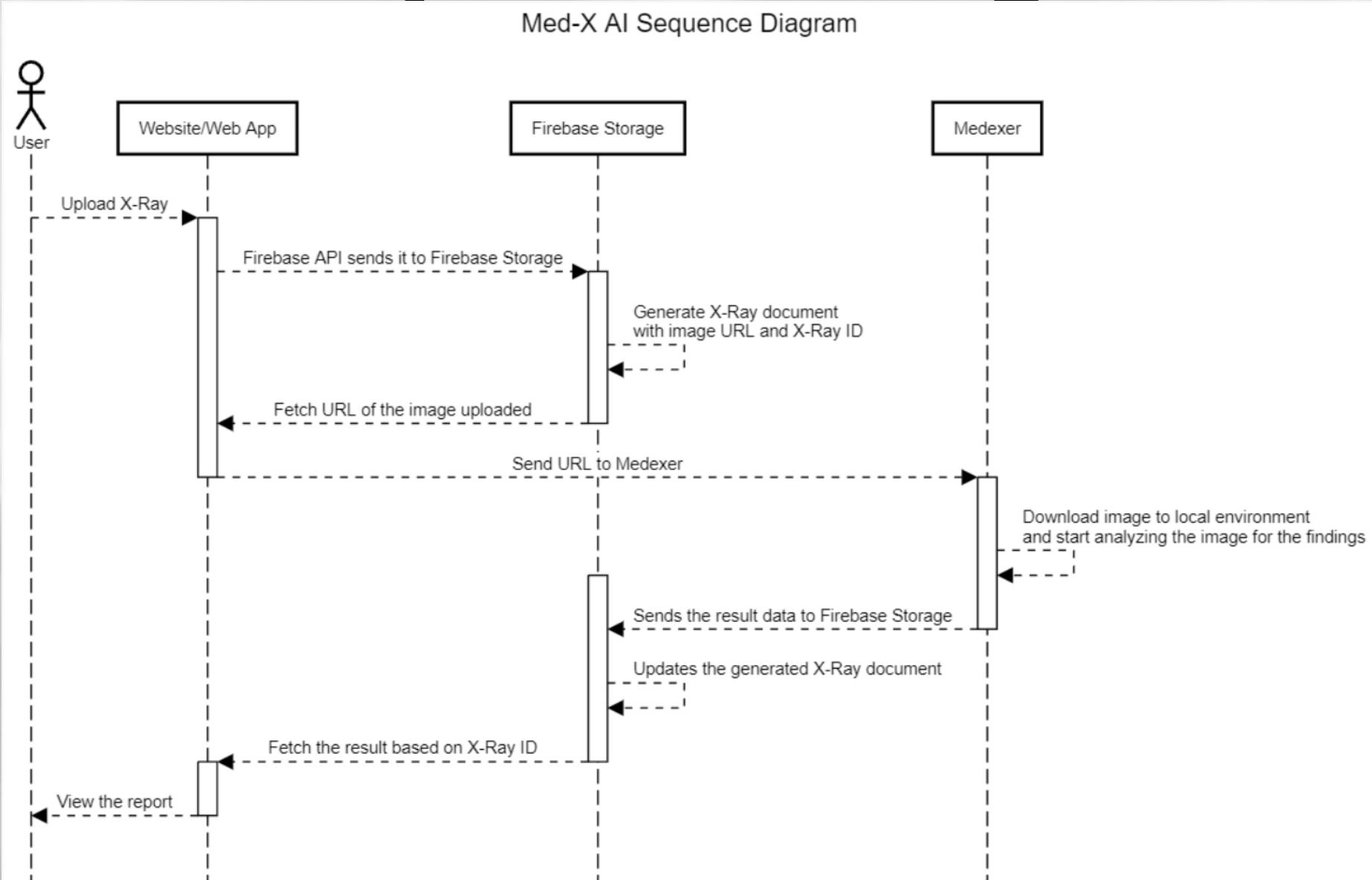


Architecture Diagram



Sequence Diagram

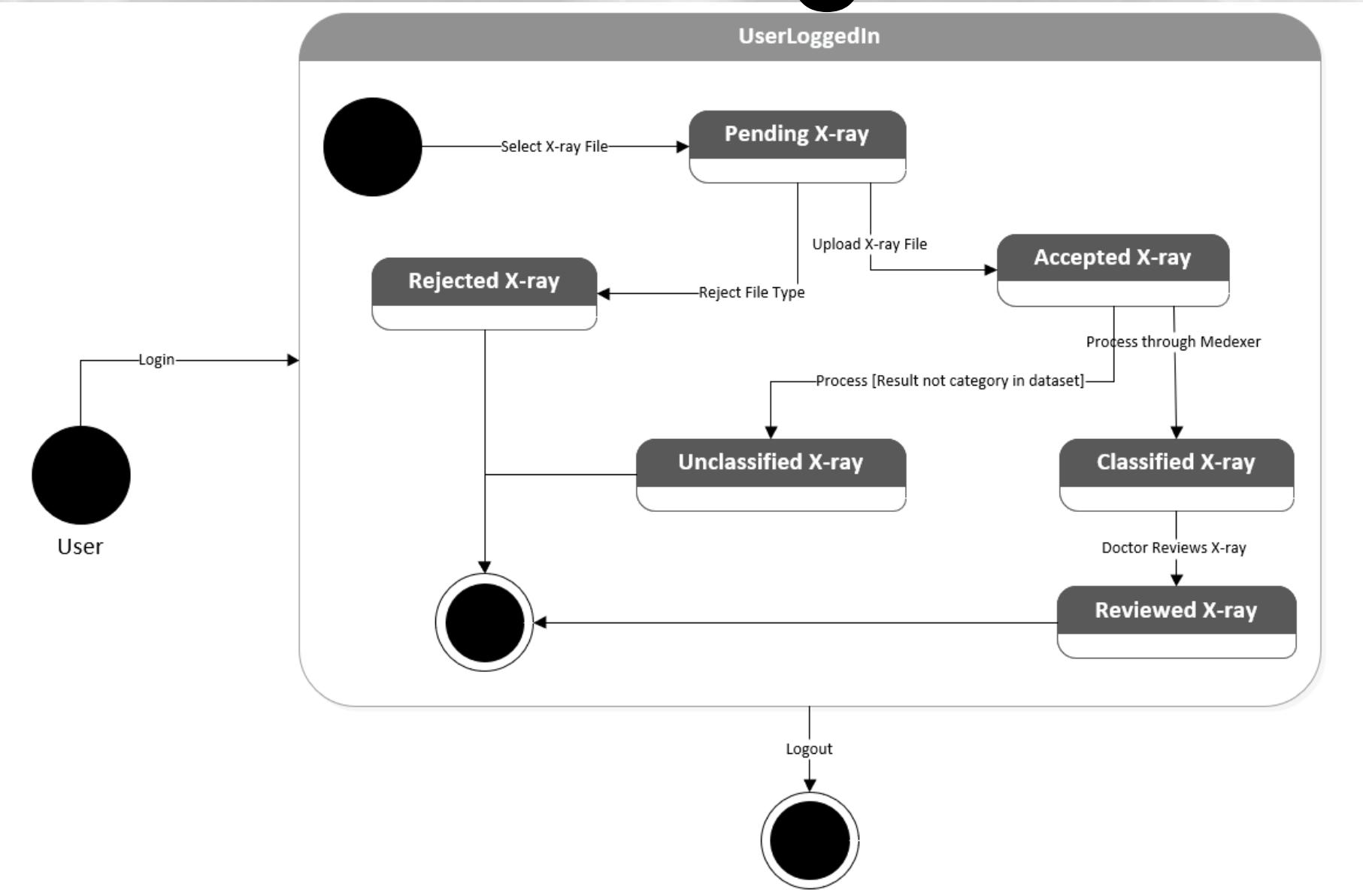
Med-X AI Sequence Diagram





MED-X AI

State Diagram





Sprint 3 Recap

- Added functionality to the Search bar (date, report id, diagnosis, status)
- Able to view reports added
- Doctor's Notes
- Status of the Report Changes once verified by the doctor
- Static UI for patient and doctor login
- Ability to download a report to a device
- Ability to print a report
- Displaying the most recent report on the Dashboard
- Self-developed Neural Network Model
- 33 Story Points
- Completed 100% of the Story Points



MED-X AI

Product Backlog



Description

Assignee

Select VS Code, Docker, No SQL database for web application development

Med-X Team

Train the basic neural network model with NIH dataset

Rahul

Check current versions of Node and ensure everyone runs version 20.8

Med-X Team

Create a base application in React JS and use Tailwind CSS for styling

Prithvi

Create Database Tables in Firebase

Filippo / Marla

Test alternative backend API with MongoDB

Filippo / Marla

Build Flask server to integrate the neural network model

Filippo / Rahul

Import dependencies from Firebase to connect app to Google services

Filippo

Dockerize front-end and back-end for cross-platform compatibility

Filippo

Increase Accuracy of neural network model by using CheXpert dataset

Rahul

Legend:

Sprint 1

Sprint 2

Sprint 3

Sprint 4





MED-X AI

Product Backlog



Description

Assignee

Integrate the new model by modifying the API functionality

Rahul

Attempt to deploy back-end to Google Cloud Console and AWS

Filippo / Prithvi /
Ronaldo / Rahul

Read documentations and follow tutorials about CRUD operations with Firebase

Filippo / Leanna

Read through various medical descriptions for diagnoses and create an excel file with friendly descriptions

Marla

Update features such as Doctor's Comment, Reviewed Status, Download Report, Dashboard, Search

Med-X Team

Create a static Login Page for patient and doctor

Prithvi

Test the application on multiple devices and troubleshoot

Anthony

Confirm the friendly medical descriptions with nurses and doctors

Rahul / Leanna

Explore and Train alternative optimization algorithms for higher accuracy

Rahul

Legend:

Sprint 1

Sprint 2

Sprint 3

Sprint 4





Product Backlog



Estimation	User Story ID	As a	I want	So that	Feature	Assignee
3	1	Radiologist	to easily upload x-ray images	doctors and patients have access to the images	Image Upload	Ronaldo / Prithvi / Filippo
3	2	Doctor	to easily upload x-ray images	doctors and patients have access to the images	Image Upload	Ronaldo / Prithvi / Filippo
3	3	Patient	to easily upload x-ray images from my personal machine	doctors have access to the images for review	Image Upload	Ronaldo / Prithvi / Filippo
13	4	Radiologist	to provide quick and automated x-ray results for common chest health issues	more time can be dedicated to analyze uncommon chest health issues	Medexer (AI)	Rahul
13	5	Doctor	to provide quick and automated x-ray results for common chest health issues	patient response rate and physician workflow improves	Medexer (AI)	Rahul
8	6	Doctor	to add comments to patient x-ray results	patients are informed early about other information the result does not provide	Doctor Notes	Leanna / Prithvi / Ronaldo / Filippo

Legend:

Sprint 2

Sprint 3

Sprint 4





Product Backlog



Estimation	User Story ID	As a	I want	So that	Feature	Assignee
5	7	Patient	to view whether a doctor has reviewed my x-ray results	I can be more confident about the verified results	Reviewed Status	Prithvi
2	8	Patient	my x-ray results to be explained in simpler terms	I can better understand my diagnosis and health issue	Result Description	Rahul / Prithvi / Marla
1	9	Doctor	to download patient x-ray reports	I can store patient records locally	Download Report	Chris / Prithvi
1	10	Patient	to download my x-ray reports	I can store patient records locally	Download Report	Chris / Prithvi
5	11	Patient	to have access to all of my x-ray report history	I can track my chest health issues	Report History	Prithvi / Marla
5	12	Doctor	to have access to all patient x-ray report histories	I can track patient chest health issues	Report History	Prithvi / Marla
2	13	Patient	to quickly view my latest x-ray report	my most recent information is easily accessible	Dashboard	Ronaldo / Prithvi

Legend:

Sprint 2

Sprint 3

Sprint 4





MED-X AI

Product Backlog



Estimation	User Story ID	As a	I want	So that	Feature	Assignee
5	14	Patient	to be notified once there is a change to my reports (upload, review, notes, etc.)	I can be informed about any updates as soon as possible	Notification	Leanna / Filippo
5	15	Doctor	to be notified once there is a change to patient reports (upload, report, etc.)	I can be informed about any updates as soon as possible	Notification	Leanna / Filippo
8	16	Doctor	to browse a specific report and record	I can quickly locate specified information	Search	Ronaldo / Prithvi
8	17	Patient	to browse a specific report and record	I can quickly locate specified information	Search	Ronaldo / Prithvi
3	18	Radiologist	to register and store my personal info (ID, name, D.O.B.) in my own account	I can access patient information and connect with patients and doctors privately	Registration/ Signup	Ronaldo / Prithvi

**Legend:**

Sprint 2

Sprint 3

Sprint 4



Product Backlog



Estimation	User Story ID	As a	I want	So that	Feature	Assignee
3	19	Doctor	to register and store my personal info (ID, name, D.O.B.) in my own account	I can access patient information and connect with patient and radiologists privately	Registration/ Signup	Ronaldo / Prithvi
3	20	Patient	to register and store my personal info (ID, name, D.O.B.) in my own account	I can access my medical information and connect with doctors privately	Registration/ Signup	Ronaldo / Prithvi
3	21	Patient	to login and logout of my own account	my medical information, records and reports are secure	Login/Logout	Prithvi / Ronaldo
3	22	Doctor	to login and logout of my own account	Patient medical information, records and reports are secure	Login/Logout	Prithvi / Ronaldo
3	23	Patient	to login using my e-mail address	I can access my medical information, records and reports	Login/Logout	Ronaldo
3	24	Doctor	to login using my medical professional ID number	I can access patient medical information, records and reports	Login/Logout	Ronaldo

Legend:

Sprint 2

Sprint 3

Sprint 4





MED-X AI



Product Backlog

Estimation	User Story ID	As a	I want	So that	Feature	Assignee
1	25	Patient	update my personal information such as my name, address, phone number etc.	the portal has up-to-date information in the event I need to be reached urgently	Profile	Anthony / Chris

Legend:

Sprint 2

Sprint 3

Sprint 4





MED-X AI

User Stories



User Story ID	Scenario	Summary	Criteria	Feature	Assignee
	As a Radiologist I want to easily upload x-ray images so that doctors and patients have access to the images				
1	A radiologist wants to upload an x-ray image	Given I'm a radiologist when I open the Med-X AI web app I should be able to locate an upload button that when clicked on and an image is selected then the application will store the image for processing	Med-X AI App will store the image for processing	Image Upload	Ronaldo / Prithvi / Filippo
	As a Doctor I want to easily upload x-ray images so that doctors and patients have access to the images				
2	A doctor wants to upload an x-ray image	Given I'm a doctor when I open the Med-X AI web app I should be able to locate an upload button that when clicked on and an image is selected then the application will store the image for processing	Med-X AI App will store the image for processing	Image Upload	Ronaldo / Prithvi / Filippo
	As a Patient I want to easily upload x-ray images from my personal machine so that doctors have access to the images for review				
3	A patient wants to upload an x-ray image	Given I'm a patient when I open the Med-X AI web app I should be able to locate an upload button that when clicked on and an image is selected then the application will store the image for processing	Med-X AI App will store the image for processing	Image Upload	Ronaldo / Prithvi / Filippo

Legend:

Sprint 2

Sprint 3

Sprint 4





MED-X AI

User Stories



User Story ID	Scenario	Summary	Criteria	Feature	Assignee
	<p>As a Radiologist I want to provide quick and automated x-ray results for common chest health issues so that more time can be dedicated to analyze uncommon chest health issues</p>				
4	A radiologist wants to quickly provide an x-ray result	Given I'm a radiologist when I upload an x-ray image then the application will provide a quick diagnosis	Med-X AI App will provide a diagnosis (finding) for the chest health issue	Medexer (AI)	Rahul
	<p>As a Doctor I want provide quick and automated x-ray results for common chest health issues so that patient response rate and physician workflow improves</p>				
5	A doctor wants to quickly access patient x-ray results	Given I'm a doctor when an x-ray image produces quick results I can then access the result in order to provide patients with a verified response	Med-X AI App will provide a diagnosis (finding) for the chest health issue	Medexer (AI)	Rahul
	<p>As a Doctor I want to add comments to patient results so that patients are informed early about other information the result does not provide</p>				
6	A doctor wants to write a comment to patient about the x-ray result	Given I'm a doctor when I click on the Doctor's Comments section on a patient's report I can then type and post a message that the patient can see	Med-X AI App will provide a text message section for each report to allow doctors to post	Doctor Notes	Leanna / Prithvi / Ronaldo /

Legend:

Sprint 2

Sprint 3

Sprint 4





MED-X AI

User Stories



User Story ID	Scenario	Summary	Criteria	Feature	Assignee
	As a Patient I want to view whether a doctor has reviewed my x-ray results so that I can be more confident about the verified results				
7	A patient wants to see any additional comments from the doctor	Given I'm a patient when I click on a report in Reports, I can then view a status bar reporting if a doctor has verified the x-ray result	Med-X App will allow patients to view "Under Review" or "Reviewed" status bar in reports	Reviewed Status	Prithvi
	As a Patient I want my x-ray results to be explained in simpler terms so that I can better understand my diagnosis and health				
8	A patient wants to better understand their x-ray result	Given I'm a patient when I click on a report in Reports tab, I can then view a text description of the result in plain language so I can better understand the technical result	Med-X AI App will provide a text description of the finding in the selected report	Result Description	Rahul / Prithvi / Marla
	As a Doctor I want to download patient x-ray reports so that I can store patient records locally				
9	A Doctor wants to store patient records locally	Given I'm a doctor when I open a patient's report and click a download button the selected record is then downloaded and saved to my local computer	Med-X AI App will transfer the report file from the remote system to the user's local system	Download Report	Chris / Prithvi

Legend:

Sprint 2

Sprint 3

Sprint 4





MED-X AI

User Stories



User Story ID	Scenario	Summary	Criteria	Feature	Assignee
	As a Patient I want to download my x-ray reports so that I can store my records locally				
10	A patient wants to store medical records locally	Given I'm a patient when I open my report and click a download button the selected report is then downloaded and saved to my local computer	Med-X AI App will transfer the report file from the remote system to the user's local system	Download Report	Chris / Prithvi
	As a Patient I want to have access to my x-ray report history so that I can track my chest health issues				
11	A patient wants to keep track of all of their x-ray reports	Given I'm a patient when I click on the Reports tab then I should see a gallery of reports that have been generated	Med-X AI App will store all the reports in the cloud	Report History	Prithvi / Marla
	As a Doctor I want to have access to patient x-ray report histories so that I can track patient chest health issues				
12	A doctor wants to keep track of their patients reports	Given I'm a doctor when I click on the Reports tab of a specific patient then I should see a gallery of reports that has been generated for that patient	Med-X AI App will store all the reports in the cloud	Report History	Prithvi / Marla

**Legend:**

Sprint 2

Sprint 3

Sprint 4



MED-X AI

User Stories



User Story ID	Scenario	Summary	Criteria	Feature	Assignee
	As a Patient I want to quickly view my latest x-ray report so that my most recent information is easily accessible				
13	A patient wants to view their latest x-ray report	Given I'm a patient when I log into the account then the Dashboard page will be displayed with the most recent x-ray results	Med-X AI App will open to the Dashboard upon sign in	Dashboard	Ronaldo / Prithvi
	As a Patient I want to be notified once there is a change to my reports (upload, review, notes, etc.) so that I can be informed about any updates as soon as possible				
14	A patients wants to be informed of any changes to their reports	Given I'm a patient when a change is made to my report then I should receive a notification	Med-X AI App will alert the user of a change made to their report	Notification	Leanna / Filippo
	As a Doctor I want to be notified once there is a change to patient reports (upload, report, etc.) so that I can be informed about any updates as soon as possible				
15	A doctor wants to be informed of any changes to patient reports	Given I'm a doctor when a change is made to a patient report then I should receive a notification	Med-X AI App will alert the user of a change made to their report	Notification	Leanna / Filippo

**Legend:**

Sprint 2

Sprint 3

Sprint 4

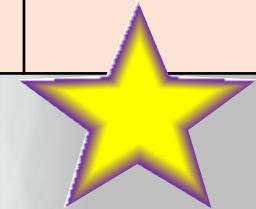


MED-X AI

User Stories



User Story ID	Scenario	Summary	Criteria	Feature	Assignee
	As a Doctor I want to browse all reports and records so that I can quickly locate specified information				
16	A doctor wants to locate a specific report/record	Given I'm a doctor when I search for a report in the search bar then I should be able to quickly locate it	Med-X AI App will store reports using an x-ray id and patient name	Search	Ronaldo / Prithvi
	As a Patient I want to browse my reports and records so that I can quickly locate specified information				
17	A patient wants to locate a specific report/record	Given I'm a patient when I search for a report in the search bar then I should be able to quickly locate it	Med-X AI App will store reports using an x-ray id	Search	Ronaldo / Prithvi
	As a Radiologist I want to register and store my personal info (ID, name, DOB) in my own account so that I can access patient information and connect to patients and doctors privately				
18	A radiologist wants to create their own account to securely access patient information	Given I'm a radiologist when I use the app, I should be able to have my own account then patient information will be secured, and communication will be private	Med-X AI App will store user credentials (medx ID)	Registration/ Signup	Ronaldo / Prithvi

**Legend:**

Sprint 2

Sprint 3

Sprint 4



MED-X AI

User Stories



User Story ID	Scenario	Summary	Criteria	Feature	Assignee
	As a Doctor I want to register and store my personal info (ID, name, DOB) in my own account so that I can access patient information and connect to patients and radiologists privately				
19	A doctor wants to create their own account to securely access patient information	Given I'm a doctor when I use the app, I should be able to have my own account then patient information will be secured, and communication will be private	Med-X AI App will store user credentials (medx ID)	Registration/ Signup	Ronaldo / Prithvi
	As a Patient I want to register and store my personal info (ID, name, DOB) in my own account so that I can access my medical information and connect to doctors privately				
20	A patient wants to create their own account to securely access their information	Given I'm a patient when I use the app, I should be able to have my own account then my information will be secured, and communication will be private	Med-X AI App will store email and password	Registration/ Signup	Ronaldo / Prithvi

**Legend:**

Sprint 2

Sprint 3

Sprint 4



MED-X AI

User Stories



User Story ID	Scenario	Summary	Criteria	Feature	Assignee
	As a Patient I want to login and logout of my own account so that my medical information, records and reports are secure				
21	A patient wants to securely and privately start and end sessions on their account	Given I'm a patient when I open the app, I then am prompted to log in to my account with my credentials and click a logout button to end my session	Med-X AI App will begin with a login page and have a button to logout of the current account	Login/Logout	Prithvi / Ronaldo
	As a Doctor I want to login and logout of my own account so that patient medical information, records and reports are secure				
22	A doctor wants to securely and privately start and end sessions on their account	Given I'm a doctor when I open the app, I then am prompted to log in to my account with my credentials and click a logout button to end my session	Med-X AI App will begin with a login page and have a button to logout of the current account	Login/Logout	Prithvi / Ronaldo

**Legend:**

Sprint 2

Sprint 3

Sprint 4



MED-X AI

User Stories



User Story ID	Scenario	Summary	Criteria	Feature	Assignee
	As a Patient I want to login using my e-mail address so that I can access my medical information, records and reports				
23	A patient wants to access their medical records by using their personal e-mail address	Given I'm a patient when I am prompted to login, I can then enter my personal e-mail address to access the records related to my account	Med-X AI App will create and store patient accounts through e-mail (username)	Login/Logout	Ronaldo
	As a Doctor I want to login using my medical professional ID number so that I can access patient medical information, records and reports				
24	A doctor wants to access patient medical records by using their ID number	Given I'm a doctor when I am prompted to login, I can then enter my personal medx ID number to access the records related to my account	Med-X AI App will create and store doctor accounts through their ID number (username)	Login/Logout	Ronaldo

**Legend:**

Sprint 2

Sprint 3

Sprint 4



MED-X AI

User Stories



User Story ID	Scenario	Summary	Criteria	Feature	Assignee
	<p>As a Patient I want to update my personal information such as my name, address, phone number, etc. so that the portal has up-to-date information in the event I need to be reached urgently</p>				
25	A patient wants to update personal profile information when they change	Given I'm a patient when I click my profile and the edit button, I can then change the inputted profile information (name, address, phone number, etc.) and click save	Med-X AI App will allow patients to update profile information and store the changes in the database	Profile	Anthony / Chris

**Legend:**

Sprint 2

Sprint 3

Sprint 4



Sprint 1 Summary:

- Found a problem in the health sector
- Came up with a Team Name
- Established team roles
- Researched user challenges (radiologist, patient, doctor)
- Brainstormed how AI can benefit users
- Designed Team Logo
- Determine the type of application to build
- Wireframing and Prototyping the App Design
- Researched technologies to use



Sprint 2 Summary:



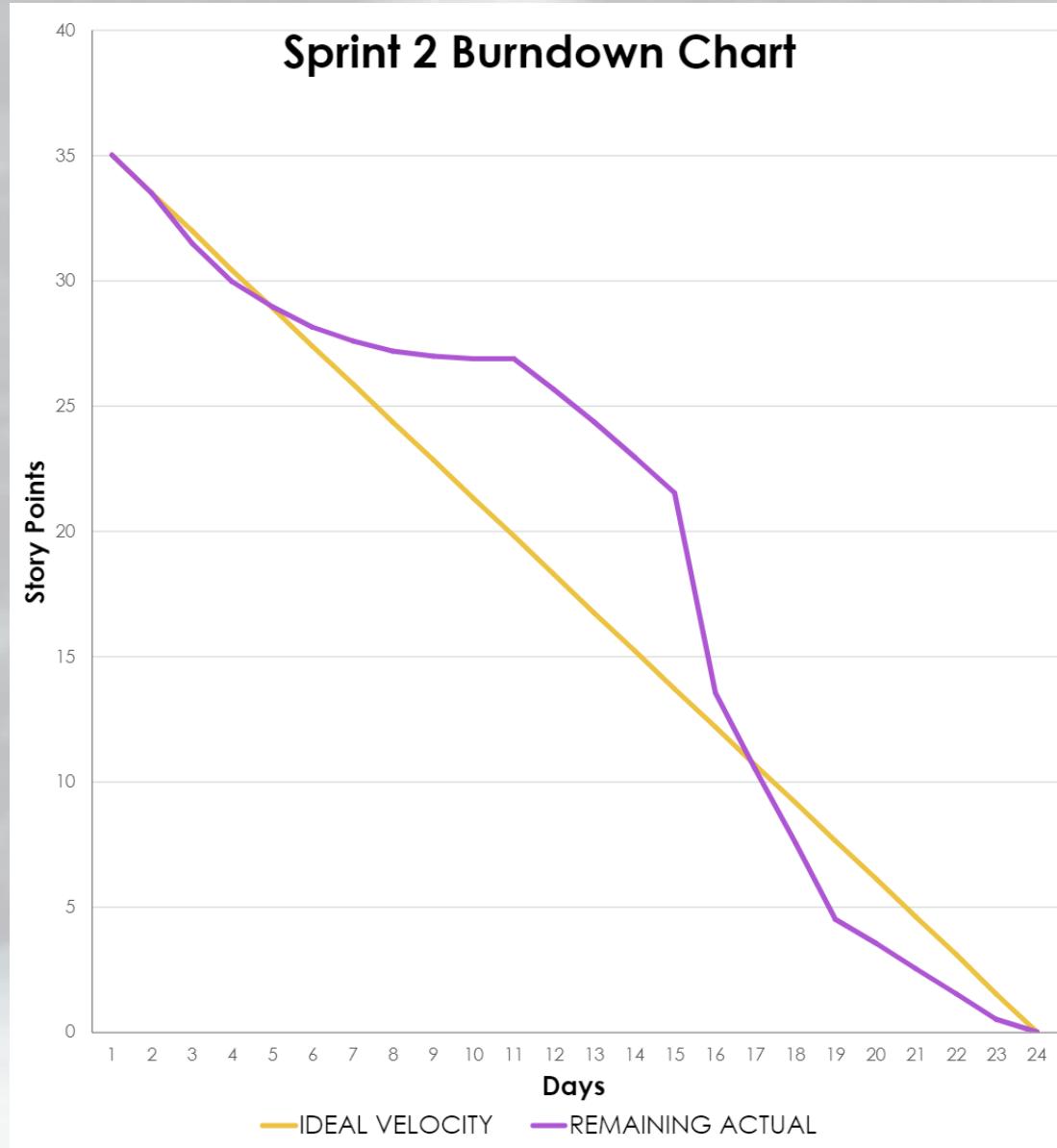
Estimation	User Story ID	As a	I want	So that	Feature	Assignee
3	1	Radiologist	to easily upload x-ray images	doctors and patients have access to the images	Image Upload	Ronaldo / Prithvi / Filippo
3	2	Doctor	to easily upload x-ray images	doctors and patients have access to the images	Image Upload	Ronaldo / Prithvi / Filippo
3	3	Patient	to easily upload x-ray images from my personal machine	doctors have access to the images for review	Image Upload	Ronaldo / Prithvi / Filippo
13	4	Radiologist	to provide quick and automated x-ray results for common chest health issues	more time can be dedicated to analyze uncommon chest health issues	Medxer (AI)	Rahul
13	5	Doctor	quick access to patient x-ray results for common chest health issues	patient response rate and physician workflow improves	Medxer (AI)	Rahul

Sprint 2 Story Points: 35





Sprint 2 Burndown Chart





Sprint 3 Summary:



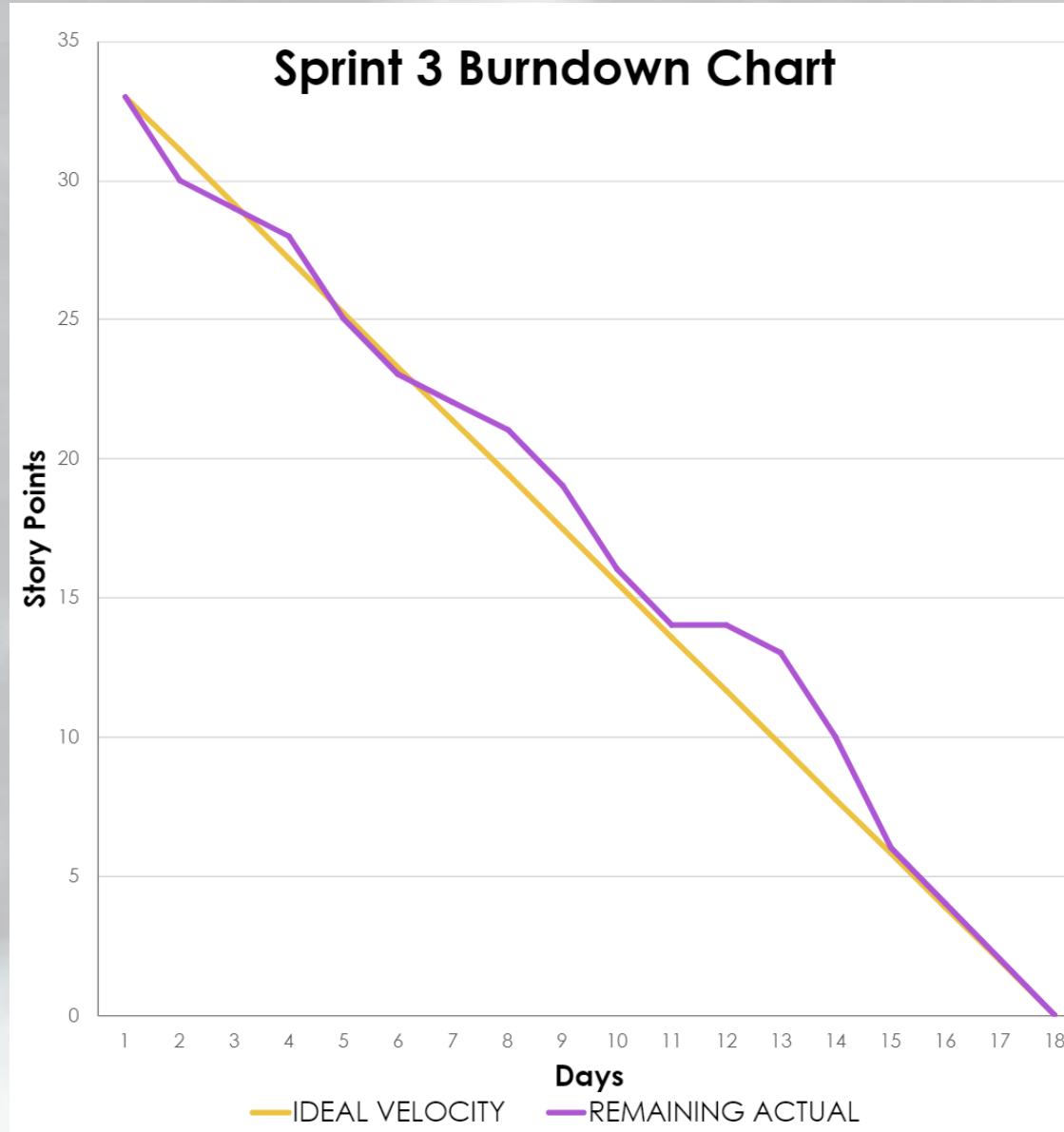
Estimation	User Story ID	As a	I want	So that	Feature	Assignee
8	6	Doctor	to add comments to patient x-ray results	patients are informed early about other information the result does not provide	Doctor Notes	Leanna / Prithvi / Ronaldo / Filippo
5	7	Patient	to view whether a doctor has reviewed my x-ray results	I can be more confident about the verified results	Reviewed Status	Prithvi
1	9	Doctor	to download patient x-ray reports	I can store patient records locally	Download Report	Chris / Prithvi
1	10	Patient	to download my x-ray reports	I can store patient records locally	Download Report	Chris / Prithvi
2	13	Patient	to quickly view my latest x-ray report	my most recent information is easily accessible	Dashboard	Ronaldo / Prithvi
8	16	Doctor	to browse a specific report and record	I can quickly locate specified information	Search	Ronaldo / Prithvi
8	17	Patient	to browse a specific report and record	I can quickly locate specified information	Search	Ronaldo / Prithvi

Sprint 3 Story Points: 33





Sprint 3 Burndown Chart





Sprint 4 Backlog:



Estimation	User Story ID	As a	I want	So that	Feature	Assignee
2	8	Patient	my x-ray results to be explained in simpler terms	I can better understand my diagnosis and health issue	Result Description	Rahul / Prithvi / Marla
5	11	Patient	to have access to all of my x-ray report history	I can track my chest health issues	Report History	Prithvi / Marla
5	12	Doctor	to have access to all patient x-ray report histories	I can track patient chest health issues	Report History	Prithvi / Marla
5	14	Patient	to be notified once there is a change to my reports (upload, review, notes, etc.)	I can be informed about any updates as soon as possible	Notification	Leanna / Filippo
5	15	Doctor	to be notified once there is a change to patient reports (upload, report, etc.)	I can be informed about any updates as soon as possible	Notification	Leanna / Filippo
3	18	Radiologist	to register and store my personal info (ID, name, D.O.B.) in my own account	I can access patient information and connect with patients and doctors privately	Registration / Signup	Ronaldo / Prithvi

Sprint 4 Story Points: 44





Sprint 4 Backlog:



Estimation	User Story ID	As a	I want	So that	Feature	Assignee
3	19	Doctor	to register and store my personal info (ID, name, D.O.B.) in my own account	I can access patient information and connect with patient and radiologists privately	Registration / Signup	Ronaldo / Prithvi
3	20	Patient	to register and store my personal info (ID, name, D.O.B.) in my own account	I can access my medical information and connect with doctors privately	Registration / Signup	Ronaldo / Prithvi
3	21	Patient	to login and logout of my own account	My medical information, records and reports are secure	Login/Logout	Prithvi / Ronaldo
3	22	Doctor	to login and logout of my own account	Patient medical information, records and reports are secure	Login/Logout	Prithvi / Ronaldo
3	23	Patient	to login using my e-mail address	I can access my medical information, records and reports	Login/Logout	Ronaldo
3	24	Doctor	to login using my medical professional ID number	I can access patient medical information, records and reports	Login/Logout	Ronaldo

Sprint 4 Story Points: 44





Sprint 4 Backlog:



Estimation	User Story ID	As a	I want	So that	Feature	Assignee
1	25	Patient	update my personal information such as my name, address, phone number etc.	the portal has up-to-date information in the event I need to be reached urgently	Profile	Anthony / Chris

Sprint 4 Story Points: 44





Test Cases

Test ID	User Story ID	Feature to Test	Test Case	Test Steps	Test Data	Expected Result	Actual Result	Pass/Fail	Comments
19	23	Login / Logout	Successfully login to the patient or doctor portal	Sign in as a Patient -> Type in e-mail and password -> Click Login	User credentials	Logging in to the patient portal	Logged in as Angela Fernandez	Pass	
20	23	Login / Logout	Incorrect e-mail address is provided	Sign in as a Patient -> Type incorrect e-mail -> Type in password	User credentials	Error Message is displayed	Invalid user/auth credentials	Pass	
21	23	Login / Logout	Incorrect password is provided	Sign in as a Patient -> Type correct e-mail -> Type incorrect password	User credentials	Error Message is displayed	Invalid user/auth credentials	Pass	
22	18, 19, 20	Registration / Signup	Successfully creating a patient account	Sign in as a Patient or Doctor -> Click on Need an Account? Click Here -> Type in your full name, e-mail, confirm e-mail, enter password -> Click Sign Up	User credentials	Successfully creates an account	Dashboard is displayed	Pass	

Pass/ Fail Ratio: 14/14 = 100%



MED-X AI

Test Cases

Test ID	User Story ID	Feature to Test	Test Case	Test Steps	Test Data	Expected Result	Actual Result	Pass/Fail	Comments
23	18, 19, 20	Registration / Signup	Duplicate e-mail address is used to create an account	Click on Patient Sign Up -> Type in full name, email, and password -> Click Sign Up	User credentials	Error Message is displayed	This email address is already in use	Pass	
24	18, 19, 20	Registration / Signup	Different email & same name and password	Click on Patient Sign Up -> Type in full name, email and password -> Click Sign Up	User credentials	Successfully creates an account	Dashboard is displayed	Pass	Despite all other user credentials being the same, a new account is created because the password is unique to that user
25	18, 19, 20	Registration / Signup	Leaving fields blank	Click on Doctor or Patient Sign Up -> Leave fields blank -> Click Sign Up	User credentials	Error Message is displayed	Please fill out this field	Pass	

Pass/ Fail Ratio: 14/14 = 100%



MED-X AI

Test Cases

Test ID	User Story ID	Feature to Test	Test Case	Test Steps	Test Data	Expected Result	Actual Result	Pass/Fail	Comments
26	18, 19, 20	Registration / Signup	Providing an invalid e-mail address	Click on Doctor or Patient Sign Up -> Type an invalid e-mail address -> Type in remaining fields -> Click Sign Up	User credentials	Error Message is displayed	Please include an '@' in the email address	Pass	As long as the user provides an @ it will be accepted. It does not verify the e-mail belongs to the user.
27	18, 19, 20	Registration / Signup	Password requirements	Click on Doctor or Patient Sign Up -> Type in full name, email, and a password not meeting requirements -> Click Sign Up	User credentials	Error Message is displayed	Password must contain at least one uppercase letter, one special character, and be at least 6 characters long.	Pass	

Pass/ Fail Ratio: 14/14 = 100%



MED-X AI

Test Cases

Test ID	User Story ID	Feature to Test	Test Case	Test Steps	Test Data	Expected Result	Actual Result	Pass/Fail	Comments
28	25	Profile	Updating User Profile	Sign in as a Patient or Doctor -> Type in user credentials -> Click Login -> Click on Profile Image -> Click on Profile Button	User Information	New Fields (date of birth, sex at birth, contact number, city, state, zip code) are populated in Firebase	User Information is updated in Firebase	Pass	
29	25	Profile	Leaving User Profile fields blank	Sign in as a Patient or Doctor -> Type in user credentials -> Click Login -> Click on Profile Image -> Click on Profile Button	User Information	Error Message is displayed	Please fill out this field	Pass	
30	15	Notification	Notification of a new report upload in dropdown	Sign in as a Doctor -> Click on bell icon	X-ray Document	A notification message with associated report ID(s) is displayed in the dropdown	Report:0000 A new report has been uploaded	Pass	

Pass/ Fail Ratio: 14/14 = 100%



MED-X AI

Test Cases

Test ID	User Story ID	Feature to Test	Test Case	Test Steps	Test Data	Expected Result	Actual Result	Pass/Fail	Comments
31	14	Notification	Notification of changes to reports in dropdown	Sign in as a Patient -> Click on bell icon	String comments	A notification message with associated report ID(s) is displayed in the dropdown	You have an update on Report: 0000	Pass	
32	8	Result Description	A friendly definition of the medical diagnosis	Sign in as a Patient or Doctor -> Click on Report -> Click on one of the Reports	X-ray Document	A user-friendly definition of the diagnosis is displayed below the medical term	The presence of denser, cloudy gray areas on the x-ray image against a normal dark-appearing lung. Gray areas indicate that something is occupying that area inside the lungs.	Pass	

Pass/ Fail Ratio: 14/14 = 100%



Sprint 4 Story Completion:

Estimation	User Story ID	As a	I want	So that	Feature	Status
2	8	Patient	my x-ray results to be explained in simpler terms	I can better understand my diagnosis and health issue	Result Description	Completed
5	11	Patient	to have access to all of my x-ray report history	I can track my chest health issues	Report History	Completed
5	12	Doctor	to have access to all patient x-ray report histories	I can track patient chest health issues	Report History	Completed
5	14	Patient	to be notified once there is a change to my reports (upload, review, notes, etc.)	I can be informed about any updates as soon as possible	Notification	Completed
5	15	Doctor	to be notified once there is a change to patient reports (upload, report, etc.)	I can be informed about any updates as soon as possible	Notification	Completed

Sprint 4 Story Points: 44



Sprint 4 Story Completion:

Estimation	User Story ID	As a	I want	So that	Feature	Status
3	18	Radiologist	to register and store my personal info (ID, name, D.O.B.) in my own account	I can access patient information and connect with patients and doctors privately	Registration / Signup	Completed
3	19	Doctor	to register and store my personal info (ID, name, D.O.B.) in my own account	I can access patient information and connect with patient and radiologists privately	Registration / Signup	Completed
3	20	Patient	to register and store my personal info (ID, name, D.O.B.) in my own account	I can access my medical information and connect with doctors privately	Registration / Signup	Completed
3	21	Patient	to login and logout of my own account	My medical information, records and reports are secure	Login/Logout	Completed
3	22	Doctor	to login and logout of my own account	Patient medical information, records and reports are secure	Login/Logout	Completed

Sprint 4 Story Points: 44



Sprint 4 Story Completion:

Estimation	User Story ID	As a	I want	So that	Feature	Status
3	23	Patient	to login using my e-mail address	I can access my medical information, records and reports	Login/Logout	Completed
3	24	Doctor	to login using my medical professional ID number	I can access patient medical information, records and reports	Login/Logout	Completed
1	25	Patient	update my personal information such as my name, address, phone number etc.	the portal has up-to-date information in the event I need to be reached urgently	Profile	Completed

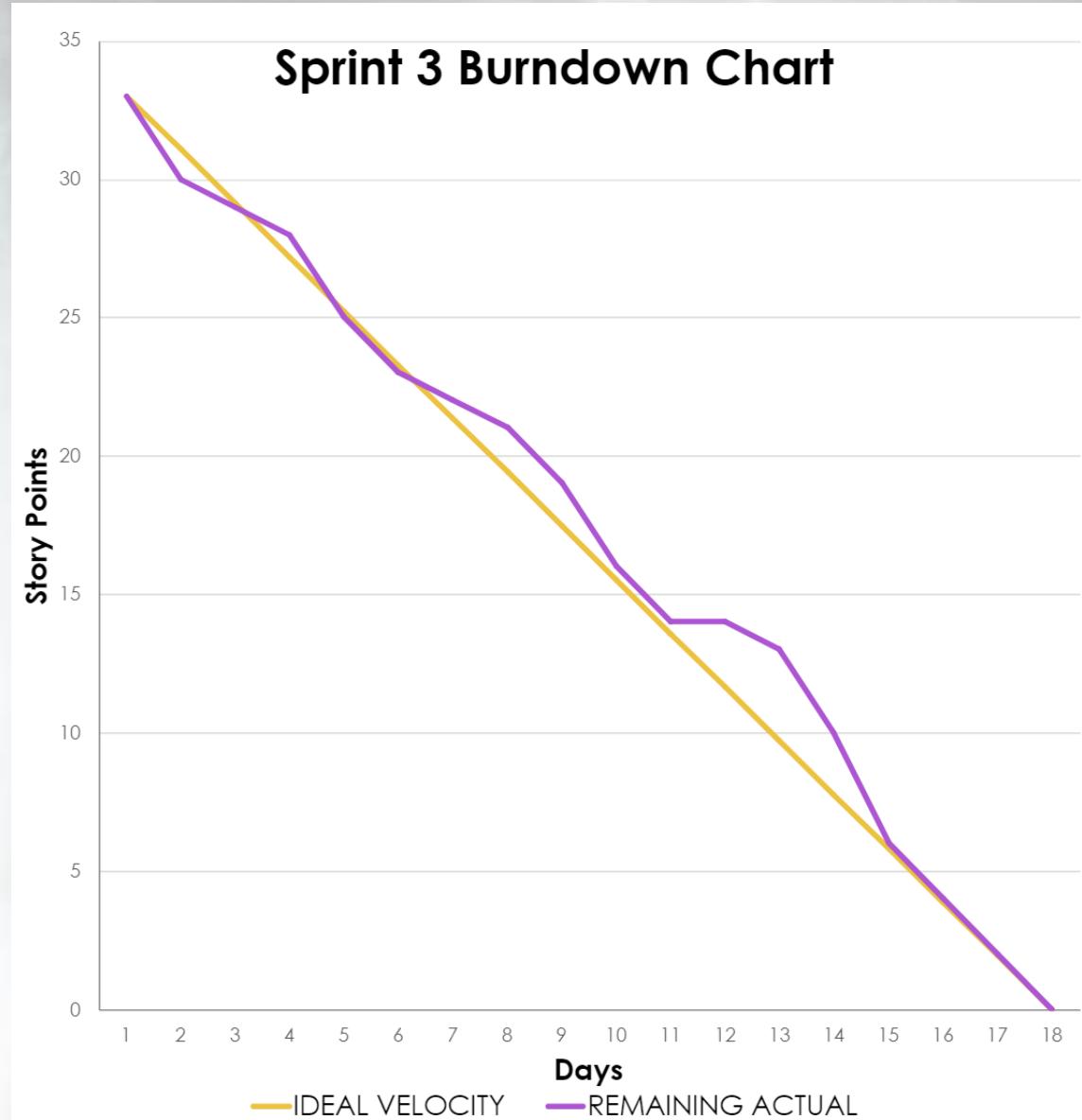
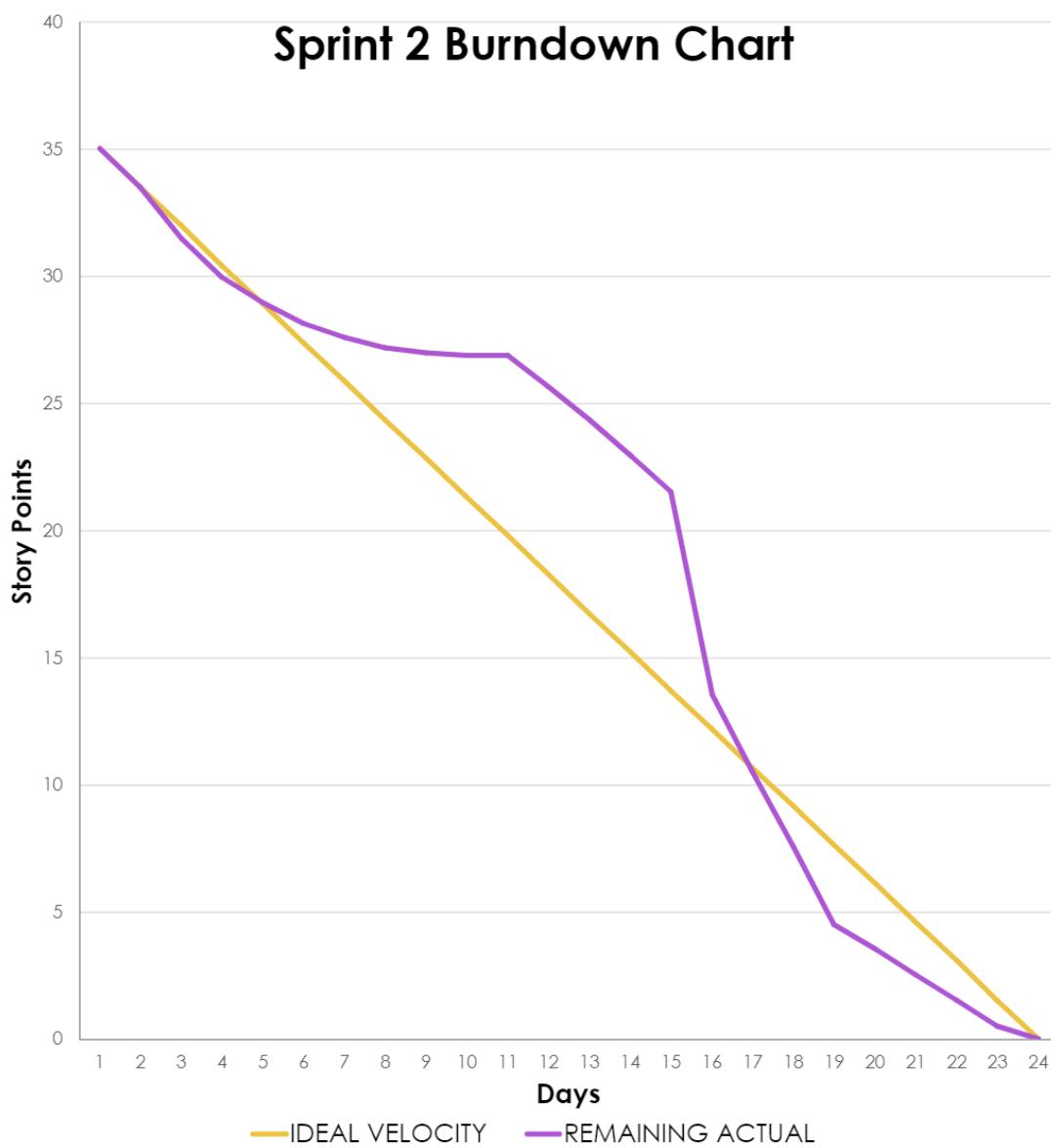
Sprint 4 Story Points: 44



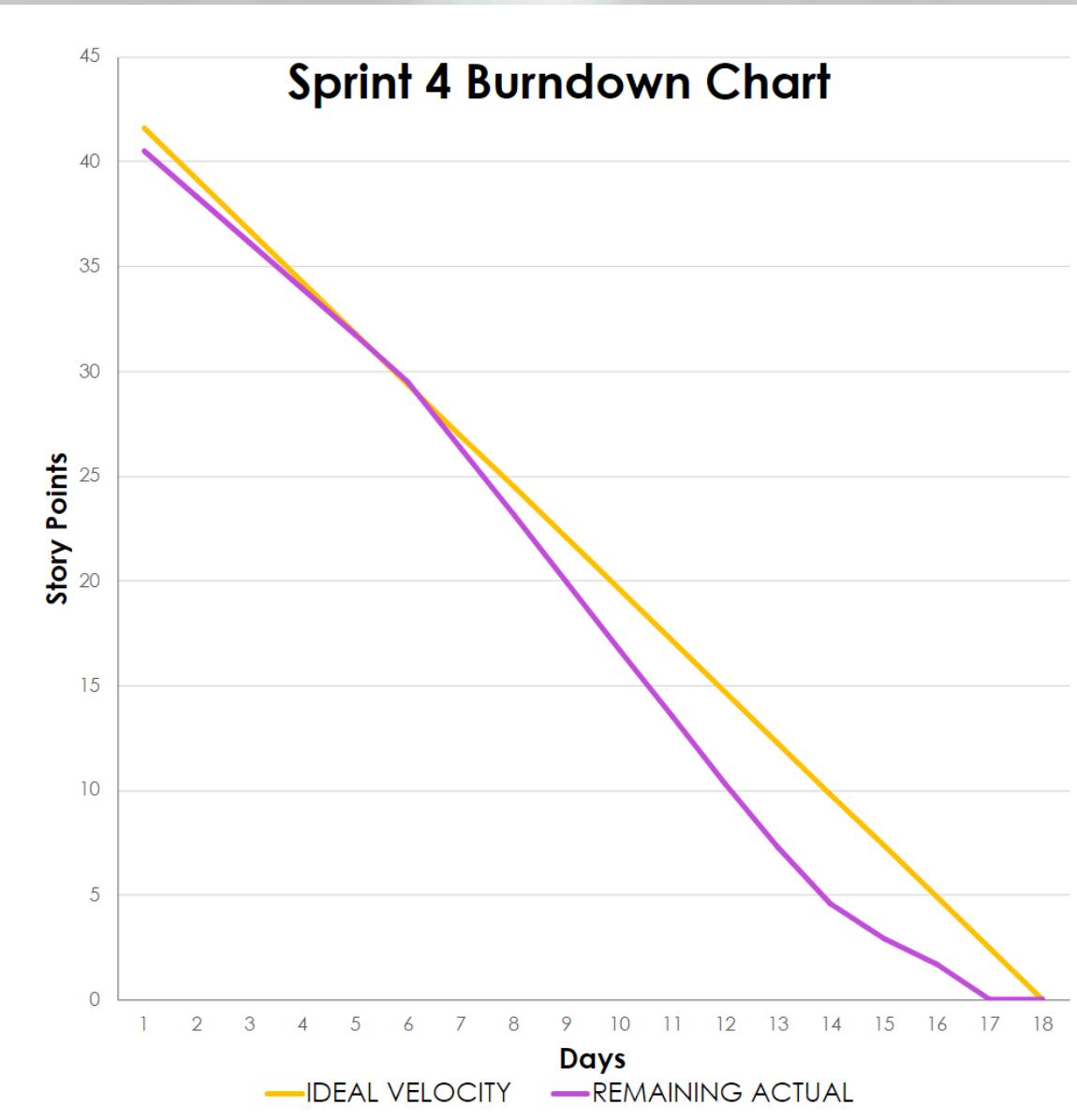
Team Velocity

*44 story
points*

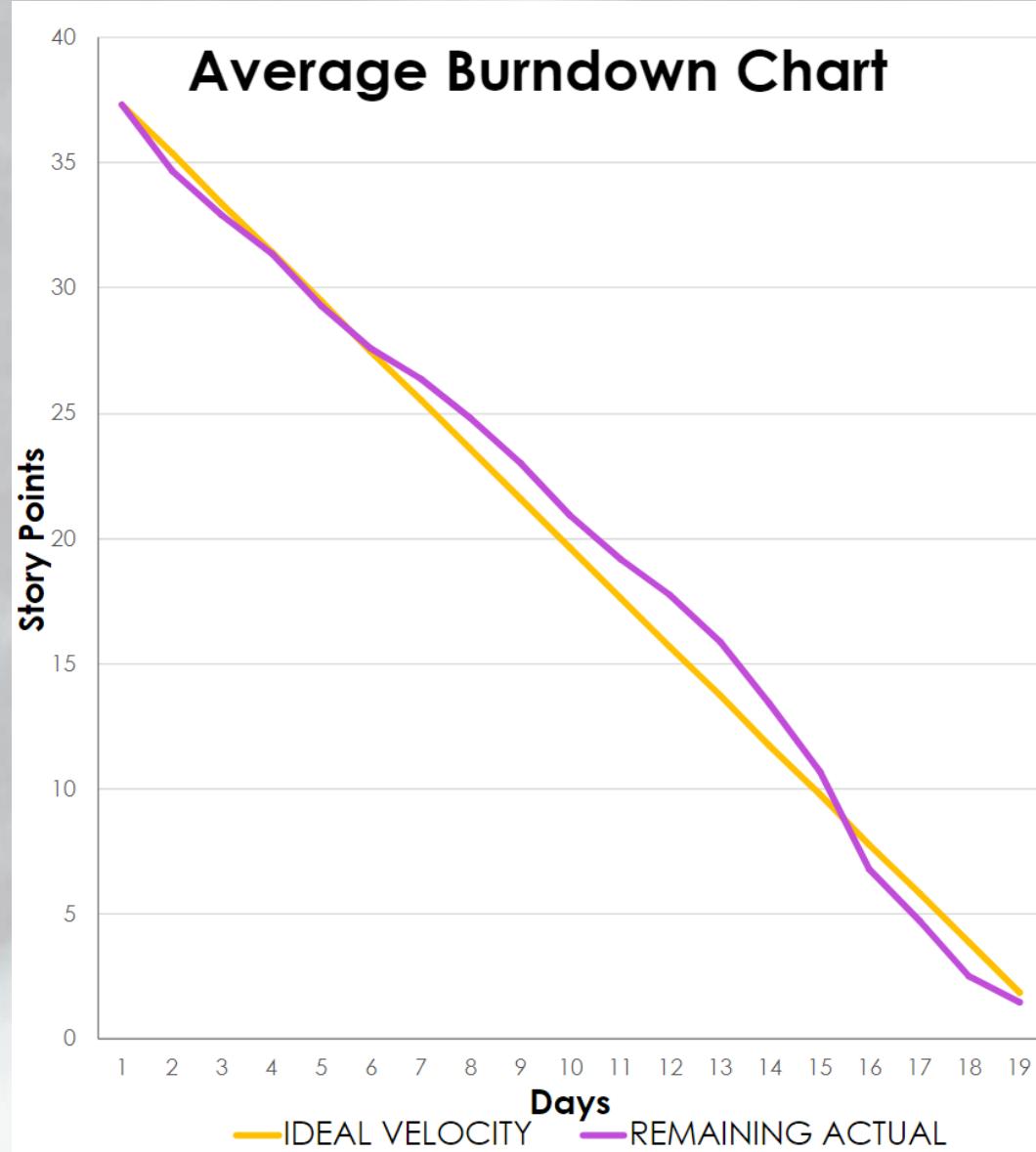
Burndown Chart



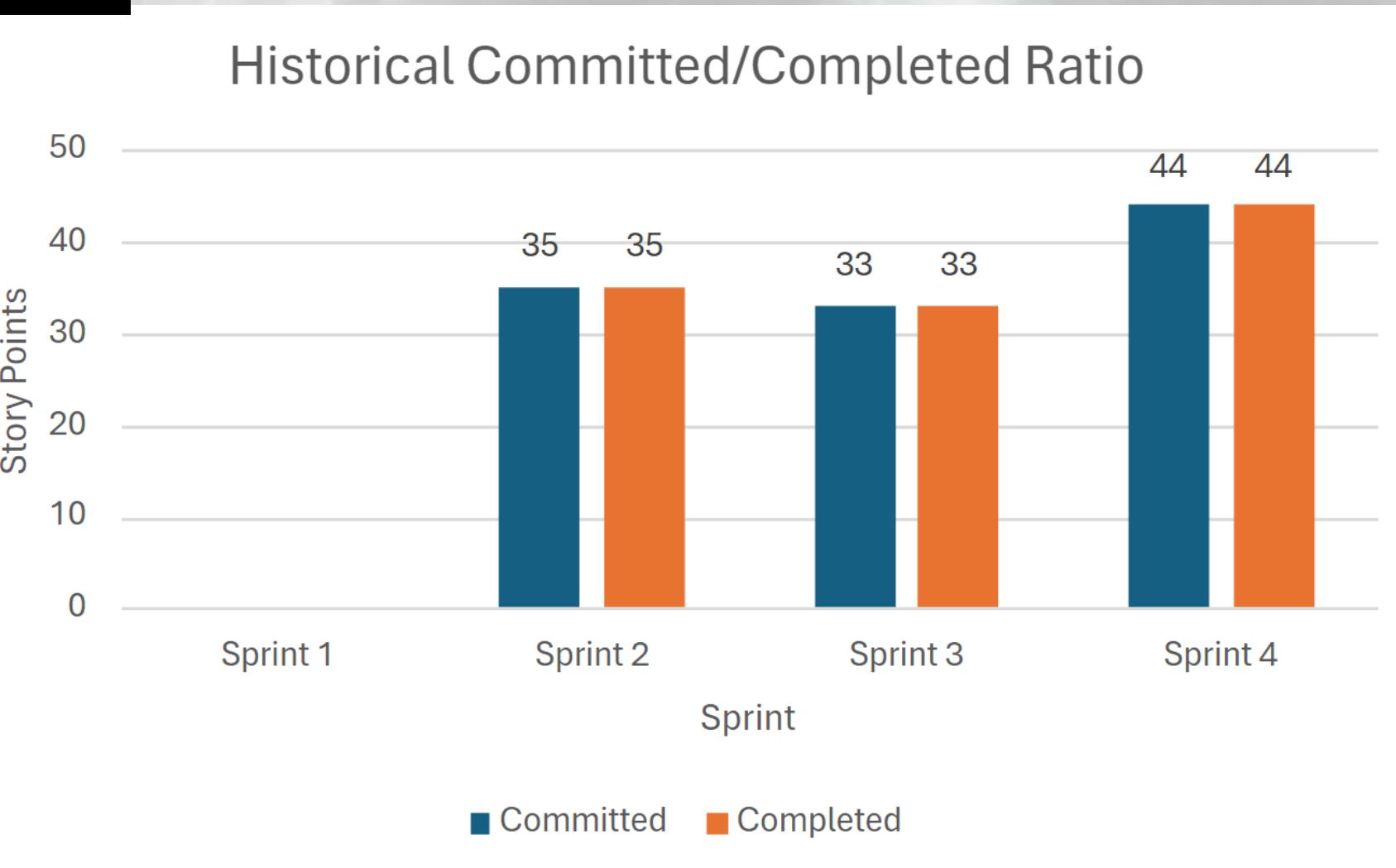
Burndown Chart



Burndown Chart



Completed / Committed Ratio



Avg
37 pts
100%

Sprint 4 Story Points: 44



Retrospective:

Retrospective 4					
What went well +		What needs to be Improved +		Action Items +	
Individual pair programming sessions with LiveShare + 4	I liked how we all managed to coordinate ourselves: taking over tickets when someone was overwhelmed + 4	Not set up meetings so late at night + 6	staying on a call for the duration of the team meeting + 4	As a team agree on the length of each team meeting + 0	Share team members schedule to let everyone know when you are available and when you are not + 0
Continuous communication and updates on WhatsApp + 4	Splitting up the work and demonstration at meetings + 3	Creating subtasks for broad user stories (helps with estimating time to complete) + 4	Specifying the length of the meeting + 3	Creating meetings for pair programming / code review and general team meetings + 0	
creating soft deadlines + 3	We went the extra mile by adding more features to the app + 3	Not merging code to other branches before asking for approvals + 3	Minimize the team length meetings + 2		
Structured Agenda with bullet points of what will be discussed during the team meeting - Usually created before the previous meeting ends + 3	Everyone had a good work ethic through all the sprints + 2	Update Jira more frequently + 2	Learn more about Tailwind CSS styling + 2		
Communication has been essential on this group + 2	We were always thinking ahead about what to do for the next steps + 2	refer documentation for the technologies we are working on + 2	Spend more time looking at all the features Jira has for product management stuff + 1		
team's flexibility and collaboration + 1	We had completed all the sprint 3 story points + 1	Set aside time for code review + 1	Looking back at the Figma Design more often + 1		
Sprint Planning more thoroughly than the previous sprints + 1	Everyone did an excellent job on their tasks + 1	improve design consistency by looking at figma design + 1	Have a set schedule + 0		



Retrospective:

What Went Well

- Pair programming sessions with LiveShare on VSCode
- Coordinated ourselves and helped someone when they were overwhelmed
- Continuous communication and updates on WhatsApp
- Creating soft deadlines

What needs to be Improved

- Avoid scheduling meetings late at night
- Staying on a call for the duration of the meeting
- Create subtasks for broad user stories
- Specify the length of the meeting / Minimize length of the meeting

Action Items

- As a team agree on the length of each meeting
- Share team members schedule to let everyone know when you are available and when you are not
- Create meetings for pair programming / code review and a separate general team meetings



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Code Snippet:

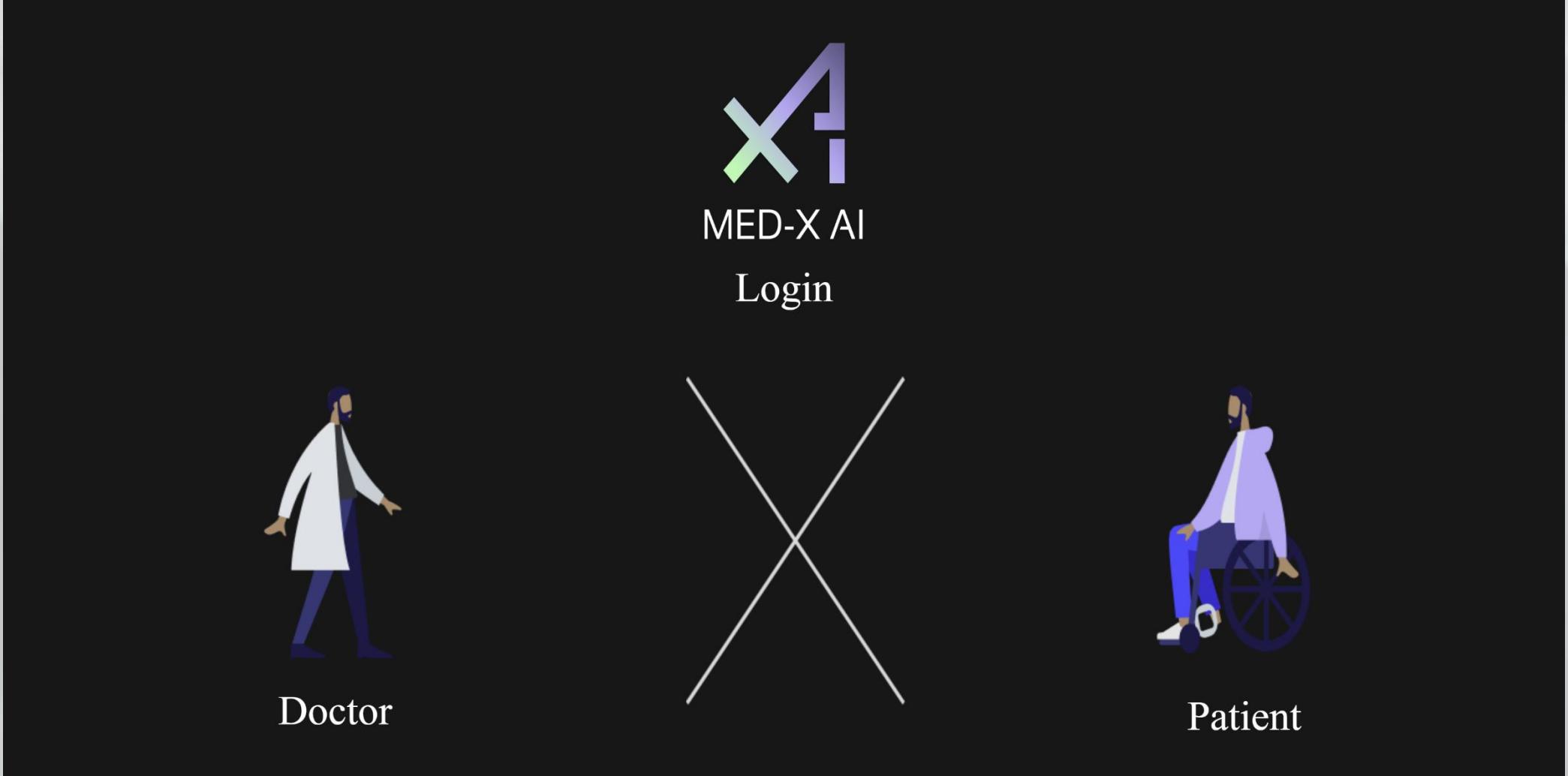
```
medexer.js ×

2024S-Med-X > Project > my-react-app > src > pages > medexer.js > Medexer > handlePredict

10  const Medexer = () => {
11    const uploadImage = () => {
12      .catch(error => {
13        ...
14      });
15    };
16
17    const handlePredict = async ( imageURL ) => {
18      try {
19        const response = await fetch(`http://localhost:5001/predict?image_url=${encodeURIComponent(imageURL)}`);
20
21        if (!response.ok) {
22          throw new Error('Failed to fetch');
23        }
24
25        const data = await response.json();
26
27        console.log('Prediction:', data.prediction.name);
28        console.log('Description:', data.prediction.description);
29
30        setFinding(data.prediction.name);
31        setDescription(data.prediction.description); // Set description in state
32        history("/report", { state: { result: data.prediction.name, img: imageURL, description: data.prediction.description } });
33      } catch (error) {
34        setIsLoading(false); // Set loading to false in case of error
35        console.error('Error occurred while fetching data:', error);
36      }
37    };
38
39    return (
40      ...
41    );
42  };
43
44  return (
45    ...
46  );
47
```



Application Screenshots:

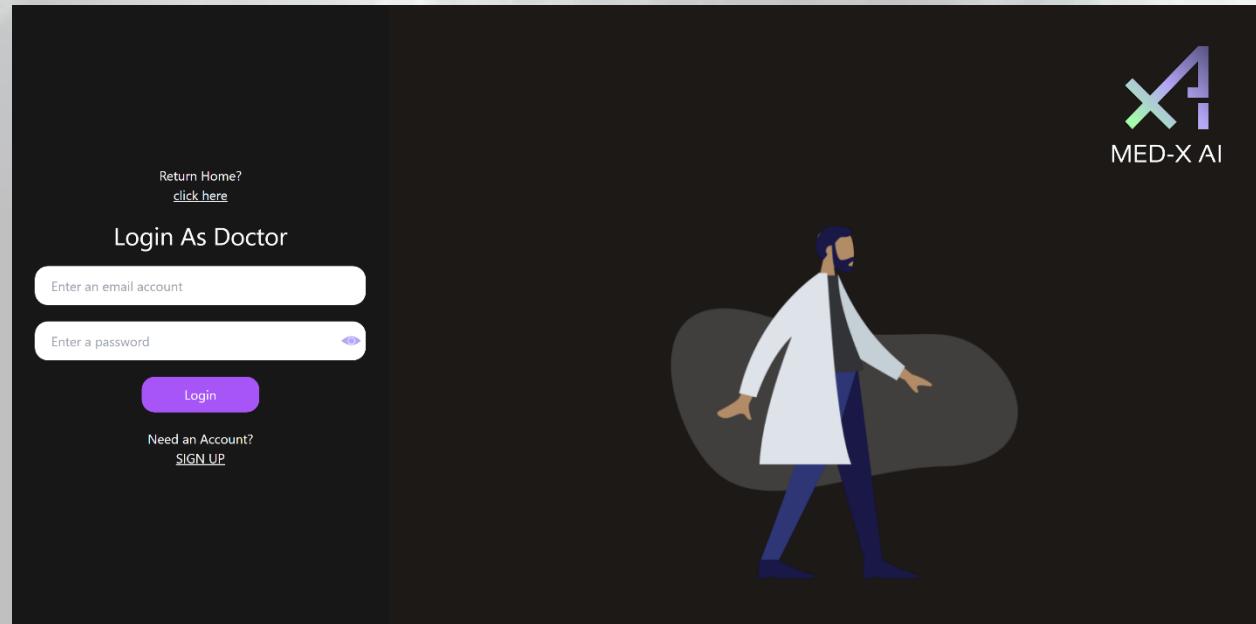




Application Screenshots:

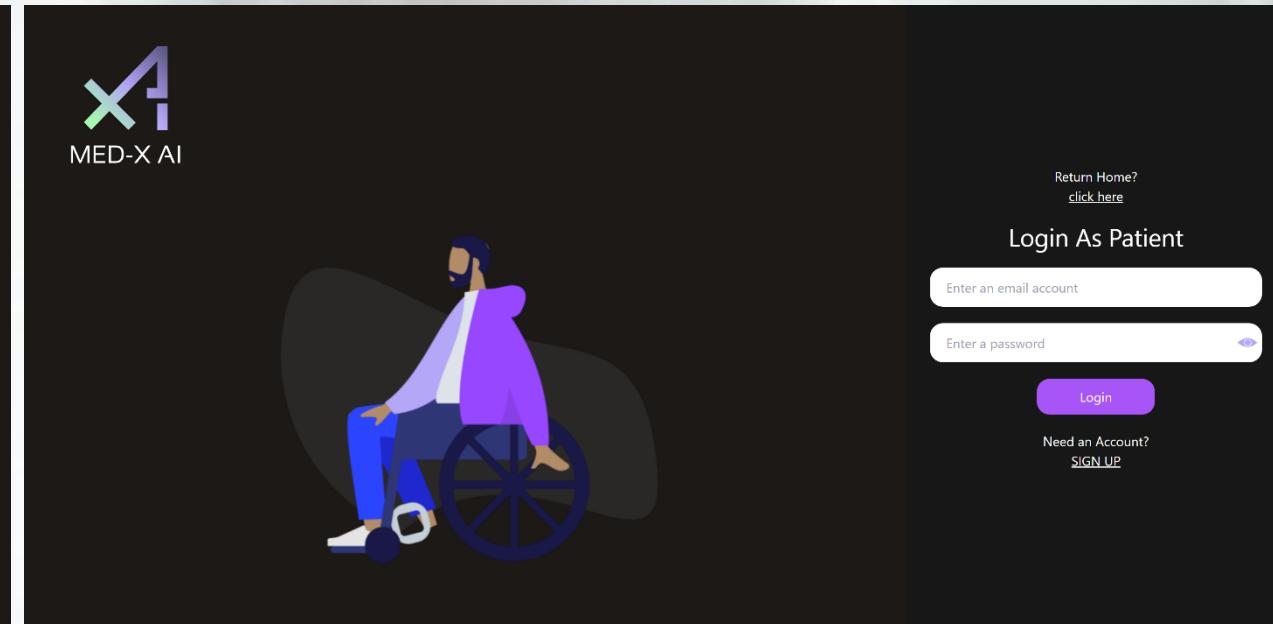
Login Portals

Doctor



A screenshot of the MED-X AI Doctor login portal. The background is dark gray. At the top left is a "Return Home?" link with a "click here" button. Below it is a "Login As Doctor" section with fields for "Enter an email account" and "Enter a password", both with "click here" buttons. A "Login" button is at the bottom. At the bottom left is a "Need an Account?" link with a "SIGN UP" button. In the center is a white illustration of a doctor in a white coat walking towards the right. The MED-X AI logo is in the top right corner.

Patient



A screenshot of the MED-X AI Patient login portal. The background is dark gray. At the top right is a "Return Home?" link with a "click here" button. Below it is a "Login As Patient" section with fields for "Enter an email account" and "Enter a password", both with "click here" buttons. A "Login" button is at the bottom. At the bottom left is a "Need an Account?" link with a "SIGN UP" button. In the center is a white illustration of a patient in a purple hoodie sitting in a wheelchair. The MED-X AI logo is in the top left corner.



Application Screenshots:

Registration Pages

Doctor

Return Home?
[click here](#)

Sign Up as a Doctor

Enter your Full Name

Email

Confirm email

Enter a password

Sign Up

Already a user?
[LOGIN](#)



MED-X AI

Patient

Return Home?
[click here](#)

Sign Up As a Patient

Enter your Full Name

Enter an email

Confirm email

Enter a password

Sign Up

Already a user?
[LOGIN](#)



MED-X AI



Application Screenshots:

Doctor Dashboard

Search your report id, medical term, date or status

Report #00020 5/4/2024, 4:15:19 PM

Atelectasis
The complete or partial collapse of a lung. It is caused by a blockage of the air passages or by compression of the lung.

Doctors Message:
Please set up an appointment ASAP

Reviewed

Dashboard

MED-X AI

Dashboard

Medexer

Report

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Search your report id, medical term, date or status

Report #00020 5/4/2024, 4:15:19 PM

Atelectasis
The complete or partial collapse of a lung. It is caused by a blockage of the air passages or by compression of the lung.

Doctors Message:
Please set up an appointment ASAP

Reviewed

Dashboard

MED-X AI

Patricia Norman
907-865-0013

Logout

Profile

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Application Screenshots:

Patient Dashboard

Search your report id, medical term, date or status

Dashboard

Report #00020 5/4/2024, 4:15:19 PM

Atelectasis
The complete or partial collapse of a lung. It is caused by a blockage of the air passages or by compression of the lung.

Doctors Message:
Please set up an appointment ASAP

Reviewed

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Search your report id, medical term, date or status

Dashboard

Report #00020 5/4/2024, 4:15:19 PM

Atelectasis
The complete or partial collapse of a lung. It is caused by a blockage of the air passages or by compression of the lung.

Doctors Message:
Please set up an appointment ASAP

Reviewed

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Application Screenshots:

Medexer (Upload Chest X-ray)

The image displays two side-by-side screenshots of the Medexer application's "Upload Chest X-ray" feature. Both screenshots show a dark-themed interface with a navigation bar at the top containing a search bar, a notification bell icon, and a user profile picture. The left screenshot shows a large, semi-transparent cloud icon with an upward arrow, indicating where to drop or upload a file. Below it is a "Drag & Drop to Upload Chest X-ray" placeholder and a "Browse" button. A note at the bottom specifies supported file formats: ".png, .jpeg". The right screenshot shows the same interface but includes a red error message box stating "Unsupported file format. Please upload a .png or jpeg file." Below this message is the same upload area and file format note. Both screenshots include a copyright notice at the bottom: "© 2024 MED-X AI. All rights reserved."



Application Screenshots:

Search your report id, medical term, date or status

MED-X AI

Dashboard

Medexer

Report



Press Submit and Wait...!

Re-upload Submit

00001322_001.png
0.39 MB

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This screenshot shows the upload interface of the MED-X AI application. A lateral chest X-ray image is displayed, with the text "Press Submit and Wait...!" above it. Below the image are two buttons: "Re-upload" and "Submit". The file name "00001322_001.png" and size "0.39 MB" are shown at the bottom. The top navigation bar includes a search bar, a notification bell, and a user profile icon.

Search your report id, medical term, date or status

MED-X AI

Dashboard

Medexer

Report

Report

Results

5/5/2024, 10:28:44 PM



Lung Lesion

An abnormal growth (nodule of ≤ 3 cm, mass of > 3 cm) that forms in a lung. Can be associated with infection, benign tumors, or malignancy.

Submit Report

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This screenshot shows the results page of the MED-X AI application. It displays a lateral chest X-ray image with a visible lung lesion. The text "Lung Lesion" is prominently displayed, along with a detailed description: "An abnormal growth (nodule of ≤ 3 cm, mass of > 3 cm) that forms in a lung. Can be associated with infection, benign tumors, or malignancy." A "Submit Report" button is located at the bottom right. The top navigation bar and sidebar are identical to the upload screen.



Application Screenshots:

Report

Search your report id, medical term, date or status

Report ID: 00020

5/5/2024, 10:31:14 PM

Results

Lung Lesion

An abnormal growth (nodule of ≤ 3 cm, mass of > 3 cm) that forms in a lung. Can be associated with infection, benign tumors, or malignancy.

Submit Report

Report is Submitted

Report ID: 00020

Reviewing

OK

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Dashboard

Search your report id, medical term, date or status

Report #00020

5/5/2024, 10:28:44 PM

Lung Lesion

An abnormal growth (nodule of ≤ 3 cm, mass of > 3 cm) that forms in a lung. Can be associated with infection, benign tumors, or malignancy.

Doctors Message:

The report is yet to be reviewed

Reviewing

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Application Screenshots:

Report Gallery

Search your report id, medical term, date or status

Report Status	Report ID	Finding
Reviewing	#00008	Lung Opacity
Reviewing	#00009	No Finding
Reviewing	#00011	Lung Opacity
Reviewing	#00012	Lung Opacity
Reviewed	#00013	Atelectasis
Reviewing	#00014	No Finding
Reviewed	#00019	Pleural Effusion

Previous 2 / 3 Next

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Application Screenshots:

Search Bar

The screenshot shows the MED-X AI application interface with a dark theme. At the top, there is a header bar with a date field containing "4/8/2024", a search icon, a bell icon, and a user profile picture. Below the header is a sidebar with navigation links: "Dashboard", "Medexer", and "Report". The main content area displays a list of five medical findings, each with a unique ID, description, review status, and timestamp. The fifth finding is currently being reviewed. Below the list is a row of five small cards, each showing a snippet of a chest X-ray image. At the bottom, there are navigation buttons for "Previous", "2 / 3", and "Next".

ID	Finding	Status	Date	Image
00001	No Finding	Reviewed	4/8/2024	
00002	Lung Lesion	Reviewed	4/8/2024	
00003	Lung Opacity	Reviewed	4/8/2024	
00004	Atelectasis	Reviewed	4/8/2024	
00005	Pleural Effusion	Reviewing	4/8/2024	

Below the findings, there is a row of five cards, each showing a snippet of a chest X-ray image and a corresponding finding label: "Lung Opacity", "No Finding", "Lung Opacity", "Lung Opacity", and "Atelectasis". At the bottom center, there are navigation buttons: "Previous", "2 / 3", and "Next".

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Application Screenshots:

Report

4/8/2024

Results

Report ID: #00004 4/8/2024, 9:38:31 PM

Atelectasis
Partial or complete collapse of the lung

Report Status: Reviewed

Doctor's Message:
Please schedule an appointment ASAP

Print Report

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Application Screenshots:

PDF Report
Printable Report

5/5/24, 10:39 PM Printable Report

 MED-X AI

Report 4/8/2024, 9:38:31 PM

ID: 00004
Name : Angela Fernandez

Atelectasis
Partial or complete collapse of the lung


Status:Reviewed

Hospital Name hospital@gmail.com
999-1232-31232

Doctors Comment:
Please schedule an appointment ASAP

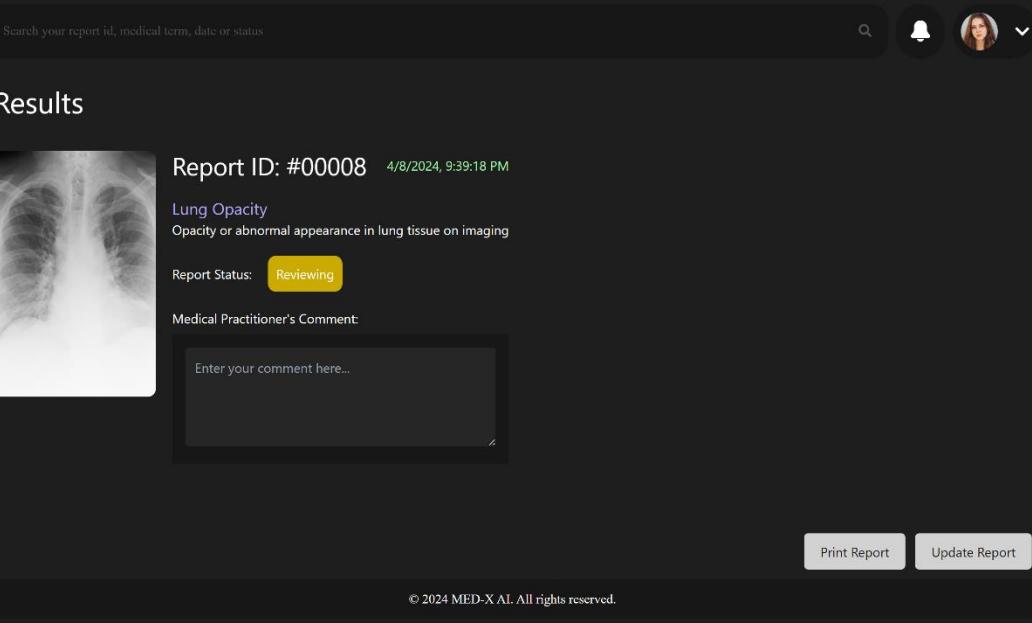
Copyright @ medxai



Application Screenshots:

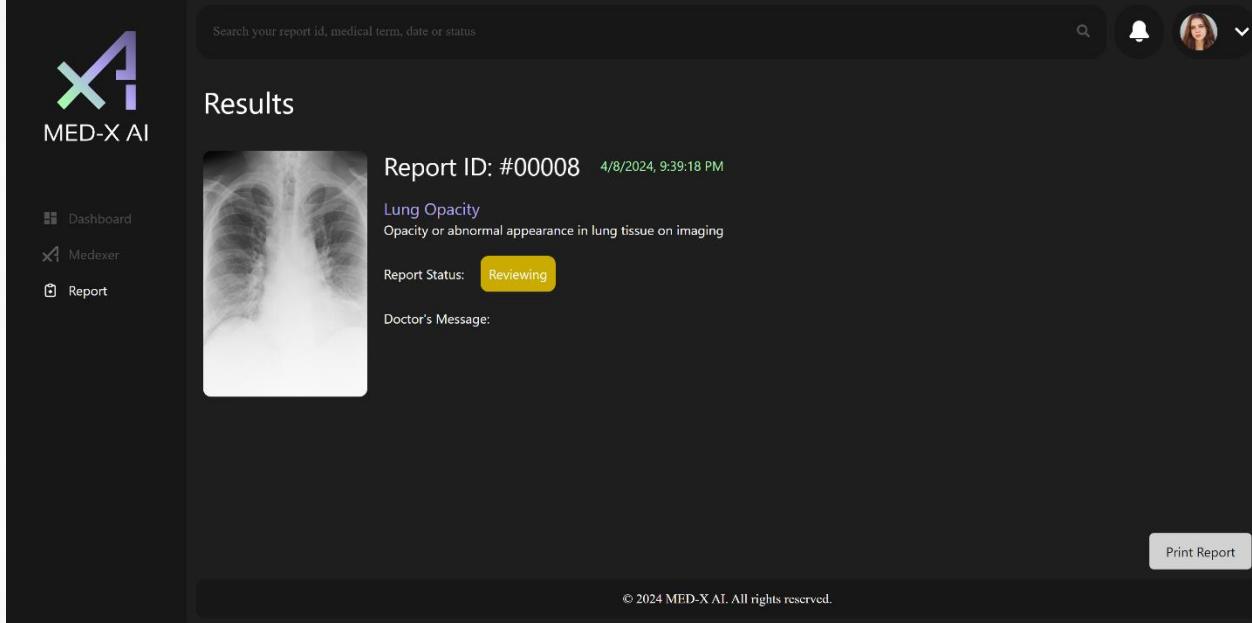
Report

Doctor



The screenshot shows the MED-X AI application interface for a doctor. The top navigation bar includes a search bar, a notification bell, and a user profile. The main content area is titled 'Results' and displays a report for 'Report ID: #00008' from 4/8/2024, 9:39:18 PM. The report details 'Lung Opacity' as 'Opacity or abnormal appearance in lung tissue on imaging'. The 'Report Status' is 'Reviewing'. A 'Medical Practitioner's Comment' section contains a placeholder 'Enter your comment here...'. At the bottom are 'Print Report' and 'Update Report' buttons, and a copyright notice at the very bottom.

Patient



The screenshot shows the MED-X AI application interface for a patient. The layout is identical to the doctor's view, with a dark theme. It displays the same report details: 'Report ID: #00008' from 4/8/2024, 9:39:18 PM, 'Lung Opacity' as 'Opacity or abnormal appearance in lung tissue on imaging', and 'Report Status' as 'Reviewing'. A 'Doctor's Message' section is present but empty. At the bottom are 'Print Report' and 'Update Report' buttons, and a copyright notice at the very bottom.



Application Screenshots:

Doctor Comment

Search your report id, medical term, date or status

Results

Report ID: #00008 4/8/2024, 9:39:18 PM

Lung Opacity
Opacity or abnormal appearance in lung tissue on imaging

Report Status: Reviewing

Medical Practitioner's Comment:
Please schedule an appointment at your earliest convenience.

Print Report Update Report

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localhost:3000/reportdetails/00008

localhost:3000 says
comment submitted

OK

Results

Report ID: #00008 4/8/2024, 9:39:18 PM

Lung Opacity
Opacity or abnormal appearance in lung tissue on imaging

Report Status: Reviewing

Medical Practitioner's Comment:
Please schedule an appointment at your earliest convenience.

Print Report Update Report

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Application Screenshots:

Doctor Notification

Search your report id, medical term, date or status

Dashboard

Report #00020 5/4/2024, 4:15:19 PM

Atelectasis
The complete or partial collapse of a lung. It is caused by a blockage of the air passages or by compression of the lung.

Doctors Message:
Please set up an appointment ASAP

Reviewed

MED-X AI

Patricia Norman
907-865-0013

Logout Profile

Dashboard Medexer Report

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Search your report id, medical term, date or status

Dashboard

Report #00020 5/4/2024, 4:15:19 PM

Atelectasis
The complete or partial collapse of a lung. It is caused by a blockage of the air passages or by compression of the lung.

Doctors Message:
Please set up an appointment ASAP

Reviewed

Report Date: 5/5/2024, Report Reviewed
ID: 00008 10:11:10 Status: PM
Doctor's comment:
Please schedule an appointment at your earliest convenience.

MED-X AI

Patricia Norman
907-865-0013

Logout Profile

Dashboard Medexer Report

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Application Screenshots:

Patient Notification

Dashboard

Report #00020 5/4/2024, 4:15:19 PM

Atelectasis
The complete or partial collapse of a lung. It is caused by a blockage of the air passages or by compression of the lung.

Doctors Message:
Please set up an appointment ASAP

Reviewed

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Dashboard

Report #00020 5/4/2024, 4:15:19 PM

Report Date: 5/5/2024, Report Reviewed
ID: 10:11:11 Status:
00008 PM
Doctor's comment:
Please schedule an appointment at your earliest convenience.

Atelectasis
The complete or partial collapse of a lung. It is caused by a blockage of the air passages or by compression of the lung.

Doctors Message:
Please set up an appointment ASAP

Reviewed

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Application Screenshots:

Updating Profile Information

Doctor



Patricia Norman
Doctor

Email: patricia.normann@presbyterian.org

Full Name: Patricia Norman

Date of Birth: 05/08/2024

Sex: Female

Contact Number: 907-865-0013

Submit

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Patient



Angela Fernandez
patient

Email: afernandez@gmail.com

Full Name: Angela Fernandez

Date of Birth: 12/22/1994

Sex: Female

Contact Number: 212-689-3925

Submit

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Firebase API:

The image shows a code editor interface with two tabs open, both titled "medexer.js".

Top Tab (Line Numbers 3-18):

```
3 import storage from "../firebase.js";
4 import { ref, getDownloadURL, uploadBytes } from "firebase/storage";
5 import { v4 } from "uuid";
6 import { useNavigate } from "react-router-dom";
7 import Loading from './loading.js';
8
9
10 const Medexer = () => {
11   const [fileData, setFileData] = useState({ previewFile: null, errorMessage: '' });
12   const fileInputRef = useRef(null);
13   const [isDraggingOver, setIsDraggingOver] = useState(false);
14   const [uploadedImage, setUploadedImage] = useState(null)
15
16   const [finding, setFinding] = useState('');
17   const [isLoading, setIsLoading] = useState(false); //state for loading status
18 }
```

Bottom Tab (Line Numbers 10-82):

```
10 const Medexer = () => {
11
12   const uploadImage = () => { //upload function that talks to storage service
13     if (uploadedImage == null) return; //if nothing has been uploaded, continue
14     setIsLoading(true); //setting loading to true before uploaded image
15     const imageRef = ref(storage, `images/${uploadedImage.name + v4()}`);
16     uploadBytes(imageRef, uploadedImage).then((snapshot) => { //translate image into bytes and send alert
17       getDownloadURL(snapshot.ref).then((url) => {
18         handlePredict(url)
19       })
20       alert("image uploaded");
21       setIsLoading(false); //set loading to false after uploaded image
22     });
23   };
24 }
```



MED-X AI

Flask/Cors:

```
server.py  x
flask-server > server.py
12     from flask import Flask, request, jsonify
13     import requests
14     from flask_cors import CORS
15     from tensorflow.keras.models import load_model
16     from predictions import get_finding
17
18     # Load the model
19     model = load_model('dicom_images.keras')
20
21     app = Flask(__name__)
22     CORS(app)
23
24     @app.route('/predict', methods=['GET', 'OPTIONS'])
25
26     def predict():
27         try:
28             # Get image URL from request arguments
29             image_url = request.args.get('image_url')
30
31             # Download image
32             print("Image URL:", image_url)
33             response = requests.get(image_url, stream=True)
34
```

```
const handlePredict = async (imageURL) => {
    try {
        const response = await fetch(`http://localhost:5001/predict?image_url=${encodeURIComponent(imageURL)}`);
        if (!response.ok) {
            throw new Error('Failed to fetch');
        }

        const data = await response.json();
        setFinding(data.prediction);
        history('/report', { state: { result: data.prediction, img: imageURL } });
        // setError('');
    } catch (error) {
        // setError('Error occurred while fetching data');
        console.error(error);
    }
};
```



Docker for CI/CD:

SPRINT 2

quizzical_perlman

myflaskapp

7b6ac82374be

5001:5000

Logs Inspect Bind mounts Exec Files Stats

```
1/1 [=====] - 0s 41ms/step
2024-03-12 15:43:05 172.17.0.1 - - [12/Mar/2024 19:43:05] "GET /predict?image_url=https://2_002.pngca4211bf-4875-476e-a564-0a0364e44b01?alt%3Dmedia%26token%3Dec130f69-596c-4c70-af7
2024-03-12 15:43:14 Image URL: https://firebasestorage.googleapis.com/v0/b/med-x-5f2b4.appspotToken=281e9d4b-01b9-4dd9-a8bf-23df65ed693f
2024-03-12 15:43:14 Image downloaded successfully!
1/1 [=====] - 0s 53ms/step
2024-03-12 15:43:14 172.17.0.1 - - [12/Mar/2024 19:43:14] "GET /predict?image_url=https://2_003.png4f315a6a-adce-4e37-a130-2fc9a7ff356?alt%3Dmedia%26token%3D281e9d4b-01b9-4dd9-a8t
2024-03-12 15:43:23 Image URL: https://firebasestorage.googleapis.com/v0/b/med-x-5f2b4.appspotToken=079db464-f343-40c2-a5fb-3c6763daec2d
2024-03-12 15:43:23 Image downloaded successfully!
1/1 [=====] - 0s 125ms/step
2024-03-12 15:43:23 172.17.0.1 - - [12/Mar/2024 19:43:23] "GET /predict?image_url=https://2_004.pngff109c6b-bc30-40e7-bc41-e21dfe125c31?alt%3Dmedia%26token%3D079db464-f343-40c2-a51
2024-03-12 15:43:34 Image URL: https://firebasestorage.googleapis.com/v0/b/med-x-5f2b4.appspotToken=d7377887-e7af-4721-9031-28dfefab6956
2024-03-12 15:43:34 Image downloaded successfully!
1/1 [=====] - 0s 51ms/step
2024-03-12 15:43:34 172.17.0.1 - - [12/Mar/2024 19:43:34] "GET /predict?image_url=https://3_000.pngfa990c97-158c-4dad-97ba-0248bd0ac038?alt%3Dmedia%26token%3Dd7377887-e7af-4721-903
2024-03-12 15:43:42 Image URL: https://firebasestorage.googleapis.com/v0/b/med-x-5f2b4.appspotToken=a26551bf-9ec9-4040-9436-f474b86982ba
2024-03-12 15:43:42 Image downloaded successfully!
1/1 [=====] - 0s 45ms/step
2024-03-12 15:43:42 172.17.0.1 - - [12/Mar/2024 19:43:42] "GET /predict?image_url=https://3_001.png0e2b00f9-eb58-43ea-a8ca-730792fc650a?alt%3Dmedia%26token%3Da26551bf-9ec9-4040-943
2024-03-12 15:43:54 Image URL: https://firebasestorage.googleapis.com/v0/b/med-x-5f2b4.appspotToken=28e84946-9ded-4c75-a8e7-754a0285c5ae
2024-03-12 15:43:54 Image downloaded successfully!
1/1 [=====] - 0s 41ms/step
```

SPRINT 3

wizardly_darwin

flask-app

6223a9eda912

5001:5000

Logs Inspect Bind mounts Exec Files Stats

```
fa1291-e287-4890-8d8b-8cb41130344a?alt=media&token=6b33d5e8-0653-4782-91e5-
2024-04-08 19:27:13 Image downloaded successfully!
1/1 [=====] - 0s 178ms/step
2024-04-08 19:27:13 172.17.0.1 - - [08/Apr/2024 23:27:13] "GET /predict?image_url=https://med-x-5f2b4.appspot.com/o/images%252F00001323_000.png
2024-04-08 19:27:36 Image URL: https://firebasestorage.googleapis.com/v0/b/cee0a6-ae7a-461e-8e3a-178e5fa53f10?alt=media&token=dcb90437-fc23-4715-b337-
2024-04-08 19:27:36 Image downloaded successfully!
1/1 [=====] - 0s 135ms/step
2024-04-08 19:27:36 172.17.0.1 - - [08/Apr/2024 23:27:36] "GET /predict?image_url=https://med-x-5f2b4.appspot.com/o/images%252F00001323_000.png
2024-04-08 19:28:00 Image URL: https://firebasestorage.googleapis.com/v0/b/06504a-3440-41e6-a9e4-396361841849?alt=media&token=c7f575d4-f174-4b60-9b53-
2024-04-08 19:28:00 Image downloaded successfully!
1/1 [=====] - 0s 159ms/step
2024-04-08 19:28:00 172.17.0.1 - - [08/Apr/2024 23:28:00] "GET /predict?image_url=https://med-x-5f2b4.appspot.com/o/images%252F00001322_004.png
2024-04-08 19:28:28 Image URL: https://firebasestorage.googleapis.com/v0/b/773ea0-51c5-4e85-8aaaf-1bd5afd9827c?alt=media&token=f71a0068-c6fd-4422-9806-
2024-04-08 19:28:28 Image downloaded successfully!
1/1 [=====] - 0s 176ms/step
2024-04-08 19:28:28 172.17.0.1 - - [08/Apr/2024 23:28:28] "GET /predict?image_url=https://med-x-5f2b4.appspot.com/o/images%252F00001322_000.png
2024-04-08 19:28:28 78773ea0-51c5-4e85-8aaaf-9806-856ed4ef9cc7 HTTP/1.1" 200 -
```



Docker:

Containers

[Give feedback](#)

Container CPU usage ⓘ
0.37% / 1600% (16 CPUs available)

Container memory usage ⓘ
1.43GB / 7.44GB

Show charts

Search

☰Only show running containers

<input type="checkbox"/>	Name	Image	Status	CPU (%)	Port(s)	Last started	Actions
<input type="checkbox"/>	 serene_jone 10db8bc84cc`	react-app	Running	0.08%	3000:3000	1 second ago	... ⋮ trash
<input type="checkbox"/>	 focused_bra df7af3266e29	flask-app	Running	0.29%	5001:5000	1 second ago	... ⋮ trash



Live Application Demo:



A large, abstract background image occupies the central portion of the slide. It features a dark blue to light blue gradient with numerous small, glowing white and blue dots scattered across it, resembling a digital or futuristic environment. In the lower right quadrant, the text 'SPRINT 4' and 'MVP' is displayed in a white, sans-serif font.

SPRINT 4
MVP



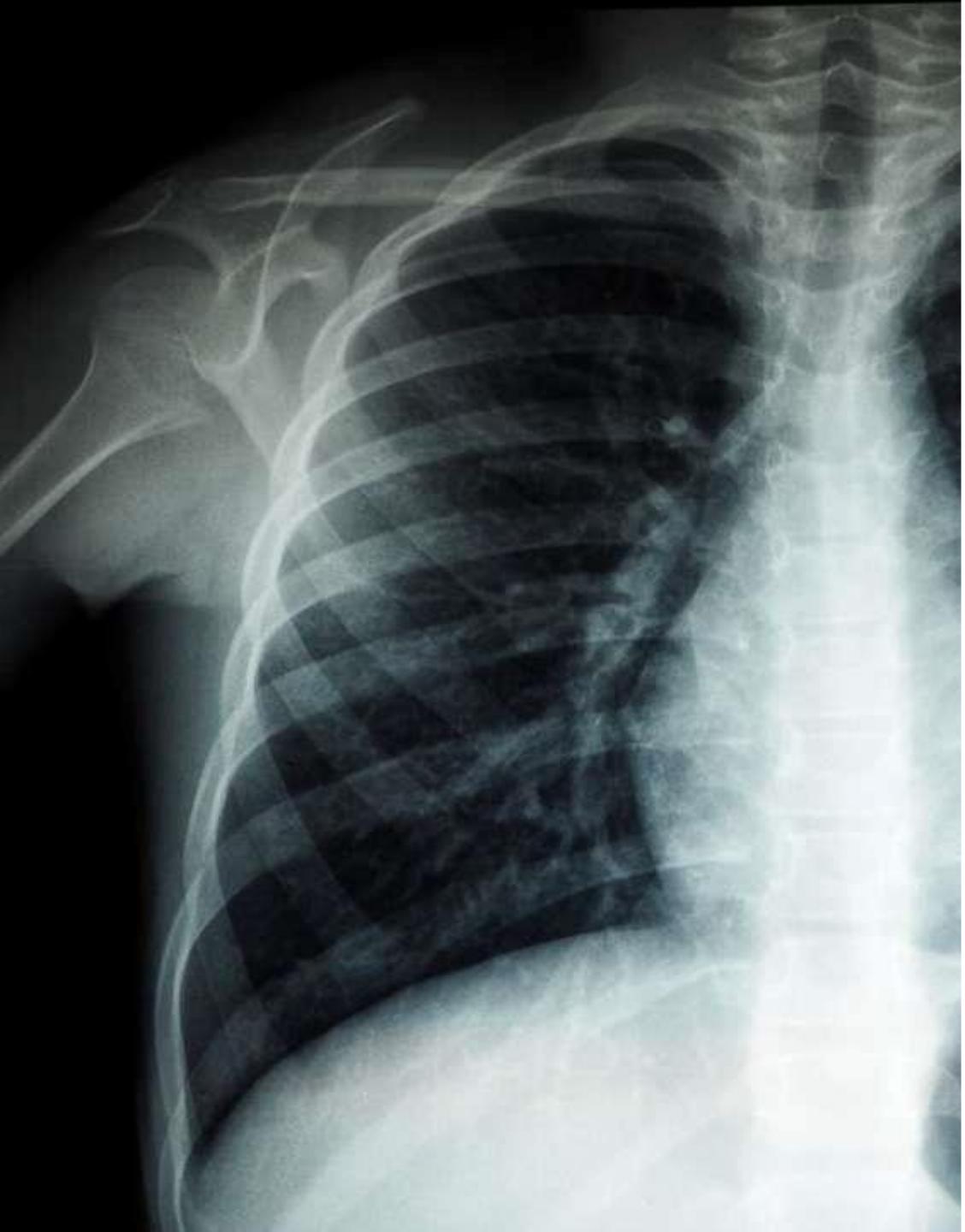
Future Enhancements:

- Update e-mail through Profile page
- Chat Assistance Bot
- E-mail Confirmation after successful sign-up
- Linking notifications to e-mail
- Top 3 diagnosis with close percentages will be displayed for Medical Professionals
- Further improve the accuracy of the CNN
- Test the web application with medical industry
- Ability to schedule an appointment



Wikipage Link

<https://github.com/htmw/2024S-Med-X/wiki>



Thank
You
For
Listening