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| SWENG 837 | Final Project | Software System Design |

# HEALTHCARE MONITORING SYSTEM

By: Holly Rossmann

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# AGENDA

1 INTRODUCTION & PROBLEM STATEMENT

2 DESIGN SOLUTION OVERVIEW

3 DETAILED EXPLANATION

4 CONCLUSION & NEXT STEPS

# INTRODUCTION & PROBLEM STATEMENT

# PROBLEM STATEMENT

- In recent years, there has been a growing need for personal, continuous health monitoring that helps to improve preventative care, manage chronic diseases, and quickly alert patients and their doctors during health emergencies. Traditional responses from healthcare settings have lacked the ability to track real-time health metrics and alerts, which often lead to delayed responses and low quality patient care.

# DESIGN SOLUTION: OVERVIEW

# Requirements Overview

- **System Functionalities**
  - Real-Time Data Collection
  - Data Analysis and Insights
  - Alerts and Notifications
  - Patient and Provider Dashboards
  - Integration with Existing Healthcare Systems
  - Communication tools
- **Business Goals**
  - Improve Patient Outcome
  - Increase Treatment Efficiency
  - Enhance Patient Engagement
  - Expand Market Reach

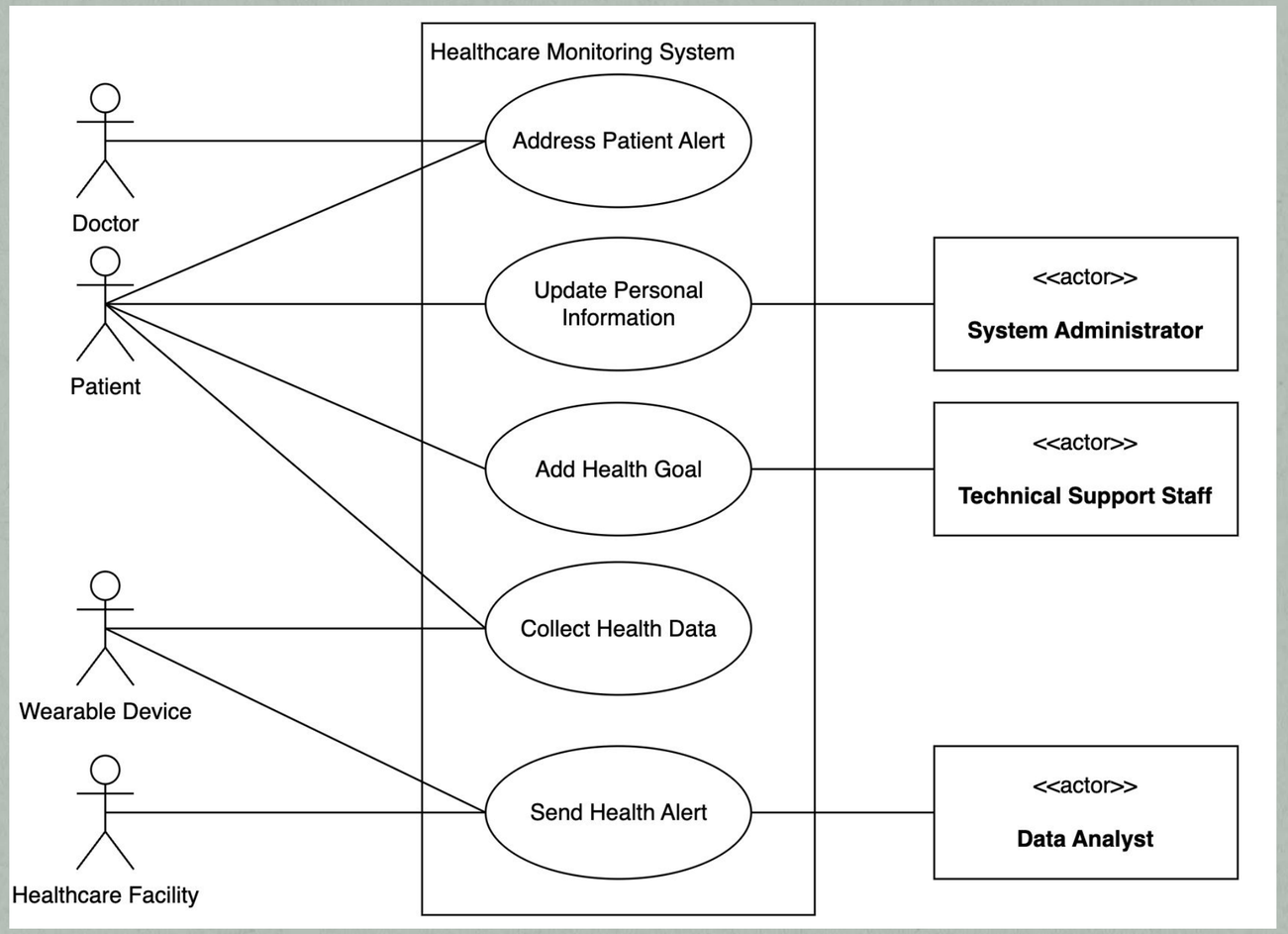
- **Non-Functional Requirements**
  - Performance
    - Scalability
    - Response Time
    - Throughput
  - Security
    - Authentication & Authorization
    - Data Encryption
    - Compliance
  - Maintainability
  - Usability
  - Reliability

# DESIGN SOLUTION: DETAILED EXPLANATION

# ACTORS TABLE

| Type | Actor | Goal Description |
|---|---|---|
| Primary | Patient | Monitor personal health metrics, receive alerts, and access insights, user of a wearable device |
| Primary | Wearable Device | Hosts the Healthcare Monitoring System for a patient. Needs to read and collect patient health data |
| Primary | Healthcare Facility | Receives patient data for monitoring and informed decision-making. Acts as the central hub for managing alerts and coordinating care. |
| Primary | Doctor | Receives alerts from the facility, reviews patient data, and makes medical decisions. |
| Supporting | System Administrator | Manage system configurations, user access, and ensure security. |
| Supporting | Data Analyst | Analyze data to identify trends and generate reports for healthcare improvements. |
| Supporting | Technical Support Staff | Provide assistance and troubleshooting for users and devices. |
| Offstage | Insurance Company | Utilize health data to assess patient health and customize insurance plans. |
| Offstage | Government Regulator | Ensures compliance with healthcare regulations, audits system usage, and enforces data protection laws. |

# USE CASE DIAGRAM

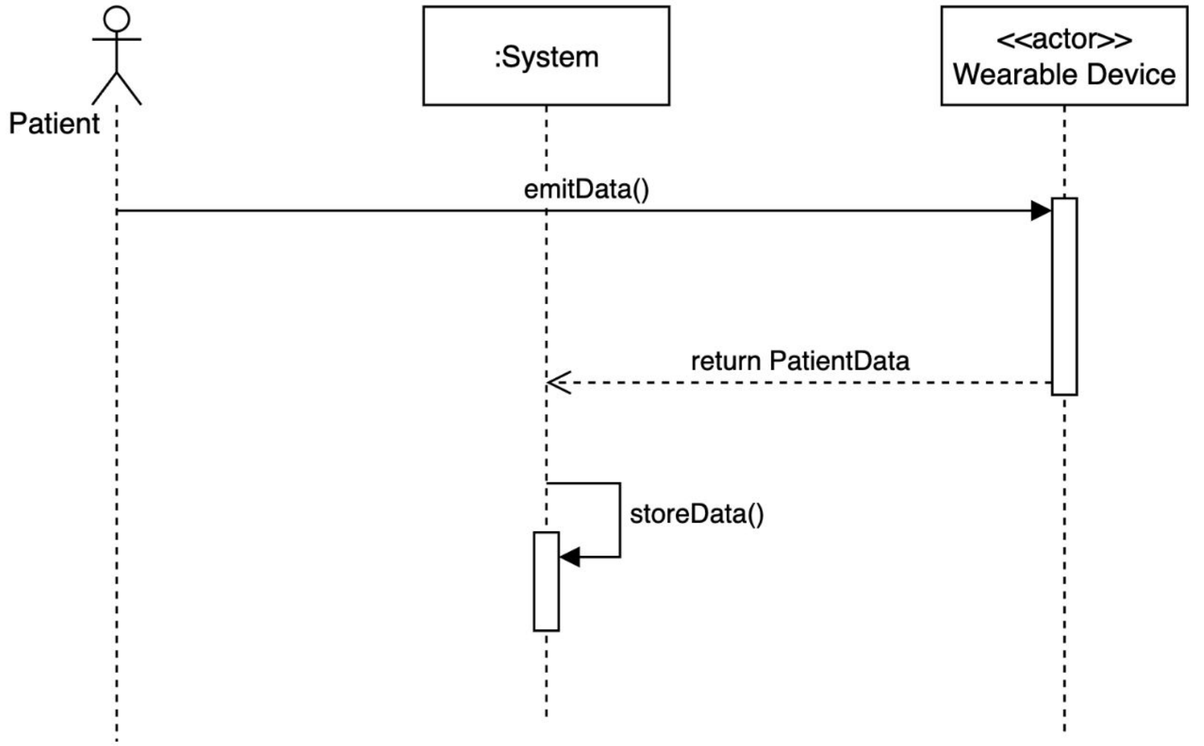


# SEQ 1 – COLLECT HEALTH DATA

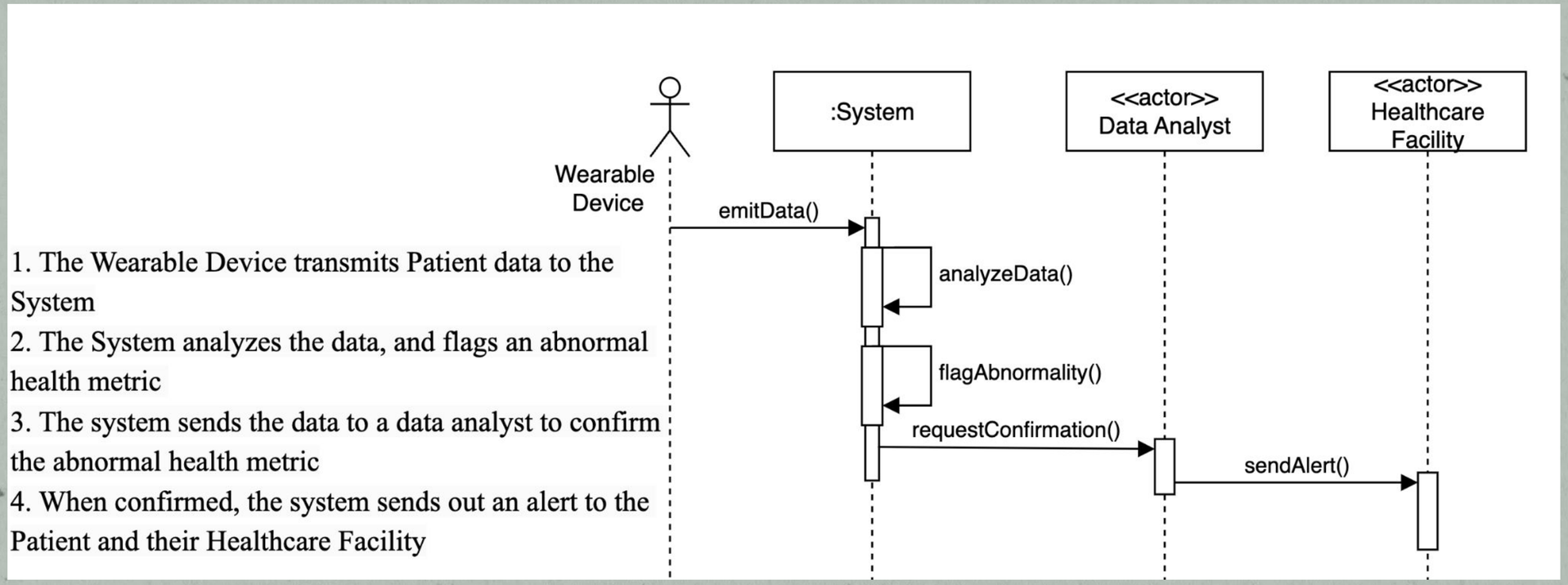
1. The Patient emits data to the Wearable Device

2. The Device transmits the Patient data to the System in real time.

3. The system stores the data.



# SEQ 2 – SEND HEALTH ALERT




1. The Wearable Device transmits Patient data to the System
2. The System analyzes the data, and flags an abnormal health metric
3. The system sends the data to a data analyst to confirm the abnormal health metric
4. When confirmed, the system sends out an alert to the Patient and their Healthcare Facility

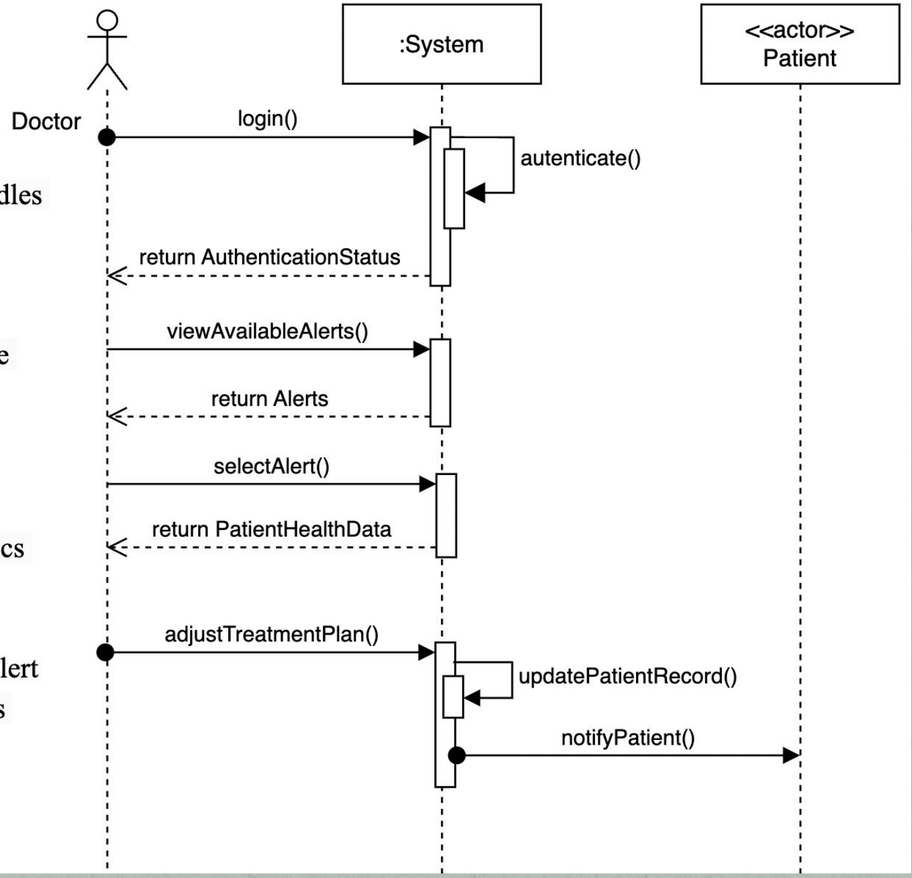
# SEQ 3–ADDRESS PATIENT ALERT

1. The Doctor logs into the System. System handles authentication.

2. The doctor browses the “Alerts” section of the system and selects one.

3. The system displays the patient’s health metrics and insights related to the alert.

4. The doctor adjusts treatment plans based on alert
5. The doctor documents changes in the patient's care record.
6. The system sends notification to the Patient regarding the change in record



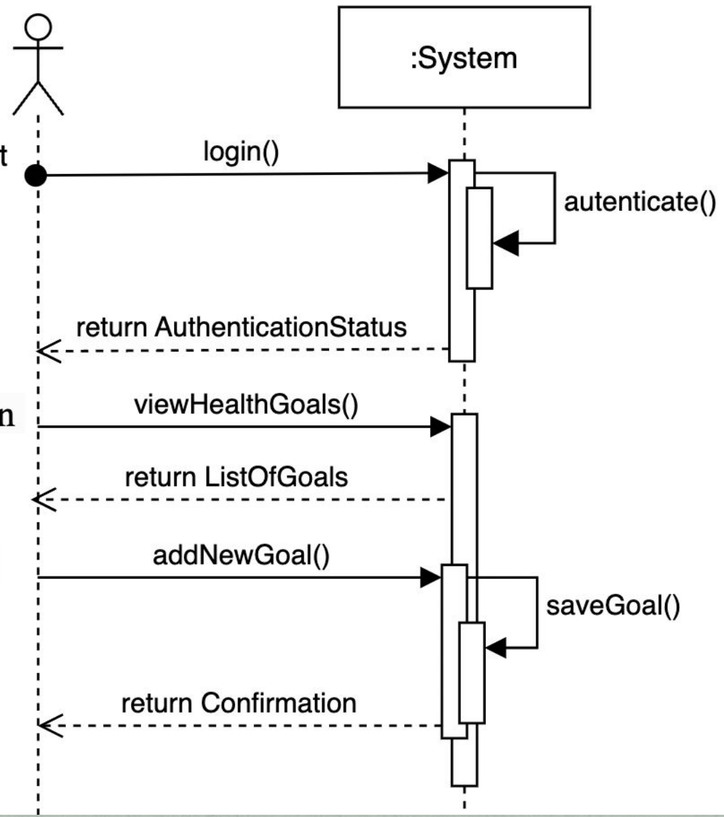
# SEQ 4 – ADD HEALTH GOAL

1. The Patient logs into the system. System handles authentication.

2. The patient selects the “Health Goals” section within the system.

3. The patient selects “Add New Goal” section within the system and adds in the details of the new health goal

4. The system saves the goal and sends a notification back to the Patient

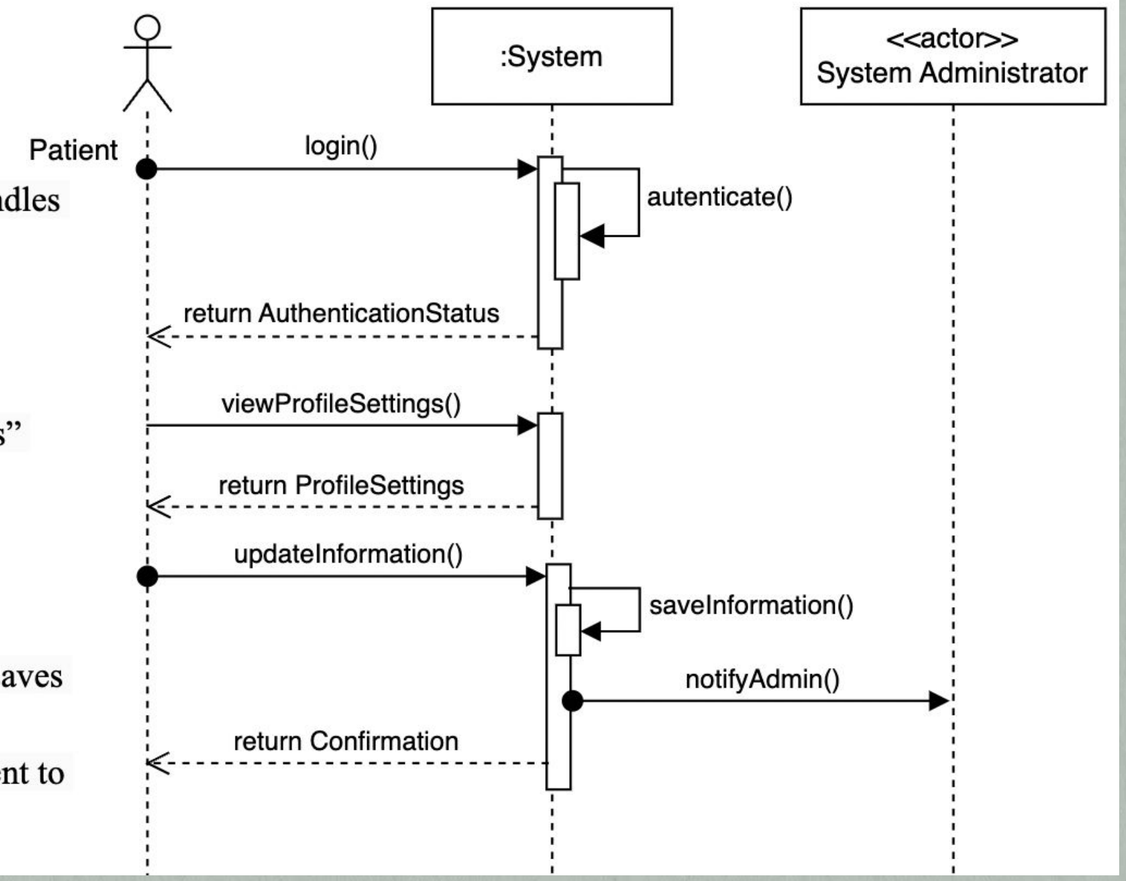


# SEQ 5 – UPDATE PERSONAL INFO

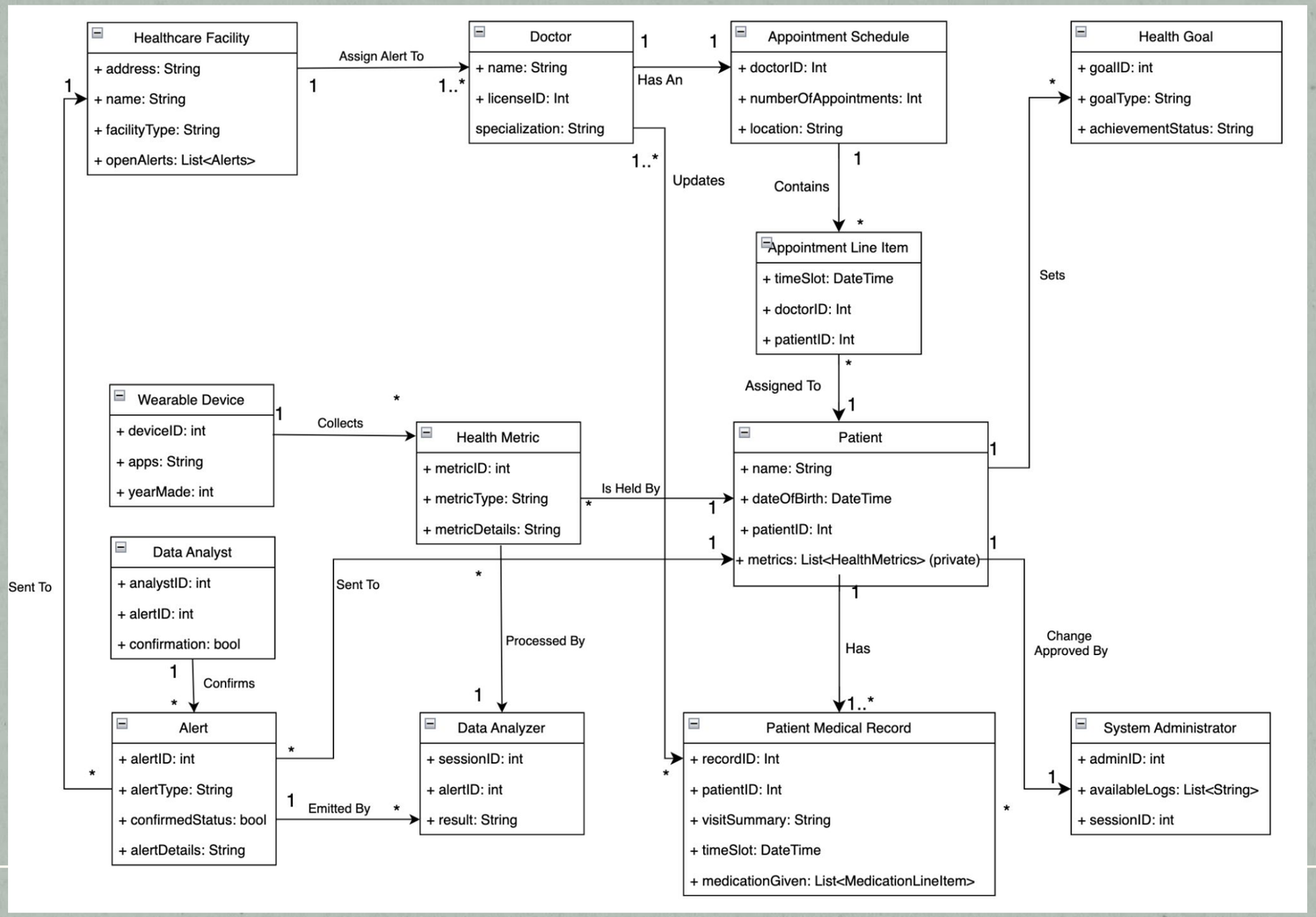
1. The Patient logs into the system. System handles authentication.

2. The Patient navigates to the “Profile Settings” section of the system

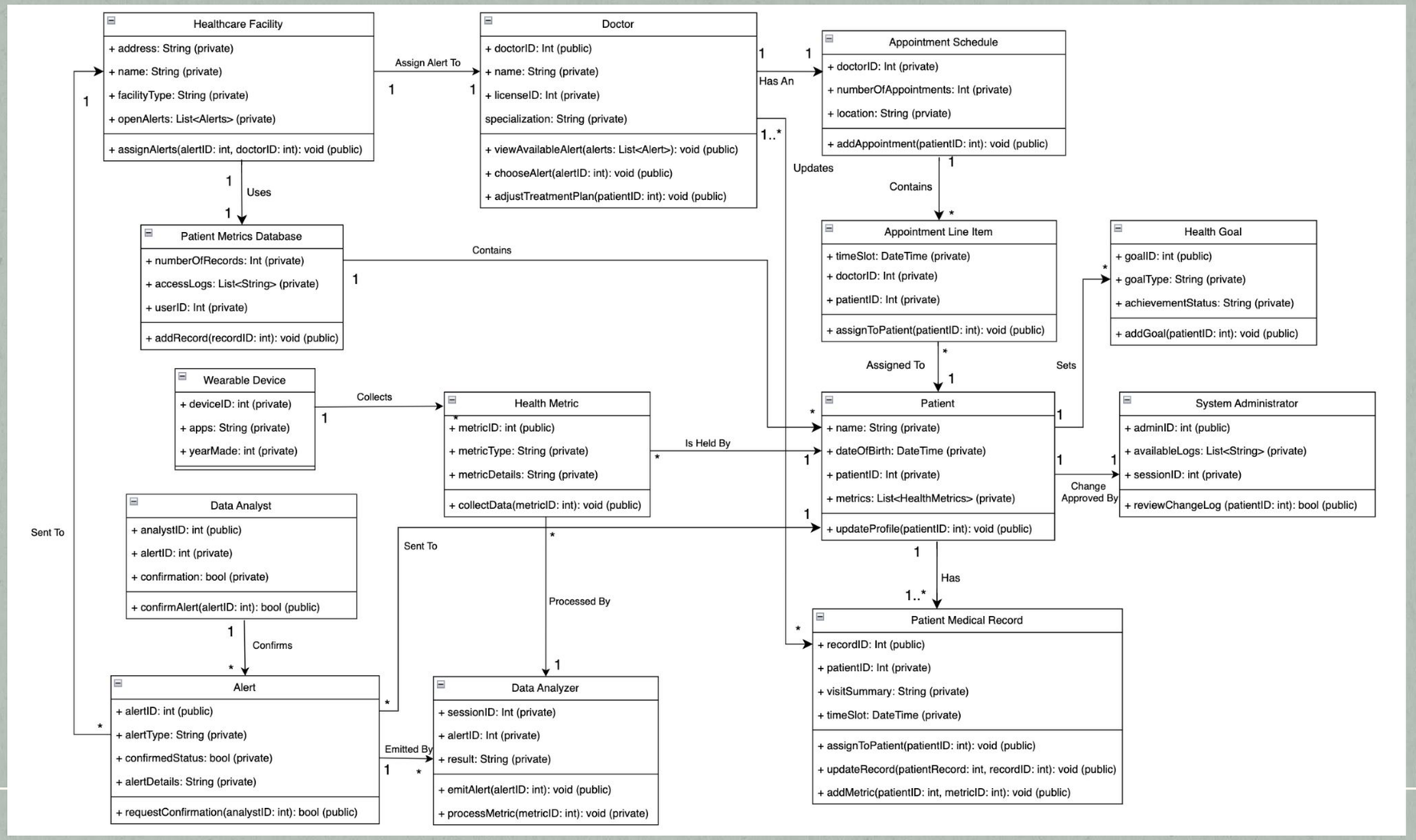
3. The patient updates personal and health information .
4. The patient chooses “Save” and the system saves the updated information.
5. A confirmation of the successful update is sent to the Patient and to the system administrator



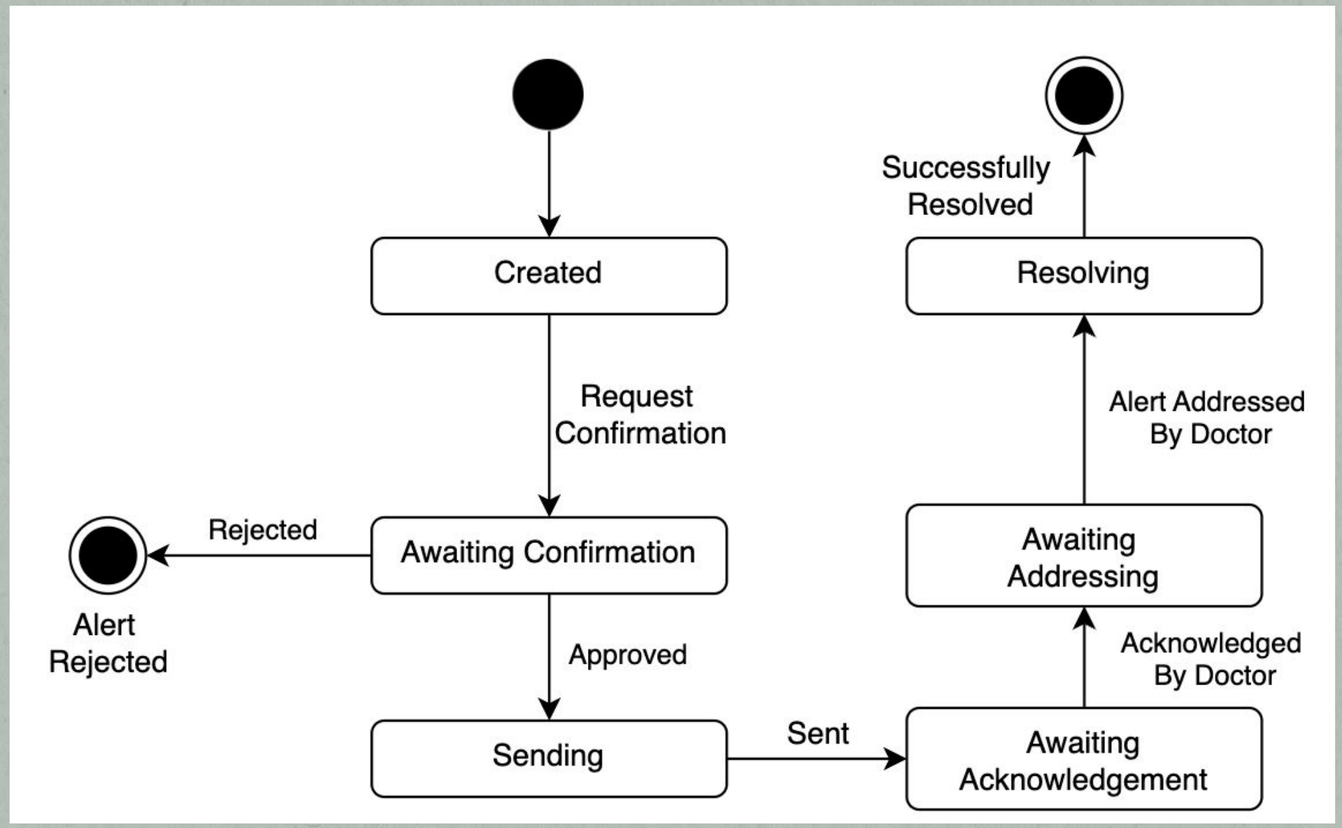
# DOMAIN MODEL



# CLASS DIAGRAM

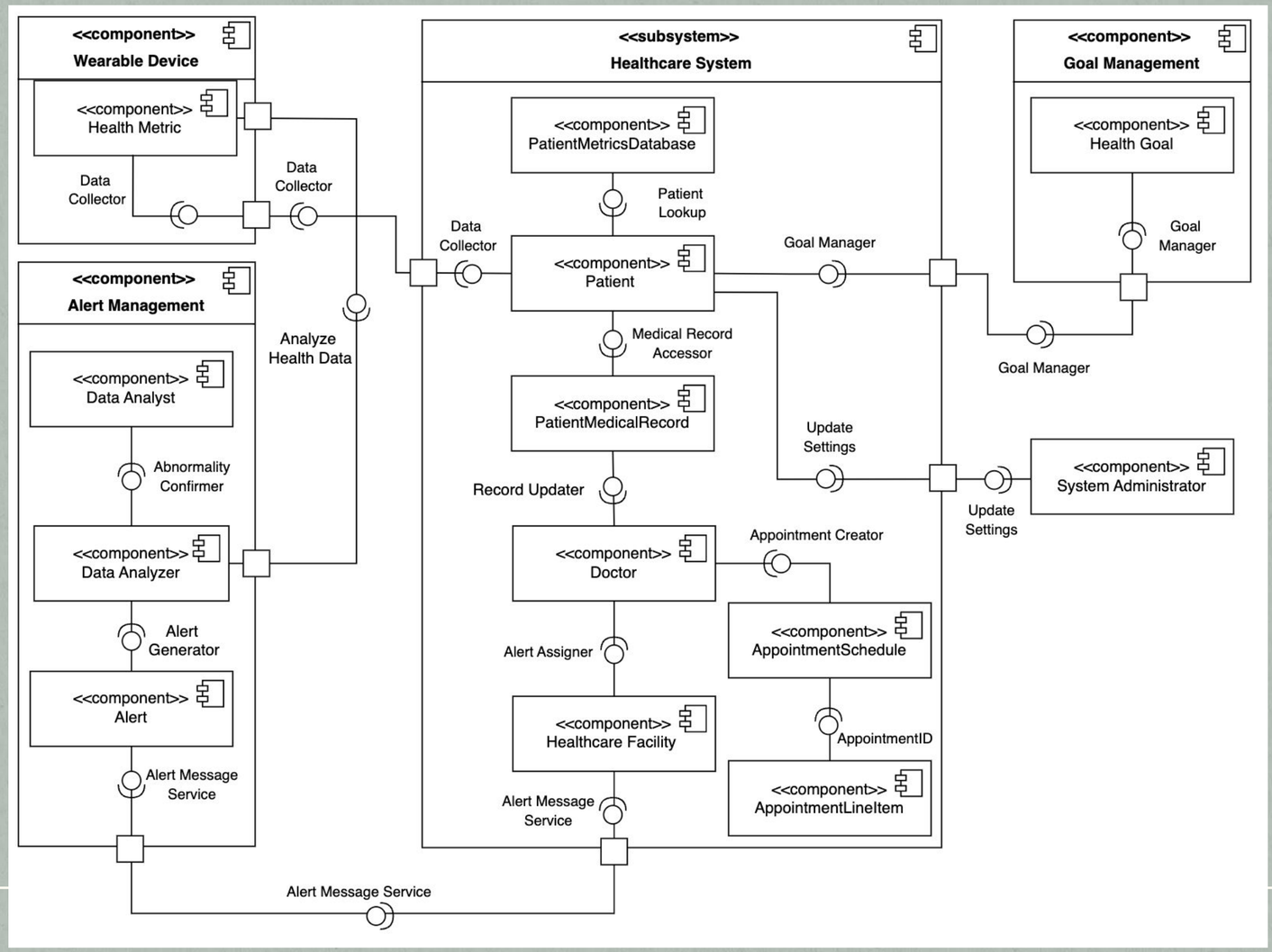


# ALERT STATE DIAGRAM

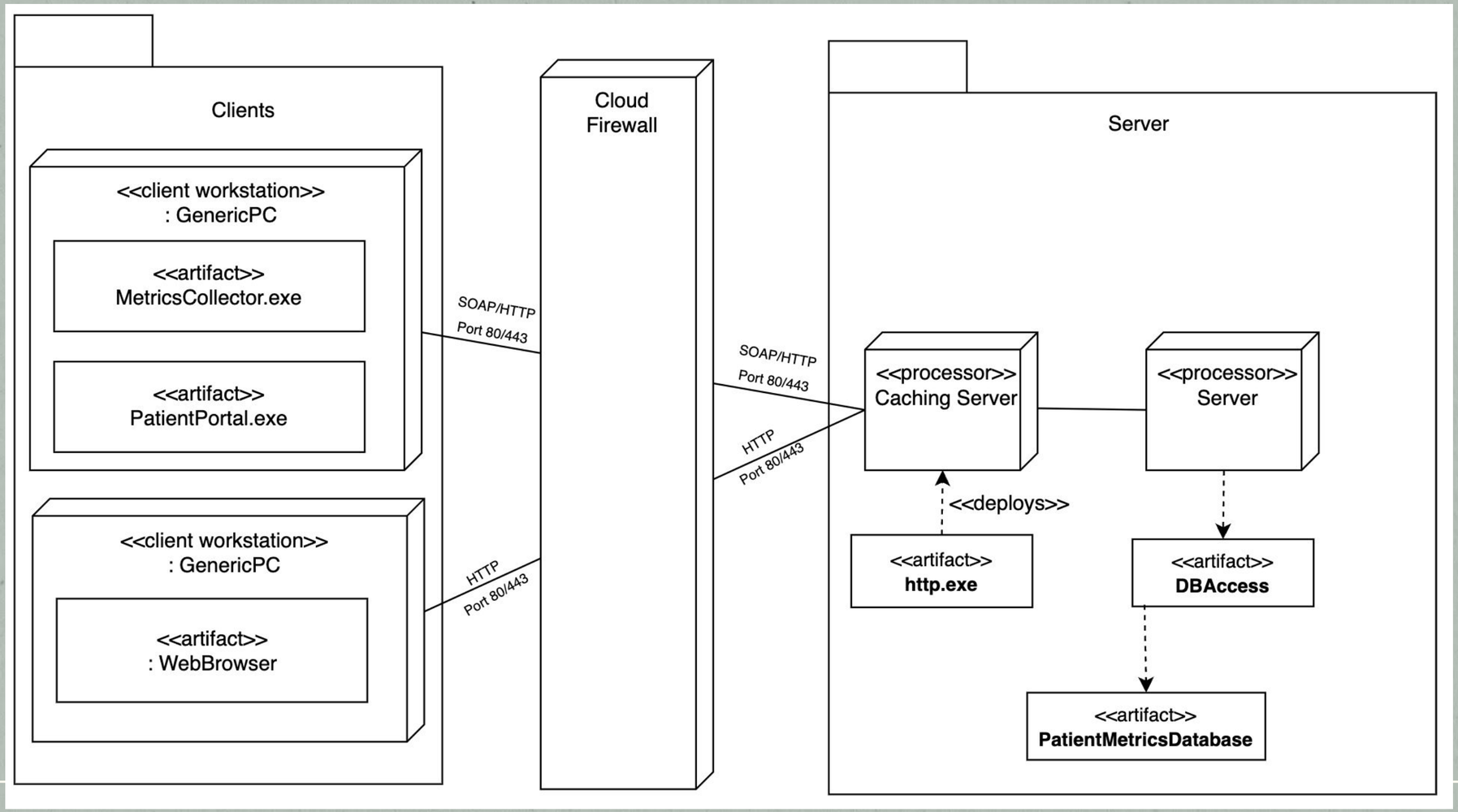


# ALERT ACTIVITY DIAGRAM

# COMPONENT DIAGRAM



# DEPLOYMENT DIAGRAM



# DESIGN PATTERNS

- SOLID Principles(Single Responsibility Principle)
  - Each component of the system has a distinct responsibility
    - Alert Management Component, handles all alert-related tasks
    - Goal Management Component, handles all goal-related tasks
- GRASP Principles (Creator)
  - Alert Management creates and manages all alert instances
- GOF / CLoud Native (Event Driver Architecture)
  - Alerts and notifications trigger actions and processes

# CONCLUSION & NEXT STEPS

# CONCLUSION

- Problem: Create a wearable, Health Monitoring Device to gather personal health metrics and to trigger alerts to any abnormal data readings that are sent to a patient's healthcare facility
  - Primary Actors: Patient, Doctor, Wearable Device, Healthcare Facility
  - Use Cases: Collect Health Data, Send health Alert, Address Patient Alert, Add Health Goal, Update Personal Information
- Next Steps
  - Take what I have learned in this project, and use it to take on new roles within the Software Engineering Industry
  - Apply my new skills to Systems Engineering within my company