

Enterprise Software Development Project

Group 11

[Project Design]



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Chapter 01

1.1 ABSTRACTION

Enterprise Software Development refers to the process of creating software applications or systems specifically tailored for large organizations or enterprises to meet their unique business needs. These software solutions are designed to support and streamline various business functions, processes, and workflows within an organization. There are some key characteristics and considerations associated with enterprise software development; they are scalability, security, integration, performance, reliability, compliance, cost-effectiveness, and many more. There are major five categories in enterprise software and they are Customer Relationship Management (CRM) systems, Enterprise Resource Planning (ERP) software, Human Resource Management Systems (HRMS), Business Intelligence (BI) tools, and Supply Chain Management (SCM) systems. Enterprise software requires careful planning, a deep understanding of the business processes it supports, and a commitment to delivering reliable, scalable, and secure software.

The requirements of one of the large-scale businesses will be gathered, processed, and designed as the outcome of this project. Using methods and diagrams which are used most frequently by software developers to handle the requirements. Diagrams are drawn by software which are specific for drawing UML diagrams.

Keywords: refers to the process of creating software applications, UML diagrams, Diagrams

1.2 INTRODUCTION

Databases, customers, employees, and inventories play major roles in large-scale companies. Handling these databases and others by manpower is very hard. So companies use software to handle their databases, customers, employees, and inventories. We selected a Large-scale Non-profit Organization, Vision Care as our resource.

Here we hope to further discuss the project design which is the next part of this project. Here we create UML diagrams related to the data requirements we have collected and obtained through studies and give our client an idea about our project.

The UML diagrams that we created:

- ✓ Use Case Diagram
- ✓ Activity Diagram
- ✓ Sequence Diagram
- ✓ Class Diagram
- ✓ Component Diagram
- ✓ Deployment Diagram

Chapter 02

2.1 Use Case Diagram

Explanation:

- Use case diagrams represent the functionality of a system from the perspective of external actors (users or systems).
- It defines actors (Patient, Optometrist/Ophthalmologist, Receptionist/Staff, Insurance Company) and use cases (e.g., Schedule Appointment, Check-In) within the system boundary.
- They show the interactions between actors and the system, depicting the various use cases or scenarios.
- Relationships between actors and use cases, as well as between use cases themselves, are specified using Include, Extend, and Generalization relationships.

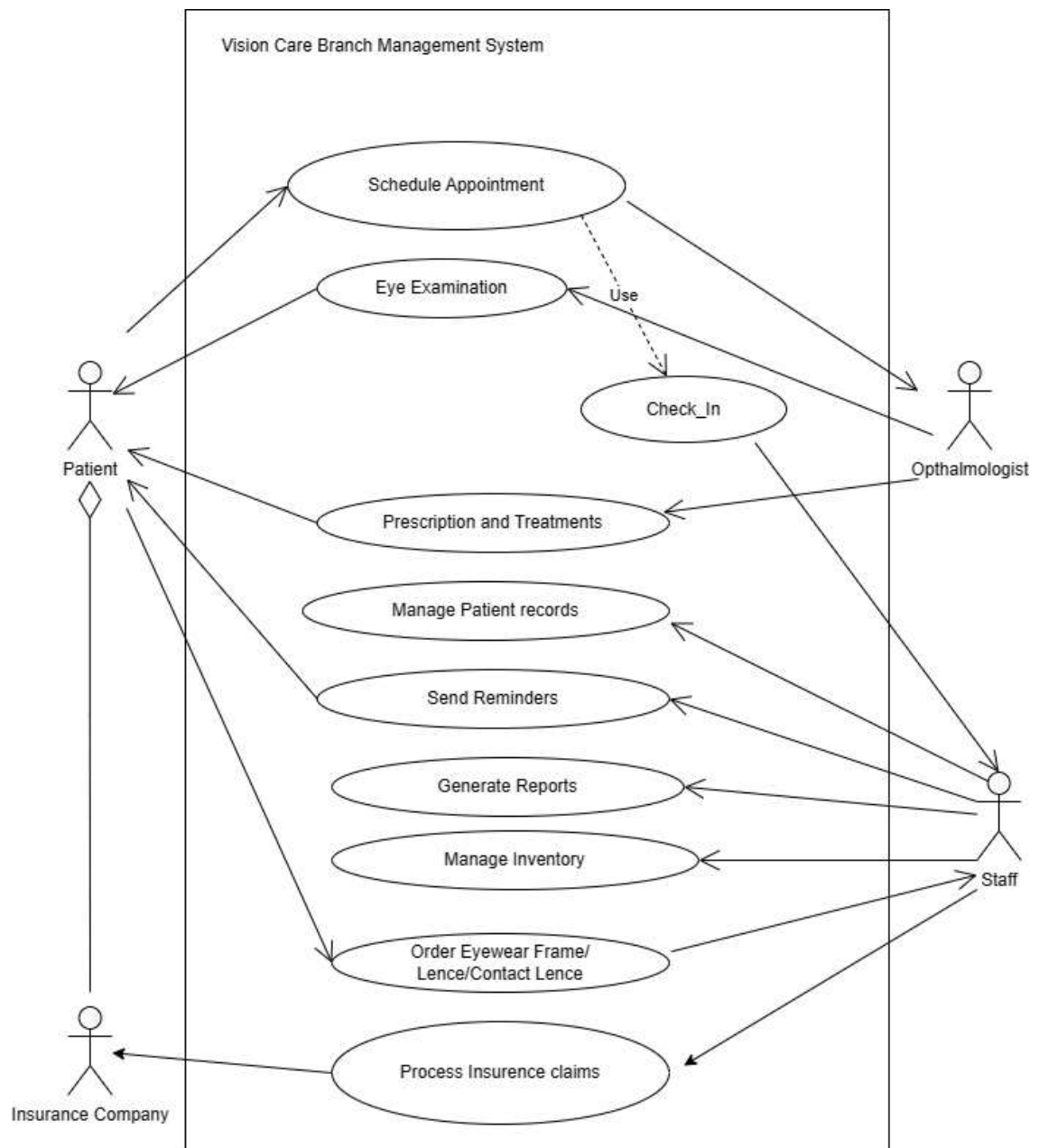


Figure 1: Use case diagram- Vision Care branch management system

Assumptions (Expanded):

1) Patient Actors:

- Patients can schedule appointments, check-in, and order glasses/contacts.
- Patients may interact with the system through these use cases.

2) Ophthalmologist Actors:

- Optometrists/Ophthalmologists can perform eye examinations and prescribe treatments.
- They have access to the Perform Eye Examination and Prescription and Treatment use cases.

3) Staff Actors:

- Receptionists/Staff handle various administrative tasks.
- They can manage patient records, send reminders, process insurance claims, manage inventory, and generate reports.
- Receptionists/Staff have access to these use cases as part of their responsibilities.

4) Insurance Company Actor:

- Insurance companies interact with the system for processing insurance claims.

5) Use cases:

- Schedule Appointment: Patients can schedule appointments for eye examinations or consultations.
- Check-In: Patients check-in for their appointments upon arrival at the clinic.
- Perform Eye Examination: Optometrists/Ophthalmologists can perform eye examinations, including vision tests and diagnostic procedures.
- Prescription and Treatment: Optometrists/Ophthalmologists can provide prescriptions for glasses, contact lenses, or medications.
- Billing and Payment: The system supports billing for services and accepts payments from patients or insurance companies.
- Manage Patient Records: Receptionists/Staff can create and maintain patient records, including personal information, medical history, and test results.
- Send Reminders: The system sends appointment reminders to patients.
- Process Insurance Claims: If applicable, the system supports the submission and processing of insurance claims.
- Order Glasses/Contacts: Patients can order glasses or contact lenses through the system.
- Manage Inventory: Receptionists/Staff and Optometrists/Ophthalmologists can manage inventory for glasses, frames, and contact lenses.
- Generate Reports: Receptionists/Staff can generate reports for business analytics, patient statistics, and inventory management.

6) Relationships:

- Include relationships indicating that one use case includes another. For instance, Check-In includes Schedule Appointment.
- Extend relationships to show optional or conditional use cases. For example, Send Reminders can extend Schedule Appointment.
- Generalization represents that Receptionist/Staff actors are specialized versions of the general Patient actor.

7) System Boundary:

- The Use Case Diagram is bounded within the "Vision Care Branch Management System."

8) Annotations:

- Descriptions or annotations for actors and use cases can be included in the diagram to clarify their functionality and purpose.

9) Constraints:

- Specific constraints or conditions associated with use cases can be added within curly braces if needed.

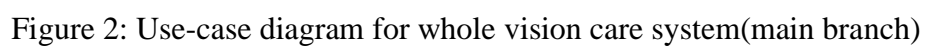


Figure 2: Use-case diagram for whole vision care system(main branch)

Assumptions:

- In Vision Care (pvt) head office has eight (8) departments and by this above use-case diagram, we represented that how each department join another and what are the main functionalities of every branch. And also it represents that how each department contact with customer and more than 38 Vision Care branches in Sri Lanka connect with head office.

1) System Boundary:

- The Use Case Diagram is bounded within the "Vision Care Head Office Management System."

2) Annotations:

- Descriptions or annotations for actors and use cases can be included in the diagram to clarify their functionality and purpose.

2.2Activity Diagram

Explanation:

- This composite activity diagram provides a high-level overview of the key activities and interactions within your vision care system, from the patient's arrival to various system interactions and processes, including billing, staff interactions, insurance processing, notifications, authentication, error handling, reporting, external system integration, telehealth consultations, accessibility features, and compliance validation.

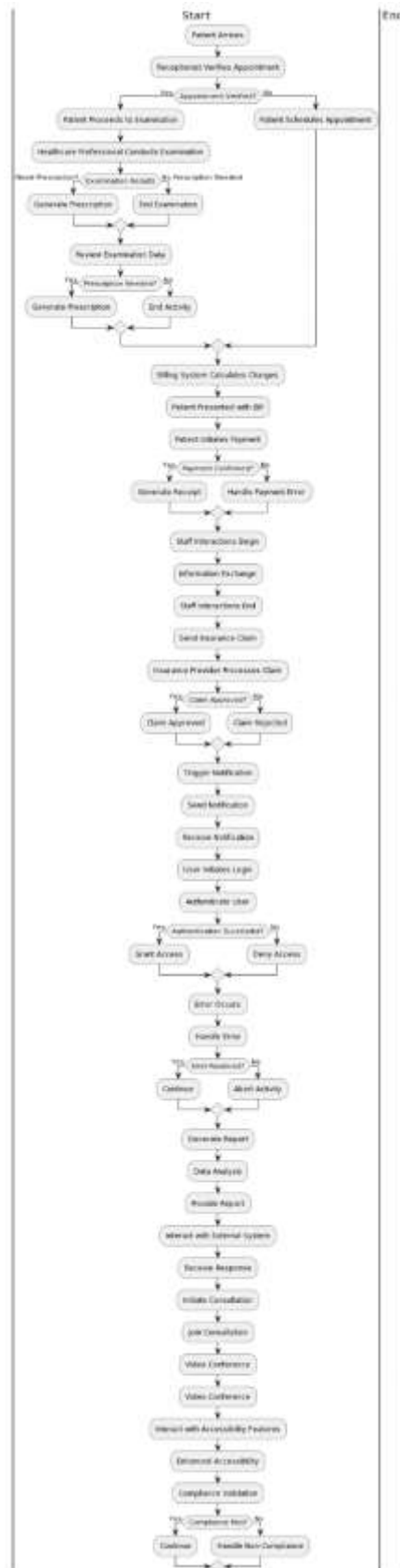


Figure 3: Activity Diagram

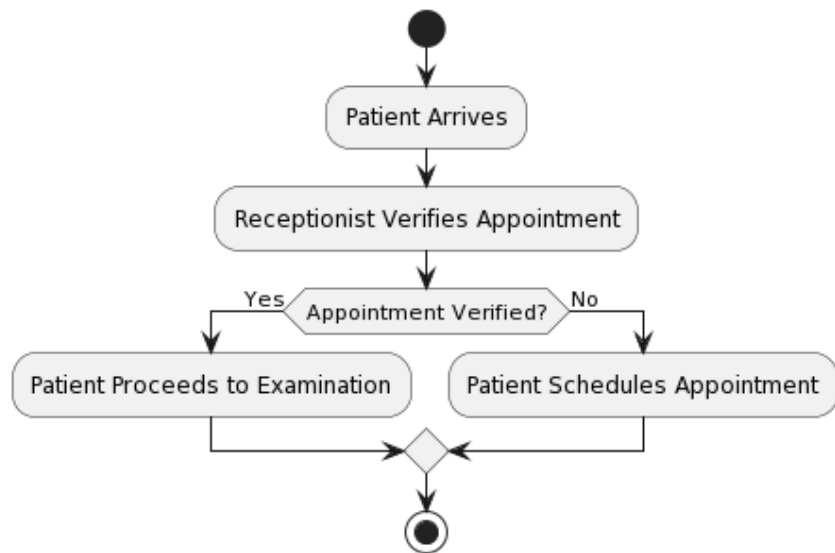


Figure 4:Patient Check_in

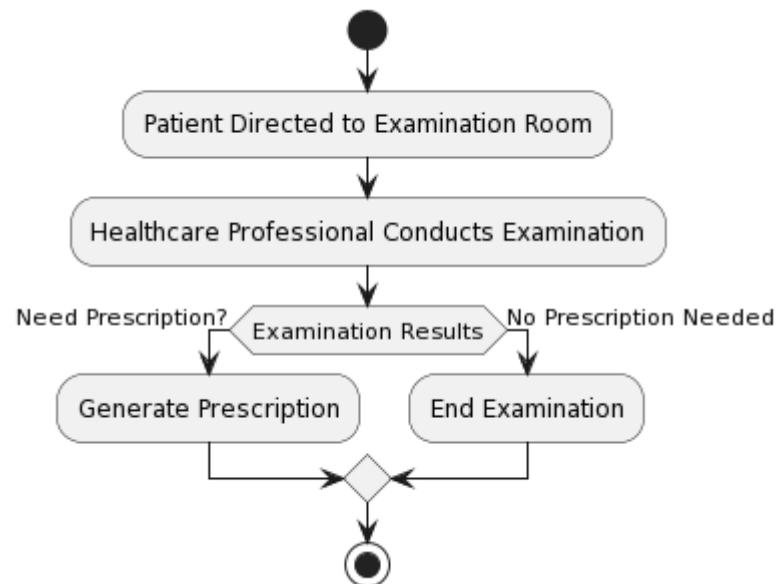


Figure 5:Medical Examination

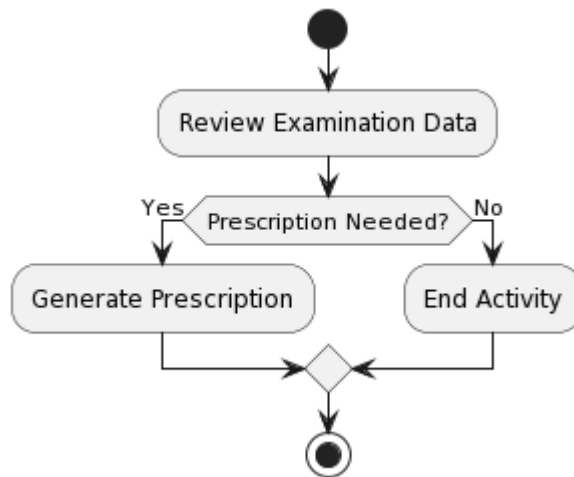


Figure 6:Prescription Generation

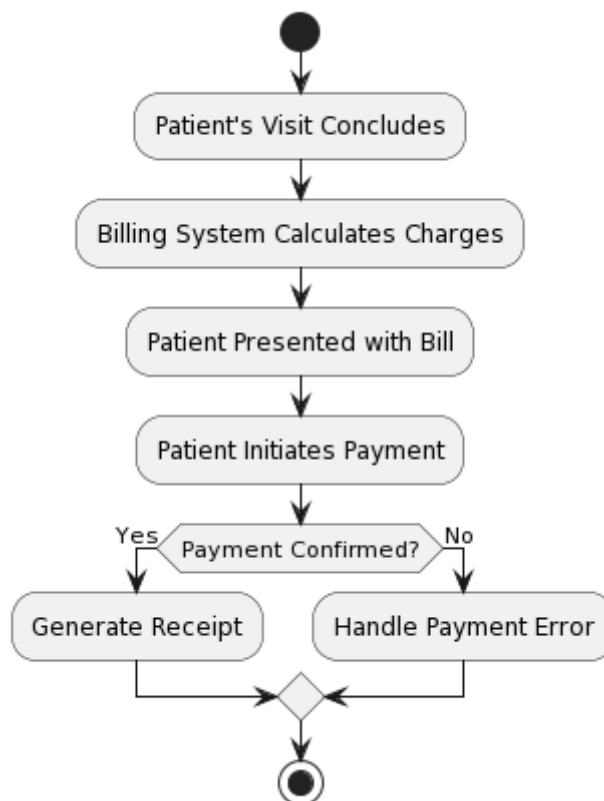


Figure 7:Billing and Payment

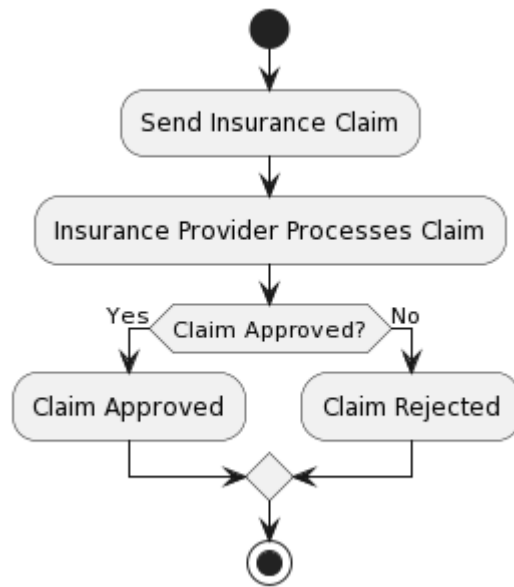


Figure 8: Integration with Insurance Providers

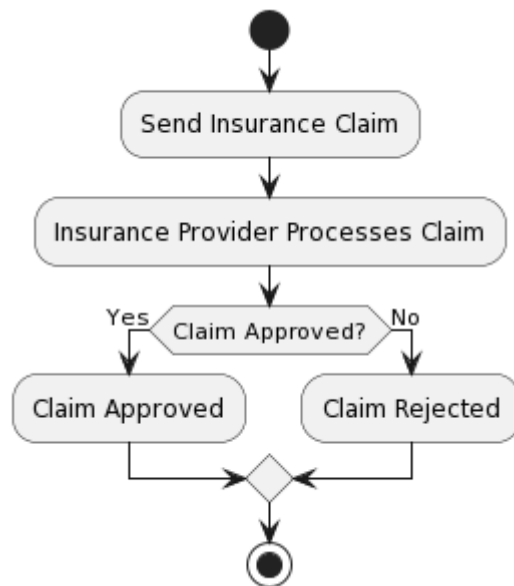


Figure 9: Security and Authentication

Assumptions:

1) Patient Arrival and Check-In:

- Patients arrive at the clinic for their appointments.
- A receptionist verifies the appointment details.
- If the appointment is verified, the patient proceeds to the examination.

2) Medical Examination:

- Healthcare professionals conduct medical examinations, which may include various tests.
- Based on examination results, a prescription may be generated if needed.

3) Prescription Generation:

- The system reviews examination data to determine if a prescription is needed.
- If required, a prescription is generated and provided to the patient.

4) Billing and Payment:

- The billing system calculates charges based on services provided during the visit.
- The patient is presented with a bill and initiates payment.
- Payment confirmation results in the generation of a receipt.

5) Staff Interactions:

- Staff members interact with each other, coordinating patient care, scheduling appointments, or managing inventory.

6) Integration with Insurance Providers:

- The system sends insurance claims for processing to external insurance providers.
- Claims are either approved or rejected.

7) Notification and Reminders:

- Notifications are triggered for various purposes, such as appointment reminders or test result notifications.
- Patients receive and acknowledge notifications.

8) Security and Authentication:

- Users initiate login requests to access the system.
- User authentication and authorization processes ensure data security and privacy compliance.

9) Error Handling:

- The system handles errors and exceptions gracefully.
- If an error is resolved, the process continues; otherwise, it is aborted.

10) Reporting and Analytics:

- The system generates reports and performs data analysis on various aspects of the business.

11) External System Integration:

- The system interacts with external systems, such as laboratory systems for processing tests or suppliers for inventory management.

12) Telehealth or Remote Consultations:

- Telehealth services are initiated, allowing patients and healthcare professionals to engage in video conferences and data exchange.

13) Accessibility Features:

- Accessibility features are available to enhance the user experience for individuals with disabilities.

14) Compliance Validation:

- Compliance with industry regulations and standards is validated.
- If compliance is met, the process continues; otherwise, non-compliance is addressed.

2.3 Sequence Diagram

- Sequence diagrams illustrate the interactions between objects or components in a system over time.
- They show the flow of messages or interactions between elements, helping to understand the dynamic behavior of a system.

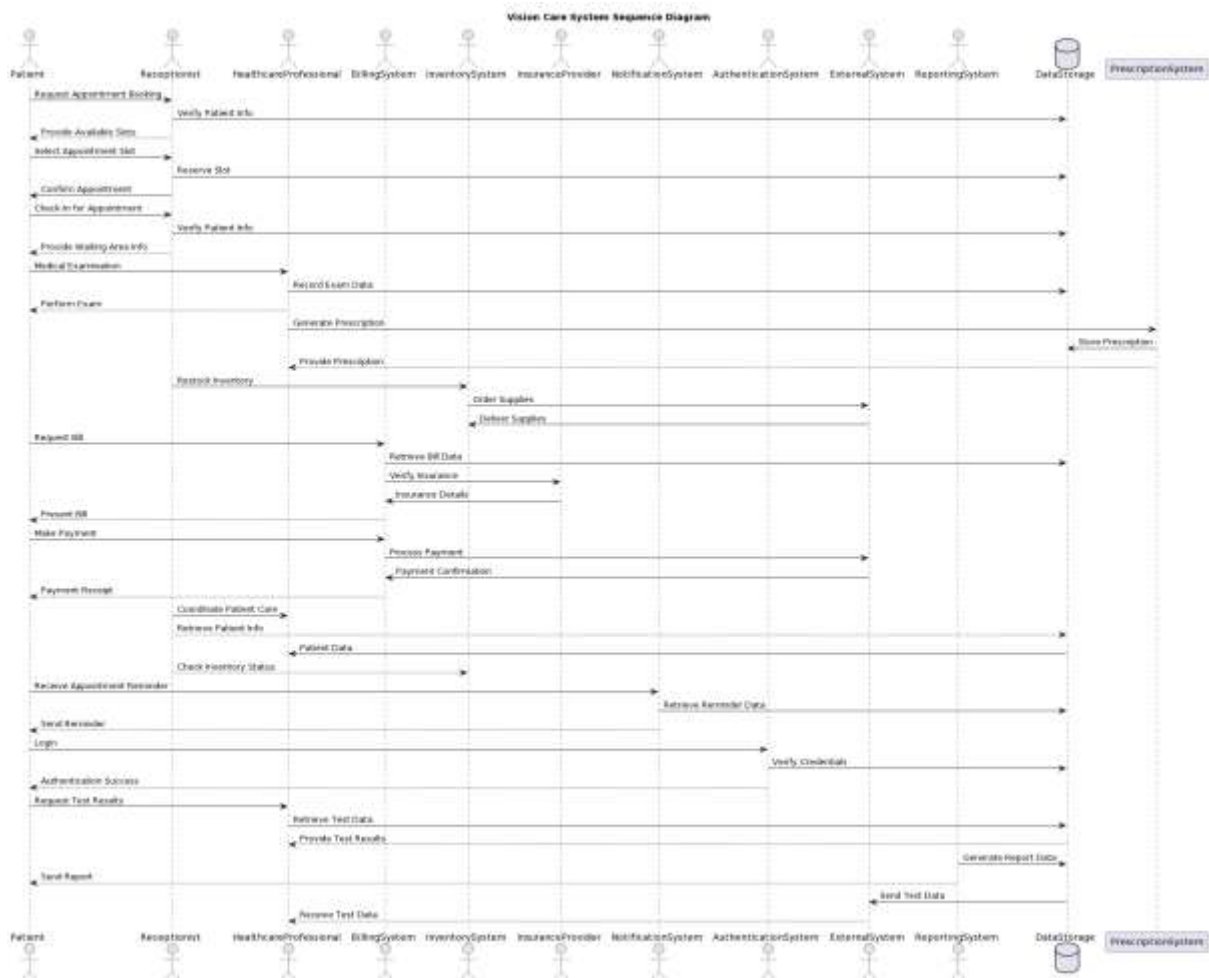


Figure 10: Sequence diagram

Sub-sequence diagrams

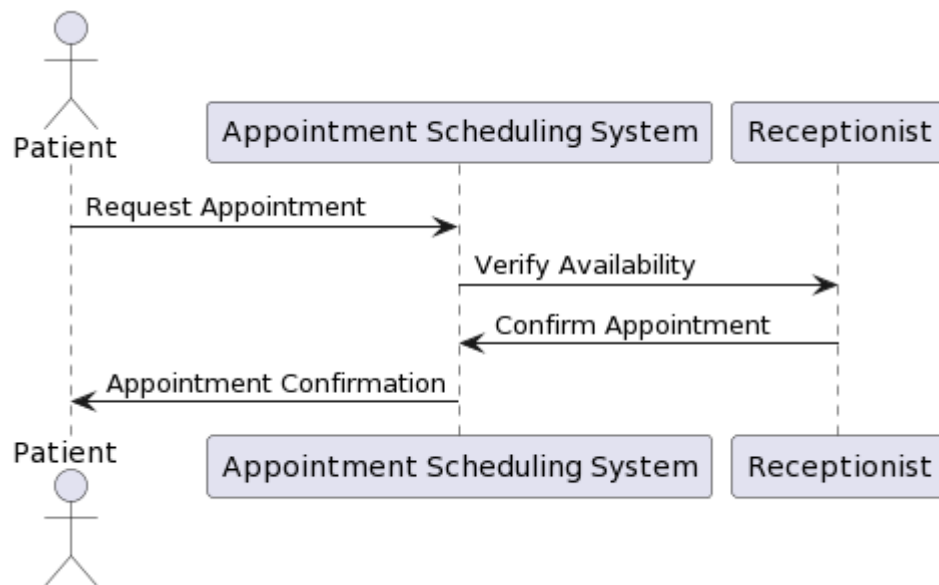


Figure 11: Patient Appointment Booking

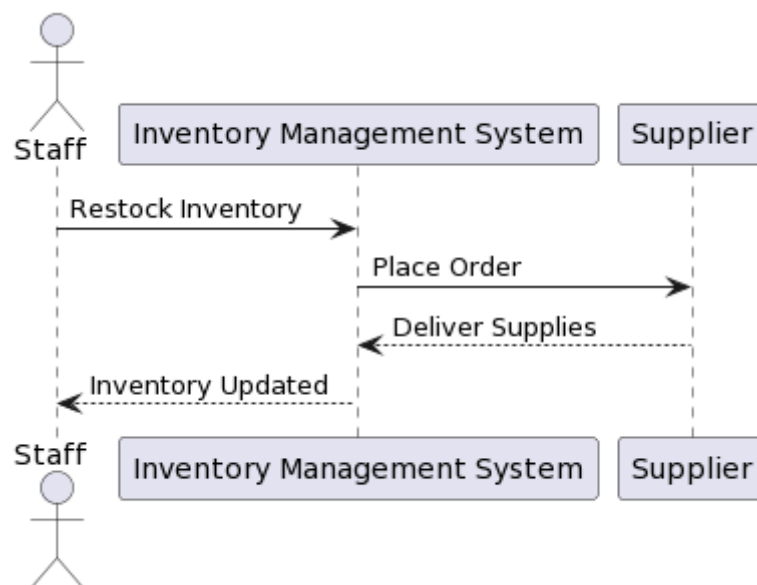


Figure 12: Inventory Management

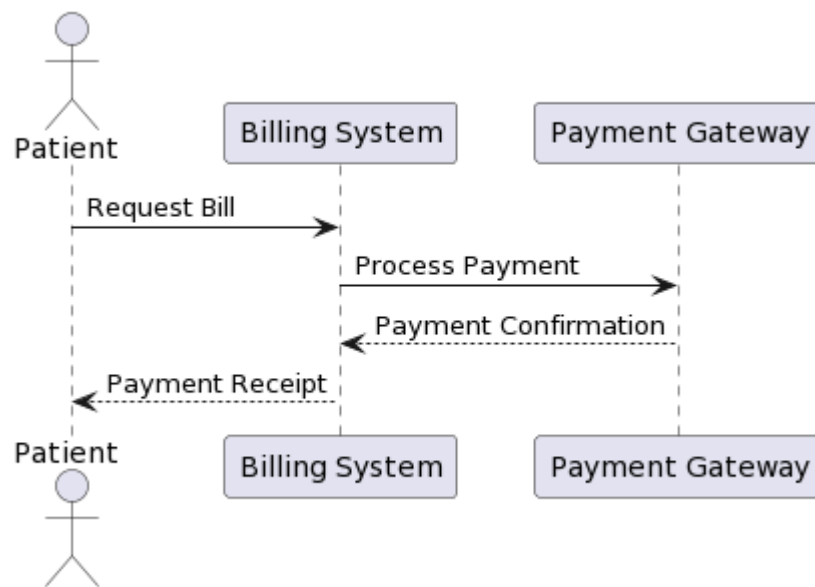


Figure 13: Billing and Payment

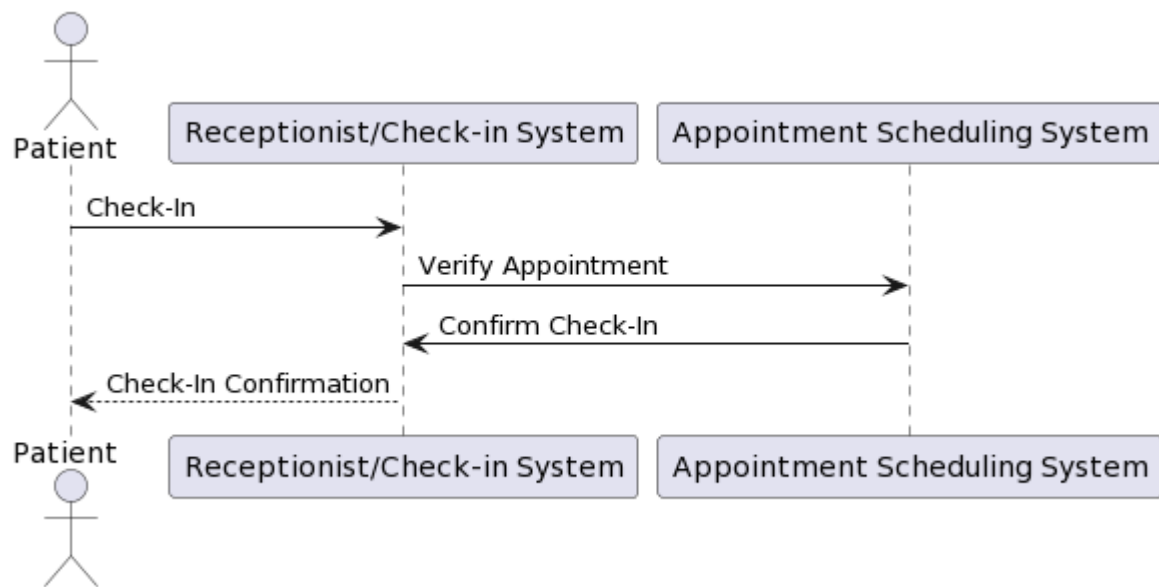


Figure 14: Patient Check-In Process

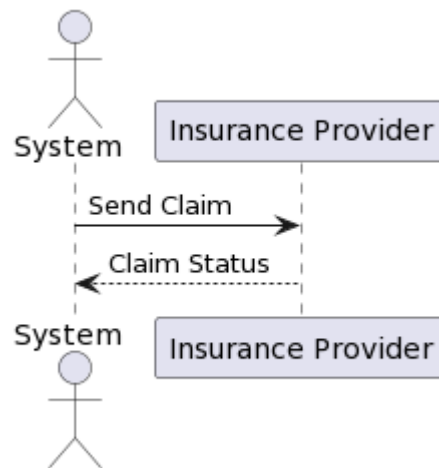


Figure 15: Integration with Insurance Providers

Assumption:

1) Patient Appointment Booking:

Explanation:

- This sequence illustrates how patients book appointments through interactions with the appointment scheduling system.

Assumptions:

- Patients initiate the process by requesting appointments.
- The system verifies appointment availability and confirms appointments.

2) Inventory Management:

Explanation:

- Shows interactions related to managing inventory, including restocking items when inventory is low.

Assumptions:

- Staff initiates inventory restocking.
- Communication with the inventory management system and suppliers takes place.

3) Billing and Payment:

Explanation:

- Models the process of billing and payment, involving interactions between patients, the billing system, and payment gateways.

Assumptions:

- Patients request bills.
- Payment gateways confirm payment and issue receipts.

4) Patient Check-In Process:

Explanation:

- This sequence shows how patients check in when arriving for appointments, involving interactions with receptionists or automated check-in systems.

Assumptions:

- Patients provide their details for verification.
- Receptionists or check-in systems confirm patient check-in.

5) Integration with Insurance Providers:

Explanation:

- Models interactions between the system and insurance providers, including the processing, verification, and approval of insurance claims.

Assumptions:

- The system interfaces with insurance providers.
- Claims processing includes verification steps.

2.4 Class Diagram

- Class diagrams depict the static structure of a system by showing the classes, their attributes, methods, and relationships.
- They provide an overview of the classes in a system and how they relate to each other.

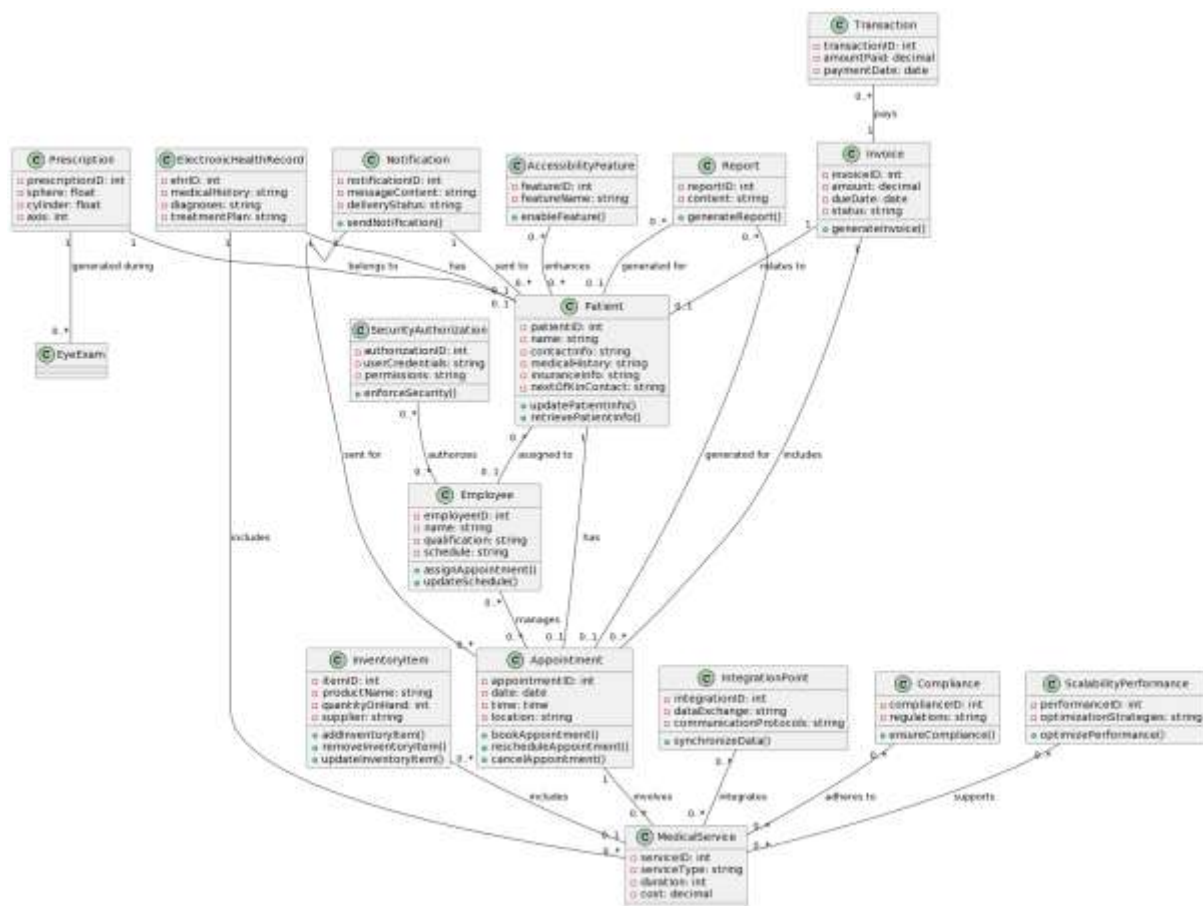


Figure 16: Class diagram

Classes:

1) Patient Information:

- This class is responsible for storing and managing patient details, including name, contact information, and medical history.
- Attributes include patient ID, insurance information, and next of kin contact details.
- Methods allow for updating and retrieving patient information.

2) Appointment Management:

- This class encompasses scheduling appointments, including attributes for date, time, and location.
- It is associated with patients and their appointments.
- Methods are implemented for appointment booking, rescheduling, and cancellation.

3) Medical Services:

- Various vision care services are represented by classes within this category, such as eye exams, vision tests, and consultations.
- Attributes specify service type, duration, and cost.
- Relationships exist between medical services and patient appointments.

4) Prescription Handling:

- This class category manages eyeglasses and contact lens prescriptions.
- Attributes describe prescription details like sphere, cylinder, and axis values.
- Associations exist with patients and eye exams.

5) Inventory Management:

- Classes are responsible for managing inventory of eyeglasses, contact lenses, and related products.
- Attributes include product details, quantity on hand, and suppliers.
- Methods are available for adding, removing, and updating inventory items.

6) Billing and Payments:

- This category includes classes for billing invoices, payment transactions, and payment methods (e.g., credit card, insurance).
- Associations are established between invoices, patients, and appointments.
- Methods are implemented for generating invoices and processing payments.

7) Staff and Employee Information:

- These classes represent eye care professionals, staff members, and their roles.
- Attributes specify qualifications, schedules, and contact details.
- Relationships exist with appointments and patient interactions.

8) Electronic Health Records (EHR):

- If applicable, classes are included for storing and managing electronic health records.
- Attributes pertain to medical history, diagnoses, and treatment plans.
- Associations are established with patients and medical services.

9) Reporting and Analytics:

- Classes are designed to generate reports on appointment statistics, patient demographics, and financial performance.
- Methods are available for running analytics on patient data and service utilization.

10) Communication and Notifications:

- These classes handle sending notifications, including appointment reminders, test results, and prescription pickup alerts.
- Attributes are defined for message content and delivery status.
- Associations exist with patients and appointments.

11) Security and Authorization:

- Classes within this category manage user authentication, authorization roles, and access control.
- Attributes include user credentials and permissions.
- Methods are implemented for enforcing data security and privacy regulations.

12) Integration Points:

- Classes are responsible for interfacing with external systems, such as insurance providers or laboratories.
- Attributes related to data exchange and communication protocols.
- Methods facilitate data synchronization and integration.

13) Accessibility Features:

- Consideration is given to classes or features that enhance accessibility for users with visual impairments or disabilities.
- This class category may include components like screen readers or voice command interfaces.

14) Compliance:

- The class diagram ensures alignment with industry regulations and standards related to healthcare and vision care services.
- Compliance is a crucial aspect, and classes related to this ensure adherence to legal requirements.

15) Scalability and Performance:

- The design of the class diagram takes into account the ability to scale the system in terms of patient volume and services offered.
- Performance optimization strategies are considered to ensure efficient system operation.

Assumptions:

1. The Vision Care system serves patients seeking vision care services.
2. Patient information, appointments, and medical services are fundamental components.
3. Prescription handling and inventory management are crucial for dispensing eyeglasses, contact lenses, and related products.
4. Billing and payments include methods for handling financial transactions.
5. Staff members, including eye care professionals, are part of the system and manage patient interactions.
6. Electronic Health Records (EHR) may be stored and managed, but their presence is contingent on system requirements.
7. Reporting and analytics provide insights into system performance and patient demographics.
8. Communication and notifications are essential for keeping patients informed.
9. Security and authorization ensure data privacy and compliance with regulations.
10. Integration points facilitate data exchange with external systems.
11. Accessibility features improve usability for users with disabilities.
12. Compliance ensures adherence to healthcare and vision care industry regulations.
13. Scalability and performance considerations allow the system to grow and perform efficiently as patient volume increases.

2.5 Component Diagram

- Component diagrams illustrate the organization and dependencies of software components within a system.
- They focus on the high-level structure of the system and how components interact to full-fill functionality.

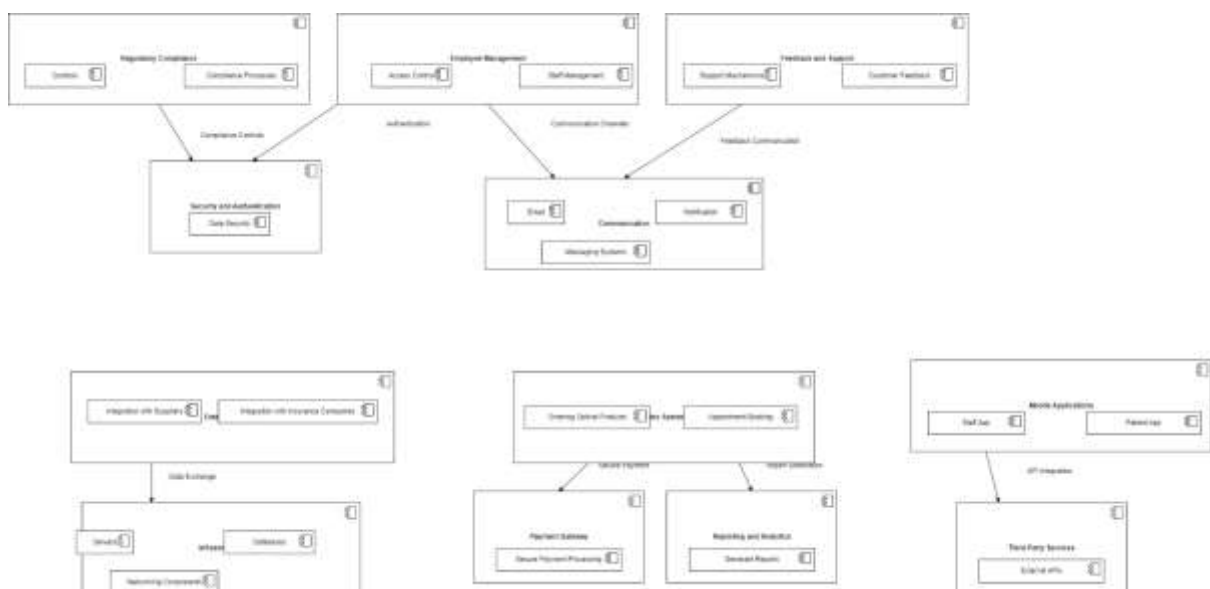


Figure 17: Component diagram

Explanations and Assumptions:

1) Online Services:

- Represents online platforms for appointment booking and optical product orders.
- Assumption: Online services interact with other components for payment and reporting.

2) Payment Gateway:

- Ensures secure payment processing for online transactions.

3) Reporting and Analytics:

- Generates reports on various business aspects.
- Assumption: Online services use reporting and analytics for business insights.

4) Employee Management:

- Manages staff, their roles, and access privileges.
- Assumption: Employee management component interfaces with security and communication.

5) Security and Authentication:

- Ensures data security and controls access to sensitive information.

6) Communication:

- Represents communication channels within the organization.
- Assumption: Communication component supports notifications and messaging.

7) External Systems:

- Represents integrations with external entities like insurance companies and suppliers.
- Assumption: External systems are integrated into infrastructure components.

8) Infrastructure:

- Represents physical or virtual infrastructure components.
- Assumption: Infrastructure supports external systems, mobile apps, and databases.

9) Mobile Applications:

- Includes patient and staff mobile apps.
- Assumption: Mobile apps interact with third-party services.

10) Third-Party Services:

- Represents external APIs and services that the company relies on.

11) Regulatory Compliance:

- Ensures compliance with regulations and standards.
- Assumption: Compliance controls are related to security and authentication.

12) Feedback and Support:

- Includes mechanisms for collecting customer feedback and providing support.
- Assumption: Feedback communication is part of the communication component.

2.6 Deployment Diagram

- Deployment diagrams visualize the physical architecture of a system, showing the hardware nodes, software components, and their connections.
- They are used to illustrate how software components are deployed across different nodes in a network.

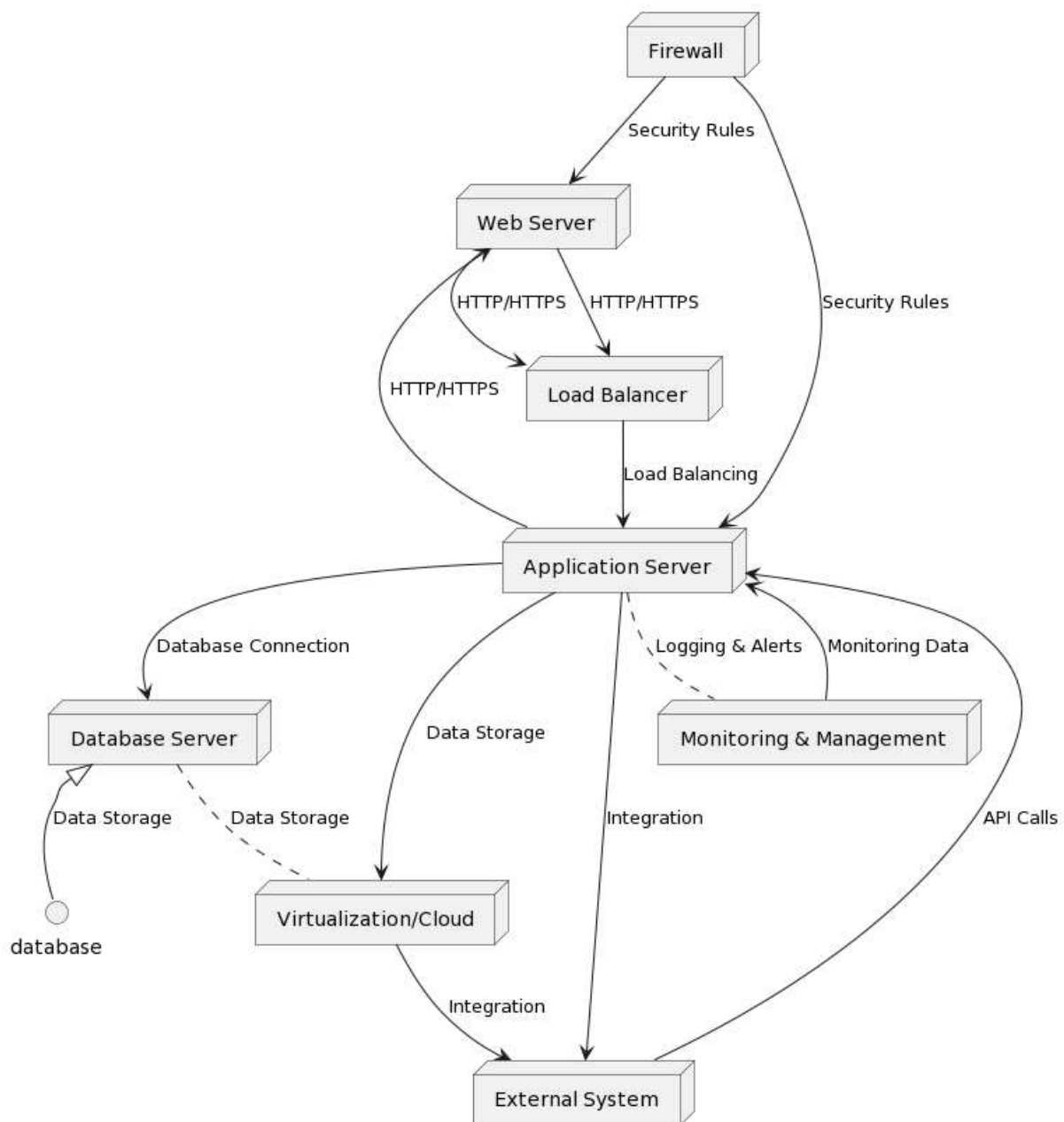


Figure 18: Deployment diagram

Explanations and Assumptions:

1) Physical Nodes:

- The diagram represents physical nodes such as web servers, application servers, database servers, and monitoring servers.

2) Software Components:

- Web servers, application servers, and database servers are represented as software components.

3) Connections and Communication:

- Communication paths are indicated with arrows and labelled with protocols (HTTP/HTTPS).

4) Database Servers:

- The database server is represented with a connection to the application server.

5) Load Balancers:

- A load balancer node is shown with connections to application servers for load balancing.

6) Firewalls and Security:

- A firewall node is depicted with connections to web and application servers.

7) Virtualization and Cloud Services:

- The cloud node represents virtualization or cloud services, which interact with the application server for data storage.

8) External Systems and Services:

- An external system node interacts with the application server via API calls.

9) Data Storage and Replication:

- Data storage is represented by the database server and its association with a database component.

10) Monitoring and Management Tools:

- A monitoring node is shown, indicating the use of monitoring and management tools.

11) Compliance and Data Security:

- Compliance and data security measures are not explicitly depicted but are assumed to be implemented within the firewall and application server.

12) Geographical Distribution:

- Geographic distribution is not explicitly shown but can be added if relevant.

13) Remote Access and VPNs:

- Remote access and VPNs are not depicted in this simplified diagram but can be added if required.

14) Physical Locations:

- Physical locations are not explicitly indicated in this diagram.

15) Failover and Disaster Recovery:

- Failover and disaster recovery solutions are not shown but can be added to ensure business continuity.

16) Performance Considerations:

- Performance considerations are not explicitly shown but should be taken into account in the system's design.

TEAM DETAILS

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9. PS/2019/309 K. H. R. Malsa