**Menoufia University**

**System Analysis & Design Project**

***Project Name***

**Hospital management system “HMS”**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Task | Evaluation |  | Task | Evaluation |
| Project Identification |  |  | **interview** |  |
| System Request |  |  | **DFD** |  |
| Feasibility Analysis |  |  | **Data Dictionary** |  |
| Project Methodology |  |  | **Process Specification** |  |
| Time Estimation |  |  | **ERD** |  |
| Tasks Identification |  |  | **Normalization** |  |
| Work Plan |  |  | **Architecture Design** |  |
| Pert Chart |  |  | **Data storage Design** |  |
| Gantt chart |  |  | **Program design** |  |
|  |  |  | **Interface design** |  |

**Project Planning**

***Project Identification***

# Project Name: A hospital Administration system

# Current Problem: difficulty in keep tracking of patient’s records and Scheduling Appointments

 **Difficulty in Tracking Patient Records:**

* **Problem:** Hospitals often face challenges in maintaining and retrieving patient records efficiently. Paper-based systems or outdated electronic systems can lead to misplaced records, delayed information retrieval, and increased administrative workload.
* **Impact:** This can result in longer wait times for patients, errors in patient information, and inefficiencies in providing medical care.

 **Challenges in Scheduling Appointments:**

* **Problem:** Scheduling appointments manually or through inefficient systems can lead to double bookings, missed appointments, and difficulty in managing doctors' schedules.
* **Impact:** Patients may experience delays in receiving care, and healthcare providers may struggle to manage their time effectively, leading to reduced overall productivity and patient satisfaction.

Description Of the project: building a system to facilitate the hospital management . The Hospital Administration System is designed to streamline and improve the management of hospital operations, focusing on enhancing the efficiency of patient record management and appointment scheduling. This system aims to provide a centralized platform for handling various administrative tasks, ensuring that hospital staff can access accurate and up-to-date information quickly and easily.

***System Request***

|  |  |
| --- | --- |
| Hospital administration system | |
| **Project Sponsor:** | Mohamed Hatem |
| **Business Need:** | 1. A system to facilitate the hospital’s work 2. Centralized Patient Record Management 3. Efficient Appointment Scheduling 4. Enhanced Data Security and Compliance 5. User-Friendly Interface |
| **Business Requirements:** | **Hospital Information System (HIS)**  **Inventory Management System**  **Clinical Decision Support System (CDSS)**  **Integrated Billing and Insurance Software**  **Automated Scheduling System**  **Appointment Management:**   * Online and offline appointment booking. * Automated scheduling and rescheduling. * Notifications and reminders for patients and staff.   **Reporting and Analytics:**   * Generate reports on patient visits, treatment outcomes, and operational efficiency. * Provide analytics to support decision-making and improve hospital services. |
| **Business Value:** | 1. **Enhanced Patient Care** 2. **Reduced Errors** 3. **Improved Communication** 4. **Increased Data Security and Compliance** 5. **Scalability and Flexibility** 6. **Competitive Advantage** 7. **Financial Performance**    1. That will save up about 3000$ per month. |
| **Special Issues or Constraints:** | 1. **Data Security and Privacy** 2. Internet and Network Reliability 3. **Scalability:** 4. The system should be scalable to handle increasing numbers of patients and data as the hospital grows. This requires careful planning of infrastructure and resources. 5. **Training Requirements:** 6. **Infrastructure Requirements:** |

# Feasibility Study for the Hospital Administration System

# **Technical Feasibility:**

 Existing Infrastructure Compatibility:

* The hospital already has some basic IT infrastructure in place, like computers and internet connectivity. This infrastructure will need upgrades to support the new system, but it's a solid starting point.

 Technology Availability:

* The necessary technology for the Hospital Administration System—like Electronic Health Records (EHR) software, appointment scheduling tools, and data storage solutions—is readily available. These technologies are well-established and widely used in the healthcare industry.

 Implementation Complexity:

* The project involves moderate complexity, with tasks like integrating new software with existing systems, setting up secure data storage, and ensuring network reliability. These tasks are manageable with the right expertise.

 IT Expertise:

* The hospital has access to IT professionals who can handle the installation, configuration, and maintenance of the system. If needed, external vendors or consultants can be brought in to assist with more complex aspects.

 Scalability:

* The system is designed to be scalable, meaning it can grow with the hospital. As the hospital expands, the system can handle more patient data and additional features without requiring a complete overhaul.

# Economic Feasibility:

## (identify costs and benefits)

**1. Development Costs:**

* **Initial Costs:**
  + **Software Development/Procurement:** $50,000
  + **Hardware Costs:** $20,000
  + **Implementation Costs:** $10,000
  + **Training Costs:** $5,000
  + **Total Initial Costs:** $85,000

**2. Operational Costs:**

* **Ongoing Costs:**
  + **Maintenance and Support:** $10,000 per year
  + **Staffing Costs:** $40,000 per year
  + **Operational Costs:** $5,000 per year
  + **Total Ongoing Costs:** $55,000 per year

**3. Tangible Benefits:**

* **Cost Savings:**
  + **Administrative Savings:** $25,000 per year
  + **Efficiency Savings:** $20,000 per year
  + **Error Reduction:** $10,000 per year
  + **Paper and Printing Savings:** $5,000 per year
  + **Total Cost Savings:** $60,000 per year
* **Revenue Enhancement:**
  + **Increased Patient Throughput:** $30,000 per year
  + **Improved Patient Satisfaction:** $10,000 per year
  + **Total Revenue Enhancement:** $40,000 per year

**4. Intangible Benefits:**

* **Improved Patient Satisfaction**.
* **Enhanced Decision-Making:** The system can provide better data for decision-making, improving overall hospital efficiency and service quality.
* **Compliance and Risk Reduction**

1. **Economic Value Assessment:**

* **Cash flow: = Total Cash Inflows - Total Cash Outflows**

### **Summary of Cash Flow:**

* **Year 0:** -$85,000 (initial investment)
* **Year 1:** +$45,000
* **Year 2:** +$45,000
* **Year 3:** +$45,000
* **Return on Investment (ROI):** 165%
* **Break-Even Point (BEP):**

**Time:** 1.89 years

* **Net Present Value (NPV):** $85,585.40 (at a 10% discount rate for 5 years)

# Operational Feasibility:

 **Fit with Hospital Goals:**

* The system aligns with the hospital’s goals to improve patient care and make operations more efficient.

 **Stakeholder Support:**

* Key stakeholders, including hospital management and staff, support the project and understand its benefits.

 **Staff Training:**

* Staff will need training to use the new system, but the hospital is prepared to provide this training to ensure everyone is comfortable with the technology.

 **Resources Available:**

* The hospital has the necessary resources, including IT staff and budget, to implement and maintain the system.

 **Managing Change:**

* The hospital plans to manage the transition carefully, with phased rollouts and clear communication to help staff adjust to the new system.

# Schedule Feasibility

This app will be finished in 10 month

# [Planning](System%20analysis1.docx)

# Project Methodology

# Rapid Application Development (RAD)

# Iterative

A diagram of a system

Description automatically generated

# Time Estimation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Planning | Analysis | Design | Implementation |
| **Standard percentages** | 15% | 20% | 35% | 30% |
| **Estimated time based on planning time** | 1.5 month | 2 months | 3.5 months | 3 months |

# Tasks Identification

|  |  |
| --- | --- |
| Project Identification | Name of Task |
| 2024-10-01 | Start Date |
| 2024-10-10 | End Date |
| Mai | The person assigned to the task |
| High | Priority |
| Microsoft Word | Resources Needed |
| 9 Days | Estimated Time |
| 4 Day | Actual Time |

|  |  |
| --- | --- |
| System Request | Name of Task |
| 2024-10-01 | Start Date |
| 2024-10-10 | End Date |
| ahmed | The person assigned to the task |
| High | Priority |
| Microsoft Word | Resources Needed |
| 9 Days | Estimated Time |
| 4 Day | Actual Time |

|  |  |
| --- | --- |
| Feasibility Analysis | Name of Task |
| 2024-10-01 | Start Date |
| 2024-10-10 | End Date |
| yara | The person assigned to the task |
| High | Priority |
| Microsoft Word | Resources Needed |
| 9 Days | Estimated Time |
| 4 Day | Actual Time |

|  |  |
| --- | --- |
| Project Methodology | Name of Task |
| 2024-10-01 | Start Date |
| 2024-10-10 | End Date |
| yussef | The person assigned to the task |
| High | Priority |
| Microsoft Word | Resources Needed |
| 9 Days | Estimated Time |
| 4 Day | Actual Time |

|  |  |
| --- | --- |
| Time estimation | Name of Task |
| 2024-10-01 | Start Date |
| 2024-10-10 | End Date |
| ayat | The person assigned to the task |
| High | Priority |
| Microsoft Word | Resources Needed |
| 9 Days | Estimated Time |
| 4 Day | Actual Time |

|  |  |
| --- | --- |
| Tasks Identification | Name of Task |
| 2024-10-01 | Start Date |
| 2024-10-10 | End Date |
| sara | The person assigned to the task |
| High | Priority |
| Microsoft Word | Resources Needed |
| 9 Days | Estimated Time |
| 4 Day | Actual Time |

|  |  |
| --- | --- |
| Project Identification | Name of Task |
| 2024-10-01 | Start Date |
| 2024-10-10 | End Date |
| momen | The person assigned to the task |
| High | Priority |
| Microsoft Word | Resources Needed |
| 9 Days | Estimated Time |
| 4 Day | Actual Time |

|  |  |
| --- | --- |
| Pert Chart | Name of Task |
| 2024-11-10 | Start Date |
| 2024-11-20 | End Date |
| Hany | The person assigned to the task |
| High | Priority |
| Microsoft Word | Resources Needed |
| 10 Days | Estimated Time |
| 9 Day | Actual Time |

|  |  |
| --- | --- |
| Gantt chart | Name of Task |
| 2024-11-20 | Start Date |
| 2024-11-30 | End Date |
| Hany | The person assigned to the task |
| High | Priority |
| Microsoft Word  Microsoft Excel | Resources Needed |
| 10 Days | Estimated Time |
| 10 Day | Actual Time |

|  |  |
| --- | --- |
| Questionnaire | Name of Task |
| 2024-11-20 | Start Date |
| 2024-11-30 | End Date |
|  | The person assigned to the task |
| High | Priority |
| Microsoft Word  Microsoft Excel | Resources Needed |
| 10 Days | Estimated Time |
| 10 Day | Actual Time |

|  |  |
| --- | --- |
| Context diagram \_ DFD | Name of Task |
| 2022-12-18 | Start Date |
| 2022-12-20 | End Date |
| Sondos | The person assigned to the task |
| High | Priority |
| Lucid Application | Resources Needed |
| 2 Days | Estimated Time |
| 2 Day | Actual Time |

|  |  |
| --- | --- |
| Level-0 \_ DFD | Name of Task |
| 2022-12-18 | Start Date |
| 2022-12-20 | End Date |
| Aya Aly | The person assigned to the task |
| High | Priority |
| Lucid Application | Resources Needed |
| 2 Days | Estimated Time |
| 2 Day | Actual Time |

|  |  |
| --- | --- |
| Data dictionary | Name of Task |
| 2022-12-18 | Start Date |
| 2022-12-20 | End Date |
| Aly | The person assigned to the task |
| High | Priority |
| Lucid Application | Resources Needed |
| 2 Days | Estimated Time |
| 2 Day | Actual Time |

|  |  |
| --- | --- |
| Process specification | Name of Task |
| 2022-12-18 | Start Date |
| 2022-12-20 | End Date |
| Momen,aly,aya,yussef | The person assigned to the task |
| High | Priority |
| Lucid Application | Resources Needed |
| 2 Days | Estimated Time |
| 2 Day | Actual Time |

# WORK Plan

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Task ID | Task Name | Assigned to | Estimated | | | Actual | | | Dependency | Status |
| Duration (Days) | Start Date | Finish Date | Start Date | Finish Date | Duration Variance |
| A | Project Identification | Aya Ali | 9 | 2024-10-01 | 2024-10-10 | 2024-10-01 | 2024-10-5 | 4 | - | Closed |
| B | System Request | Aya Ali | 14 | 2024-10-01 | 2024-10-15 | 2024-10-01 | 2024-10-15 | 14 | - | Closed |
| C | Feasibility Study | Aya Ali | 5 | 2024-10-10 | 2024-10-15 | 2024-10-6 | 2024-10-11 | 5 | A | Closed |
| D | Project Methodology | Afnan  Raafat | 17 | 2024-10-15 | 2024-11-01 | 2024-10-11 | 2024-10-20 | 9 | C | Closed |
| E | Time estimation | Afnan Raafat | 17 | 2024-10-15 | 2024-11-01 | 2024-10-11 | 2024-10-20 | 9 | C | Closed |
| F | Task Identification | Anas Hany | 9 | 2024-11-01 | 2024-11-10 | 2024-10-20 | 2024-10-25 | 5 | E | Closed |
| G | Work Plan | Anas Hany | 9 | 2024-11-1 | 2024-11-10 | 2024-10-20 | 2024-10-25 | 5 | E | Closed |
| H | Pert Chart | Anas Hany | 10 | 2024-11-10 | 2024-11-20 | 2024-11-1 | 2024-11-10 | 9 | F, G | Closed |
| I | Gantt Chart | Anas Hany | 10 | 2024-11-20 | 2024-11-30 | 2024-11-10 | 2024-11-20 | 10 | G, H | Closed |
| J | Questionnaire | Islam Sobhy | 10 | 2024-11-20 | 2024-11-30 | 2024-11-20 | 2024-11-30 | 10 | - | Closed |
| K | Interview | Islam Sobhy | 10 | 2024-11-20 | 2024-11-30 | 2024-11-20 | 2024-11-30 | 10 | - | Closed |
| L | Context diagram DFD | Aya Aly | 1 | 2024-12-1 | 2024-12-2 | 2024-12-1 | 2024-12-2 | 1 | K | Closed |
| M | Level-0 \_ DFD | Afnan Raafat | 3 | 2024-12-3 | 2024-12-6 | 2024-12-3 | 2024-12-6 | 3 | K, L | Closed |
| N | Level-1 \_ DFD | Anas Hany | 4 | 2024-12-7 | 2024-12-11 | 2024-12-7 | 2024-12-11 | 4 | K, M | Closed |
| O | Data Dictionary | Aya,  Anas | 2 | 2024-12-12 | 2024-12-14 | 2024-12-11 | 2024-12-14 | 2 | M | Closed |
| P | Process specification | Aya,  Anas,  Afnan,  Islam | 3 | 2024-12-15 | 2024-12-18 | 2024-12-15 | 2024-12-18 | 3 | M | Closed |

# Pert Chart (MS-Project)

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | Description | Predecessors | Duration in days |
| A | Project Identification | - | 9 |
| B | System Request | - | 14 |
| C | Feasibility Study | A | 5 |
| D | Project Methodology | C | 17 |
| E | Time estimation | C | 17 |
| F | Task Identification | E | 9 |
| G | Pert Chart | F | 10 |
| H | Gantt Chart | G | 10 |
| I | Context diagram DFD | - | 2 |
| J | Level-0 \_ DFD | I | 4 |
| K | Level-1 \_ DFD | J | 4 |
| L | Data Dictionary | J | 4 |
| M | Process specification | J | 4 |

D, 17

C, 5

A, 9

E, 17

B, 14

F, 9

G, 10

H, 10

J, 4

K, 4

L, 4

I, 2

8

M, 4

# Gantt chart (MS-Project)

# Analysis (Project Proposal)

**Interview**

1. **Current System**:
   * Can you describe the current patient record management and appointment scheduling processes?
   * What are the primary challenges you face with the current system?
   * How is patient data currently stored, accessed, and updated?
   * Are there any concerns regarding data security or accuracy?
2. **User Requirements**:
   * What specific features or functionalities would you like to see in the new system? (automated appointment reminders, patient history tracking)
   * How do you envision the new system improving overall hospital efficiency and patient care?
3. **Integration with Other Systems**:
   * Are there any existing systems or software that the new system needs to integrate with? (billing, laboratory management)
   * How should data be shared across departments to ensure seamless operations?
4. **User Access and Permissions**:
   * What levels of access should different staff members have? (doctors, nurses, administrative staff)
   * Are there any specific roles or departments that require special access or permissions within the system?
5. **Compliance and Regulations**:
   * What are the key regulatory requirements (HIPAA) that the system must comply with?
   * How do you currently handle patient consent and data privacy, and what improvements would you like to see?

**For Medical Staff (Doctors, Nurses, Technicians):**

1. **Daily Operations**:
   * How do you currently manage patient records, appointments, and communication with other departments?
   * What challenges do you face in accessing or updating patient information during your daily tasks?
2. **System Features**:
   * What features would help you deliver better patient care? (quick access to medical history, integration with lab results)
   * How should the system support decision-making during patient treatment?
3. **Ease of Use**:
   * What would make the system more user-friendly for you? ( mobile access, intuitive interface)
   * How much training do you think will be needed for the new system, and what training formats would be most effective?
4. **Emergency Situations**:
   * How should the system handle emergencies or urgent cases? (e.g., prioritization of certain tasks or information)
   * What are the critical pieces of information you need during an emergency, and how should they be presented?

**For IT and Support Staff:**

1. **Technical Requirements**:
   * What are the technical requirements and infrastructure considerations for implementing the new system?
   * What challenges do you anticipate in integrating the new system with existing IT infrastructure?
2. **Data Migration**:
   * How will existing data be migrated to the new system? What issues might arise during this process?
   * Are there any specific data formats or standards that the system needs to adhere to?
3. **Support and Maintenance**:
   * What are your expectations for system maintenance and technical support post-implementation?
   * How should the system handle backups, disaster recovery, and regular updates?
4. **Security**:
   * What security measures do you currently have in place, and what additional security features do you need in the new system?
   * How should the system handle potential security breaches or unauthorized access attempts?

### For Patients (Optional):

**Patient Experience**:

* How do you currently schedule appointments and access your medical records?
* What improvements would you like to see in how the hospital manages appointments and patient information?

**Accessibility**:

* What would make it easier for you to interact with the hospital’s systems? (e.g., online portals, mobile apps)
* How important is it for you to have access to your medical history and test results online?

|  |
| --- |
| **Interview Report** |
| **Person Interviewed:** Dr. Sarah Ahmed, Hospital Administrator  **Interviewer:** Yussef , mai ,sara  **Date: August 19, 2024**  **1.** Determine System’s Details.  **Summary of Interview:**   * **Permissions and Roles:**   + The system will have three primary user roles: Doctor, Nurse, and Administrative Staff.   + Doctors will have access to patient medical records, be able to update treatment plans, and request lab tests.   + Nurses will access patient care plans, record vital signs, and manage medication administration schedules.   + Administrative Staff will handle patient registrations, appointment scheduling, and billing information. * **Patient Data Management:**   + Each patient will have a unique Patient ID for tracking across the system.   + Doctors will enter patient diagnosis, treatment plans, and prescriptions.   + Nurses will update patient progress notes and administer treatments as per the doctor’s instructions.   + Administrative Staff will input patient demographic details, insurance information, and appointment dates. * **Appointment Scheduling:**   + The system will include a centralized calendar for managing doctor and patient appointments.   + Patients will be able to view available time slots and request appointments online.   + Administrative Staff will confirm appointments and manage rescheduling as needed. * **Billing and Payments:**   + The system will integrate with existing billing software for processing patient payments.   + Patients will have the option to pay bills online using their Patient ID.   + The system will generate invoices and track payment status for each patient.   **Detailed Notes:**   The interview provided insights into the specific needs and expectations for the new system, highlighting the importance of role-based access, streamlined appointment scheduling, and integration with billing processes.   Additional details and quotes from the interview are available in the attached transcript. |

**Functional and non functional**

**Functional Requirements**

**Patient Record Management:**

* + Manage patient information (create, update, delete, retrieve).
  + Secure sharing of records among authorized personnel.

1. **Appointment Scheduling:**
   * Online and offline booking.
   * Automated conflict-free scheduling, rescheduling, and reminders.
2. **Inventory Management:**
   * Real-time tracking of medical supplies.
   * Alerts for low stock or expiring items, and support for reordering.
3. **Billing and Insurance Processing:**
   * Generate invoices and process payments.
   * Integrate with insurance systems for claim submissions and tracking.
4. **Reporting and Analytics:**
   * Generate reports on various hospital metrics.
   * Provide data analytics for informed decision-making.
5. **User Management:**
   * Role-based access control.
   * Manage user accounts (create, update, deactivate).

**Non-Functional Requirements (How the system should perform):**

1. **Performance:**
   * Fast response times, handling multiple users simultaneously.
2. **Scalability:**
   * Ability to grow with the hospital’s needs, supporting additional users, data, and features.
3. **Security:**
   * Protect patient data with strong encryption, authentication, and compliance with regulations.
4. **Usability:**
   * User-friendly interface with easy navigation and support resources.
5. **Reliability:**
   * High system uptime (99.9%) with backup and disaster recovery in place.
6. **Maintainability:**
   * Modular design for easy updates and enhancements, with comprehensive documentation.
7. **Compliance:**
   * Adherence to healthcare regulations with audit and reporting capabilities.

# System Proposal for Hospital Administration System

## 1. Executive Summary

The Hospital Administration System (HAS) is proposed to modernize the hospital’s administrative functions by digitizing patient records and streamlining appointment scheduling. The system aims to increase efficiency, minimize errors, and enhance patient and staff experiences through automation and improved data access.

## 2. System Request

**Project sponsor , business need, business value , special issues more details in slides 1**

3. **Work Plan**

** Project Phases:**

1. **Initiation: Define the project’s scope, objectives, and deliverables; identify key stakeholders and resources.**
2. **Planning: Gather requirements, design the system architecture, and create a risk management plan.**
3. **Execution: Develop, test, and validate the system; ensure it meets the defined requirements.**
4. **Closure: Deploy the system, conduct training, and perform a post-implementation review.**

** Timeline: The project is projected to be completed within six months.**

** Resources: The team will include project managers, analysts, developers, and testers.**

**More in slides**

## 4. Feasibility Analysis

** Technical Feasibility: The hospital’s existing infrastructure can support the HAS, and the necessary technical expertise is available.**

** Economic Feasibility: The project is financially viable, with long-term cost savings expected to outweigh the initial investment.**

** Operational Feasibility: The system is expected to be well-received by hospital staff, with proper training ensuring a smooth transition.**

**More in slides**

## 5. Requirements Definition

** Functional Requirements:**

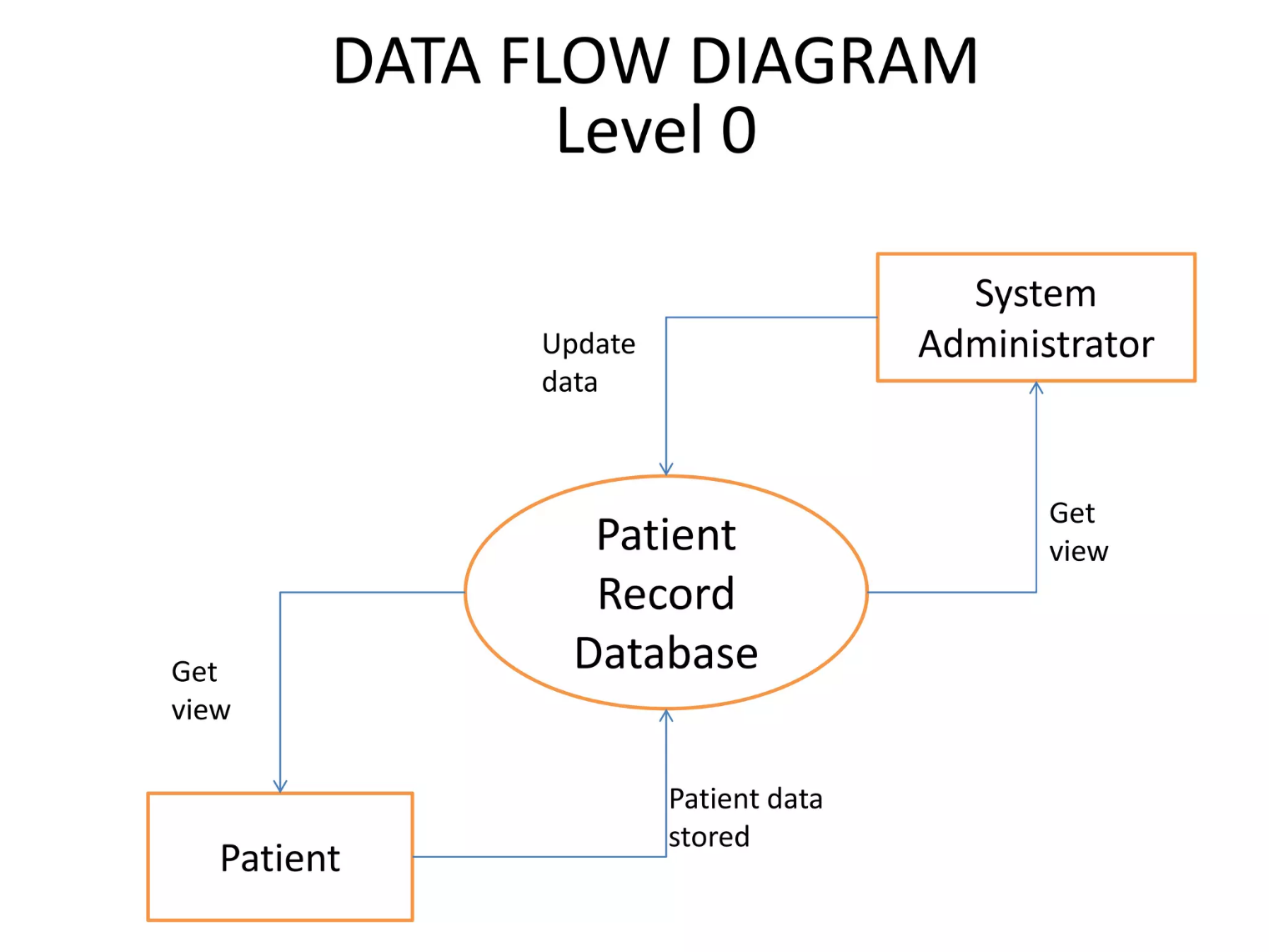
* **Enable digital management of patient records and appointments.**
* **Provide tools for efficient retrieval and updating of patient data.**
* **Generate administrative reports for hospital management.**

** Non-Functional Requirements:**

* **Performance: Support multiple users simultaneously without significant lag.**
* **Security: Ensure that patient data is protected in accordance with regulatory standards.**
* **Usability: Design the system to be intuitive for healthcare professionals.**
* **Reliability: Maintain high availability and regular backups to prevent data loss.**

**This proposal provides a high-level overview of the Hospital Administration System, highlighting the need for modernization and the expected benefits of the project.**

**Data Flow Diagram - Context Diagram**



**Data Flow Diagram – Level 1**

A diagram of a patient

Description automatically generated

A diagram of a patient record

Description automatically generated