**The Islamia University of Bahawalpur**

**Department of Computer Science**

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**SOFTWARE REQUIREMENTS SPECIFICATION**

**(SRS DOCUMENT)**

**for**

**<Hospital Management System>**

##### Version 1.0

***By***

**Student Name**

**Roll No**

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***Bachelor of Science in Computer Science***

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**Revision History**

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**Application Evaluation History**

|  |  |
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**Supervised by**

**<Supervisor’s Name>**

Signature

# INTRODUCTION

A Hospital Management System (HMS) is a sophisticated software solution designed to digitize and optimize the administrative and clinical processes within a healthcare institution. This system facilitates efficient management of patient records, billing, and inventory. By centralizing these functions, an HMS helps enhance overall hospital efficiency, reduce paperwork, and improve patient care. It provides a user-friendly interface for healthcare professionals and administrative staff, contributing to a more organized and streamlined healthcare environment.

## 1.1 Purpose

The primary purpose of a **Hospital Management System (HMS)** is to streamline and automate the administrative and clinical operations within a healthcare facility. This includes managing patient information, maintaining medical records, handling billing and invoicing, and overseeing inventory. The overarching goal is to improve overall operational efficiency, reduce manual paperwork, enhance accuracy in data management, and ultimately, provide better patient care. The HMS aims to create a centralized and integrated platform that enables healthcare professionals and administrators to access, manage, and share critical information swiftly, contributing to the overall effectiveness and productivity of the healthcare institution.

## 1.2 Scope

Information about Patients is done by just writing the Patients name, age and gender. Whenever he Patient comes up his information is stored freshly. Bills are generated by recording price for each facility provided to Patient on a separate sheet and at last they all are summed up. Diagnosis information to patients is generally recorded on the document, which contains Patient information. It is destroyed after some time to decrease the paper load in the office. All this work is done manually by the receptionist and other operational staff and lot of papers are needed to be handled and taken care of. Doctors must remember various medicines available for diagnosis and sometimes miss better alternatives as they can’t remember them at that time.

# The Overall Description

## 2.1 Product Perspective:

The Hospital Management System (HMS) represents a new and innovative product designed to enhance the efficiency and effectiveness of healthcare management. It is not a replacement for an existing application but rather a fresh solution addressing the growing needs of modern healthcare facilities. The system stands as an independent and standalone product, not necessarily part of an existing product line. It introduces a novel approach to hospital management, leveraging advanced technologies to streamline patient data management, appointment scheduling, medical record updates, billing, and inventory management. The HMS is envisioned as a comprehensive tool catering to the evolving requirements of healthcare professionals and administrative staff, providing a user-friendly interface for seamless interaction with the system.

## 2.2 Operating environment

The Hospital Management System (HMS) boasts a versatile operating environment, supporting Windows, macOS on desktops, laptops. Secure data centers host HMS servers and databases, emphasizing data integrity and security. The cloud service provider ensures reliable management. The system is optimized for major web browsers, including Chrome, Firefox, Edge, and Safari. Overall, the HMS offers a flexible and secure ecosystem for healthcare professionals worldwide.

OE-1: The Hospital Management System (HMS) shall operate on the following hardware platforms:

* Desktop Computers: Compatible with Windows and macOS operating systems.
* Laptops: Compatible with Windows and macOS operating systems.
* Tablets: Compatible with iOS and Android operating systems.
* Servers: Linux-based servers with sufficient processing power and storage capabilities.

OE-2: The recommended operating systems and versions for the HMS are as follows:

* Windows 7 or later for desktop computers and laptops.
* macOS Catalina (10.15) or later for Apple devices.
* Ubuntu Server 18.04 LTS or later for hosting the system on servers.

OE-3: Organizations hosting databases, servers, and websites:

* The HMS databases and servers will be hosted and managed by a reliable cloud service provider with a strong focus on security and data privacy.
* The associated website, used for user interaction and access to the HMS, will be hosted on secure servers provided by a reputable hosting service

## 2.3 Design and implementation constraints

### 2.3.1 General constraints:

1. **Regulatory policies**

To understand what rules, regulations and obligations are applicable to the companies. The companies use Regulatory policies. Administrator of the Hospital Management System develop these policies. He can change his policies according to his own requirements.

1. **Hardware limitations**

The required minimum hardware for the system should be 1gb ram and 80gb hard drive and processing capacity should be 2.4 core duo.

1. **Parallel operation**

The developing system will be able to handle multiple operations at the same time.

The system and SQL server will work in synchronized way.

The system is capable of printing report of different types.

1. **Higher-order language requirements**

The software is being developed by using English American or British language.

1. **Reliability requirements**

System is reliable because several recovery procedures will be maintained from the back up storage.

1. **Safety and security considerations**

Safety is maintained by using the login mechanism and the security will be maintained according to the standard of the shop.

1. **Others:**

The application is being developed by using C# window form tool which will be initially accessible using Microsoft visual studio.

### 2.3.2 Assumptions and dependencies:

This includes delay in delivery, delivering product with problems in alterations, giving wrong delivery address, delivering the product in wrong address, any miscommunication and online payment issues. Each step is dependent on other step and mistake in any step can lead to failure of the project.

# Requirement identifying technique

## 3.1 SPECIFIC REQUIREMENTS

### 3.1.1 External Interface Requirements

**System Interfaces**

The system interface is like forms which are to be filled to enter data into the system. The employee interacts with the system through system interfaces.

**User Interfaces**

The system is designed in such a way that the users can post reviews, ratings and complaints in the sections which are separately provided for it. The vendors are given provision to upload the image of their products. There is a section for the vendors and the customers to chat through a bot with smart technology. If it is a new question, then the user can post the question which will be answered within short span of time. The images which are uploaded should be of the .jpeg or .png format. There are also options for user to change the website language according to his/her wish.

**Home Page**

It is the first interface that appears on the screen when the application is being loaded. This interface displays the name of the application and some other information about the software. The page consists of logins that exist for several other levels in the application. They consist of administrator, supervisor and staff login.

**Admin Login Menu**

After a successful login supplying the correct username and password, it opens into another page where the activities of the admin module are fully stipulated. The admin controls all the major activity is of this application. Activities such as Add staff, Add Drugs, Change Username and password, manage drugs, View sales etc. can only be controlled by the admin. Furthermore, the Admin has control over the supervisor and all other user of the application.

**Staff Login**

The staff is responsible for updating the list of patients in the system. The staff can also engage in buying, selling of drugs and printing the reports. The staff is required to provide a valid username and password in other to be able to perform its activities

### 3.1.2 Hardware Interfaces

The system that going to developed is requires some hardware specifications so that it can be utilized efficiently. The computer on which this system is going to be used must have the specified hardware components. All the hardware needed here are generally the basic configuration of a typical office computer. A list of the hardware requirement used in the system given below:

**Minimum Configuration**

Minimum configuration for the system is described below:

* + Keyboard.
  + Mouse.
  + A printer.
  + 2.5 Hz Pentium processor.
  + 500 MB SD RAM.
  + Minimum 80 GB Hard Drive.
  + Monitor Display. Or LCD or LED.

**Recommended Configuration**

The configuration mention above is to use the system just effectively. The configuration described below can be used to have better and optimum result during the working of the system.

* + 2GHz core 2 duo.
  + Keyboard.
  + Mouse.
  + Crystal Report
  + 2GB or more SD RAM.
  + Minimum 80 or more GB Hard drive.
  + Color Monitor.
  + 500 V. UPS. (can be used in case of power failure)

### 3.1.3 Software Interface

The system will have form-based interface which allow an employee to enter a specific password assigned to it and username. After this he will open different screens for different purposes. This is customized software in the form of a package. The software which I have chosen for the system are explained below. These are the updated version compatible with the system.

* Operating system.
* Window 10 (32 or 64 bit).
* Visual studio 2019 Enterprise.
* .Net Framework 4.6 or higher.
* Notepad or MS word installed.

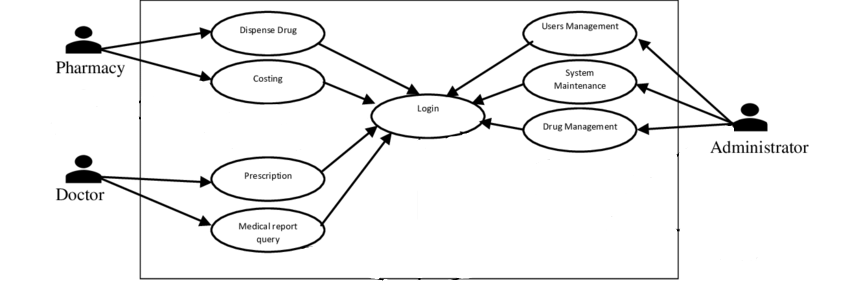
### 3.1.4 Microsoft SQL Server

SQL server is used to connect with the database using OLEDB and ODBC data connection. Many backend software is available for data storage such as MS access, Sybase, oracle and my SQL. Here we are choosing Microsoft SQL Server as database for the system. It has best features supporting the .net framework. Some features are:

* Multiple platforms supported by the system.
* Integration with Windows 8.1 or 10 or 7.
* Integration with MS .NET Enterprise Servers.
* Scalability.
* Replication.
* Centralized Management.
* Reliability.

## 3.2 Use Case Diagram

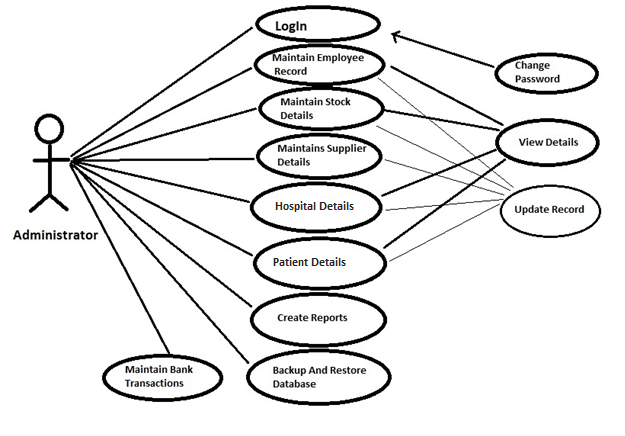
The Use Case Diagram for the Hospital Management System (HMS) provides a visual representation of the various interactions and functionalities within the system. Actors, including the Receptionist, Patient, and Calendar System, are illustrated, depicting their roles and relationships with distinct use cases. Key use cases such as Scheduling Patient Appointments, Updating Patient Information, Checking Appointment Availability, and Notifying Patients are outlined to offer a comprehensive overview of the system's capabilities. This diagram serves as a valuable tool for understanding the high-level functionalities and interactions within the HMS, aiding in system design and communication among stakeholders.



**Use Case Diagram 1**

### 3.2.1 Admin Use Case

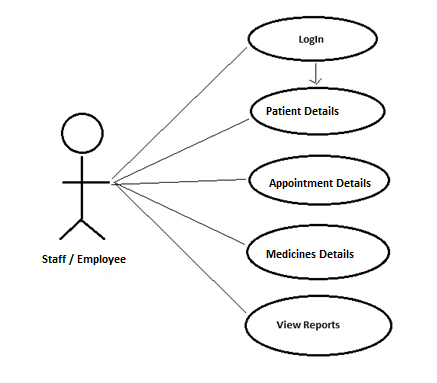
In the Hospital Management System (HMS), the Administrator Management use case is essential for overseeing the system's overall functionality. The Administrator, as the primary actor, holds responsibilities such as user management, system configuration, data security, and system maintenance. By managing user accounts, configuring system settings, ensuring data security and privacy, and handling routine maintenance tasks, the Administrator plays a crucial role in maintaining the integrity and security of patient data. Additionally, the generation of reports and analytics falls under the Administrator's purview, contributing to informed decision-making. This use case ensures that the HMS operates seamlessly, aligns with organizational policies, and remains secure.



**Use Case Diagram 2**

### 3.2.2 Use Case for Staff/Employee

The Staff Interaction use case caters to the daily operational needs of healthcare professionals within the HMS. Staff members, as primary actors, engage with the system for patient management, appointment scheduling, billing and payments, prescription management, and resource allocation. This use case empowers staff with the tools needed for efficient patient care, streamlined appointment processes, and effective financial management. Staff members can also utilize the system for internal communication, collaboration on patient care, and accessing training modules for professional development. Together, the Administrator and Staff Interaction use cases contribute to the holistic functioning of the HMS, ensuring it meets the diverse needs of both administrators and healthcare professionals.



**Use Case Diagram 3**

## 3.3 Use Case Description

### 3.3.1 Use Case Description for Admin

|  |  |
| --- | --- |
| **Use Case ID:** | UC-Admin-1 |
| **Use Case Name:** | Administer System Configuration |
| **Actors:** | Primary Actor: Administrator  Secondary Actors: Database Management System (DBMS |
| **Description:** | The Administrator accesses the Hospital Management System (HMS) to configure and administer system settings. This includes managing user roles and permissions, configuring data backup schedules, and ensuring data security protocols are in place. The Administrator may also oversee integrations with external systems and manage the overall system configuration to align with organizational requirements. |
| **Trigger:** | The Administrator initiates the use case by indicating the need to configure or administer system settings. |
| **Preconditions:** | PRE-1: The Administrator is logged into the HMS.  PRE-2: The HMS is in an operational state. |
| **Postconditions:** | POST-1: System configuration changes are saved and implemented.  POST-2: User roles and permissions are updated if modified.  POST-3: Data security protocols are in effect.  POST-4: Integration settings, if modified, are applied. |
| **Normal Flow:** | 1. The Administrator accesses the system configuration panel. 2. The Administrator selects the category of configuration to be modified (e.g., user roles, data backup). 3. The Administrator makes necessary changes. 4. The Administrator confirms the changes, triggering the system to apply the modifications. 5. The system displays a confirmation message indicating successful configuration changes. |
| **Alternative Flows: [Alternative Flow 1 – Not in Network]** | 1. The Administrator selects the user roles category. 2. The Administrator modifies user roles and permissions. 3. The Administrator confirms changes, and the system updates user roles accordingly. |
| **Exceptions:**  **Configuration Error:** | If there is an error in the configuration changes, the system displays an error message.  The Administrator can choose to correct the error and reconfirm the changes or cancel the process. |
| **Business Rules** | BR-1: Configuration changes must comply with organizational policies.  BR-2: User roles and permissions must adhere to the principle of least privilege. |
| **Assumptions:** | Assumption 1: The Administrator has the necessary knowledge to make informed system configuration decisions.  Assumption 2: The HMS is in a stable operational state during the configuration process. |

### 

### 3.3.2 Use Case Description for Staff/Employee

|  |  |
| --- | --- |
| **Use Case ID:** | UC-Staff-1 |
| **Use Case Name:** | Perform Daily Tasks |
| **Actors:** | Primary Actor: Staff Member  Secondary Actors: None |
| **Description:** | Staff members utilize the Hospital Management System (HMS) to perform daily tasks related to patient care, appointment scheduling, and updating patient records. This includes recording vital signs, scheduling appointments, and updating patient information. Staff members interact with the system to ensure accurate and up-to-date patient records, contributing to efficient healthcare service delivery. |
| **Trigger:** | The Staff Member initiates the use case when there are daily tasks to be performed, such as recording patient information or scheduling appointments. |
| **Preconditions:** | PRE-1: The Staff Member is logged into the HMS.  PRE-2: The HMS is in an operational state. |
| **Postconditions:** | PRE-1: The Staff Member is logged into the HMS.  PRE-2: The HMS is in an operational state. |
| **Normal Flow:** | 1. The Staff Member accesses the patient records module. 2. The Staff Member selects a patient file to update. 3. The Staff Member records or updates vital signs, symptoms, or any relevant patient information. 4. The Staff Member accesses the appointment scheduling module. 5. The Staff Member schedules or modifies appointments based on patient needs. 6. The Staff Member confirms the updates, and the system reflects the changes. |
| **Alternative Flows: Urgent Appointment:** | 1. If an urgent appointment is required, the Staff Member prioritizes scheduling. 2. The Staff Member updates the appointment details, ensuring timely patient care. |
| **Exceptions:**  **Data Entry Error:** | If there is an error in data entry, the system prompts the Staff Member to review and correct the information.  The Staff Member corrects the error and confirms the updates. |
| **Business Rules** | BR-1: Patient records must be updated in real-time to ensure accuracy.  BR-2: Appointment scheduling follows a prioritization algorithm based on urgency and availability. |
| **Assumptions:** | Assumption 1: Staff members have received training on using the HMS for daily tasks.  Assumption 2: The HMS is in a stable operational state during daily task execution. |

### 3.3.3 Use Case Description for Doctor

|  |  |
| --- | --- |
| **Use Case ID:** | UC-Doctor-1 |
| **Use Case Name:** | Review Patient Health Information |
| **Actors:** | Primary Actor: Doctor  Secondary Actors: None |
| **Description:** | Doctors utilize the Hospital Management System (HMS) to review and analyze the health information of their assigned patients. This use case enables doctors to access patient records, view medical history, and make informed decisions regarding diagnoses and treatment plans. |
| **Trigger:** | The Doctor initiates the use case when they need to review the health information of a specific patient. |
| **Preconditions:** | PRE-1: The Doctor is registered in the HMS.  PRE-2: The Doctor is logged into the system.  PRE-3: The Doctor is assigned to the patient whose information they want to review |
| **Postconditions:** | POST-1: The Doctor successfully reviews the patient's health information.  POST-2: Any annotations or updates made by the Doctor are saved in the patient's records. |
| **Normal Flow:** | 1. The Doctor logs into the HMS using valid credentials. 2. The Doctor navigates to the "Patient List" or similar section. 3. The system displays a list of patients assigned to the Doctor. 4. The Doctor selects a specific patient from the list to review their health information. 5. The system presents a summary of the patient's medical records, including current medications, test results, and relevant medical history. 6. The Doctor can access detailed information by selecting specific categories such as lab results, imaging reports, or treatment plans. |
| **Alternative Flows: Update Patient Records:** | 1. If the Doctor identifies the need to update the patient's records (e.g., adding new test results or updating medication), they can initiate the update process. 2. The Doctor follows the prompts to add or modify information. 3. The updated information is saved in the patient's records. |
| **Exceptions:**  **Patient Not Assigned:** | If the Doctor attempts to access the information of a patient not assigned to them, the system notifies the Doctor.  The Doctor is prompted to select a patient from their assigned list. |
| **Business Rules** | BR-1: Doctors have both read and write access to patient information within their assigned patient list.  BR-2: Any modifications or annotations made by the Doctor are logged for audit purposes. |
| **Assumptions:** | Assumption 1: Doctors are assigned patients based on their specialty or workload.  Assumption 2: The HMS provides a user-friendly interface for Doctors to quickly access and review patient information. |

# 4. Functional Requirement

This section delineates the functional requirements of the Hospital Management System (HMS), articulating the system's capabilities and features in a natural language style. The functional requirements are organized by specific features, each identified with a unique code, ensuring a structured and comprehensible presentation. The detailed descriptions within each requirement offer a comprehensive understanding of the expected functionalities, ranging from patient registration and appointment scheduling to medical records access, billing and payments, prescription management, and reporting and analytics. This organized approach facilitates a clear comprehension of the HMS's operational scope and assists in the subsequent stages of system development and testing.

***Feature: Patient Registration***

1. **FR-PREG-001: Registration Form**
   * The system shall provide a user-friendly registration form to capture patient personal details, including name, contact information, and date of birth.
2. **FR-PREG-002: Unique Identifier**
   * Each registered patient shall be assigned a unique identifier by the system to ensure distinct and unambiguous identification.
3. **FR-PREG-003: Validation Checks**
   * The registration form shall include validation checks for entered data, ensuring accuracy and completeness.
4. **FR-PREG-004: Emergency Contact Information**
   * The system shall allow patients to provide emergency contact information during the registration process.

***Feature: Appointment Scheduling***

1. **FR-APPT-001: Appointment Booking**
   * Patients shall be able to schedule appointments through the system, selecting preferred dates and available time slots.
2. **FR-APPT-002: Calendar Integration**
   * The system shall integrate with a calendar system to display available appointment slots and avoid scheduling conflicts.
3. **FR-APPT-003: Appointment Reminders**
   * Automated appointment reminders shall be sent to patients via email or SMS a specified time before the scheduled appointment.

***Feature: Medical Records Access***

1. **FR-MREC-001: Access Control**
   * Only authorized medical staff, including doctors and nurses, shall have access to patient medical records.
2. **FR-MREC-002: Real-time Updates**
   * Medical records shall be updated in real-time to reflect the latest information on diagnoses, treatments, and prescriptions.

***Feature: Billing and Payments***

1. **FR-BILL-001: Invoice Generation**
   * The system shall generate invoices for medical services rendered to patients, including details of treatments and associated costs.
2. **FR-BILL-002: Online Payments**
   * Patients shall have the option to make online payments for medical services through a secure payment gateway integrated into the system.

***Feature: Reporting and Analytics***

1. **FR-REPORT-001: Performance Metrics**
   * The system shall provide administrators with performance metrics and analytics, including patient satisfaction, appointment wait times, and staff efficiency.
2. **FR-REPORT-002: Custom Reports**
   * Users with administrative privileges shall be able to create custom reports based on specific criteria for in-depth analysis.

## 4.1 Functional Requirement of X

### 4.1.1 Functional Requirement of Patient Registration

|  |  |
| --- | --- |
| **Identifier** | FR-PREG-001 |
| **Title** | Patient Enrollment |
| **Requirement** | The system shall allow the registration of new patients into the HMS, capturing essential information such as full name, date of birth, gender, contact details, and primary healthcare provider. |
| **Source** | User perspective - Registration Clerk |
| **Rationale** | To establish a comprehensive patient database and facilitate effective healthcare management. |
| **Business Rule (if required)** | Each patient must have a unique identifier for accurate record-keeping. |
| **Dependencies** | None |
| **Priority** | High |

### 4.1.2 Functional Requirement of Appointment Scheduling

|  |  |
| --- | --- |
| **Identifier** | FR-APPT-002 |
| **Title** | Schedule Patient Appointments |
| **Requirement** | The system shall enable healthcare providers to schedule appointments for patients, considering availability, medical urgency, and specialty requirements. |
| **Source** | User perspective - Healthcare Provider |
| **Rationale** | To streamline patient visits, optimize healthcare resource allocation, and minimize waiting times. |
| **Business Rule (if required)** | Appointments must be scheduled with consideration of the healthcare provider's availability and workload. |
| **Dependencies** | FR-PREG-001 (Patient Enrollment) |
| **Priority** | Medium |

### 4.1.3 Functional Requirement of Medical Records Access

|  |  |
| --- | --- |
| **Identifier** | FR-MR-003 |
| **Title** | Access Patient Medical Records |
| **Requirement** | Authorized healthcare professionals shall be able to access and retrieve comprehensive medical records of patients, including diagnosis history, treatment plans, and medication details. |
| **Source** | User perspective - Healthcare Provider |
| **Rationale** | To facilitate informed decision-making by healthcare providers and ensure seamless patient care. |
| **Business Rule (if required)** | Access to medical records is restricted to authorized personnel with the necessary credentials. |
| **Dependencies** | FR-PREG-001 (Patient Enrollment) |
| **Priority** | High |

### 4.1.4 Functional Requirement of Reporting and Analytics

|  |  |
| --- | --- |
| **Identifier** | FR-RAA-004 |
| **Title** | Generate Reports and Analytics |
| **Requirement** | The system shall provide reporting and analytics functionalities to generate insights into patient demographics, treatment outcomes, and resource utilization for informed decision-making. |
| **Source** | User perspective - Administrator |
| **Rationale** | To support strategic planning, resource optimization, and continuous improvement in healthcare delivery. |
| **Business Rule (if required)** | Reports should be generated based on accurate and up-to-date data. |
| **Dependencies** | FR-MR-003 (Medical Records Access) |
| **Priority** | Medium |

# Non-Functional Requirements

This section outlines the non-functional requirements that are essential for the effective performance and user experience of the Hospital Management System (HMS).

1. **Performance:**
   * *Response Time:* The system should respond to user interactions within 2 seconds to ensure a seamless user experience.
   * *Scalability:* The system must handle a minimum of 100 concurrent users without a significant decrease in performance.
2. **Reliability:**
   * *Availability:* The system should be available 99.9% of the time, allowing for scheduled maintenance periods.
   * *Error Handling:* The system should provide meaningful error messages to users and log errors for system administrators.
3. **Security:**
   * *Data Encryption:* Patient-sensitive data must be encrypted during transmission and storage.
   * *Access Control:* Role-based access control should be implemented to ensure that users have access only to the data and features relevant to their roles.
4. **Usability:**
   * *Intuitiveness:* The user interface should be intuitive, requiring minimal training for healthcare professionals to use the system effectively.
   * *Accessibility:* The system should comply with accessibility standards to ensure usability for users with disabilities.
5. **Scalability:**
   * *Database Size:* The system should accommodate a growth in the database size by 20% annually for the next five years.
6. **Compatibility:**
   * *Browser Compatibility:* The system should be compatible with the latest versions of commonly used web browsers, including Chrome, Firefox, and Safari.
7. **Maintainability:**
   * *Code Documentation:* The source code should be adequately documented to facilitate future maintenance and updates.
   * *Modularity:* The system architecture should support modular development and updates without affecting the entire system.
8. **Performance:**
   * *Reporting Performance:* Reports and analytics generation should take no more than 5 seconds, even with large datasets.

## Usability

The usability requirements outlined below are crucial for creating an optimal user experience within the Hospital Management System (HMS).

1. **Ease of Learning:**
   * *Intuitive Navigation:* The system should provide an intuitive navigation structure, allowing users to quickly learn and locate features without extensive training.
   * *Onboarding Assistance:* A user onboarding process should be in place to guide new users through essential functionalities.
2. **Ease of Use:**
   * *Consistent Interface:* The user interface should maintain consistency across different modules, ensuring a uniform and familiar user experience.
   * *Customizable Preferences:* Users should be able to customize their dashboard and settings for a personalized experience.
3. **Error Avoidance and Recovery:**
   * *User-Friendly Error Messages:* Error messages should be clear, concise, and guide users on how to rectify the issue.
   * *Transaction Rollback:* In case of an error during a critical transaction, the system should support transaction rollback to maintain data integrity.
4. **Efficiency of Interactions:**
   * *Shortcut Keys:* The system should provide shortcut keys or quick commands to facilitate power users in performing tasks more efficiently.
   * *Efficient Data Entry:* Data entry forms should be designed to minimize the number of keystrokes required.
5. **Accessibility:**
   * *Compliance with Accessibility Standards:* The system should comply with recognized accessibility standards (e.g., WCAG) to ensure usability for individuals with disabilities.
   * *Text-to-Speech Capability:* For visually impaired users, the system should support text-to-speech functionality.
6. **User Feedback:**
   * *Confirmation Messages:* Users should receive confirmation messages upon the successful completion of critical actions to provide reassurance.
   * *Feedback Mechanism:* The system should include a feedback mechanism allowing users to report issues or suggest improvements.
7. **Efficient Information Retrieval:**
   * *Search Functionality:* The system should offer an efficient search functionality, enabling users to quickly retrieve patient records or relevant information.
8. **Consolidated Dashboards:**
   * *Unified View:* Dashboards should provide a consolidated and unified view of critical information, reducing the need for users to navigate through multiple screens.

## 5.2 Performance

The performance requirements outlined below are essential to ensure the optimal functioning of the Hospital Management System (HMS) across various operations.

1. **System Responsiveness:**
   * *Page Load Time:* The system should have a page load time of no more than 3 seconds for standard operations under normal user load conditions.
   * *Transaction Processing:* Critical transactions, such as patient admissions or billing, should be processed within 5 seconds.
2. **Concurrent User Handling:**
   * *Concurrent Users:* The system should support a minimum of 100 concurrent users without significant degradation in performance.
   * *Scalability:* The system architecture should be scalable to accommodate a 20% annual growth in concurrent users.
3. **Data Retrieval Speed:**
   * *Patient Record Retrieval:* The average time to retrieve a patient's complete electronic health record (EHR) should not exceed 2 seconds.
   * *Diagnostic Reports:* Diagnostic reports, including imaging results, should be retrieved within 5 seconds of request.
4. **Batch Processing:**
   * *Data Import:* The system should be able to import bulk data (e.g., patient records, inventory updates) in batches of 1000 records within 15 minutes.
   * *Background Jobs:* Background jobs, such as data backups and system maintenance, should not affect real-time user operations.
5. **Database Performance:**
   * *Database Query Speed:* Database queries should execute within 1 second for commonly accessed information.
   * *Indexing Efficiency:* Database indexing should be optimized to ensure efficient retrieval of data without performance bottlenecks.
6. **Report Generation:**
   * *Ad-hoc Reports:* The system should generate ad-hoc reports, such as financial summaries or patient demographics, within 10 seconds.
   * *Scheduled Reports:* Scheduled reports should be generated during non-peak hours to minimize impact on real-time operations.
7. **Reliability and Uptime:**
   * *System Uptime:* The system should maintain at least 99.5% uptime, excluding scheduled maintenance windows.
   * *Error Handling:* The system should handle errors gracefully, with an error rate below 0.1% of transactions.
8. **Data Security:**
   * *Encryption Overhead:* The use of data encryption should not result in more than a 5% performance overhead on data transmission and retrieval.

# References

* IEEE Std 830-1998. (1998). IEEE Recommended Practice for Software Requirements Specifications.
* Sommerville, I. (2011). Software Engineering. Addison-Wesley.
* Pressman, R. S. (2014). Software Engineering: A Practitioner's Approach. McGraw-Hill.
* UML (Unified Modeling Language) - Object Management Group. ([www.uml.org](http://www.uml.org/))
* ISO/IEC/IEEE 29148:2018. (2018). Systems and software engineering -- Life cycle processes -- Requirements engineering.
* Microsoft Visio - Microsoft Corporation. ([www.microsoft.com/visio](https://www.microsoft.com/visio))