SOFTWARE REQUIREMENTS SPECIFICATION (SRS) DOCUMENT

CLINIC MANAGEMENT SYSTEM

CSE2101 – SOFTWARE ENGINEERING 1

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INTRODUCTION

The proposed project, Clinic Management System (CMS), is an Information System that will be able to record and track information about patients, clinic staff, and the service as a whole efficiently. This system will allow the clinic staff to reduce the workload and reduce the amount of time spent on logistics. The system will be able to accommodate an ever-increasingly large number of patients who visit the clinic. It will also allow staff to easily maintain and make updates to the data within the system securely. This project has been developed to aid the clinic in carrying out its processes quickly and easily which was not possible with the previous manual system.

Purpose

The Clinic Management System Software will be designed to manage all the areas of the clinic which includes medical, financial, administrative, and the related practices of the service.

Project Scope

After installing the CMS software, daily operations such as patient registration, admission management, and general administration of various departments may be conducted more conveniently and accurately. The modules of the CMS software will be user-friendly and will allow easy navigation. The system will be confined to the clinic meaning the database will be that of a centralised database. However, the system can be adapted for use by other clinics and small private hospitals.

Document Conventions

- This document was created based on the IEEE template provided for the System Requirements Specification Documents.
- Main Headings: Calibri (Body), Capitalized, 16 size, Bold.
- Sub-headings: Calibri (Body), 14 size, Bold.
- Writing (Paragraphs/ Statements): Calibri (Body), 12 size.

Intended Audience

The intended audience of this document would be the client; the development team, i.e., the UI/UX designers, coders, and documentation writers; the specific employees of the clinic, i.e.,

the managers, doctors, nurse staff, receptionists, department managers, and staff, etc.; and anyone who has an interest in the system and its development.

Reading Suggestions

This document assumes that its readers possess knowledge and background in the world of IT/CS or just a basic understanding of it. This document first explains why the project is being developed and the scope of the project. It then gives an overall description of the system and an overview of its major features. Finally, it provides insight as to what happens behind the scenes when the system is operational. The readers should read this document progressively but can move to any sections if they choose.

Abbreviations and Terminologies

- CMS – Clinic Management System
- CS – Computer Science
- IT/ICT – Information (Communication) Technology
- URL -Uniform Resource Locator
- EMR - Electronic Medical Records
- Clinicians – a term loosely used to describe all clinic staff
- IP – Inpatient
- OP – Outpatient
- Java – Programming Language
- JDK – Java Development Kit
- JRE – Java Runtime Environment
- DBA – Database Admin

References

The following reference provided is not in any form of an APA referencing style. They are URLs that point to documents that aid in the writing of this document.

- https://drive.google.com/file/d/1wZ9TIjHdb7yUyw24P2kfS0nESaX_3SQH/view - The IEEE SRS document guide.

OVERALL DESCRIPTIONS

The Clinic Management System (CMS) is software designed to handle all aspects of a medical clinic, including medical, administrative, and service-related procedures. It is an integrated software that manages various processes. It oversees the seamless operation of healthcare as well as administrative, medical, legal, and financial supervision. That is a critical component of the healthcare facility's success.

Product Perspective

The CMS is a proposed system to replace the paper-based system that is currently in use. This is a completely new system for generating, managing and maintaining records. The system being developed is for the benefit of, for the most part, the clinic and its patients. It provides the end-users with the ease of recording all the day-to-day activities of the clinic as well as handling patient registration, staff management, authentication management and invoicing.

Product Functions

This section provides the apprehensible functional overview of the end product. The CMS will have functionalities such as:

1. Login
2. Logout
3. Registration (Staff)
4. Generate invoice report
5. Activity logs for staff
6. Admin control
7. EMR
8. Appointment scheduling
9. Visit Management*
10. Insurance (if any)

The technical features of the CMS include:

- Multi-Component Architecture
- Technical Safeguards Compliance
- Ease of Integration
- Locally hosted Centralised Database

User Classes and Characteristics

The CMS will be used only in the clinic. The health administrator and the front desk staff will be the main users. Some of the end-users will have to be trained to use the system given the condition that not all of the end-users have the necessary knowledge and background.

Administrative

The health administrator has full access to the system. This means he is capable of managing any activity regarding the system. The health administrator is the utmost privileged end-user who has access to the CMS.

Key Functions

- Management of employees and patient records and resource data
- Allocation of system resources
- Generate reports
- Human resource processes, i.e., payroll, hiring, compensation, etc.

Employee

The employees interact or interface with the CMS most often to provide services of the clinic to the patients.

Key Functions

- Keeping track of patient data
- Generating (or deleting) patient data
- Keeping track of test details
- Prescription data
- In-Patient (IP) care
- Keeping track of patient progress
- Inventory management
- Billing details

Operating Environment

Operating System:

- Windows OS – Windows or higher

Software Requirements

- Java
- JDK
- JRE 1.8 or higher
- MySQL server

Hardware Requirements

- Core i5 processor or higher
- At least 4GB RAM
- At least 100GB of hard disk space in terminal machines
- 50TB of hard disk space or higher in the server machine

Design and Implementation Constraints

- The CMS will be a wired network with encryption.
- The CMS is only accessible on clinic premises.
- Database is password protected and has different levels of end-user access.
- Should be able to use less RAM and processing power as specified.
- Each end-user should have a unique ID and password.
- Only the health administrator can access the entire system.
- Be able to handle most if not all transactions all the time.
- Always ensure the integrity of the data, even in concurrent consultation.
- Information should always be accessible, even in concurrent consultation.
- Guarantee rapid response time to all requests.
- Be able to log all system transactions.
- The system must be able to support a high rate of concurrent electronic transactions as different health staff/professionals may have to enter new data or modify data.

Assumptions and Dependencies

- Each end-user must have a valid user ID and password.
- Server must be running for system operation.
- Users must and only log into the CMS to access records.
- Only the Health Administrator can delete records or provide clearance to delete records.

**Visit Management - with easy access to important medical information, clinicians may easily manage continuing treatment, observations, prescriptions, and follow-ups. Configurable workflow to smoothly govern patient movement between reception, insurance desk consultation and examination rooms. Track referrals to increase collaboration with outside doctors and clinics.*

**IP and OP modules are subdivisions of the patient module. There will also be an IP module subdivided under the Invoicing module.*

SYSTEM FEATURES

This section describes the requirements for the CMS features. The features of the system are divided into modules and expounded upon as follows. These modules illustrate the major services provided by the CMS.

- **Doctor Module**

  Description and Priority

  This module provides the functionalities required by in-house doctors or specialists. The priority level of this feature is high because doctors and specialists will be unable to perform their duties, i.e., doctors will be unable to make proper diagnoses without patient medical history which is stored in patient records.

  Stimulus/Response Sequences

  Doctors and specialists will be able to use the system to perform the following actions:

  - Add patients report
  - Delete patients report
  - Display reports
  - Give prescriptions
  - Search reports of patients

  Functional Requirements

  - Doctors must be able to perform CRUD operations with the exception of the delete operation. This is a special operation that requires some level of clearance from the admin.
  - Doctors and specialists should be able to use the system to generate reports from patients' records.
  - Doctors should be able to pull patient reports from records and display it.
  - Doctors should be able to delete reports.
  - Doctors should be able to communicate with other medical staff using the system.

- **Receptionist Module**

  Description and Priority

The receptionists are the front-desk staff who will be using this module when dealing with patients visiting the clinic. The priority level for this module is of the highest degree because without the module the clinic will be unable to move from the initial stage of operation. The clinic will be unable to function. Every medical activity carried out by the clinic is based on records made by receptionists.

Stimulus/Response Sequences

- Add patient data
- Delete patient data
- Display records
- Referrals (refer to different in-house doctors)
- Search the record of patients

Functional Requirements

- Front-desk staff must be able to perform CRUD operations with the exception of the delete operation. This is a special operation that requires some level of clearance from the admin.
- Front-desk staff must be able to read all medical records from the database.
- Front-desk staff must be able to use the system to communicate with other clinical staff.

- **Billing/Invoicing Module**

Description and Priority

This module allows staff to make invoices based on services provided by the clinic. This module is of high priority because it helps in automating time-consuming activities such as invoice generation, the medical product sold, payment tracking and other accounting documentation. The component of the software will do all the necessary calculations for prices reducing the workload of staff.

Stimulus/Response Sequences

This module will allow clinic staff to:

- Search patient reports.
- Search patient records.

- Search In-Patient care records.
- Search Out-Patient records.
- Track overall services and medications provided.
- Make invoices by generating reports.
- Calculate the prices of services and medical products provided.

Functional Requirements

- Must be able to handle complex formulas for calculations
- Must be able to generate reports from IP and OP records
- Must be able to read all IP and OP records
- Use the generate report feature to produce invoices.
- Must be able to record every service delivered to the patient.

Administrator Module

Description and Priority

This module allows the health administrator to have total governance over the CMS. The database admin (DBA) is responsible for directing and performing all activities to maintain a successful database system environment. The DBA makes sure the clinic database system operates functionally and efficiently. This module is of the utmost highest priority because it gives the user total access and control over the system.

Stimulus/Response Sequences

- CRUD operations in the database system
- View all data in the database
- Authentication
- Performance monitoring
- Database backup and recovery
- Specialized data handling
- Data extraction, transformation and loading

Functional Requirements

- Must provide the admin an ID and password that allow the highest level of access.
- All CRUD activities must be reflected throughout the system
- Show admin all logs of transaction, data entry, updates, etc.

- Must be able to generate ID and passwords for new user.
- Any specialized data handling done without resistance.
- Provide oversight of the system grant access to or logout users.

Other operational modules include:

1. Pharmacy and inventory
2. Accounting and asset management
3. Human resource management
4. IP*
5. OP*
6. Billing or Invoicing
7. Lab
8. Patient

Use Case Specification

Name	Add Patient
Description	This function gets the details of the patient and adds the record to the patient file and generates a patient registration number.
Actors	Front-desk staff, receptionists
Pre-conditions	The end-user should log into the system with user credentials.
Main flow of events	1. User selects “add patient” at the home page. 2. Patient entry form displayed. 3. User enter data into required fields 4. User selects the “Add entry” button 5. “Record Add Successfully” message displayed. 6. System generates a patient ID and displays it.
Extensions	If necessary, fields left empty by the end-user, prompt the user to fill in all required field.
Post Conditions	Patient record added to the patient file.

Name	Patient referrals

Description	This function assigns a number to the patient for relevant channeling.
Actors	Receptionist
Pre-conditions	Patients must register to the system
Main flow of events	1. User selects “generate a number” at the Receptionist Module. 2. System prompts to select the medical situation type. 3. If OPD, generates the next available number to the available doctor and displays the number. 4. User confirms number and prints card.
Extensions	-
Post Conditions	Patient records should be updated with patient channeling details.

Name	Add prescription entry
Description	This function records patient prescription details
Actors	Data entry operator/doctor
Pre-conditions	Doctor’s ID and password
Main flow of events	1. User selects “Prescription form” from the patient module. 2. System prompts to enter the patient’s registration number. 3. User enters the system registration number. 4. Prescription form displayed with relevant patient details. 5. User navigates to ‘tests’ field and selects prescribed test details. 6. User navigates to the ‘vaccine’ field and enters vaccine details. 7. User navigates to the ‘medicine’ field and enters medicine details. 8. User enters re-consolation date. 9. User selects the ‘Add’ button and add prescription details. 10. User selects ‘Print’ and print the prescription details.
Extensions	-

Post Conditions	-

Name	Calculate Bill/Invoice
Description	This function calculates the total charge for the patient.
Actors	Receptionist, cashier
Pre-conditions	Both patient and end-user must be registered in the system.
Main flow of events	1. User selects patient receipt card. 2. System prompts patient registration number. 3. User enters registration number. 4. System prompts date and time, which the total charge required for. 5. User enter date and time 6. Receipt form displayed with patient details, lab tests details, X-ray details, ECG details, etc., and total the fee. 7. User select print receipt. 8. The patient receipt is printed.
Extensions	-
Post Conditions	The payment details should be update in payments file and patient records.

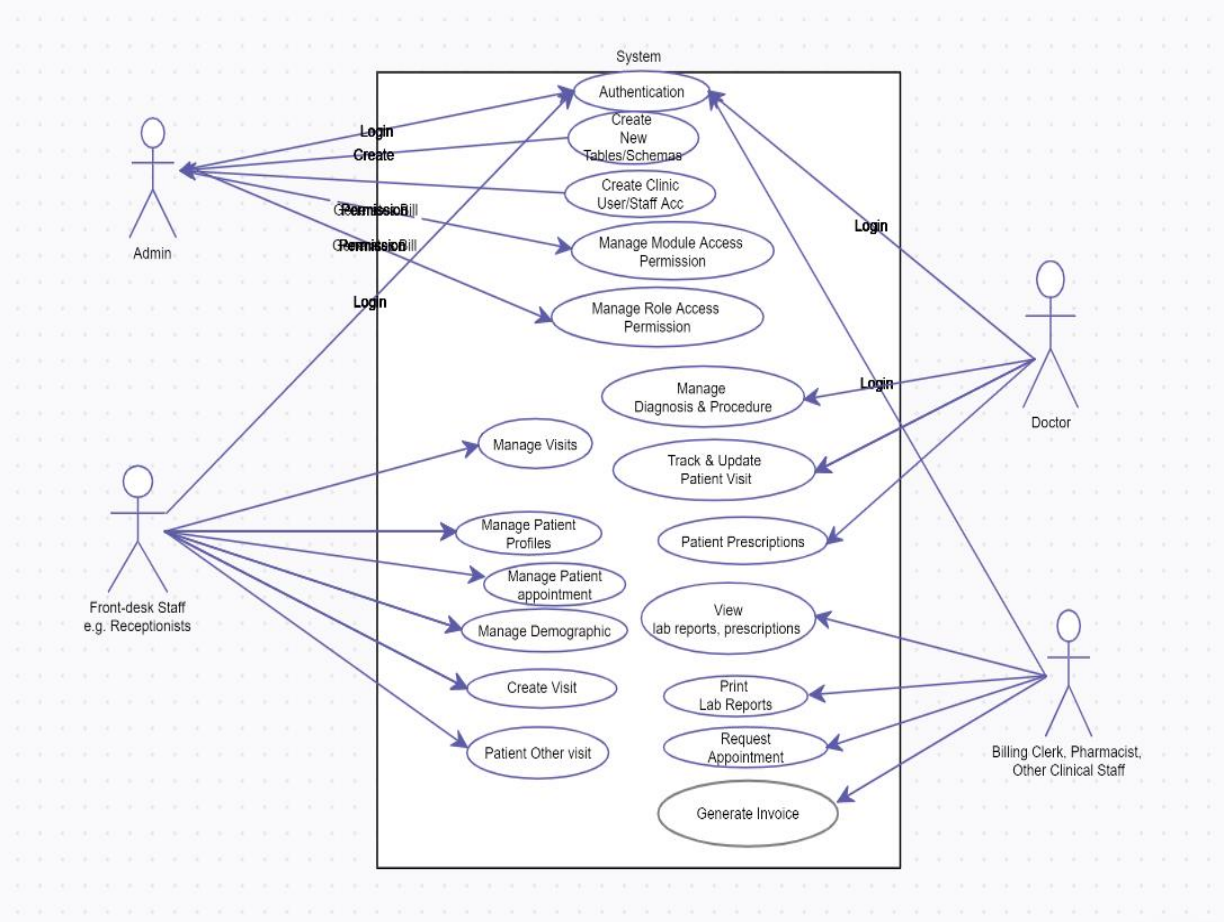
Name	Add Patient diagnoses history
Description	This function adds patient's diagnosis details to the system.
Actors	Data entry operator
Pre-conditions	Patient must register to the system.
Main flow of events	1. User selects patient diagnosis card. 2. System prompts for patient ID 3. User enter the patient ID 4. System display patient details in the form. 5. User enters diagnosis details and date. 6. User selects Add diagnosis record.
Extensions	
Post Conditions	The diagnoses record should be added to the diagnosis file.

Name	Generate lab report
Description	This function generates the report of a particular test and prints the report.
Actors	Lab Assistant
Pre-conditions	The user should log in. Relevant lab test results should be available
Main flow of events	1. User selects lab report form from lab module. 2. System prompts patient id. 3. User enters patient id. 4. System displays patient details. 5. System prompts to select the lab test category. 6. User selects category by navigating to the relevant tab and entering test results. 7. User selects add lab test record. 8. System displays successfully added message. 9. User selects print report. 10. System prints the report.
Extensions	
Post Conditions	

Name	Generate salary
Description	This function generates the employee salary for the given pay period.
Actors	Health Administrator
Pre-conditions	The user should be login into the system
Main flow of events	1. Admin selects 'Generate salary form' in the employee management module. 2. System prompts employee ID and period. 3. User enter required data. 4. The total salary calculated by the system. 5. User select print pay slip.
Extensions	User enters allowance and bonus details if any.

Post Conditions	The payments file should be updated with salary payment record.

Use Case Diagram



OTHER NON-FUNCTIONAL REQUIREMENTS

Performance Requirements

- Response Time – the system shall give responses within a fraction of a second after processing requests.
- Capacity – although the system will be able to support tens of staff, it should be capable of supporting 1000 people.
- User Interface – the UI screen will respond within 2 seconds.
- Conformity – the system will conform to Microsoft accessibility guidelines.
- Data integrity – the system should be able to check for and flag redundancies; make sure the data is accurate and consistent as possible.
- System updates and maintenance should be done within the closing hours of the clinic.
- The system should only be shut down after closing hours and should be operational at least 30 minutes before working hours.

Reliability Requirements

- Availability – although the system is not required to be operating 24 hours a day it will be available all the time.

Safety Requirements

- Back-Up – the system will provide the capability to back up the data and provide adequate recovery features when it is necessary. Both data and system software should be backed up periodically.
- Errors – The system will log all errors.
- An off-site backup should be provided for recovery from major system failure.

Security Requirements

- User Identification – the system requires the end-user to identify himself/herself using a unique ID and password associated with that ID. These will also determine the end-user level of access to the system.
- Modification – any modification, i.e., insert, delete and update (CRUD elements) will be done by the health administrator and staff members with provided clearance.

- Front-desk staff and customer service staff rights – the front-desk staff and all customer service staff will be able to view all information in the CMS, add new patient records but will not be able to modify any information without clearance or and health administrator oversight.
- Health Administrator rights - the health administrator will be able to view and modify all information in the CMS. These modifications should also be logged.

Software Quality Attributes

1. Availability – the system, although not required, should be available all the time.
2. Correctness – bug-free software that will fulfill the correct needs/requirements of the end-users.
3. Maintainability – the system should have the ability to maintain, modify information and update to fix issues with the system.
4. Usability – the system software can be used repeatedly with distortion.
5. Accessibility – Health Administrator and many other users can access the system but the access level is controlled for each user according to their work scope.
6. Accuracy – the reliability of the data or output. Can depend on the outcome. It should not instill any doubts in any form.
7. Stability – the CMS outcome or output will not change over time. The same output or outcome will always be provided for the related requests.

Business Rules

For accessing and interacting with the database, the CMS must establish at least an administrator role and a user role. Additional system roles may be developed as long as the business requirements for administrator and public user roles are met. At the minimum, the administrator should have total governance over the system and the users will have leveled access provided by the administrator. The administrator and users must adhere to the following business rules.

Business rules for administrators

1. Maintain all back-end system configurations.
2. Maintain all schemas and templates.
3. Maintain all user groups and user accounts

Business rules for users

1. Connects to, and retrieve and read data from the database in conformance with the maintained schemas and templates.
2. Provided level access to be able to perform CRUD operations, i.e., Insert – receptionists should be able to add new patients' records.