

Design and Implementation of a Smart Hospital Management System

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Annotation

The Hospital Management System is a system that is built on the Salesforce platform. This system helps hospitals manage things like admissions and appointments. It makes things easier and faster for hospitals to do their work. This is because it uses cloud technology.

Old hospital systems use paper. People have to enter data by hand. This can be slow. People can make mistakes. The Hospital Management System uses Salesforce to keep track of people who ask about the hospital and to follow up with them. It also makes reports to help doctors and administrative people make decisions.

The Hospital Management System uses Salesforce tools like Leads and Accounts and Contacts. It also uses custom things like Department and Patient Records to keep data organized. The system automatically sends reminders and confirmations and notifications. This means that no one forgets about a patient who asked about the hospital.

The Hospital Management System also makes reports and dashboards that show what is happening with admissions and how departments are doing and information about patients. By using the Hospital Management System hospitals can work better. Do not have to do as much work, by hand. They can also talk to patients better. Help them more.

Keywords: Salesforce CRM, Hospital Management System, Patient Management, Lead Management, Automation, Salesforce Flow, Cloud Computing, CRM Analytics, Healthcare CRM.



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Introduction

In the world we live in today hospitals and healthcare institutions deal with a number of patient enquiries, appointments and admissions every single day. It is really important to manage these things so that patients get the care they need on time and the hospital runs smoothly. A lot of healthcare institutions still use ways like spreadsheets, emails or paper to keep track of patient information and manage admissions.

These old ways often cause problems like lost data, missed follow-ups, slow responses and trouble keeping track of history.

Hospitals can use Salesforce CRM to make their administrative work more efficient by turning it into an automated system that is all in one place. The Hospital Management System uses Salesforce to make patient enquiry management easier, follow-ups track how admissions are going and turn people who are interested in being patients into actual registered patients using tools like Leads, Accounts and Contacts in Salesforce.

A special Department object is used to store and manage information, about the parts of the hospital and the services they offer.

This system makes sure that every patient enquiry is taken care of away and that the people who work in administration stay in touch with patients throughout their whole experience. The Hospital Management System also has advanced automation and analysis tools.

By using automation storing data in one place and analysis tools that're all part of Salesforce the system shows how using cloud-based CRM technology can really help with managing healthcare.

Proposed AI-Based Solution

While the basic system utilizes Salesforce CRM, the AI components may be integrated to enhance decision-making and facilitate several activities. Several AI components offered by Salesforce include Einstein Analytics that can be used to help manage hospitals. AI enables us to analyze the admission data to identify trends related to the visits during different seasons, and machine learning can help predict the probability of converting the leads into patients.

We can direct patients to proper departments depending on their symptoms and previous visits. Our AI components may recommend appropriate departments and booking for patients. AI chatbots can answer routine queries about departments by our patients.

Motivation

Healthcare institutions have a lot of problems when they do tasks by hand. They usually keep information in spreadsheets or on paper, which makes it hard to keep track of questions and follow up with patients on time. The main idea behind the Hospital Management System is to make a place where everything is easy to handle. By making repetitive tasks automatic hospitals can make sure they do not miss follow-ups and can talk to patients when they need to.

Salesforce CRM has tools like automation, reports and dashboards that make it a lot easier to run a hospital. Another big reason for this system is to help make decisions based on facts. With information, about how the hospital is running administrators can look at

- admission patterns
- see which departments are busiest
- And plan for the resources they will need later. The Hospital Management System is a part of reaching these aims.

Related Work

Extensive research has been conducted on the use of CRM systems and cloud computing in the healthcare sector. Studies have shown that adopting Salesforce can significantly improve patient relationship management and operational efficiency. Cloud computing provides a scalable and accessible platform for storing and analyzing large volumes of healthcare data. Other research demonstrates that CRM-based platforms can reduce manual administrative workload and enhance patient communication.

The Hospital Management System builds upon these concepts by creating a specialized CRM solution with Salesforce tailored specifically for managing patient enquiries, appointments, and hospital admissions. It integrates principles of CRM systems and cloud computing to deliver a robust healthcare management platform.

Research Methodology

The Hospital Management System is made by following some steps. First we look at what the hospital needs to work. We talk about what problems the hospital faces when taking care of patients and answering questions. Our goal is to make a system using Salesforce CRM technology to help the hospital.

We did some research to see what the hospital staff and administrative teams need. Then we used this information to design the system with Salesforce. We used tools and features to make reports and automate tasks. We made the system in a way that it's easy to use works well and can handle a lot of work. The Hospital Management System is developed to be efficient, scalable and user-friendly which means the Hospital Management System is made to help the hospital staff and the Hospital Management System is easy to use.

Phases of Project Development

1. Requirement Analysis Phase

Requirements for the management system for the hospital were determined at this stage. Discussions with employees and administration in the hospital helped us in determining the requirement of this system which are given below:

- Manage queries from the patients and appointments.
- Keep track of the process of admission in all departments.
- Automatic reminders of appointments.
- Generation of performance report.

2. System Design Phase

During the system design phase, we developed the architecture of the Salesforce application. The system was designed using Salesforce objects like Leads, Accounts, and Contacts along with custom objects for Departments, Patient Records, and Appointments. Data relationships between objects were defined to keep records structured. User interfaces were designed using Salesforce Lightning components for simplicity and ease of use. Automation workflows and reporting mechanisms were also planned during this phase.

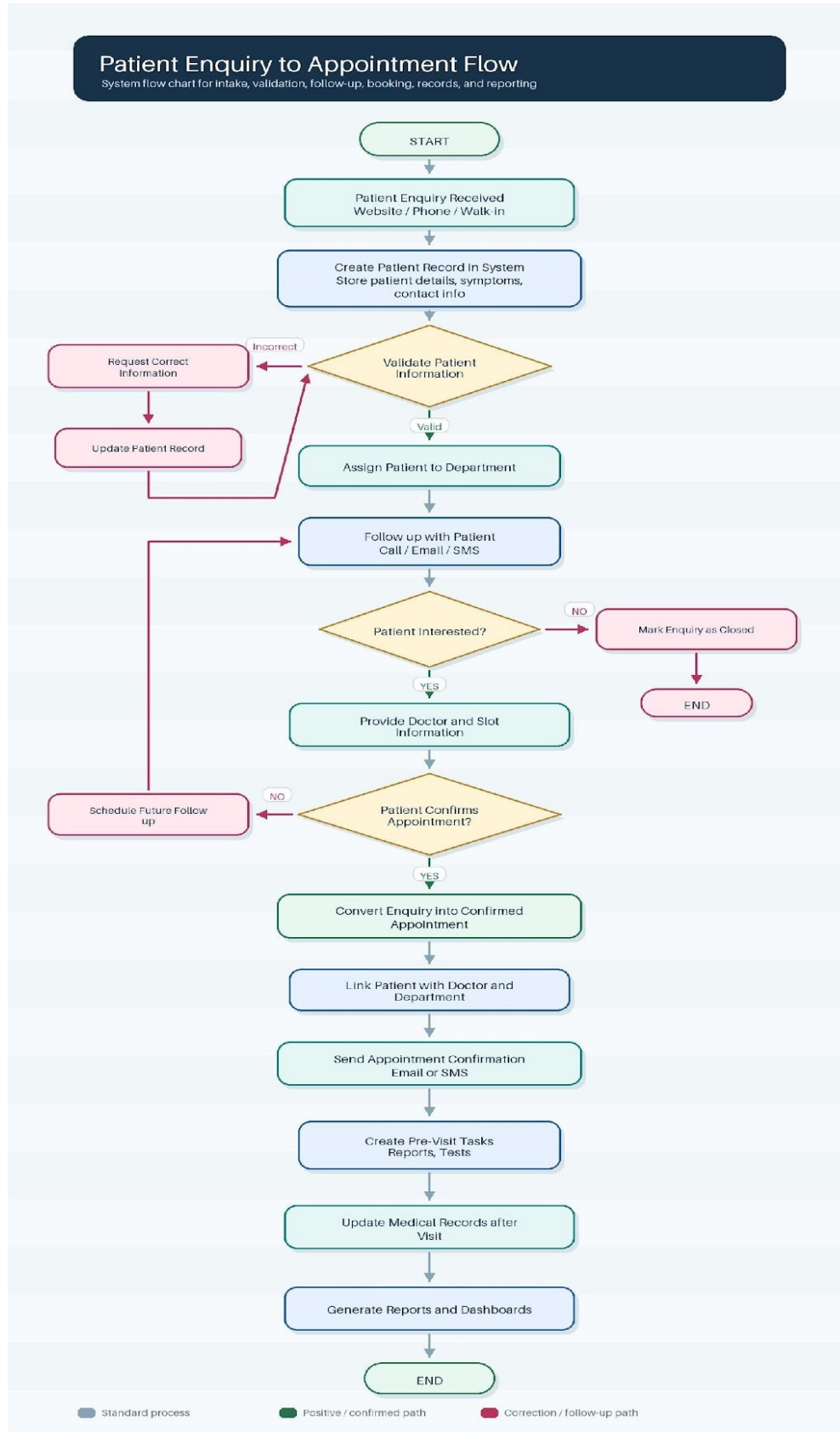
3. Implementation Phase

The part where we had to make it all work was when we built the system inside Salesforce. We made fields to keep track of patient information like which department they like what is in their medical history what symptoms they have and when they want to have their appointments. We used Salesforce Flow to make some tasks automatic, like setting reminders for appointments sending emails to confirm and making tasks for the hospital staff to follow up. We also made reports and dashboards to see how many people are being admitted and what is going on with the hospital operations.

4. Testing Phase

We did some testing to see if the system works right and does everything it is supposed to do. We ran tests to make sure we can create leads turn leads into sales. Get reports. We also checked to see if the system can do things on its own like it is supposed to. We did two kinds of testing: one where we looked at parts of the system and one where we had real users try it out. We got feedback from the people who used the system. We used that to make the system easier to use and work better. We used this feedback to make the systems usability and performance which is what the system is all about so the system works well and the people who use the system are happy, with the system.

System Flow



Data Preprocessing and Analysis

Data preprocessing is very important for any system that handles information.

In our Hospital Management System we make sure that patient enquiry details and admission records are correct and consistent and ready to be analysed.

This step is crucial because it helps us get insights from the data allows us to automate some tasks and supports making smart decisions based on patient data and admission records.

We ensure that patient enquiry data and admission records are accurate, consistent and ready for analysis to achieve this.

Good data preprocessing is essential for getting high-quality insights, from patient enquiry data and admission records.

It also enables us to automate some tasks. Facilitates informed decision-making using patient enquiry data and admission records.

1. Data Collection

The first step is collecting patient information from various sources including online forms, hospital websites, phone calls, emails, and walk-in visits. All information is stored in Salesforce using the Lead object, capturing details such as patient name, contact information, department of interest, medical history, and preferred appointment date.

2. Data Cleaning

The process of checking records for mistakes is really important. Patient records can have problems like information missing details or things like phone numbers and email addresses that are not formatted correctly. To fix these problems we use validation and duplicate checks in Salesforce. We do this to make sure the patient records are accurate. Validation and duplicate checks, in Salesforce help us find and correct errors that happen when we collect data.

3. Data Transformation

The patient's information like department preferences, admission status, and source of referrals is classified into standardized forms. The text data is preprocessed to standardize the department name and the medical terms used. This will enable proper functioning of the Salesforce CRM and easy access of the data.

4. Data Analysis

Analysis of data will help hospitals analyze patient behavior, need for particular departments, and admission trends. Reports from Salesforce offer descriptive analytics indicating key metrics such as patient enquiries within a specific period, conversion rate, and popularity of different departments. Correlation analysis will assist in identifying correlations between referral sources and admission rates.

Project Objectives

Lead Management	Automation	Conversion Tracking	Analytics
Capture and track patient enquiries efficiently to ensure no potential admission is missed.	Automate follow-ups, reminders, and appointment confirmations using system workflows.	Convert prospective patients into admitted individuals through structured CRM processes.	Generate reports and dashboards to monitor admission trends and hospital performance.

System Modules

Patient Enquiry Management	Admission Tracking	Automation System	Reports & Dashboards
Captures prospective patient information including department interest, symptoms, and contact details.	Tracks the admission lifecycle From enquiry to Registration and treatment.	Sends automated follow-up reminders, appointment confirmations, and notifications.	Provides analytical insights for better hospital administration and decision-making.

Proposed Algorithm

The process employs an algorithm to handle patient queries and transform them into admissions:

1. Capture patient query data by creating a Lead record in Salesforce.
2. Maintain records of all query data along with preferred department and contacts.
3. Assign tasks to hospital admission officers to contact patients.
4. Send automatic appointment reminders using the Salesforce Flow.
5. In case of admission confirmation, change Lead to Account and Contact.
6. Connect the patient to the Department object based on preference.
7. Build analytics and reports for patient queries and admissions.

Result Evolution and Analysis

The Hospital Management System gives us results that show it really helps with handling patient enquiries keeping track of admissions and sending follow-up messages on its own. We get to see what is happening with admissions and how different departments are doing through reports and dashboards that are updated all the time. The Hospital Management System also helps hospitals make decisions based on facts and keep making their work processes better. The Hospital Management System is very useful for healthcare institutions because it helps them understand things, like admission trends and patient demographics.



Figure 1: User Login Interface of the System

The image shows the Login Page of the Hospital Management System. This is where people who are allowed to use the system like administrators and doctors and admission staff can put in their email

address and password. The page looks really nice with a background and it has spaces to put in your email address and password. Then there is a Login button that checks who you are and lets you into the Hospital Management System.

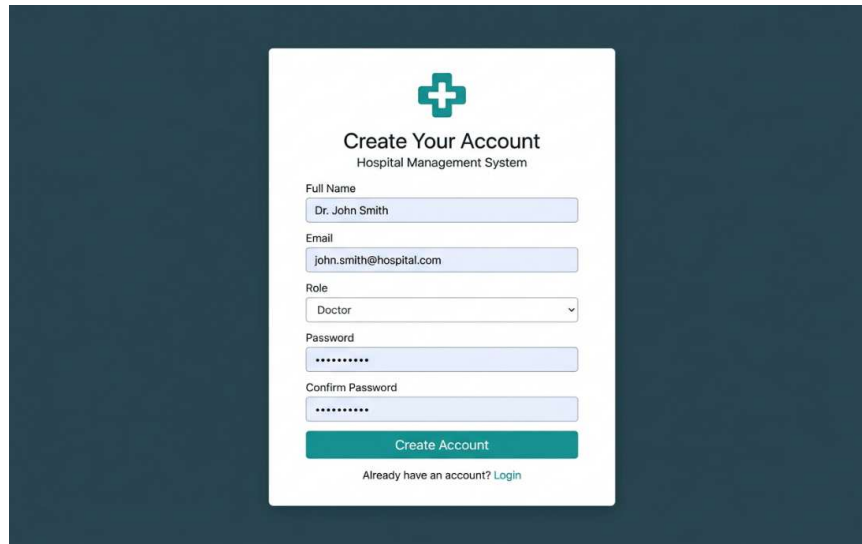
The image shows a 'Create Your Account' form for a 'Hospital Management System'. The form is centered on a dark blue background. It features a green cross icon at the top. The form fields include: 'Full Name' with the text 'Dr. John Smith', 'Email' with 'john.smith@hospital.com', 'Role' with a dropdown menu set to 'Doctor', 'Password' and 'Confirm Password' both with masked characters. There is a green 'Create Account' button and a link that says 'Already have an account? Login'.

Figure 2: User Registration (Sign Up) Interface

The picture shows the Sign Up or Registration Page of the Hospital Management System. This is where new users can make an account so they can use the system. The form has spaces for users to put in their full name, email address, role, password and the password again to make sure everything is correct.

When users have put in all the information they can click the Create Account button to sign up for the system. The system checks that the password and the password again are the same before it lets users make an account. The Hospital Management System Sign Up or Registration Page is really important because it helps new users join the system in a smooth way and take care of things related to patient management.

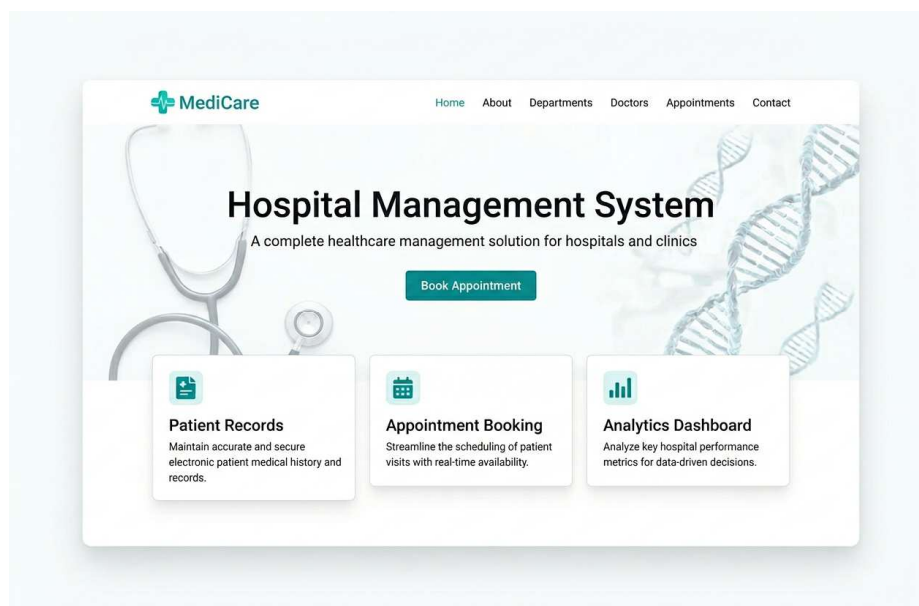


Figure 3: Hospital Management System – Homepage

The homepage of the Hospital Management System has a blue color and it is easy to find what you need. You can go to parts of the website like Home, About, Objectives, Modules and Enquiry.

The main part of the homepage shows the name of the Hospital Management System. It says it is a special tool that uses Salesforce to help hospitals manage things. The Hospital Management System is like a computer program that helps hospitals take care of people who are asking for help make the admission process easier and make decisions based on information. There is a button that says "Apply and when you click it you can start the process of admitting a patient to the hospital. The Hospital Management System is really helpful, for healthcare institutions.

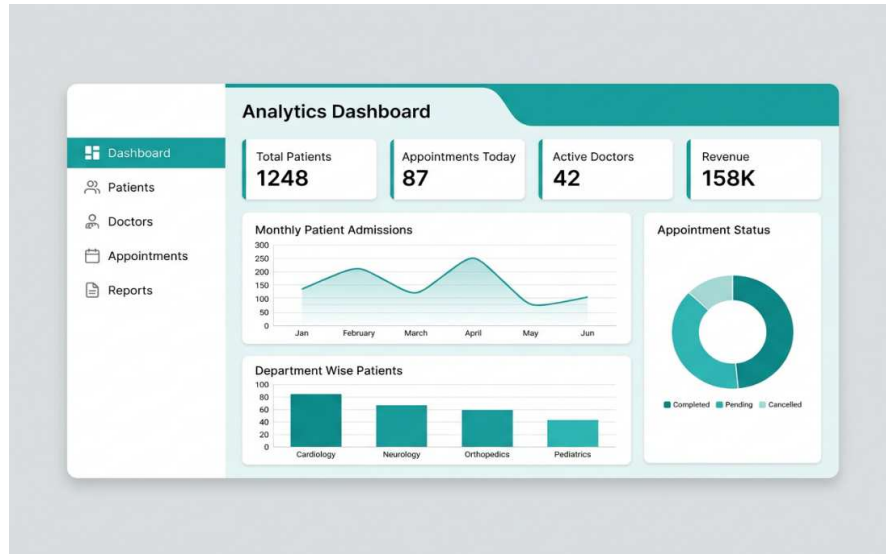


Figure 4: Hospital Management System – Analytics Dashboard

Overview of Hospital Operations

The dashboard offers a clear insight into all operational processes within a hospital setting. Some of the critical information available on the dashboard includes metrics such as admissions per department, sources of patients using pie charts, monthly admissions trends using line charts, and performance metrics of departments. Left side bar contains navigation menus such as Patients, Departments, Admissions, and Reports.

The Patient Enquiry Form is designed to collect essential information from potential patients. It includes the following fields:

- Patient Name:** Text input field with the value "Rahul Sharma".
- Email Address:** Text input field with the value "rahul@email.com".
- Phone Number:** Text input field with the value "+91 9876543210".
- Department:** Dropdown menu with "Cardiology" selected.
- Preferred Doctor:** Text input field with the value "Dr. Mehta".
- Preferred Date:** Date picker field.
- Symptoms / Message:** Text area with the value "Experiencing chest pain and shortness of breath".

A "Submit Enquiry" button is located at the bottom of the form.

Patient Enquiry Form is where a potential patient can make his/her inquiries to the hospital. The inquiry form will collect all necessary details such as Patient Name, Email, Phone Number,

Department, and Patient's Medical History. Once the user hits the Submit Enquiry button, all these details are stored in Salesforce as a lead record.

Conclusion

Hospital Management System with Salesforce CRM allows us to design an integrated system that will allow the efficient management of the whole cycle of patient admission. With such components as patient enquiry management, task automation, and data analysis combined in one cloud-based platform, the performance of the Hospital Management System will be greatly enhanced and optimized.

Some of the important elements of this system include the automated reminder system, appointment confirmations via email, and real-time dashboards. These ensure that no patient enquiry will be overlooked and that hospital administrators will have enough data at their disposal in order to make informed decisions.

References

1. Salesforce Documentation: <https://developer.salesforce.com/docs>
2. Lamba, H. S. And Singh G. Wrote about a plan for cloud computing in healthcare management in 2011 in the International Journal of Computer Applications.
3. Paiva, J. C., Leal, J. P. And Figueira Á. Published a book in 2022 with Springer about automated assessment in computer science education.
4. Parthasarathy, M. And Sohi R. S. Discussed salesforce automation and new technology in the Journal of Business & Industrial Marketing in 1997.
5. The World Health Organization released a report, in 2023 called Digital Health: Transforming Healthcare Delivery Through Technology.