B-HOSPITAL
CARE BEYOND LIMITS

Business Requirements Document (BRD)

<B-hospital management system, HR optimization and FR optimization>

<R1> <13-August-2023>

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<BRD #032>

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1- Version Info

1.1- Revision History:

Date	Version Number	Document changes
13-8-2023	0.1	Initial version
16-8-2023	0.2	Modified initial version

1.2- Stakeholders:

Name	Role	Title
Galal Ezzat	B-Hospitals SME	B-hospitals CEO
Yousef Mohamed	B-Hospitals SME	B-hospitals clerk

1.3- Approvals:

Name	Title	Signature	Date
Galal Ezzat	B-hospitals CEO		
Yousef Mohamed	B-hospitals clerk		
Mohamed Salama	Jadara Business analyst		

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2. Introduction

2.1 Project Summary

2.1.1 Goals and Objectives

1. Patient Information Management.
2. Appointment Scheduling.
3. Medical Staff Management.
4. Department Management.
5. Billing and Insurance Integration.
6. Room and Resource Management.
7. Appointment Notes and History.
8. Reporting and Analytics.
9. User Authentication and Authorization.
10. Data Backup and Recovery.
11. Integration with Other Hospital Systems.

2.1.2 Problem or Opportunity

1- This will enable the team to get a clearer view and optimize analyzing financial data and optimizing revenue collection strategies.
2- Develop an automated billing and payment calculation system to streamline the work of the B-hospitals team. By automating these processes, the team can save time, reduce errors, and improve accuracy in billing calculations and payment tracking.

2.2 Project Scope

2.2.1 In Scope

1. Allow the user to store and manage patient details including name, date of birth, contact information, medical history, and insurance information.
2. Show appointments for patients with doctors.Ensure that each doctor's availability is taken into consideration.
3. Keep track of medical staff members' information, such as doctors' specializations and roles.Enable the assignment of medical staff to specific departments.
4. Store department details and descriptions.Associate medical staff and administrative staff with relevant departments.
5. Manage patient insurance information, including policy numbers, coverage details, and expiry dates.Calculate and store billing information for patients based on appointments and treatments.
6. Track room availability and types (e.g., ICU, surgery, regular rooms).Ensure efficient allocation of rooms based on medical procedures and patient needs.

7. Allow doctors to add notes and treatment details to each appointment. Maintain a history of appointments, treatments, and prescribed medications.
8. Generate reports on patient appointments, doctor availability, room occupancy, and more.Provide insights into hospital operations and trends.
9. Implement user authentication and role-based access control to ensure data security. Differentiate between administrative staff, medical staff, and patients with appropriate access levels.
10. Develop a system to handle emergency cases, including quick appointment scheduling and resource allocation..
11. Implement regular data backups to prevent data loss in case of system failures. Develop a data recovery plan to restore the database in case of emergencies.
12. Consider integrating your database with other hospital systems like billing, laboratory, and pharmacy systems.

2.3 System Perspective

2.3.1 Dependencies

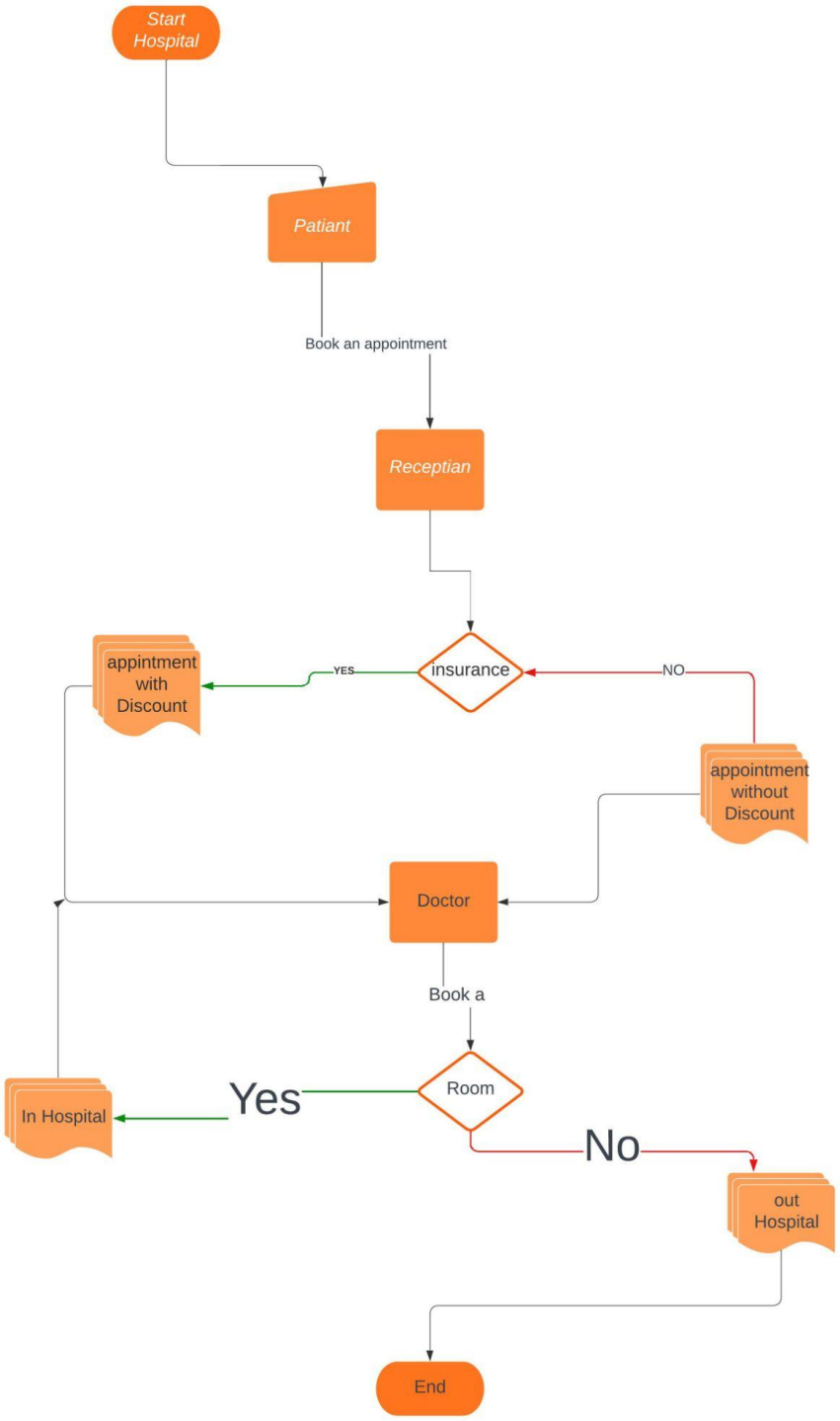
The successful operation of the proposed system relies on dependencies with an existing MS SQL Server database. The system will interact with this database to retrieve and manage crucial data required for its functionality.

2.3.1.1: Existing MySQL Database

Description: The system depends on an existing MySQL database to access and manage essential data related to patients, medical staff, appointments, financial transactions, and other relevant information.
Purpose: The database serves as the primary source of information for the system's various features and functionalities.
Data Flow: The system will establish a connection to the MySQL database and retrieve data through structured queries. Data will be utilized for features such as patient information management, appointment scheduling, financial analysis, and more.
Impact: Any disruptions or issues with the MySQL database may impact the system's ability to function effectively and provide accurate information.

3.UML models

3.1 B-Hospitals Analytics Activity Diagram



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4- Business Requirements

4.1 Functional Requirements:

4.1.1- FR-001

→**Patient Information Analysis**
→**Priority: HiGH**
→**Description:**

The "Patient Information Analysis" feature empowers higher staff administrators with comprehensive insights into patient-related data, enabling informed decisions and resource allocation. Administrators can access analytics such as the distribution of inpatients and outpatients, geographic patient distribution, room occupancy rates, and customizable filtering options. This feature facilitates effective hospital management by visualizing patient trends and optimizing services based on real-time data.

→**User Steps:**

1. Access Patient Information Analysis:
   Log in to the system with valid credentials.
   Navigate to the main dashboard or the patient information analysis section.
2. View Overview Analytics:
   Upon accessing the patient information analysis section, a dashboard will display overview analytics.
3. Inpatient-Outpatient Analysis:
   Examine the visualization illustrating the ratio of inpatients to outpatients over the selected time frame.
   Identify trends and patterns related to patient admittance.
4. Geographic Distribution Analysis:
   Interact with the interactive map to observe the geographic distribution of patients.
   Zoom in on specific regions and hover over areas to view patient counts.
5. Room Occupancy Analysis:
   Explore the graph showcasing room occupancy rates over time.
   Analyze peak occupancy periods to ensure optimal room utilization.
6. Departmental Patient Trends:
   Access insights related to patient distribution across different hospital departments.
   Apply filters to view patient trends for specific departments.
7. Apply Custom Filters:
   Utilize filtering options to refine analytics based on time periods, hospital branches, or departments.
   Apply multiple filters to obtain precise insights.
8. Analyze Trends and Patterns:

Analyze the presented insights to identify trends, patterns, and correlations.
Use gained insights to make informed decisions about resource allocation and patient services.

4.1.2- FR-002

→Staff Information Analysis
→Priority: HiGH
→Description:

The "Staff Information Analysis" feature empowers administrators with valuable insights into medical staff performance, facilitating optimized resource allocation and enhanced productivity. For doctors, insights include the count of doctors, average session times, number of sessions, and department distribution. For nurses, insights encompass the total patients attended, room allocation, and the overall number of nurses. These insights enable informed decisions to improve human resource management and staff productivity.

→User Steps:

1. Access Staff Information Analysis:
   Log in to the system with valid credentials.
   Navigate to the main dashboard or the staff information analysis section.
2. View Overview Analytics:
   Upon accessing the staff information analysis section, a dashboard will present overview analytics.
3. Doctor Performance Insights:
   Explore the visualization displaying the total count of doctors, average session times, and number of sessions.
   Observe department-wise distribution of doctors across different specialties.
4. Nurse Productivity Insights:
   Access insights related to the total number of nurses in the hospital.
   Review the total patients attended by each nurse and their room allocation.
5. Apply Custom Filters:
   Utilize filtering options to refine insights based on specific criteria such as time periods or departments.
   Apply multiple filters to obtain detailed insights.
6. Analyze Trends and Patterns:
   Analyze the provided insights to identify trends, patterns, and correlations.
   Utilize insights to enhance resource allocation and staff productivity.
7. Make Informed Decisions:
   Use gained insights to make informed decisions about human resource management, department allocation, and staff productivity enhancements.

4.1.3- FR-003

→Financial analysis
→Priority: HiGH
→Description:

The "Financial Analysis" feature empowers administrators with comprehensive insights into the hospital's financial health, enabling informed decision-making and strategic planning. Through this feature, administrators can analyze income and expenses, including total salaries, payments, departmental income, net revenue trends, and contributions from insurance companies. These insights facilitate effective financial management, resource allocation, and the enhancement of revenue streams.

→User Steps:

1. Access Financial Analysis:
   Log in to the system with valid credentials.
   Navigate to the main dashboard or the financial analysis section.
2. View Overview Analytics:
   Upon accessing the financial analysis section, a dashboard will display overview analytics.
3. Total Income and Expenses:
   Explore the visualization showcasing the total income and expenses for the chosen time frame.
   Observe the breakdown of income sources and expense categories.
4. Departmental Income Analysis:
   Access insights related to income generated by individual hospital departments.
   Compare departmental contributions to assess financial performance.
5. Net Revenue Trends:
   Analyze the area graph displaying net revenue trends over the selected time period.
   Identify patterns and fluctuations in revenue growth.
6. Insurance Contributions:
   Gain insights into the revenue contributed by different insurance companies.
   Review the percentage breakdown of revenue from insurance sources.
7. Apply Custom Filters:
   Utilize filtering options to refine insights based on specific criteria such as time periods or departments.
   Apply multiple filters to obtain precise financial analytics.
8. Analyze Trends and Patterns:
   Analyze the provided financial insights to identify trends, patterns, and correlations.
   Utilize insights to make informed decisions about financial strategies and resource allocation.
9. Make Informed Financial Decisions:
   Use gained insights to optimize financial management, allocate resources effectively, and enhance revenue streams.

4.2 Non-Functional Requirements

4.2.1- NFR-001

→**Data Backup and Recovery.**
→**Priority: HIGH**
→**Description:**

Make a robust backup for the data and high availability recovery to ensure the security, availability, and integrity of the hospital's critical data. It involves the implementation of a robust backup strategy and mechanisms for high availability recovery in case of data loss or system failures. This feature plays a crucial role in safeguarding patient records, medical information, appointments, and other critical data, thus minimizing downtime and potential disruptions in hospital operations.

→**Steps:**

Access Data Backup and Recovery:
Log in to the system using valid credentials.
Navigate to the main dashboard or the data backup and recovery section.
Verify User Access:
Ensure that only authorized users with appropriate roles have access to the data backup and recovery functionality.
Implement role-based access control to restrict access to specific personnel responsible for data management.
Configure Backup Settings:
Define the backup frequency, including daily, weekly, or custom intervals.
Specify the backup destination, such as local servers or cloud storage.
Initiate Data Backup:
Manually trigger a backup process or allow the scheduled backup to run automatically.
Ensure that all critical data, including patient records, appointments, and medical information, is included in the backup.
Monitor Backup Progress:
Keep track of the backup progress, including the data being transferred and the completion status.
Receive notifications or alerts if any issues arise during the backup process.
Test Data Restoration:
Periodically test the restoration process by simulating a data recovery scenario.
Verify that the backed-up data can be successfully restored without loss or corruption.
High Availability Recovery:
Implement mechanisms for high availability recovery to ensure quick system restoration in case of failures.
Utilize redundant servers, failover systems, and load balancing to maintain continuous operation.
Recover from Data Loss:
In case of data loss or system failure, initiate the recovery process.
Access the backup data and restore it to the affected systems.

Verify Data Integrity:
After recovery, validate the restored data's integrity and accuracy.
Perform data integrity checks to ensure that the recovered data matches the original.
Regularly Update Backups:
Maintain a consistent backup schedule to ensure that the latest data is protected.
Update backup configurations as needed to accommodate changes in data volume and system structure.
Implement Encryption:
Encrypt backup data both during transit and while stored, ensuring data remains confidential even if compromised.
Implement Access Controls:
Employ strong access controls for data backup and recovery features.
Enforce two-factor authentication for critical actions such as initiating recovery.
Audit Trails and Logging:
Enable detailed logging and auditing of backup and recovery activities.
Monitor logs for any suspicious or unauthorized activities.
Conduct Security Testing:
Regularly conduct security testing, including vulnerability assessments and penetration testing, to identify and address potential vulnerabilities.

5 VRD

We will expect the output to be dashboards like this:

5.1 patient dashboard:

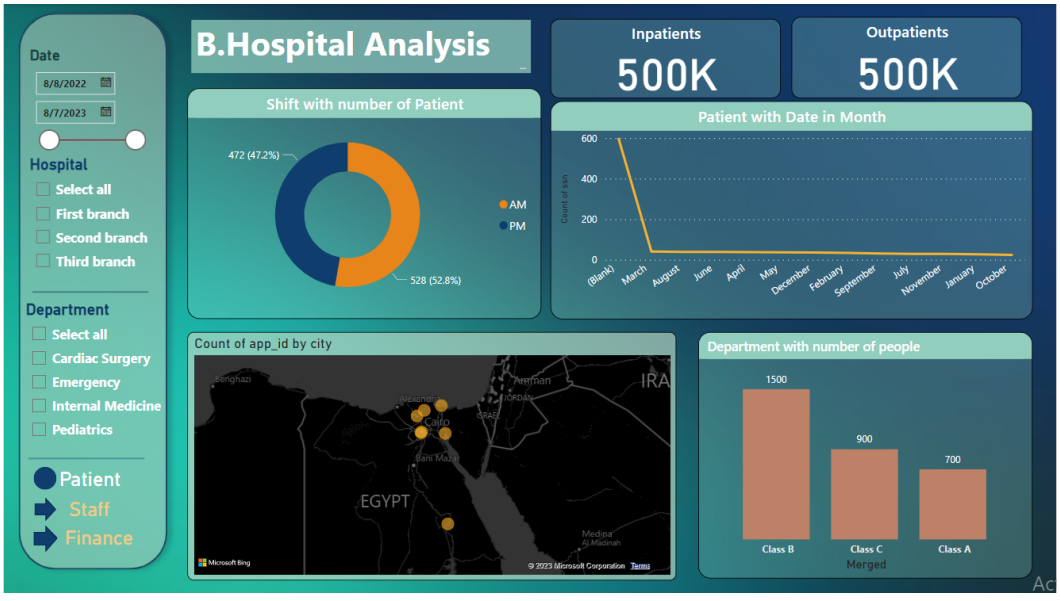

Chart Title	KPI	Description
Donut Chart Number of Patients Each Shift in a Hospital	Average Number of Patients per Shift.	This KPI helps in assessing the workload and resource allocation efficiency across different shifts.
Map Bubble Chart Number of Patients Each Country	Average Patients per Country	This KPI gives an overview of the patient distribution across different countries
Bar Chart Room Type (Class A, Class B, Class C)	Percentage Distribution of Room Types with patient demand	This KPI provides insights into the utilization of different room classes. It helps in understanding the demand for different levels of room
Line Chart Monthly Patient Count	Monthly Average Patient Count	This KPI helps in tracking the overall patient influx over time.
Cards Number of Inpatients and Number of Outpatients	Inpatient to Outpatient count	This KPI compares the number of inpatients to the number of outpatients.

5.2 Staff dashboard:

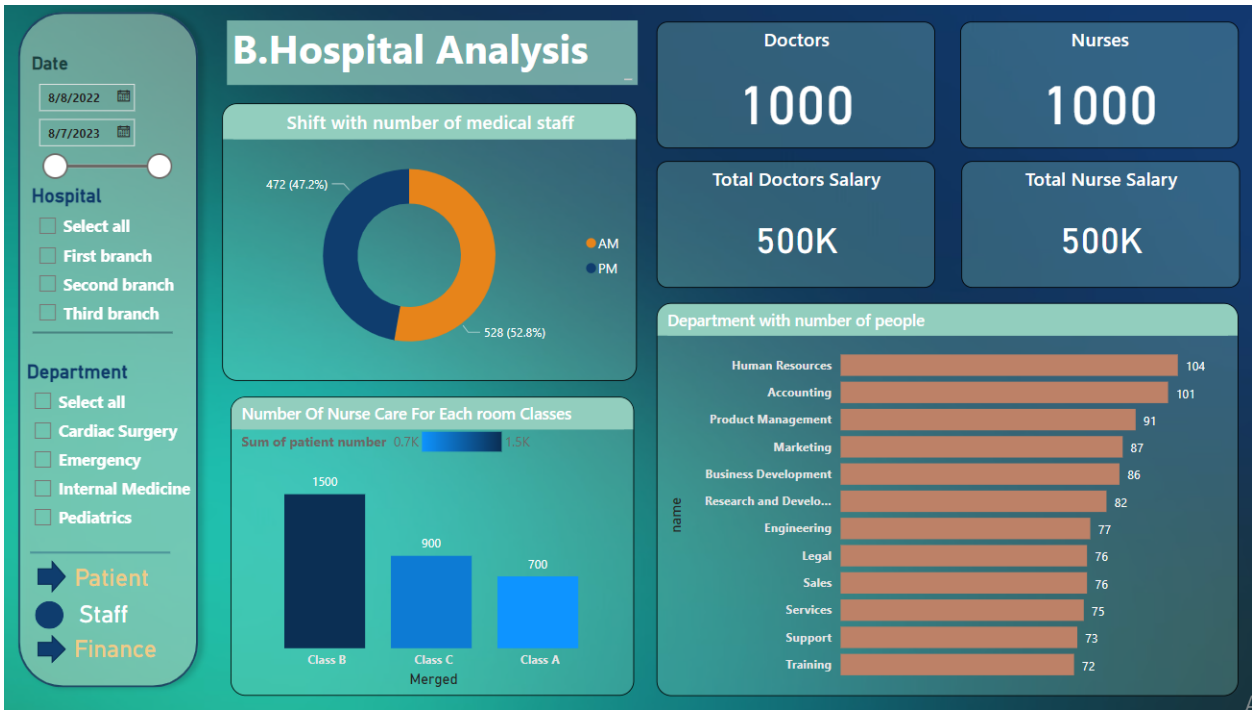

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Chart Title	KPI	Description
Donut Chart Number of Medical Staff Each Shift	Average Medical Staff Count per Shift	This KPI provides insight into the distribution of medical staff across different shifts
Bar Chart Nurses Assigned to Each Room Type	Nurse-to-Room Ratio by Room Type	This KPI indicates the average number of nurses assigned to each room type. It helps in ensuring appropriate nurse staffing based on the intensity of care required for different room types.
Pareto Chart Administration Staff by Department	count of Administration Staff by Department	This KPI uses a Par chart to display the distribution of administration staff among different departments
Bar Chart: Room Type (Class A, Class B, Class C)	Percentage Distribution of Room Types with patient demand	This KPI provides insights into the utilization of different room classes. It helps in understanding the demand for different levels of room
Line Chart Monthly Patient Count	Monthly Average Patient Count	This KPI helps in tracking the overall patient influx over time.
Cards Number of Doctors, Number of Nurses, Nurse Salary, Doctor Salary	Doctor and Nurses count Total sum of salary for each of them	This KPI compares the number of doctors to the number of nurses. It helps in understanding the balance between medical professionals and can impact patient care quality

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5.3 Finance dashboard:

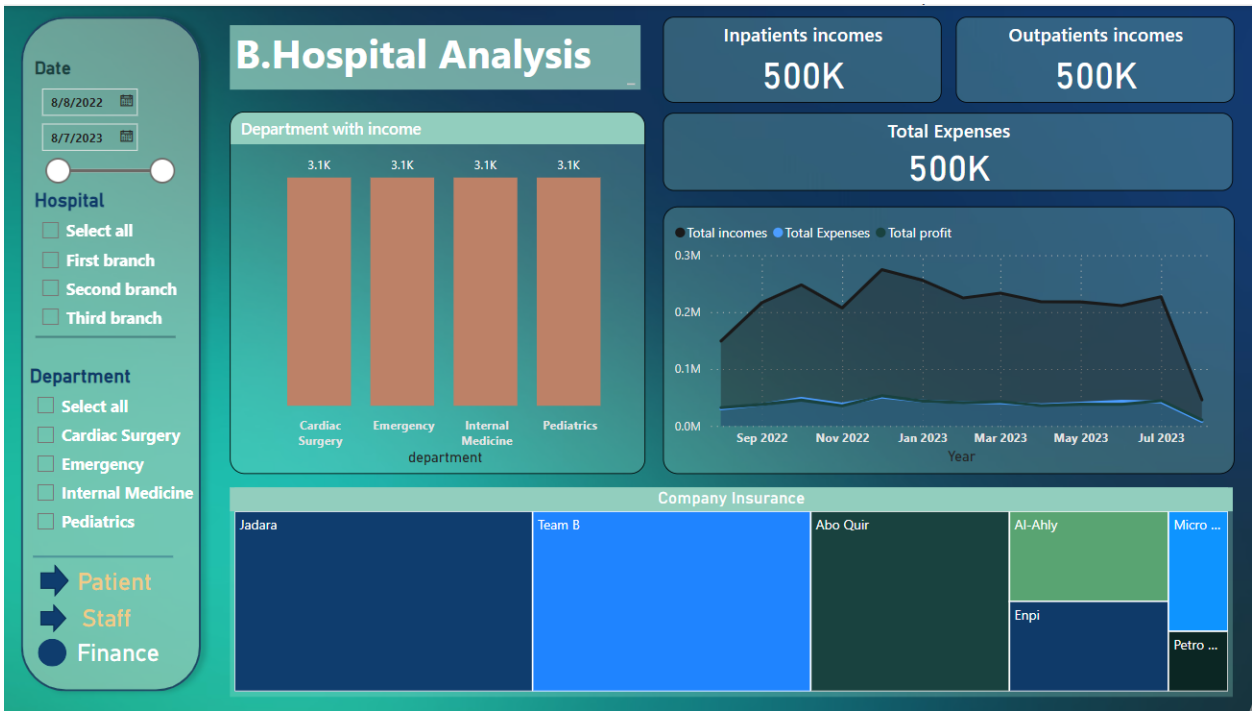

Chart Title	KPI	Description
Bar Chart Total Income of Each Department	Department-wise Total Income	This KPI helps visualize the income generated by each department. It can aid in identifying the most profitable departments and potential areas for improvement
Card Inpatient Total Income	Total Income from Inpatient Services	This KPI displays the total income generated from inpatient services
Card Outpatient Total Income	Total Income from Outpatient Services	This KPI displays the total income generated from outpatient services.
Card Total Expenses	Total Expenses	This KPI shows the total expenses incurred by the hospital. It's important to track expenses to understand the financial health of the organization.

Treemap Company-wise Total Income from Insurance	Income from Insurance by Company	This KPI visualizes the income generated from insurance for different companies using a treemap. It helps in understanding which insurance companies contribute the most to the hospital's revenue.
Area Map by Date Comparing Income, Expenses, and Total Profit	Net Income (Income - Expenses & profit) Over Time	This KPI uses an area map chart to visually compare the trend of income, expenses, and total profit over a selected period. The chart will show the areas representing income, expenses, and the net income (profit) over each date