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# 1. Introduction

## 1.1 Purpose

This document outlines the design and implementation strategy for the capstone project, which aims to develop a comprehensive data analytics system for hospital management. The design document serves as a blueprint, ensuring all stakeholders understand the project's scope, system architecture, data management strategies, and technical requirements.

## 1.2 Scope

The project focuses on creating a system for efficient data handling and analysis in a hospital setting. It includes data sourcing, storage, ETL (Extract, Transform, Load) processes, data modelling, and visualization. The system will not cover aspects like real-time patient monitoring or electronic health record integration.

# 2. System Overview

## 2.1 System Architecture

* Data Sourcing: Patient records, treatment data, hospital management data.
* Data Storage: Cloud-based SQL database.
* ETL Process: Extraction from various hospital systems, transformation to standardize formats, and loading into the database.
* Data Modelling: Entity-Relationship modelling.
* Visualization: Interactive dashboards using Tableau.

## 2.2 System Components

* User Interface: Web-based dashboard for data visualization.
* Backend Processing: ETL scripts and data cleaning routines.
* Database: Structured storage in an Excel worksheet.

# 3. Data Management

## 3.1 Data Sourcing

* Patient Records: Data from the hospital's patient management system.
* Treatment Data: Information from treatment logs and schedules.
* Management Data: Administrative and operational data from hospital management systems.

## 3.2 ETL Process

* Extract: Automated scripts to pull data from various sources.
* Transform: Data cleaning and formatting to ensure consistency.
* Load: Storing the cleaned data into the SQL database.

# 4. Data Modelling

## 4.1 Table description

|  |  |  |
| --- | --- | --- |
| Table\_name | Columns | Data\_type |
| ID | Hospital\_id(P.K) | Number |
|  | Patient\_ID(P.K) | Number |
|  | Visit\_ID(P.K) | Number |

|  |  |  |
| --- | --- | --- |
| Table\_name | Columns | Data\_type |
| Hospital\_info | Admission\_Type | Text |
|  | Department\_Name | Text |
|  | Diagnosis\_code | Number |
|  | Diagnosis\_Description | Text |
|  | Hospital | Text |
|  | Hospital\_ID(F.K) | Number |
|  | Satisfaction\_score | Number |

|  |  |  |
| --- | --- | --- |
| Table\_name | Columns | Data\_type |
| Admission\_info | Admission\_type | Text |
|  | Arrival\_Time | Time |
|  | Attending\_time | Time |
|  | Date\_of\_admission | Date |
|  | Department\_name | Text |
|  | Medication | Text |
|  | Patient\_id(FK) | Number |
|  | Visit\_ID(F.K) | Number |
|  | Waiting\_time | Time |

|  |  |  |
| --- | --- | --- |
| Table\_name | Columns | Data\_type |
| Patient\_info | Admission\_type | Text |
|  | Age | Time |
|  | Amount\_paid | Time |
|  | Blood\_type | Date |
|  | City | Text |
|  | Department\_name | Text |
|  | Gender | Number |
|  | Hospital | Number |
|  | Insurance\_provider | Time |
|  | Patient\_ID(F.K) | Number |
|  | Total\_Amount | Number |

|  |  |  |
| --- | --- | --- |
| Table\_name | Columns | Data\_type |
| Insurance | Insurance\_provider | Text |
|  | Patient\_id(F.K) | Number |
|  | Total\_amount | Number |

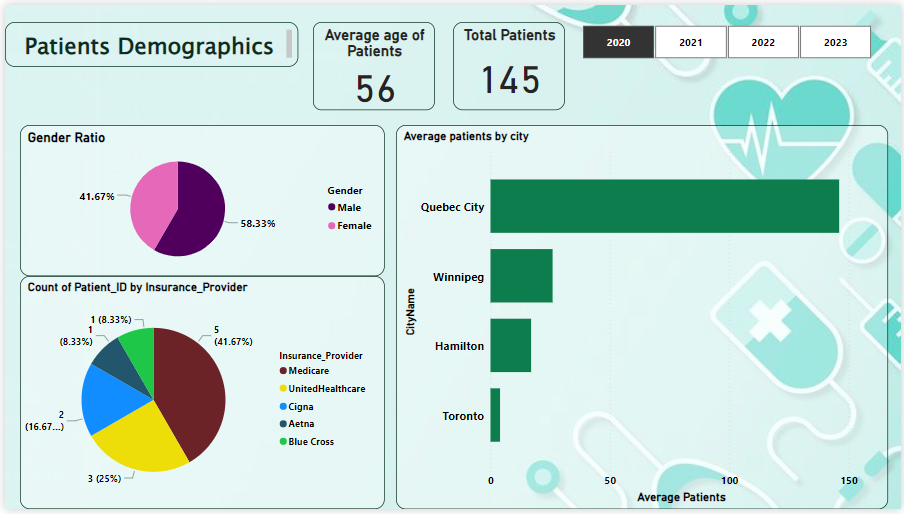
## 4.2 Schema Design

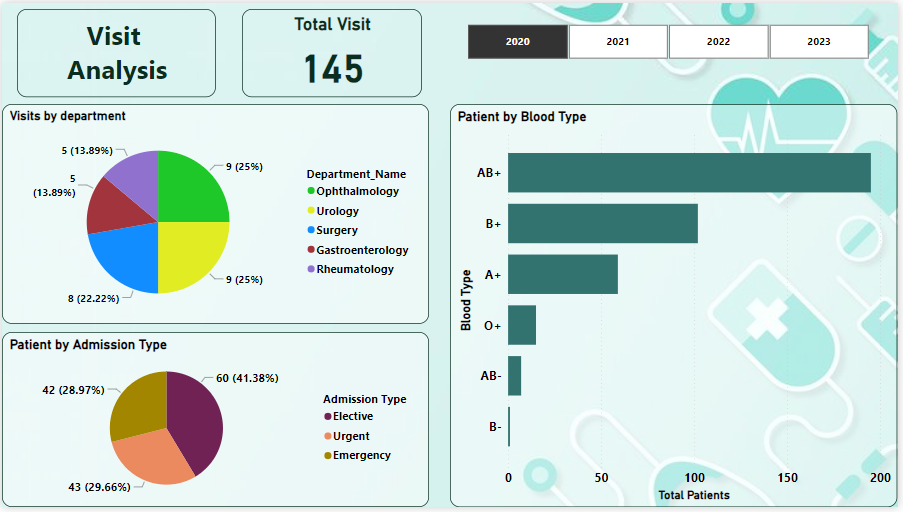
* ID: Stores all the primary keys
* Hospital\_info: Stores the data related to the hospital
* Admission\_info: It stores the data related to the admission of the patients
* Patients\_info: Stores patient demographic details.
* Insurance: Stores details of insurance related data.

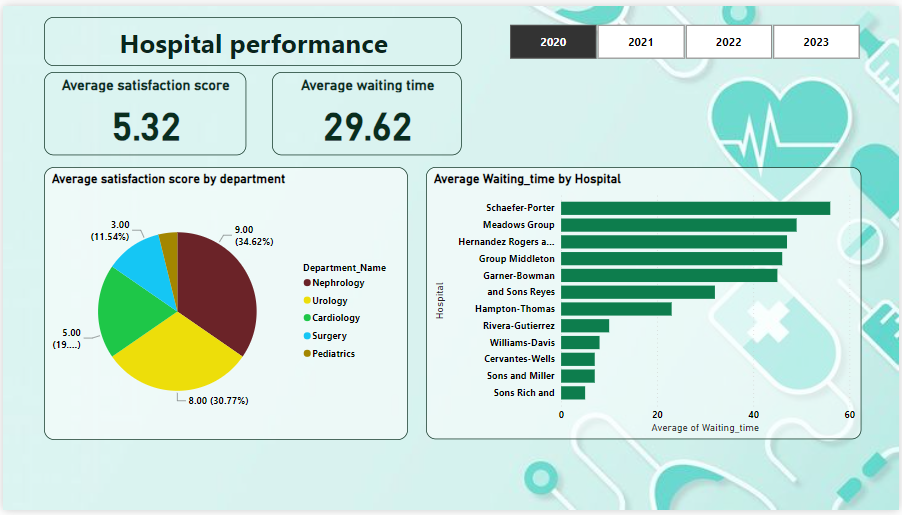
# 5. Visualization & User Interface

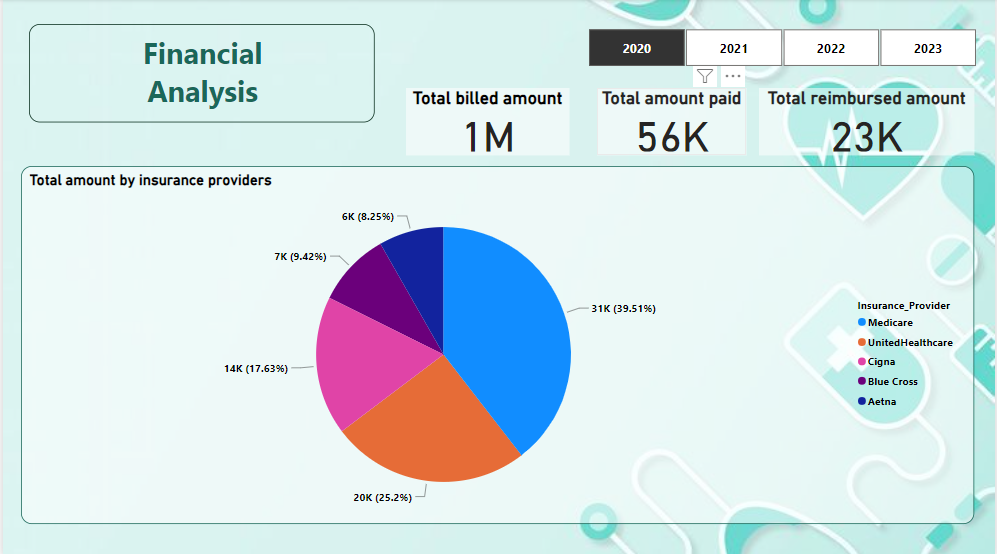
## 5.1 Layout

* Dashboard Layout: Divided into sections for patient statistics, treatment outcomes, and hospital operations.
* Interactive Elements: Filters for date ranges, patient demographics, and treatment types.









## 5.2 Features & Functionalities

* Interactive Elements: Dropdowns, date pickers.
* Filter & Search Options: Search by patient ID, treatment type.
* Navigation: Menu bar with links to different sections of the dashboard.

# 6. Technical Requirements

## 6.1 Software & Tools

* MS Excel: For data storage.
* Power BI: For data visualization.
* Python: For ETL scripts and data processing, cleaning and sorting the data.

## 6.2 Hardware Requirements

* Computational Requirements: Minimum 4 vCPUs, 16GB RAM.

# 7. Conclusion

This design document provides a comprehensive plan for developing a hospital management data analytics system. Future enhancements could include real-time data processing and integration with electronic health records.