SOFTWARE ENGINEERING DEPARTMENT

Total Marks: ___100___

Obtained Marks: _____

<u>Hospital ERD Project</u>

<u>Last date of Submission: 20 Nov 2025</u>

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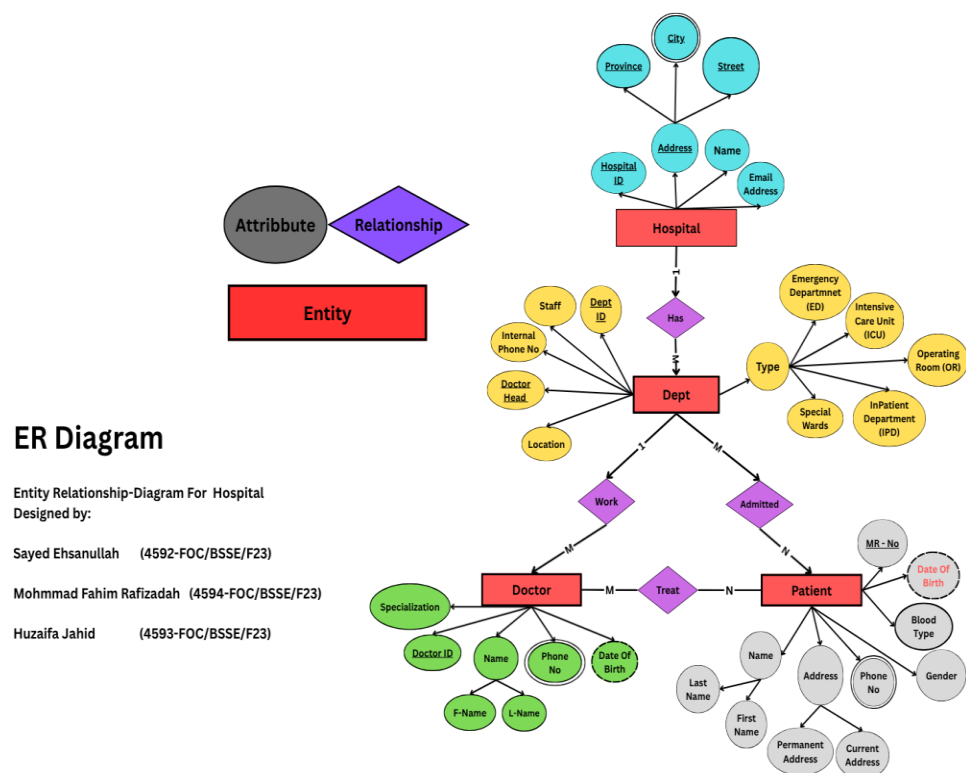Sayed EshanUllah(4592 FOC/BSSE/F23)

Hospital Management System ERD Project Documentation

1. **Project Overview**

2. This document serves as the formal submission for the Hospital Management System (HMS) Database Design project. It presents the Entity-Relationship Diagram (ERD) and the corresponding logical design for a Hospital Management System (HMS). The system is designed to manage the core entities involved in a hospital environment, including patients, doctors, departments, and the hospital itself.

3. The documentation includes the complete Entity-Relationship Diagram (ERD) developed using Canva , a detailed breakdown of the logical schema, and an explanation of the design decisions. The primary goal of this design is to create a relational schema that ensures data integrity, minimizes redundancy, and facilitates efficient tracking of patient treatment history, departmental admissions, and staff assignments.

2. Entity-Relationship Diagram (ERD)

ER Diagram

Entity Relationship-Diagram For Hospital
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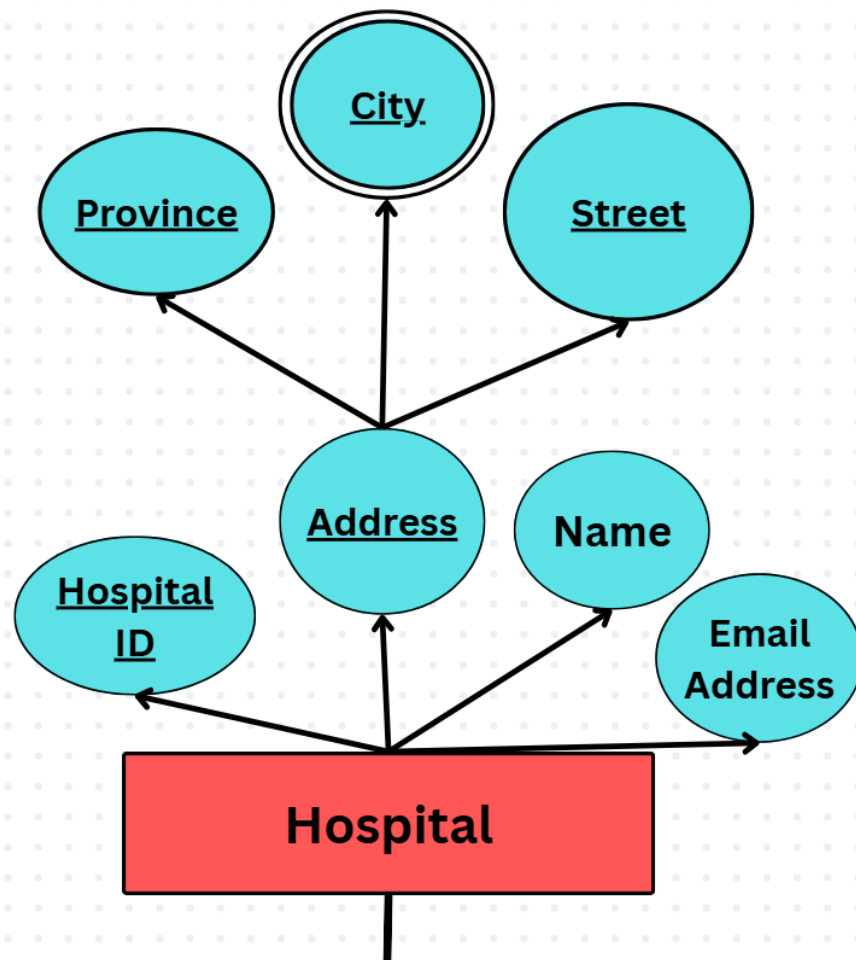Sayed EshanUllah(4592 FOC/BSSE/F23)

4. **Entity-Specific Explanations**

This section details the attributes for each core entity, defining their roles and how composite and multivalued attributes were handled.

3.1. Hospital Entity:

The Hospital entity represents the primary institution hosting the system. It serves as the top-level entity, to which all departments belong.

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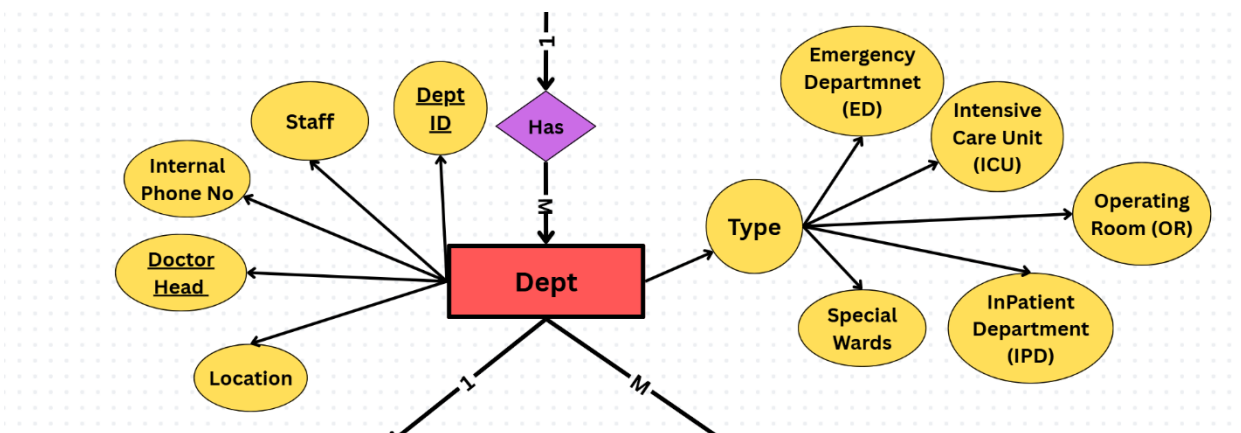**Designed BY:** Mohammmad Fahim Rafizada(4594 FOC/BSSE/ F23)   Huzaifa Jahid(4593FOC/BSSE/ F23)
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Attribute	Type	Description
Hospital ID	Primary Key	A unique identifier for the hospital. [11]
Name	Simple	The official name of the institution (must be unique). [12]
Info	Simple	General description or contact information for the hospital. [13]
Address	Composite	Decomposed into multiple atomic fields (City, State, Pincode) to allow for structured queries. [14]

3.2. Department (Dept) Entity

The Department entity defines the organizational units within the hospital (e.g., Cardiology, Emergency, Radiology). It connects the hospital structure to the staff and patients.

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Attribute	Type	Description
DeptID	Primary Key	A unique identifier for the department. [17]
Name	Simple	The official name of the department. [18]
Type	Simple	Specifies the kind of department (e.g., 'Emergency', 'Inpatient', 'OPD'). [19]
Location	Simple	The physical location within the hospital building. [20]
InternalPhoneNo	Simple	Internal extension or contact number for the department. [21]
HospitalID	Foreign Key	Links the department to its parent Hospital (enforcing the 1:N relationship). [22]

3.3. Doctor Entity

The Doctor entity represents the medical professionals who treat patients and work within a specific department.

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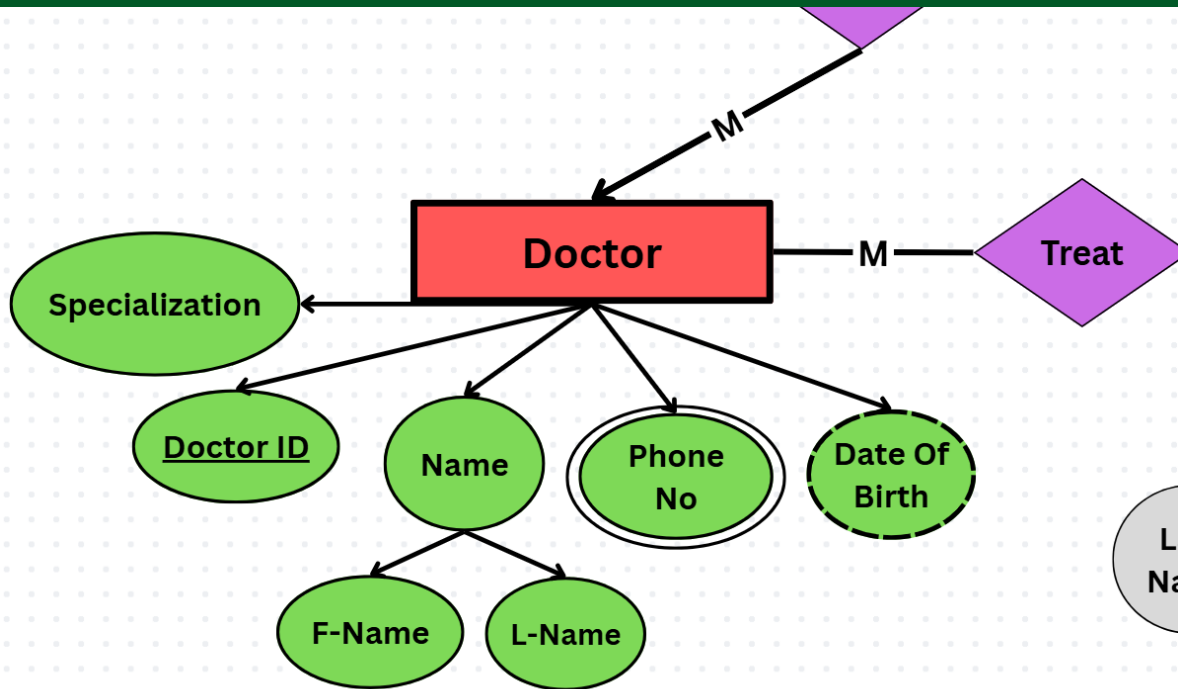**Designed BY:** Mohammmad Fahim Rafizada(4594 FOC/BSSE/ F23)   Huzaifa Jahid(4593FOC/BSSE/ F23)
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Attribute	Type	Description
Doctor ID	Primary Key	A unique identifier for the doctor. [24]
Name	Composite	Decomposed into FName (First Name) and LName (Last Name). [25]
Specialization	Simple	The specific medical field the doctor practices (e.g., 'Pediatrics', 'Oncology'). [26]
Contact No	Multivalued	Handled in a separate table (Doctor_Phone) to allow multiple phone numbers without violating 1NF. [27]

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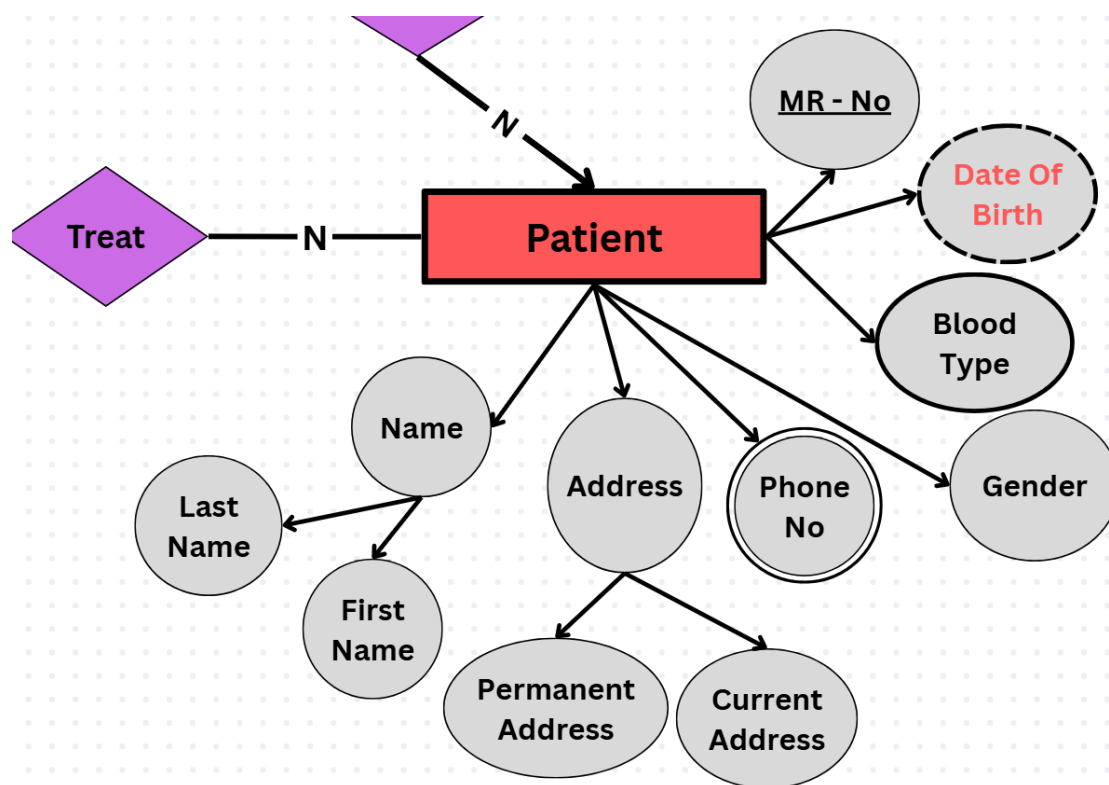
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Attribute	Type	Description
DeptID	Foreign Key	**Links the doctor to the Department where they are primarily assigned (1:N relationship). [28]**
Date of Birth	simple	The Doctor's date of birth. [34]

3.4. Patient Entity:

The Patient entity represents the individuals receiving care at the hospital. This entity holds biographical and basic clinical data.

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Attribute	Type	Description
MR_No	Primary Key	The Medical Record Number, serving as the unique patient identifier. [31]
Name	Composite	Decomposed into FName and LName. [32]
Address	Composite	Decomposed into StreetAddress, City, State, and Pincode. [33]
DateOfBirth	Simple	The patient's date of birth. [34]
Gender	Simple	The patient's biological sex. [35]
BloodType	Simple	The patient's blood group (e.g., A+, O-). [36]
History	Simple	Text field for general medical history. [37]

4. Key Relationships and Cardinality

This section summarizes the critical relationships that define the data model:

- **Hospital and Department (Has):** This is a **One-to-Many (1:N)** relationship, meaning one hospital can have multiple departments, but each department belongs to only one hospital. This is enforced by the HospitalID foreign key in the Department entity.

- **Department and Doctor (Works_in):** This is a **One-to-Many (1:N)** relationship, where one department employs many doctors, but each doctor is primarily assigned to one department. This is enforced by the DeptID foreign key in the Doctor entity.

- **Deparment and patient (admitted):** This is a **one to many (1:N)** relationship, where one department has many patients.

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- **Patient and Doctor (Treat):** This interaction involves a complex **Many-to-Many (M:N)** relationship. A single patient can be treated by multiple doctors over time, and a single doctor treats multiple patients. This relationship is resolved by an associative/linking entity (like **Admission** in the ERD), which includes the primary keys (MR_No and DoctorID) of both entities, capturing the treatment history and departmental admissions.

5. **GitHub Link:**

The source files and high-resolution diagram for this ERD project have been uploaded to the following mandatory GitHub repository:

Here is the Github's link of each member

Sayed Ehsanullah:

https://github.com/Majeed-Ehsan/Hospital-ERD-Project

Mohammad Fahim Rafizada:

https://github.com/Fahimbsse4594/Hospital-ERD-Project.

Huzaifa Jahid:
https://github.com/huzaifabsse4593-wq/Hospital-ERD-Project

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