# Hospital Administration Database Design

Version 1.0

Submitted 9/22/24

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# Version Control

|  |  |
| --- | --- |
| Version | Description |
| 1.0 | First released draft |
| 1.1 | Updates made   * Added Relational Schema * Corrected ERD errors * Corrected EERD errors * Terminology in Business Rules more standardized and streamlined * Added Reports to Narrative section * Updated Backgrounds on ERD and EERD for easier tracibility |
| 1.2 | Updates made   * Added Hospital Data Dictionary * Added Certification Table to Relational Schema * Updated Entities w/ Nested Attributes |
| 1.3 | Updates made   * Added age column to Patient Table * Added age column to Relational Schema |

# Purpose:

The purpose for this Database Design Documentation (DBDD) is to outline a database that will track and record various assets and staff around a hospital. As critical an environment a hospital often can be, it is important to have as much organization as possible in assigning staff to certain areas as well as treatments and facilities for the patients.

Narrative:

The hospital administrator wants to create a database to track nurse assignments to their wards and nurse interactions with their patients, patient admissions by their doctors and treatments administered by doctors to their patients, bed assignments for each patient and items charged to patients during their stay. Administrator wants to record each nurse’s name and address, phone and alternate phone, email and the medical specialties he or she is certified. Some nurses supervise one or more other nurses. No nurse is supervised by more than one nurse, and some nurses are unsupervised.  
 Each ward at the hospital has a designated number, descriptive name, physical location and phone number. Each ward has at least one nurse assigned to it. A nurse is assigned to at least one ward and rotates assignments among other wards. The assignment is tracked by the specific date and the hours worked in the assigned ward by each nurse on that date.  
 In addition to nurse assignments, each ward also has a charge nurse. The charge nurse is the custodian of the medical records for the ward. Not all nurses act in this capacity, but those that do oversee only one ward, and a ward only has one charge nurse.  
 A ward consists of hospital beds. The beds are inventoried to a specific ward. Information on beds including their size (small, large, extra-large) and their type (elevated electrically or manually). Most of the beds are large and manual (this is the default setting).  
When a patient is admitted to the hospital they are assigned to a specific bed. Not all beds are available for use all the time, and a bed may not be assigned to more than one patient.  
Information on patients is recorded: name, gender, dob, address, phone, alternate phone, email.  
 The date the patient is admitted to the hospital, the admitting doctor, the date the patient is discharged, and discharging doctor are also tracked.  
 Some doctors admit patients while others do not. Doctor information tracked: name, address, phone, alternate phone, email and their medical specialties.  
The hospital tracks the treatments administered to patients and the treating doctor. Treatments are tracked by name, description, and charge. The hospital also tracks the date and time of each treatment administered and the results. Some doctors treat patients while others do not.  
 A given patient may receive no treatments or may receive many, and some patients may receive their treatments from more than one doctor. Some treatments have yet to be used while others have been used often. In addition to treatments, patients incur other charges for items used during their stay. The hospital tracks these charges as “items” and stores information on what items have been charged.

REPORTS  
The administrator runs the following reports:  
1. Daily report of beds assigned and beds available.  
2. Weekly report of patients admitted and discharged, sorted by age.  
3. Monthly report of physician admits.  
4. Shift Rotation report of nurse patient care.  
5. Summary of charges for a patient stay.  
6. Ward scheduling report with name of charge nurse.  
7. Patient ward assignment report.  
8. Patient treatment report with and without treating physician.  
9. Physician treatment report of dates and types of treatments.  
10. Report of Physicians and their specialties.  
11. Report of Nurses with their certifications and ward assignments, including those who  
supervise.

# Requirements (Actors and Roles)

Nurses: nurses are assigned to wards and see patients. Some oversee wards and other nurses

Wards: Wards are staffed by nurses and contain beds.

Beds: Beds are located inside wards and get occupied by patients

Patients: Patients get assigned to beds, receive treatments, are charged for items and get seen by both doctors and nurses

Doctors: Doctors see patients and assign treatments to patients.

Items: Items get charged to the patients for use  
  
Treatments: Treatments get administered by doctors and are administered to patients.

Entities

* Nurses
* Wards
* Beds
* Doctors
* Items
* Treatments
* Patients

Entities with Nested Attributes

Nurses

* Name
* Address
* Phone Number
* Alternate Phone Number
* Medical Specialty

Wards

* Designated Number
* Descriptive Name
* Physical Location
* Phone Number

Beds

* Size
* Type

Patients

* Name
* Gender
* Date of Birth
* Address
* Phone Number
* Alternate Phone Number
* Email

Treatments

* Name
* Description
* Charge amount

Items

* Name
* Charge Amount

Doctors

* Name
* Address
* Phone Number
* Alternate Phone Number
* Email
* Medical Specialty

Business Rules

Nurses: Nurses are assigned to one or many wards and may be in charge of zero or one ward. They also see zero or many patients. Some nurses supervise zero or many nurses, but nurses can have zero or one nurse supervising them.

Wards: Wards have one or many nurses assigned to it and have one or many beds.

Beds: A bed is assigned to one and only one ward and have zero or only one patient assigned to it

Patients: patients are assigned to one and only one bed and are seen by one or many doctors. They are seen by one or many nurses. They are administered zero or many treatments. A patient is charged for one or many items.

Doctors: a doctor admits none or many patients and administer zero or many treatments

Items: items go to zero or many patients  
  
Treatments: Treatments are administered by zero or many doctors and are administered to none or many patients.

ERD:  
A diagram of a computer

Description automatically generated

EERD

A computer screen shot of a computer flow chart

Description automatically generated

Relational Schema  
A blue rectangular object with text

Description automatically generated with medium confidence

**(Hospital Administration Data Dictionary)**

Table: **Certification**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| Cert | **PK;** for certifications | int |  | Y |  |  |  |  |  | Y |
| Certification | Nurses Certifications | nvarchar | 50 |  |  |  |  |  |  | Y |

Table: **Nurse Certification**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| NurseID | **CPK**; **FK** to Nurse Table to track Nurses | int |  | Y |  |  |  |  |  | Y |
| Cert | **CPK; FK** to Cert Table to track Certifications | int |  |  |  |  |  |  |  | Y |

Table: **Nurse**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| NurseID | **PK**; Unique sequential Nurse  Identification | int |  | Y |  |  |  |  |  | Y |
| FirstName | First name of the Nurse | nvarchar | 15 |  |  |  |  |  |  |  |
| LastName | Last name of the Nurse | nvarchar | 20 |  |  |  |  |  |  |  |
| PhoneNumber | Primary Phone Number for  Corresponding Nurse | varchar | 14 |  |  |  | Phone  Rule |  |  |  |
| Street | Street of the Nurse | nvarchar | 20 |  |  |  |  |  |  |  |
| City | City of the Nurse | nvarchar | 15 |  |  |  |  |  |  |  |
| State | State of the Nurse | char | 2 |  |  |  |  | LIKE ‘[A-Z] [A-Z]’ |  |  |
| Zip | Zip code of the Nurse | char | 10 |  |  |  |  | LIKE ‘[0-9] [0-9] [0-9] [0-9] [0-9] |  |  |
| AltPhoneNumber | Secondary Phone number for the Nurse | varchar | 20 |  |  |  | Phone  Rule |  |  |  |
| Email | Email for the Nurse | nvarchar | 30 |  |  |  |  |  |  |  |
| SupervisorNo | **FK** Recursive to Nurse Table; Unique Sequential Supervisor Nurse Identification | int |  |  |  |  |  |  |  |  |

Table: **Ward**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| WardID | **PK;** Unique Sequential Ward Identification | int |  | Y |  |  |  |  |  | Y |
| Location | Identifies the wing in which the ward is located | char | 20 |  |  |  |  |  |  |  |
| DesignatedNumber | The Wards Reference Number within the Hospital | int | 2 |  |  |  |  |  |  |  |
| DescriptiveName | The Name to Specify what Medical activities are carried out in the Ward | nvarchar | 30 |  |  |  |  |  |  |  |
| PhoneNumber | Phone Number to the Ward Help Desk | char | 14 |  |  |  | Phone  Rule |  |  |  |
| ChargeNurseID | **FK**; reference to Nurse table. The ID of the Nurse in charge of the ward | int |  |  |  |  |  |  |  |  |

Table: **Nurse Assignment**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| AssignmentID | PK; Unique sequential nurse assignment ID number | int |  | y |  |  |  |  |  | y |
| Date | Date the Nurse worked | date |  |  |  |  |  |  |  |  |
| Hours | The number of hours worked in the ward | decimal |  |  |  |  | (4,2) |  |  |  |
| NurseID | **FK** to referencing Nurse table | int |  |  |  |  |  |  |  | Y |
| WardID | **FK** to reference Ward table | int |  |  |  |  |  |  |  | Y |

Table: **Bed**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| BedNumber | **PK**; Unique Sequential Bed Identification | int |  | Y |  |  |  |  |  | Y |
| Size | Bed Size | char | 2 |  |  | [L] |  | LIKE “S”, “L”, OR “XL" |  |  |
| Type | Adjustment type of the Bed; either manual or automatic | char | 1 |  |  | [M] |  | LIKE “M”, “A” |  |  |
| Availability | Availability of the bed | char | 1 |  |  | [O] |  | LIKE “O” “A” |  |  |
| WardID | **FK**; Reference to the Ward Table | int |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| PatientNumber | **PK**; Unique sequential Patient  Identification | int |  | Y |  |  |  |  |  | Y |
| FirstName | First name of the Patient | nvarchar | 15 |  |  |  |  |  |  |  |
| LastName | Last name of the Patient | nvarchar | 20 |  |  |  |  |  |  |  |
| Street | Street of the Patient | nvarchar | 20 |  |  |  |  |  |  |  |
| City | City of the Patient | nvarchar | 15 |  |  |  |  |  |  |  |
| State | State of the Patient | char | 2 |  |  |  |  | LIKE ‘[A-Z] [A-Z]’ |  |  |
| Zip | Zip code of the Patient | char | 10 |  |  |  |  | LIKE ‘[0-9] [0-9] [0-9] [0-9] [0-9] |  |  |
| Gender | Gender of the Patient | char | 2 |  |  |  |  | LIKE ‘M’ OR ‘F’ OR “NA” |  |  |
| DateOfBirth | Birthday of the Patient | date |  |  |  |  |  |  |  |  |
| PhoneNumber | Phone Number of Patient | char | 14 |  |  |  | Phone Rule |  |  |  |
| AltPhoneNumber | Secondary Phone Number for Patient | Char | 14 |  |  |  | Phone Rule |  |  |  |
| Email | Email for the Patient | nvarchar | 35 |  |  |  |  |  |  |  |
| Age | Calculated age of Patient | calculated |  |  |  |  |  |  |  |  |
| BedNumber | **FK**; Reference to Bed Table | int |  |  |  |  |  |  |  | Y |

Table: **Patient**

Table: **Item charge**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| ChargeID | **PK**; Unique Sequential Bed Identification | int |  | Y |  |  |  |  |  | Y |
| Date | Date of item charge | date |  |  |  |  |  |  |  |  |
| Quantity | Quantity of item | int |  |  |  |  |  |  |  |  |
| PatientNumber | FK; reference to the Patient Table | int |  |  |  |  |  |  |  |  |
| ItemNumber | **FK**; Reference to the ItemTable | int |  |  |  |  |  |  |  |  |

Table: **Item**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| ItemNumber | **PK**; Unique Sequential Item Identification | int |  | Y |  |  |  |  |  | Y |
| Name | Name of item | nvarchar | 50 |  |  |  |  |  |  |  |
| Charge | The cost of the item | money |  |  |  |  |  |  |  |  |

Table: **Admit/Discharge**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| AdmitID | **PK;** Unique Sequential Admit Identification | int |  | Y |  |  |  |  |  | Y |
| AdmitDate | Date patient is admitted | date |  |  |  |  |  |  |  |  |
| DischargeDate | Date patient is discharged | date |  |  |  |  |  |  |  |  |
| PatientNumber | FK to Patient table | int |  |  |  |  |  |  |  |  |
| AdmitDocID | FK; reference to Doctor Table. Synonym for DoctorID | int |  |  |  |  |  |  |  |  |
| DischargeDocID | **FK**; reference to Doctor Table. Synonym for DoctorID | int |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| DoctorID | **PK**; Unique sequential Doctor  Identification | int |  | Y |  |  |  |  |  | Y |
| FirstName | First name of the Doctor | nvarchar | 15 |  |  |  |  |  |  |  |
| LastName | Last name of the Doctor | nvarchar | 20 |  |  |  |  |  |  |  |
| Street | Street of the Doctor | nvarchar | 20 |  |  |  |  |  |  |  |
| City | City of the Doctor | nvarchar | 15 |  |  |  |  |  |  |  |
| State | State of the Doctor | char | 2 |  |  |  |  | LIKE ‘[A-Z] [A-Z]’ |  |  |
| Zip | Zip code of the Doctor | char | 10 |  |  |  |  | LIKE ‘[0-9] [0-9] [0-9] [0-9] [0-9] |  |  |
| PhoneNumber | Phone Number of Patient | char | 14 |  |  |  | Phone Rule |  |  |  |
| AltPhoneNumber | Secondary Phone Number for Doctor | Char | 14 |  |  |  | Phone Rule |  |  |  |
| Email | Email for the Doctor | nvarchar | 35 |  |  |  |  |  |  |  |

Table: **Doctor**

Table: **Doctor Specialty**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| DoctorID | **CPK;FK**; Unique Sequential Item Identification | int |  | Y |  |  |  |  |  | Y |
| MedicalSpecialty | **CPK; FK** referencing Specialty table | int |  |  |  |  |  |  |  | Y |

Table: **Specialty**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| MedicalSpecialty | **PK;** tracks specialty | int |  | Y |  |  |  |  |  | Y |
| Specialty | Doctors Specialty | nvarchar | 30 |  |  |  |  |  |  | Y |

Table: **Administer**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| PatientNumber | **CPK; FK** to Patient table | int |  | Y |  |  |  |  |  | Y |
| DoctorID | **CPK; FK** to Doctor table | int |  |  |  |  |  |  |  | Y |
| TreatmentNo | **CPK; FK** to Treatment table | int |  |  |  |  |  |  |  | Y |
| Date | Date treatment given to Patient | date |  |  |  |  |  |  |  |  |
| Time | Time treatment was administered to Patient | decimal |  |  |  |  | (4,2) |  |  |  |
| Results | Results of patient’s treatment | nvarchar | 200 |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| TreatmentNo | **PK;** unique sequential Treatment number | int |  | Y |  |  |  |  |  | Y |
| Name | Name of the Treatment | nvarchar | 40 |  |  |  |  |  |  |  |
| Description | The type of Treatment | nvarchar | 100 |  |  |  |  |  |  |  |
| Charge | The cost of the Treatment | money |  |  |  |  |  |  |  |  |

Table: **Treatment**

Table: **Care**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| EventID | **PK;** Unique sequential Event Number | int |  | Y |  |  |  |  |  | Y |
| Event | Nurses notations of the administered treatment | nvarchar | 200 |  |  |  |  |  |  |  |
| Date | Date treatment given to Patient | date |  |  |  |  |  |  |  |  |
| Time | Time treatment given to Patient | decimal |  |  |  |  | (4,2) |  |  |  |
| PatientID | FK; reference to Patient table | Int |  |  |  |  |  |  |  |  |
| NurseID | FK; reference to Nusre table | Int |  |  |  |  |  |  |  |  |