# Hospital Database Design Document

# Version 1.0

# Submittal Date: 1/19/24

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**Purpose**

The purpose of this Database Design Documentation is to communicate the structure and design of the hospital administrator's database to stakeholders. It serves as a guide for understanding, maintaining, and updating the database. Additionally, it documents the business rules and requirements of the system and provides a foundation for future development.

**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.

Nurses are tracked by Nurse ID, Name, Address, Phone Number, Alternate Phone Number, Email, and Medical Specialties. Some nurses supervise one or more other nurses. No nurse is supervised by more than one nurse, and some nurses are unsupervised. A nurse is assigned to at least one ward and rotates assignments among other wards. Each ward must have one and only one charge nurse. Wards are tracked by Ward Number, Name, Location, and Phone Number.

Each of a ward’s bed is specified by their Bed Number, Size, and Type. Some are allocated to a specific ward. A bed may not be assigned to more than one patient. Patients are tracked by patient number, name, date of birth, address, phone number, alternate phone number, email, admitting date, and discharging date.

After being admitted by one or many doctors, patients may receive no treatment or may receive much from doctors. Treatments are tracked by their number, name, description, and charge; some treatments have yet to be used while others have been used often. Some patients may receive their treatments from more than one doctor. Doctors are tracked by their Doctor ID, name, date of birth, address, phone number, alternate phone number, email, and medical expertise. Not all doctors admit patients.

Each patient consumes at least one item per stay which is tracked by item number, name, and charge. Some items are used often while items may be unused.

**Requirements (Actors and Roles):**

Nurse: The healthcare professionals who provide care to patients.

Ward: The physical units within the hospital where patients are accommodated.

Bed: The units where patients are accommodated within the wards.

Patient: Individuals who receive medical care at the hospital.

Doctor: Medical professionals who admit patients and provide medical treatment and care to patients.

Treatment: Medical procedures or interventions provided to patients by doctors.

Item: Miscellaneous items that will be used in the hospital by patients.

Care: Events or activities involving nurses and patients.

**Entities**:

* Nurse
* Ward
* Bed
* Patient
* Doctor
* Treatment
* Item
* Nurse patient care

**Entities w/ Nested Attributes**

* Nurse
  + Nurse ID
  + Name
  + Address
  + Phone Number
  + Alternate Phone Number
  + Email
  + Medical Specialties
* Ward
  + Ward Number
  + Name
  + Location
  + Phone Number
* Bed
  + Bed ID
  + Size
  + Type
* Patient
  + Patient Number
  + Name
  + Gender
  + DOB
  + Address
  + Phone Number
  + Alternate Phone Number
  + Email
  + Admitting Date
  + Discharging Date
* Doctor
  + Doctor ID
  + Name
  + Address
  + Phone Number
  + Alternate Phone Number
  + Email
  + Medical Specialties
* Treatment
  + Treatment Number
  + Name
  + Description
  + Charge
  + Time
  + Results
* Item
  + Item Number
  + Name
  + Charge
* Care
  + Care ID
  + Event
  + Time

**Business Rules:**

Nurse: Some nurses supervise one or more other nurses. No nurse is supervised by more than one nurse, and some nurses are unsupervised.

Ward: A nurse is assigned to at least one ward and rotates assignments among other wards. Each ward must have one and only one charge nurse.

Bed: Some are inventoried to a specific ward. A bed may not be assigned to more than one patient.

Patient: Patients are assigned to a specific bed. Patients may receive no treatment or may receive many. Some patients may receive their treatments from more than one doctor. Each patient consumes at least one item per stay.

Doctor: Not all doctors admit patients.

Treatment: Some treatments have yet to be used while others have been used often.

Item: Some items are used often while items may be unused.

**ERD:**



**EERD:**



**Relation Schema:**



**Data Dictionary:**

**(Microsoft SQL Server Notation)**

Table: **Nurse**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| NurseID | **PK**; Unique sequential employee ID number | int |  | Y | Y |  |  |  |  | Y |
| FirstName | First name of the nurse | nvarchar | 15 |  |  |  |  |  |  |  |
| LastName | Last name of the nurse | nvarchar | 20 |  |  |  |  |  |  |  |
| PhoneNumber | Phone number of the nurse | nvarchar | 13 |  |  |  | PhoneRule |  |  |  |
| Street | Street of the nurse | nvarchar | 50 |  |  |  |  |  |  |  |
| City | City of the nurse | nvarchar | 20 |  |  | Tampa |  |  |  |  |
| State | State of the nurse | char | 2 |  |  | FL |  | LIKE ‘[A-Z] [A-Z]’ |  |  |
| Zip | Zip code of the nurse | nvarchar | 5 |  |  |  |  | ([Zip] like '[0-9][0-9][0-  9][0-9][0-9]') |  |  |
| AltPhone | Alternate Phone number of the nurse | nvarchar | 14 |  |  |  | PhoneRule |  | Y |  |
| Email | Email of the nurse | nvarchar | 20 |  |  |  |  |  |  |  |
| SupervisorID | Recursive **FK**; Synonym for NurseID; One Nurse Supervises another Nurse | int | 1 |  |  |  |  |  | Y |  |

Table: **NurseCertifications**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| NurseID | **CPK**; **FK** to Nurse table; NurseID of the nurse with the certifications | int |  |  |  |  |  |  |  | Y |
| Certification | **CPK**; Nurse’s certification | nvarchar | 50 |  |  |  |  |  |  | Y |

Table: **Assignment**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| AssignmentID | **PK**; Unique sequential assignment ID number | int |  | Y | Y |  |  |  |  | Y |
| Date | Date of the nurse’s ward assignment | date |  |  |  |  |  |  |  | Y |
| Hour | Phone number of the ward | decimal | (4,2) |  |  |  |  |  |  |  |
| NurseID | **FK** to Nurse Table; NurseID of the nurse assigned to the assignment | int |  |  |  |  |  |  |  | Y |
| WardID | **FK** to Ward Table; WardID of the ward assigning the assignment | int |  |  |  |  |  |  |  | Y |

Table: **Ward**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| WardID | **PK**; Unique sequential ward ID number | int |  | Y | Y |  |  |  |  | Y |
| Location | Location of the ward | nvarchar | 30 |  |  |  |  |  |  |  |
| PhoneNumber | Phone number of the ward | nvarchar | 13 |  |  |  |  |  |  |  |
| ChargeNurseID | **FK** to Nurse Table; NurseID of the nurse who is a charge nurse | int |  |  |  |  |  |  |  |  |

Table: **Bed**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| BedNo | **PK**; Unique sequential bed number | int |  | Y | Y |  |  |  |  | Y |
| Size | Size of the bed | char | 2 |  |  | L |  | [Size] = (‘S’)  OR  [Size] = (‘L’)  OR  [Size] = (‘XL’) |  |  |
| Type | Type of the bed | char | 1 |  |  | M |  | [Type] = (‘M’)  OR  [Type] = (‘E’) |  |  |
| WardID | **FK** to Ward Table; WardID of the ward containing the bed | int |  |  |  |  |  |  |  |  |

Table: **Patient**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| PatientNo | **PK**; Unique sequential patient number | int |  | Y | Y |  |  |  |  | Y |
| FirstName | First name of the patient | nvarchar | 15 |  |  |  |  |  |  |  |
| LastName | Last name of the patient | nvarchar | 20 |  |  |  |  |  |  |  |
| Gender | Gender of the patient | char | 1 |  |  |  |  | [Gender] = (‘M)  OR  [Gender] = (‘F) |  |  |
| DOB | Date of Birth of the patient | date |  |  |  |  |  |  |  |  |
| PhoneNumber | Phone number of the nurse | nvarchar | 13 |  |  |  | PhoneRule |  |  |  |
| Age | Age of the patient, a derived value from the DOB column | smallint |  |  |  |  |  |  | Y |  |
| Street | Street of the patient | nvarchar | 50 |  |  |  |  |  |  |  |
| City | City of the patient | nvarchar | 20 |  |  | Tampa |  |  |  |  |
| State | State of the patient | char | 2 |  |  | FL |  | LIKE ‘[A-Z] [A-Z]’ |  |  |
| Zip | Zip code of the patient | nvarchar | 5 |  |  |  |  | ([Zip] like '[0-9][0-9][0-  9][0-9][0-9]') |  |  |
| BedNo | **FK** to Bed Table; BedNo of the bed assigned for the patient | int |  |  |  |  |  |  |  |  |

Table: **ItemCharge**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| ChargeNo | **PK**; Unique sequential charge number | int |  | Y | Y |  |  |  |  | Y |
| Date | Date of the charge | date |  |  |  |  |  |  |  | Y |
| Quantity | Amount of item used in the charge | int |  |  |  |  |  |  |  |  |
| PatientNo | **FK** to Patient Table; PatientNo of the patient being charged | int |  |  |  |  |  |  |  | Y |
| ItemNo | **FK** to Item Table; ItemNo of the item being charged | int |  |  |  |  |  |  |  | Y |

Table: **Item**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| ItemNo | **PK**; Unique sequential item number | int |  | Y | Y |  |  |  |  | Y |
| ItemName | Name of the item | nvarchar | 50 |  |  |  |  |  |  |  |
| Charge | Price of the item | money |  |  |  |  |  |  |  |  |

Table: **AdmitDischarge**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| AdmitID | **PK**; Unique sequential Admit ID number | int |  | Y | Y |  |  |  |  | Y |
| AdmitDate | Date of the patient admission | date |  |  |  |  |  |  |  | Y |
| DischargeDate | Date of the patient discharge | date |  |  |  |  |  |  | Y |  |
| PatientNo | **FK** to Patient Table; PatientNo of the patient being admitted | int |  |  |  |  |  |  |  | Y |
| AdmitDoc | **FK** to Physician Table; DoctorID of the admitting doctor | int |  |  |  |  |  |  |  | Y |
| DischargeDoc | **FK** to Physician Table; DoctorID of the discharging doctor | Int |  |  |  |  |  |  | Y |  |

Table: **Physician**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| DoctorID | **PK**; Unique sequential physician ID number | int |  | Y | Y |  |  |  |  | Y |
| FirstName | First name of the physician | nvarchar | 15 |  |  |  |  |  |  |  |
| LastName | Last name of the physician | nvarchar | 20 |  |  |  |  |  |  |  |
| PhoneNumber | Phone number of the physician | nvarchar | 13 |  |  |  | PhoneRule |  |  |  |
| Street | Street of the physician | nvarchar | 50 |  |  |  |  |  |  |  |
| City | City of the physician | nvarchar | 20 |  |  | Tampa |  |  |  |  |
| State | State of the physician | char | 2 |  |  | FL |  | LIKE ‘[A-Z] [A-Z]’ |  |  |
| Zip | Zip code of the physician | nvarchar | 5 |  |  |  |  | ([Zip] like '[0-9][0-9][0-  9][0-9][0-9]') |  |  |
| Email | Email of the physician | nvarchar | 20 |  |  |  |  |  |  |  |

Table: **PhysicianSpecialty**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| DoctorID | **CPK**; **FK** to Physician table; DoctorID of the physician with the specialty | int |  |  |  |  |  |  |  | Y |
| Specialty | **CPK**; Physician’s specialty | nvarchar | 50 |  |  |  |  |  |  | Y |

Table: **TreatmentAdministration**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| TreatAdmin ID | **PK**; Unique sequential Treatment Administration ID number | int |  | Y | Y |  |  |  |  | Y |
| TreatmentNo | | **FK** to Treatment Table; TreatmentNo of the treatment being administered to the patient | int |  |  |  |  |  |  |  |  |
| PatientNo | **FK** to Patient Table; PatientNo of the patient receiving the treatment | int |  |  |  |  |  |  |  | Y |
| DoctorID | **FK** to Physician Table; DoctorID of the doctor administrating the treatment | int |  |  |  |  |  |  |  | Y |
| DateTime | the date and time a physician administered a treatment to a patient | datetime |  |  |  |  |  |  |  | Y |
| Results | Results of the treatment administration | nvarchar | 50 |  |  |  |  |  |  |  |

Table: **Treatment**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| TreatmentNo | **PK**; Unique sequential treatment number | int |  | Y | Y |  |  |  |  | Y |
| TreatName | Name of the treatment | nvarchar | 50 |  |  |  |  |  |  |  |
| Descrip | Description concerning the treatment | nvarchar | 100 |  |  |  |  |  |  |  |
| Charge | Price of the treatment | money |  |  |  |  |  |  |  |  |

Table: **NursePatient**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column Name** | **Description** | **Data Type** | **Size** | **Identity** | **Unique** | **Default** | **Rule** | **Check** | **Allow Nulls** | **Index** |
| EventID | **PK**; Unique sequential Event ID number | int |  | Y | Y |  |  |  |  | Y |
| EventType | Type of the event | char | 3 |  |  |  |  | [EventType]  LIKE (‘WC’) OR  LIKE ('MED') OR  LIKE (‘FS’) OR  LIKE ('AS') OR  LIKE (TA') OR  LIKE (‘O’) |  |  |
| Date | Date of the Nurse patient care event | date |  |  |  |  |  |  |  |  |
| Time | Time of the Nurse patient care event | time | 7 |  |  |  |  |  |  |  |
| PatientNo | **FK** to Patient Table; PatientNo of the patient involved in the care event | int |  |  |  |  |  |  |  |  |
| NurseID | **FK** to Nurse Table; NurseID of the nurse involved in the care event | int |  |  |  |  |  |  |  |  |

**Database Diagram:**

**A computer screen shot of a diagram

Description automatically generated**