Hospital Administrator's Database Design Document

Version 1.0 Revision 12

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Version History

Version	Description
1.0 rev 10	Released draft of ERD and EERD with regards to requirements.
1.0 rev 11	Summary of changes: 1. Added screen capture of RS diagram. 2. Edited entities w/ nested attributes, ERD, and EERD for consistence
1.0 rev 12	Summary of changes: 1. Created data dictionary from the RS diagram to ensure consistency 2. Fixed typos in DBDD and formatting

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Purpose

The purpose of this Database Design (DBDD) is to keep track of everything that happens in the hospital from patients, nurses, doctors, wards, and medical treatments. Hospitals require an efficient logistical system that will ensure patients' health and treatment is at the highest standard, therefore it requires an organized record keeping in a database.

Narrative

A hospital is developing a database to manage nurse assignments, the hospitals wards with corresponding beds, patient information and care, doctor duties of admitting and treating patients, items and treatments performed, if necessary.

Each nurse is uniquely identified by a Nurse ID and their name, address, phone number, alternate phone number, email address, and medical specialties are recorded. A nurse may supervise one or more other nurses, but no nurse is supervised by more than one nurse. Some nurses may not have supervisory responsibilities.

Each hospital ward is identified by a Ward ID and includes a descriptive name, physical location, and phone number. Each ward has at least one assigned nurse, and nurses can be assigned to multiple wards, with assignments tracked by date and hours worked per ward. Each ward has a designated charge nurse, responsible for medical records, and a nurse can only be a charge nurse for one ward.

Each bed is identified by a Bed ID and has a size (small, large, extra-large) and type (electric or manual). The default is large and manual. Beds are assigned to specific hospital wards. Patients are assigned to beds upon admission, with only one patient per bed at a time. Bed availability is not constant.

Patient data includes a Patient ID, name, gender, date of birth, address, phone number, alternate phone number, and email address. The system records the patient's admission date, admitting doctor (Doctor ID), discharge date, and discharging doctor.

Each doctor is identified by a Doctor's ID and their name, address, phone number, alternate phone number, email address, and medical specialties are recorded. Doctors may admit and/or treat patients.

Treatments are identified by a Treatment ID and include a name, description, and charge. The system tracks the date and time of each treatment administration, the treating doctor (Doctor ID), and the results. A patient may receive multiple treatments from one or more doctors, or no treatments. Some treatments may be inactive (or not yet administered).

Items used by patients during their stay are tracked by Item ID, name, and charge. The system records which items are charged to which patients, including the date and quantity. All patients incur charges for consumable items. Item usage frequency varies.

Nurse-patient interactions are recorded as events, each with a unique Event ID and a type (wellness check, medication, food service, assistance, treatment administration, or other). The system records the date and time of the event, the nurse (Nurse ID), and the patient (Patient ID). Patients typically interact with multiple nurses during their stay, and nurses may interact with the same patient multiple times.

Requirements (Actors and Roles

Nurses: Nurse's work in a ward and some nurses are in charge.

Wards: Ward that is located within the hospital is assigned by a nurse and has patient's beds.

Beds: Beds are in each ward and are used by one patient at a time.

Patients: Patients arrive at a hospital to be treated for a medical condition.

Doctors: Doctors admit and treat patients.

Item: Items that are used by the patient.

Treatment: Treatments are the type of treatments that the hospital doctors provide.

Entities

- Nurse
- Ward
- Bed
- Patient
- Doctor
- Item
- Treatment

Entities w/ Nested Attributes

- Nurse
  - NurseID
  - Name (first, last)
  - Address (street, city, state, zip)
  - Phone
  - AltPhone
  - Email
  - {Certifications}
- Ward
  - WardID
  - WardName
  - Location
  - Phone
- Bed
  - BedID
  - Size
  - Type
  - WardID
- Patient
  - PatientID
  - Name (first, last)
  - Gender
  - DateOfBirth [age]
  - Address (street, city, state, zip)
  - Phone
  - AltPhone
  - Email
  - BedNo
- Doctor
  - DoctorID
  - Name (first, last)
  - Address (street, city, state, zip)
  - Phone
  - AltPhone
  - Email
  - {Specialty}
- Item
  - ItemID
  - ItemName
  - Charge
- Treatment
  - TreatmentID

- TreatmentName
- Descrip
- Charge

Business Rules

Nurse: Charge nurses are assigned one or more nurses. A nurse can only be supervised by one charge nurse, some nurses are unsupervised.

Ward: Each ward has no more than one charge nurse, and one nurse assigned.

Bed: Beds are in each specific ward and used by one patient at a time, when available.

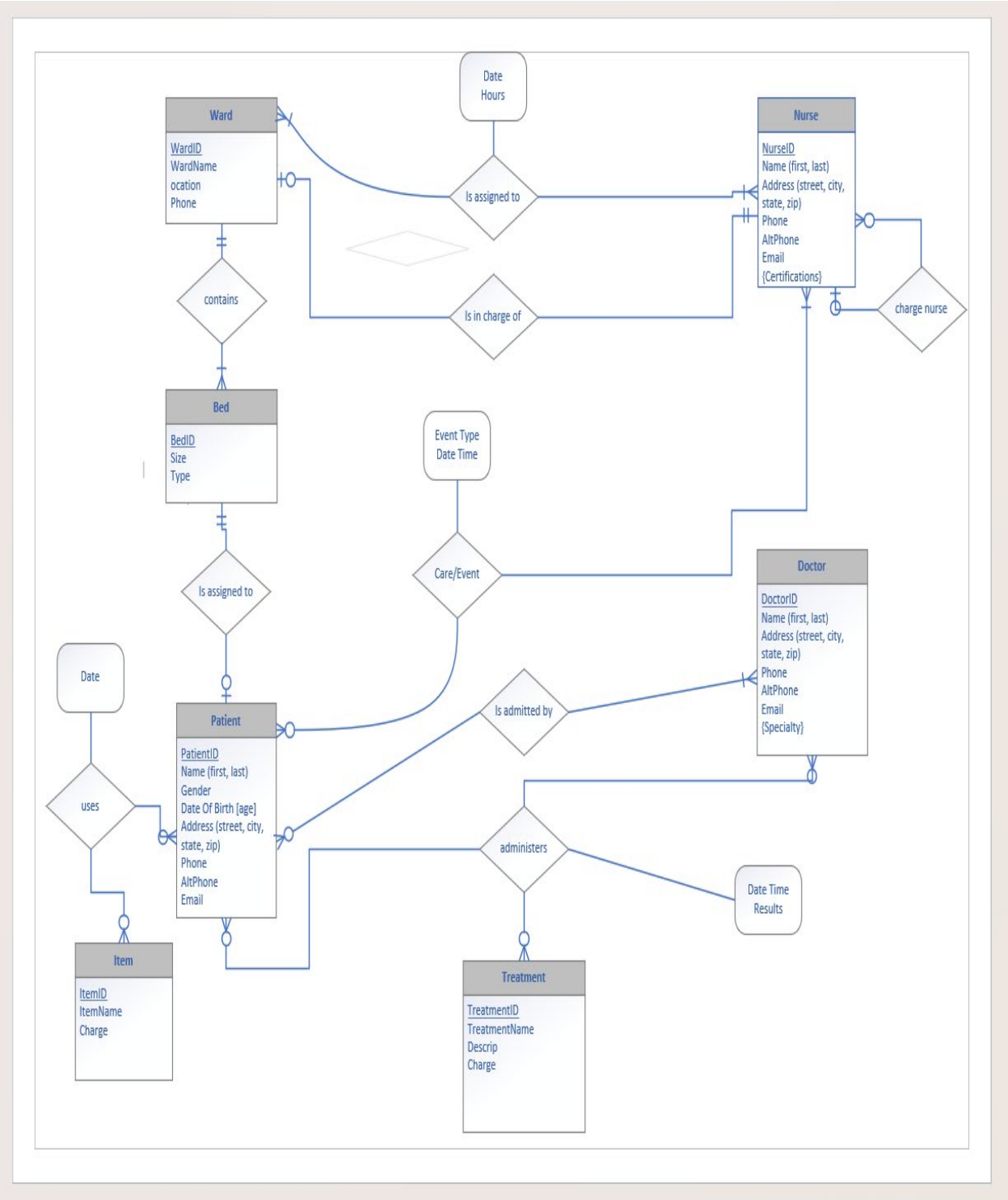
Patient: When admitted, patient is assigned an available bed. Patient's Information is recorded.

Doctor: Doctors can admit patients and treat patients, or both.

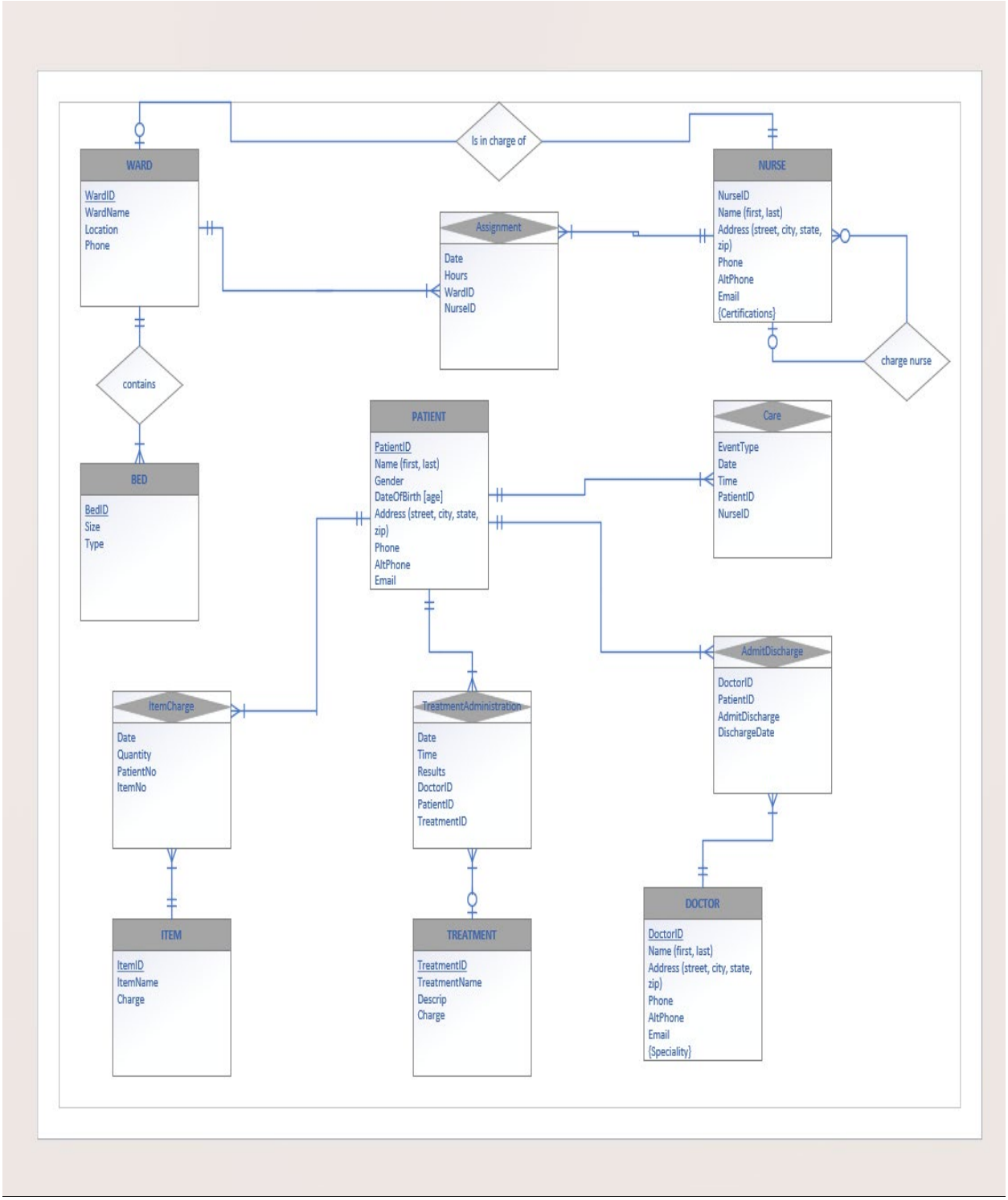
Item: Items charged for patient use.

Treatment: Treatments are tracked by name, description, cost, time, and doctor. Patients can receive no treatments or multiple treatments, by one or more doctors.

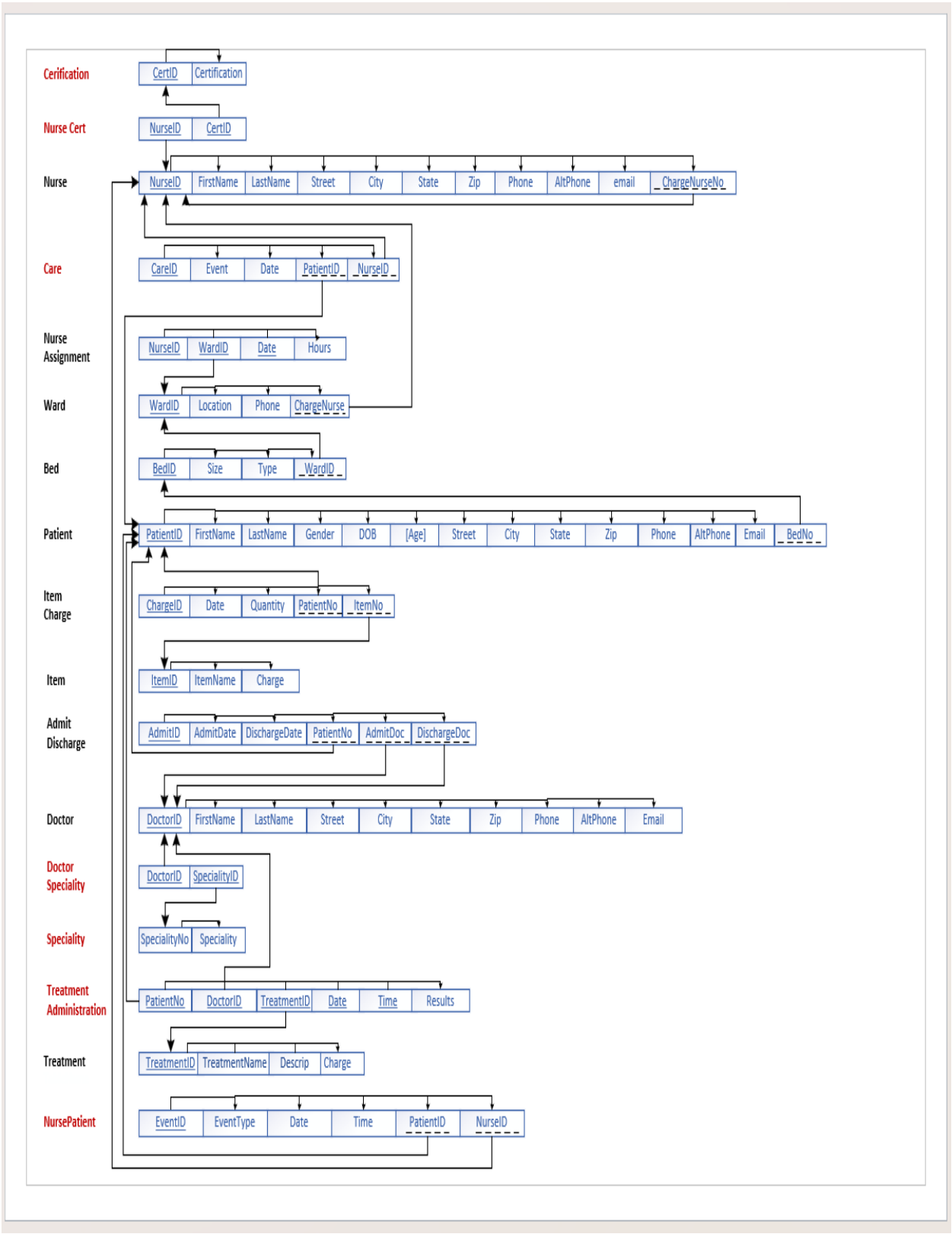
ERD


Date
Hours
Ward
WardID
WardName
ocation
Phone
Is assigned to
Nurse
NurseID
Name (first, last)
Address (street, city, state, zip)
Phone
AltPhone
Email
{Certifications}
contains
Is in charge of
charge nurse
Bed
BedID
Size
Type
Event Type
Date Time
Care/Event
Is assigned to
Doctor
DoctorID
Name (first, last)
Address (street, city, state, zip)
Phone
AltPhone
Email
{Specialty}
Date
Patient
PatientID
Name (first, last)
Gender
Date Of Birth [age]
Address (street, city, state, zip)
Phone
AltPhone
Email
Is admitted by
uses
administers
Date Time
Results
Item
ItemID
ItemName
Charge
Treatment
TreatmentID
TreatmentName
Descrip
Charge

EERD


Is in charge of
WARD
WardID
WardName
Location
Phone
Assignment
Date
Hours
WardID
NurseID
NURSE
NurseID
Name (first, last)
Address (street, city, state, zip)
Phone
AltPhone
Email
{Certifications}
charge nurse
contains
BED
BedID
Size
Type
PATIENT
PatientID
Name (first, last)
Gender
DateOfBirth [age]
Address (street, city, state, zip)
Phone
AltPhone
Email
Care
EventType
Date
Time
PatientID
NurseID
AdmitDischarge
DoctorID
PatientID
AdmitDischarge
DischargeDate
ItemCharge
Date
Quantity
PatientNo
ItemNo
TreatmentAdministration
Date
Time
Results
DoctorID
PatientID
TreatmentID
ITEM
ItemID
ItemName
Charge
TREATMENT
TreatmentID
TreatmentName
Descrip
Charge
DOCTOR
DoctorID
Name (first, last)
Address (street, city, state, zip)
Phone
AltPhone
Email
{Speciality}

RS


Cerification
CertID
Certification
Nurse Cert
NurseID
CertID
Nurse
NurseID
FirstName
LastName
Street
City
State
Zip
Phone
AltPhone
email
ChargeNurseNo
Care
CareID
Event
Date
PatientID
NurseID
Nurse Assignment
NurseID
WardID
Date
Hours
Ward
WardID
Location
Phone
ChargeNurse
Bed
BedID
Size
Type
WardID
Patient
PatientID
FirstName
LastName
Gender
DOB
[Age]
Street
City
State
Zip
Phone
AltPhone
Email
BedNo
Item Charge
ChargeID
Date
Quantity
PatientNo
ItemNo
Item
ItemID
ItemName
Charge
Admit Discharge
AdmitID
AdmitDate
DischargeDate
PatientNo
AdmitDoc
DischargeDoc
Doctor
DoctorID
FirstName
LastName
Street
City
State
Zip
Phone
AltPhone
Email
Doctor Speciality
DoctorID
SpecialityID
Speciality
SpecialityNo
Speciality
Treatment Administration
PatientNo
DoctorID
TreatmentID
Date
Time
Results
Treatment
TreatmentID
TreatmentName
Descrip
Charge
NursePatient
EventID
EventType
Date
Time
PatientID
NurseID

Data Dictionary

Table: Certification

Column Name	Description	Data Type	Size	Identity	Unique	Default	Rule	Check	Allow Nulls	Index
CertID	**PK** for certifications.	int		Y						Y
Certification	Nurse's certification	nvarchar	50							Y

Table: NurseCert

Column Name	Description	Data Type	Size	Identity	Unique	Default	Rule	Check	Allow Nulls	Index
NurseID	**CPK; FK** track certifications, reference Cert table	nvarchar	50							Y
CertID	**CPK; FK** track nurses, reference Cert table	int								Y

Table: Nurse

Column Name	Description	Data Type	Size	Identity	Unique	Default	Rule	Check	Allow Nulls	Index
NurseID	**PK**; Unique sequential nurse ID number	int		Y						Y
FirstName	First name of the nurse	nvarchar	20							
LastName	Last name of the nurse	nvarchar	20							
Street	Street of the nurse	nvarchar	30							
City	City of the nurse	nvarchar	30							
State	State of the nurse	char	2					LIKE '[A-Z] [A-Z]'		
Zip	Zip code of the nurse	nvarchar	5					LIKE '[0-9] [0-9]		

								[0-9] [0-9]’		
Phone	Phone number of the nurse	nvarchar	14				Phone Rule			
AltPhone	Alternative phone number of nurse	nvarchar	14				Phone Rule			
Email	Email address of the nurse	nvarchar	20							
ChargeNurseNo	Recursive **FK**; Synonym for NurseID; One nurse supervises another nurse	int							Y	

Table: Care

Column Name	Description	Data Type	Size	Identity	Unique	Default	Rule	Check	Allow Nulls	Index
CareID	**PK**; Unique sequential care ID number	int		Y						Y
Event	Event type of the care	nvarchar								
Date	Date of the care	date								
PatientID	**FK** to the Patient table	int								
NurseID	**FK** to the Nurse table	int								

Table: NurseAssignment

Column Name	Description	Data Type	Size	Identity	Unique	Default	Rule	Check	Allow Nulls	Index
AssignmentID	**PK**; Unique sequential nurse ID number	int		Y						Y

Hours	Number of hours the nurse works on assignment	decimal	(4,2)							
Date	Date of the nurse assignment	date								
NurseID	**FK** to Nurse table	int								
WardID	**FK** to Ward table	int								

Table: Ward

Column Name	**Description**	**Data Type**	**Size**	**Identity**	**Unique**	**Default**	**Rule**	**Check**	**Allow Nulls**	**Index**
WardID	**PK**; Unique ward ID number	int		Y						Y
Location	Location of the ward	nvarchar	20							
Phone	Phone number of the ward	nvarchar	14				Phone Rule			
ChargeNurse	**FK** to Nurse table; Synonym for NurseID; One nurse charge of a ward	int								

Table: Bed

Column Name	**Description**	**Data Type**	**Size**	**Identity**	**Unique**	**Default**	**Rule**	**Check**	**Allow Nulls**	**Index**
BedID	**PK**; Unique bed ID number	int		Y						Y
Size	Size of the bed	char	2			‘L’		LIKE ‘S’ OR ‘M’ or ‘L’ OR ‘XL’		
Type	Type of bed	char	1			‘M’		LIKE ‘E’ or ‘M’		
Availability	Availability of the bed	char	1			‘O’		LIKE ‘O’ OR ‘A’		
WardID	**FK** to Ward table	int								

Table: Patient

Column Name	Description	Data Type	Size	Identity	Unique	Default	Rule	Check	Allow Nulls	Index
PatientD	**PK**; Unique sequential patient ID number	int		Y						Y
FirstName	First name of the patient	nvarchar	20							
LastName	Last name of the patient	nvarchar	20							
Gender	Gender of the patient	char	2					LIKE 'M' OR 'F' OR 'NA'		
DOB	Date of birth of the patient	date								
[Age]	Calculated age of the patient	computed								
Street	Street of the patient	nvarchar	30							
City	City of the patient	nvarchar	30							
State	State of the patient	char	2					LIKE '[A-Z] [A-Z]'		
Zip	Zip code of the patient	char	5					LIKE '[0-9] [0-9] [0-9] [0-9] [0-9]'		
Phone	Phone number of the patient	nvarchar	14				Phone Rule		Y	
AltPhone	Alternative phone number of the patient	nvarchar	14				Phone Rule			
Email	Email address of the patient	nvarchar	20							
BedNo	**FK** to Bed table	int								Y

Table: ItemCharge

Column Name	Description	Data Type	Size	Identity	Unique	Default	Rule	Check	Allow Nulls	Index
ChargeID	**PK**; Unique sequential charge ID number	int		Y						Y
Date	Date of item charge	date								
Quantity	Quantity of items	int								
PatientNo	**FK** to Patient table	int								
ItemNo	**FK** to Item table	Int								

Table: Item

Column Name	Description	Data Type	Size	Identity	Unique	Default	Rule	Check	Allow Nulls	Index
ItemID	**PK**; Unique item ID number	int		Y						Y
ItemName	Description of the item name	nvarchar	30		Y					
Charge	Cost of Item in money	Money								

Table: AdmitDischarge

Column Name	Description	Data Type	Size	Identity	Unique	Default	Rule	Check	Allow Nulls	Index
AdmitID	**PK**; Unique sequential admin ID number	int		Y						Y
AdmitDate	Date the patient is admitted	date								
DischargeDate	Date the patient is discharged	date								
PatientNo	**FK** to Patient table	int								

AdmitDoc	**FK** to Doctor table; Synonym for DoctorID	int								
DischargeDoc	**FK** to Doctor table; Synonym for DoctorID	int								

Table: Doctor

Column Name	Description	Data Type	Size	Identity	Unique	Default	Rule	Check	Allow Nulls	Index
DoctorID	**PK**; Unique sequential doctor ID number	int		Y						Y
FirstName	First name of the doctor	nvarchar	20							
LastName	Last name of the doctor	nvarchar	20							
Street	Street of the doctor	nvarchar	30							
City	City of the doctor	nvarchar	30							
State	State of the doctor	char	2					LIKE '[A-Z] [A-Z]'		
Zip	Zip code of the doctor	nvarchar	5					LIKE '[0-9] [0-9] [0-9] [0-9] [0-9]'		
Phone	Phone number of the doctor	nvarchar	14				Phone Rule			
AltPhone	Alternative phone number of the doctor	nvarchar	14				Phone Rule			
Email	Email address of the doctor	nvarchar	20							

Table: DoctorSpecialty

Column Name	Description	Data Type	Size	Identity	Unique	Default	Rule	Check	Allow Nulls	Index
DoctorID	**PK**; Unique sequential employee ID number	int		Y						Y
SpecialtyID		nvarchar	15							

Table: Specialty

Column Name	Description	Data Type	Size	Identity	Unique	Default	Rule	Check	Allow Nulls	Index
SpecialityID	**PK**; Unique specialty ID number	int		Y						Y
Specialty	Doctor's specialties	nvarchar	50							

Table: TreatmentAdministration

Column Name	Description	Data Type	Size	Identity	Unique	Default	Rule	Check	Allow Nulls	Index
PatientNo	**CPK; FK**; Unique patient ID number; reference Patient table	int		Y						Y
Date		date								
Time		time								
Results		nvarchar	30							
DoctorID	**FK** to Doctor table	int								
TreatmentID	**FK** to Treatment table	int								

Table: Treatment

Column Name	Description	Data Type	Size	Identity	Unique	Default	Rule	Check	Allow Nulls	Index
TreatmentID	**PK**; Unique treatment ID number	int		Y						Y
TreatmentName	Name of the treatment	nvarchar	30							
Descrip	Description of the treatment	nvarchar	30							
Charge	Charge of the treatment	nvarchar	20							

Table: NursePatient

Column Name	Description	Data Type	Size	Identity	Unique	Default	Rule	Check	Allow Nulls	Index
EventID	**PK**; Unique sequential patient event ID number	int		Y						Y
EventType	Type of the nurse patient event	type	3					LIKE 'WC' OR 'MED' OR 'FS' OR 'AST' OR 'OTH'		
Date	Date of the nurse patient event	date								
Time	Time of the nurse patient event	time								
PatientID	**FK** to Patient table	int								
NurseID	**FK** to Nurse table	int								