Hospital Administrator's Database Design Document

Version 1.0 Revision 13

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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
1.0 rev 13	Summary of changes: 1. Fixed issue regarding duplication of Care and NursePatient. 2. Database creation and diagram

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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

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. The 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 are in charge of 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 to which patients, based on date and quantity. Information that is to be stored for each item includes the item name and charge. All patients incur at least one charge for consumable items used during their stay. Some items are used often while items may be new or unusual in nature and might rarely or never be charged to any patients.

Lastly, the hospital tracks nurse patient care. Each nurse patient care interaction is an event. There are several types of events: wellness check, medication, food service, assistance, treatment admin, and “other.” Given the number of shifts and ward rotations, a patient will typically be seen by more than one nurse during their stay, and a nurse most likely will interact with the same patient over several events during a single shift.

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
  - SupervisorID
  - {Certifications}
- Ward
  - WardID
  - WardName
  - Location
  - Phone
  - ChargeNurseID
- Bed
  - BedID
  - Size
  - Type
  - Availability
  - WardID
- Patient
  - PatientID
  - Name (first, last)
  - Gender
  - DateOfBirth [age]
  - Address (street, city, state, zip)
  - Phone
  - AltPhone
  - Email
  - BedID
- 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.

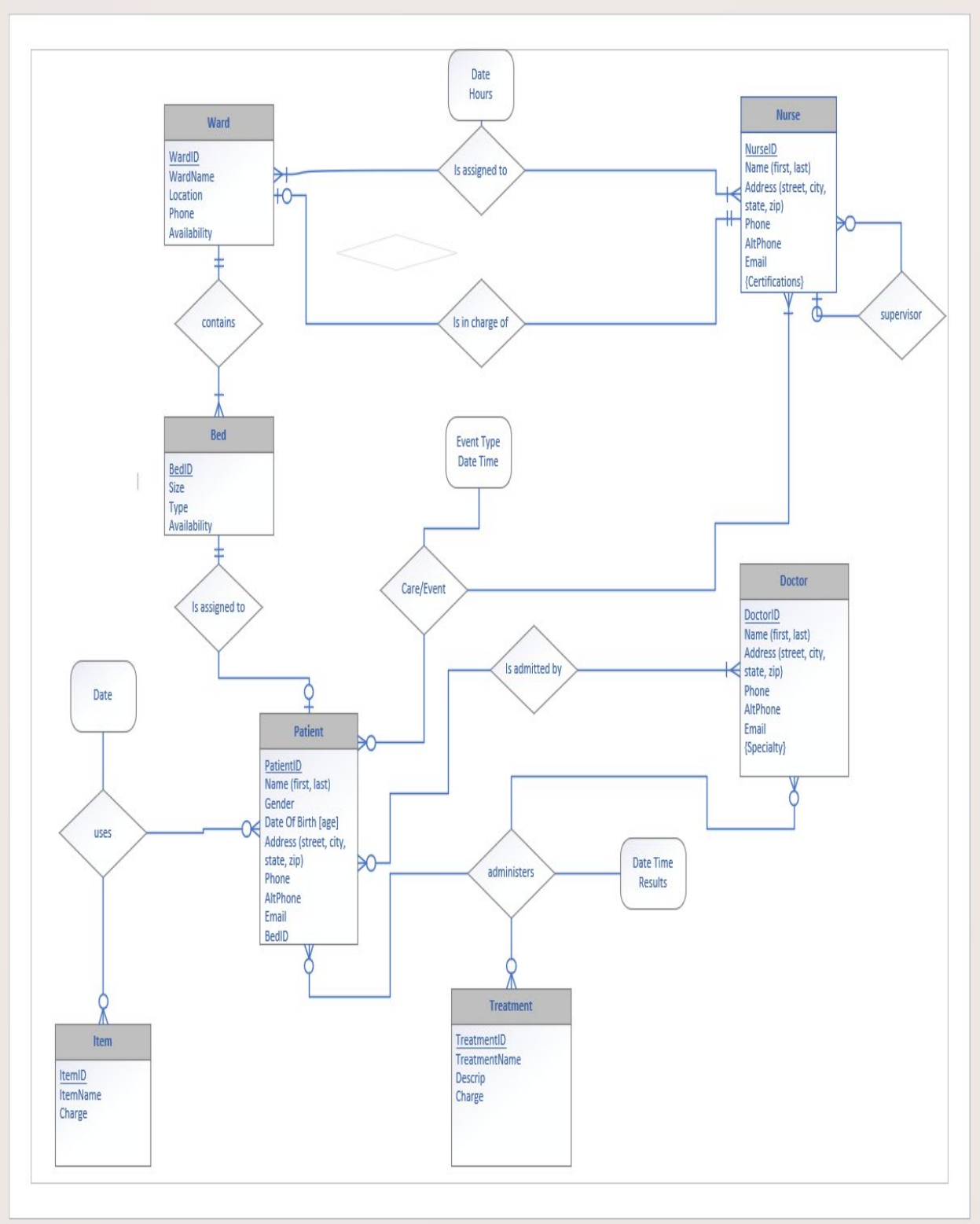
Patient: When admitted, patient is assigned an available bed. Patient's Information is recorded.

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

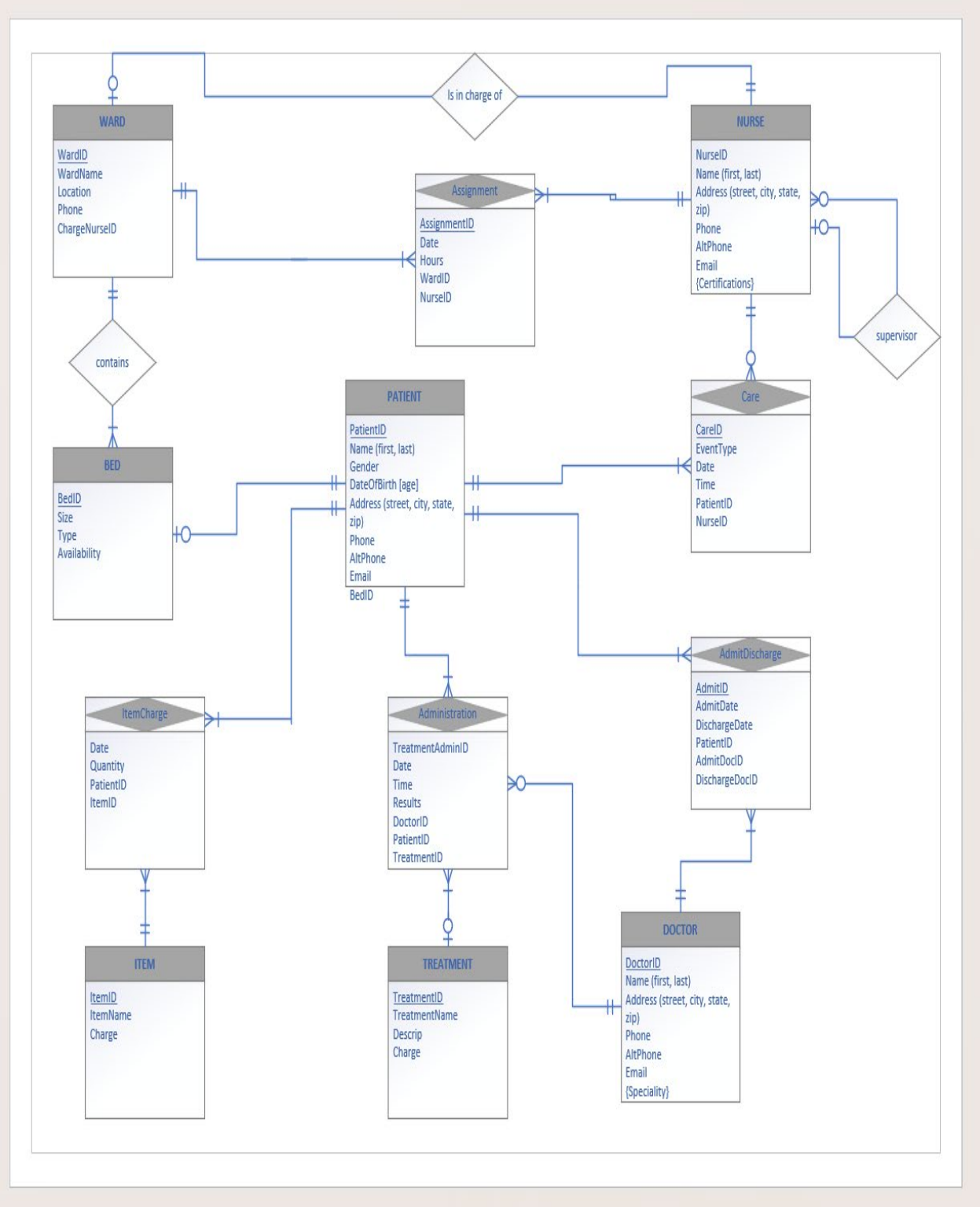
Item: Items charged for patient use.

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

EERD


Is in charge of
WARD
WardID
WardName
Location
Phone
ChargeNurseID
Assignment
AssignmentID
Date
Hours
WardID
NurseID
NURSE
NurseID
Name (first, last)
Address (street, city, state, zip)
Phone
AltPhone
Email
{Certifications}
supervisor
contains
PATIENT
PatientID
Name (first, last)
Gender
DateOfBirth [age]
Address (street, city, state, zip)
Phone
AltPhone
Email
BedID
Care
CareID
EventType
Date
Time
PatientID
NurseID
BED
BedID
Size
Type
Availability
AdmitDischarge
AdmitID
AdmitDate
DischargeDate
PatientID
AdmitDocID
DischargeDocID
ItemCharge
Date
Quantity
PatientID
ItemID
Administration
TreatmentAdminID
Date
Time
Results
DoctorID
PatientID
TreatmentID
ITEM
ItemID
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TREATMENT
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DOCTOR
DoctorID
Name (first, last)
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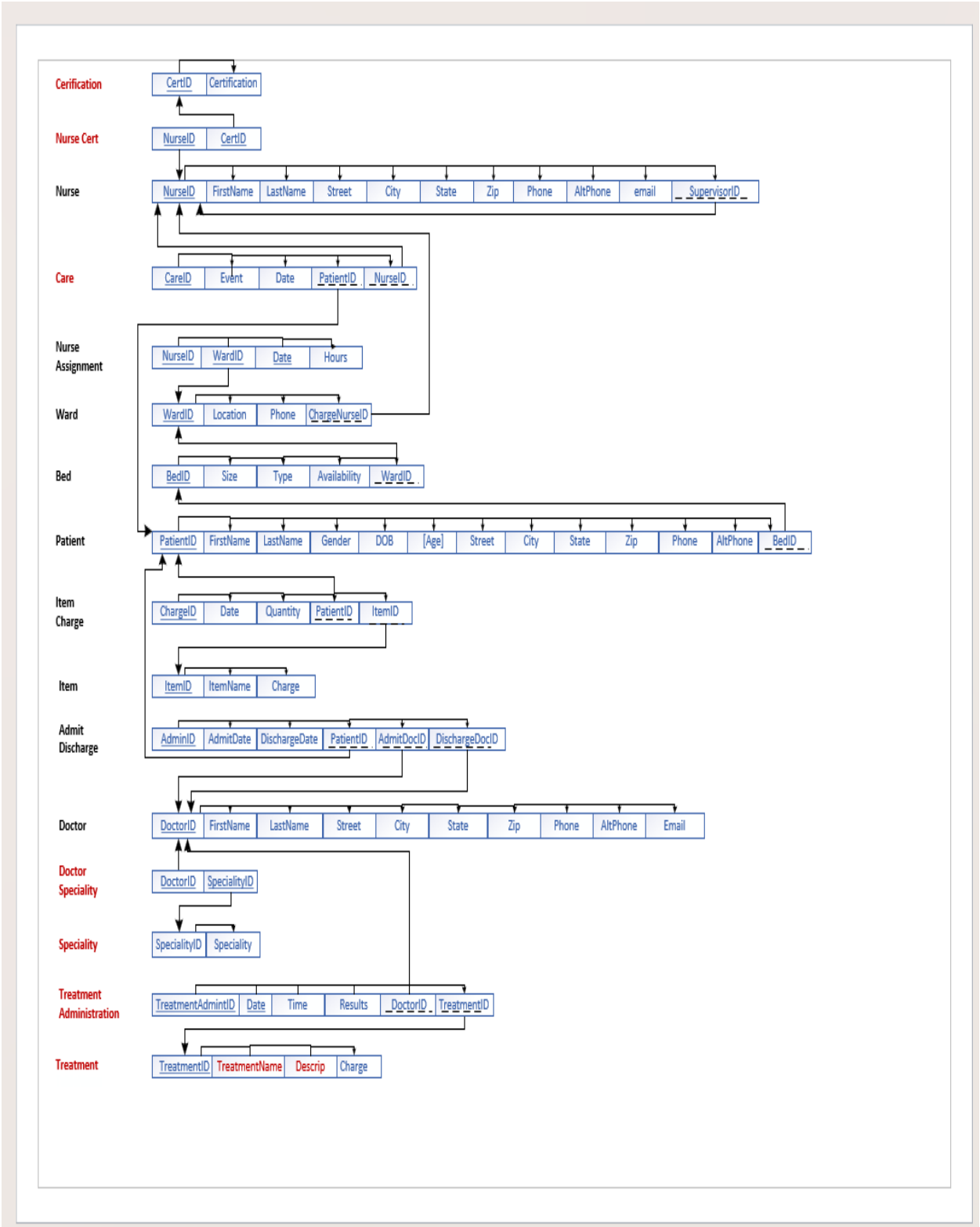
RS


Cerification
CertID
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Nurse
NurseID
FirstName
LastName
Street
City
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Phone
AltPhone
email
SupervisorID
Care
CareID
Event
Date
PatientID
NurseID
Nurse Assignment
NurseID
WardID
Date
Hours
Ward
WardID
Location
Phone
ChargeNurseID
Bed
BedID
Size
Type
Availability
WardID
Patient
PatientID
FirstName
LastName
Gender
DOB
[Age]
Street
City
State
Zip
Phone
AltPhone
BedID
Item Charge
ChargeID
Date
Quantity
PatientID
ItemID
Item
ItemID
ItemName
Charge
Admit Discharge
AdminID
AdmitDate
DischargeDate
PatientID
AdmitDocID
DischargeDocID
Doctor
DoctorID
FirstName
LastName
Street
City
State
Zip
Phone
AltPhone
Email
Doctor Speciality
DoctorID
SpecialityID
Speciality
SpecialityID
Speciality
Treatment Administration
TreatmentAdmintID
Date
Time
Results
DoctorID
TreatmentID
Treatment
TreatmentID
TreatmentName
Descrip
Charge

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					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	int								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							
SupervisorID	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	char	3					LIKE 'WC' OR 'MED' OR 'FS' OR 'AST' OR 'OTH'		
Date	Date of the care	date								
Time	Time of the care	time	3							
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			
ChargeNurseID	**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							
BedID	**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								
PatientID	**FK** to Patient table	int								
ItemID	**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								
PatientID	**FK** to Patient table	int								
AdmitDocID	**FK** to Doctor table; Synonym for DoctorID	int								
DischargeDocID	**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	**CPK**; **FK;** Unique sequential doctor ID number	int		Y						Y
SpecialtyID	**CPK; FK;** Unique sequential specialty ID number	int								Y

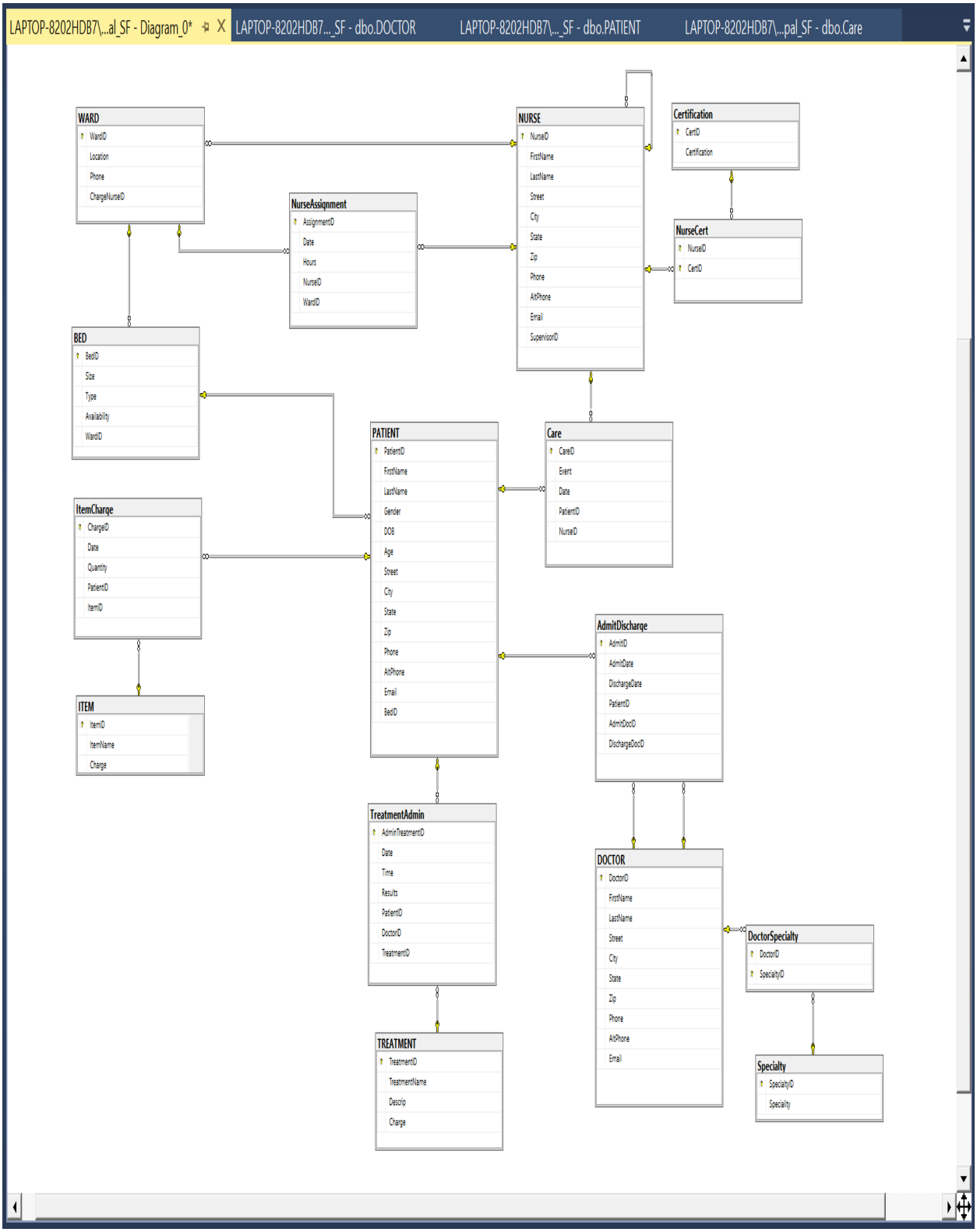
Table: Specialty

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
PatientID	**PK**; Unique treatment administration ID number	int		Y						Y
Date	Date of treatment	date								
Time	Time of treatment	time	3							
Results	Results of treatment	nvarchar	30							
PatientID	**FK** to Patient table	int								
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							

Database Diagram