

Hospital Administrator's Database Design Document

Version 1.0 Revision 14

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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: <ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> 1. Fixed issue regarding duplication of Care and NursePatient. 2. Database creation and diagram
1.0 rev 14	Summary of changes: <ol style="list-style-type: none"> 1. Insert rows for all tables 2. Screen captures of records for each table 3. Fixed data types

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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, medium, 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.

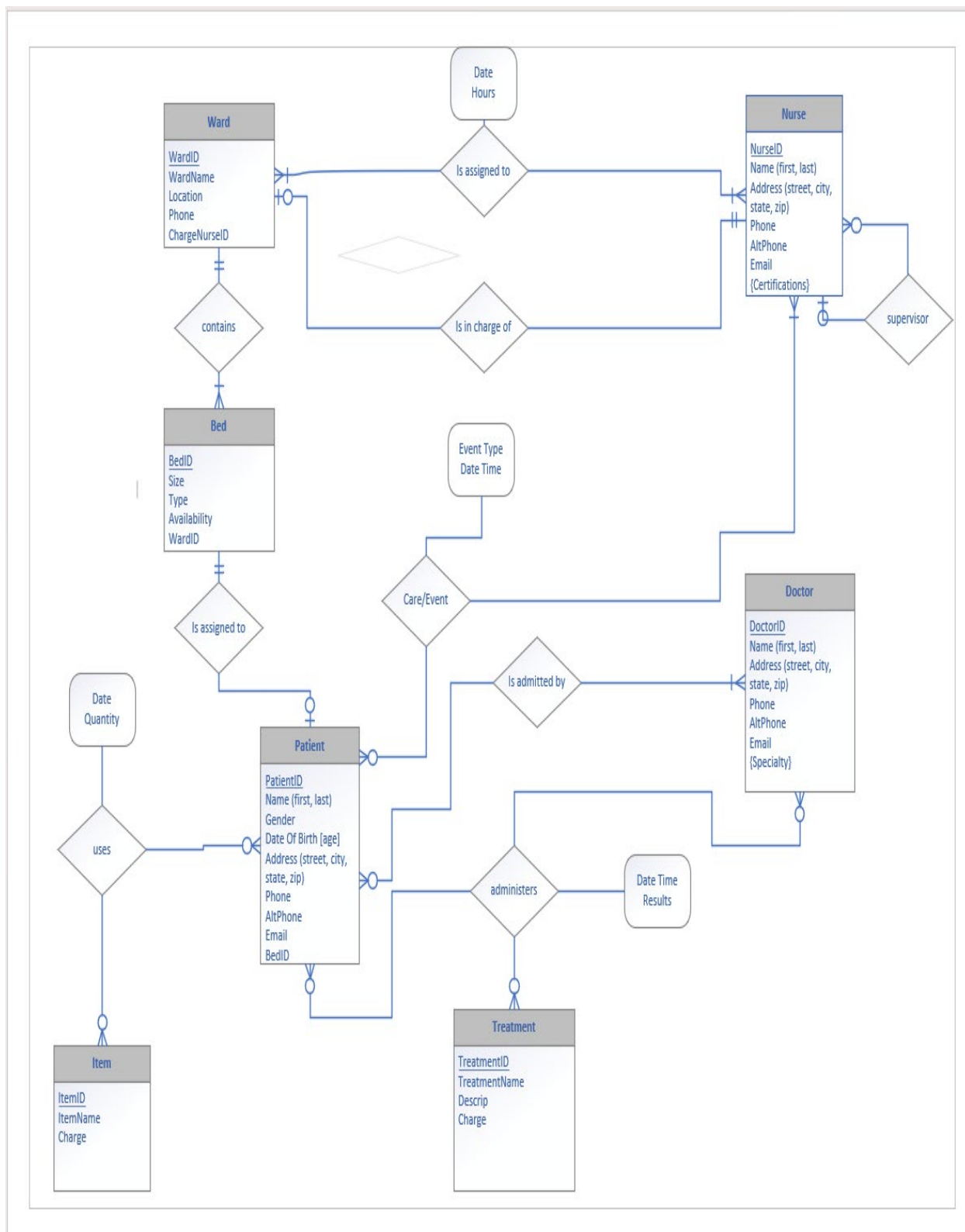
Bed: Beds are in each specific ward and used by one patient at a time, when available.

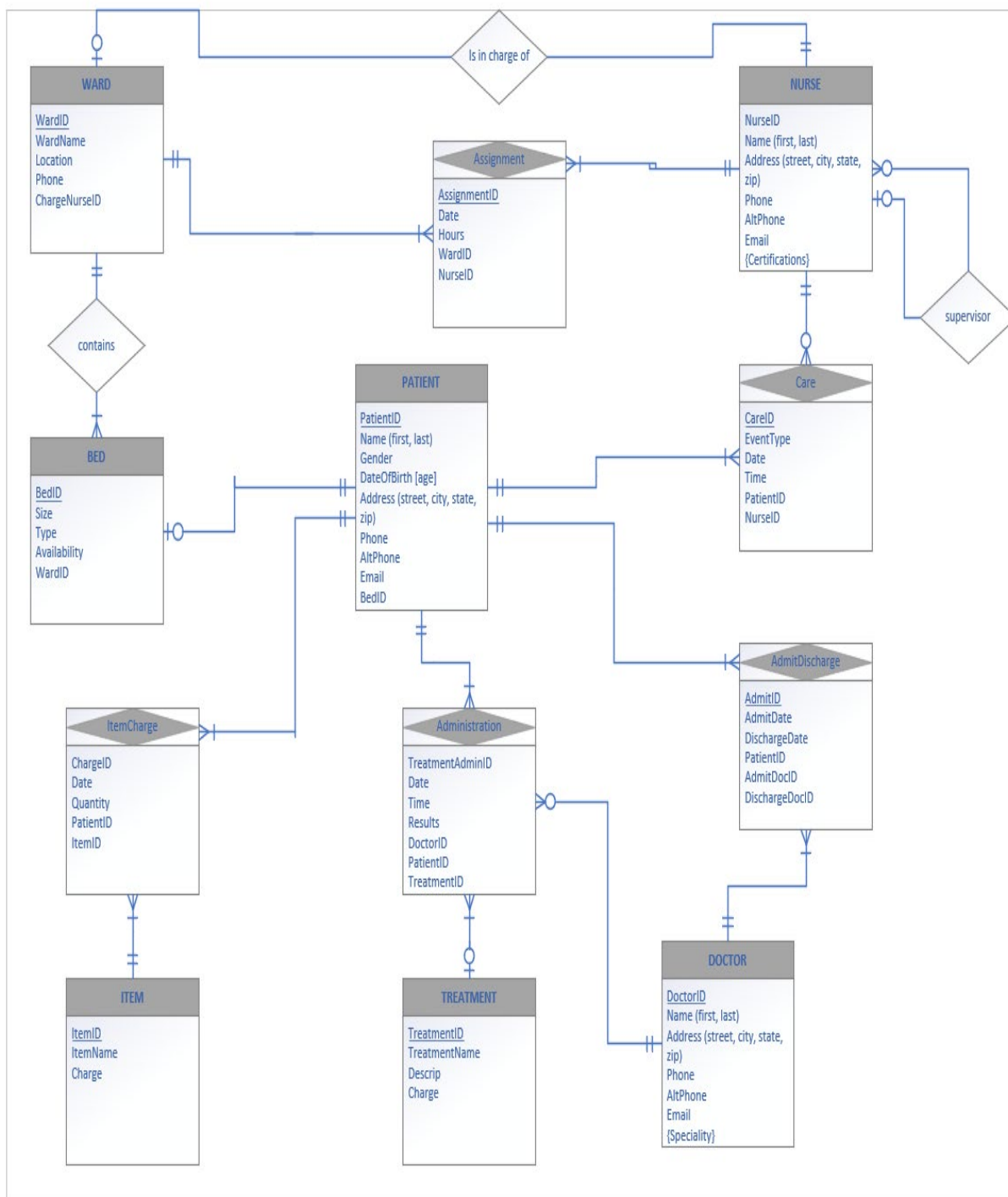
Patient: When admitted, patient is assigned an available bed. Patient's Information is recorded.

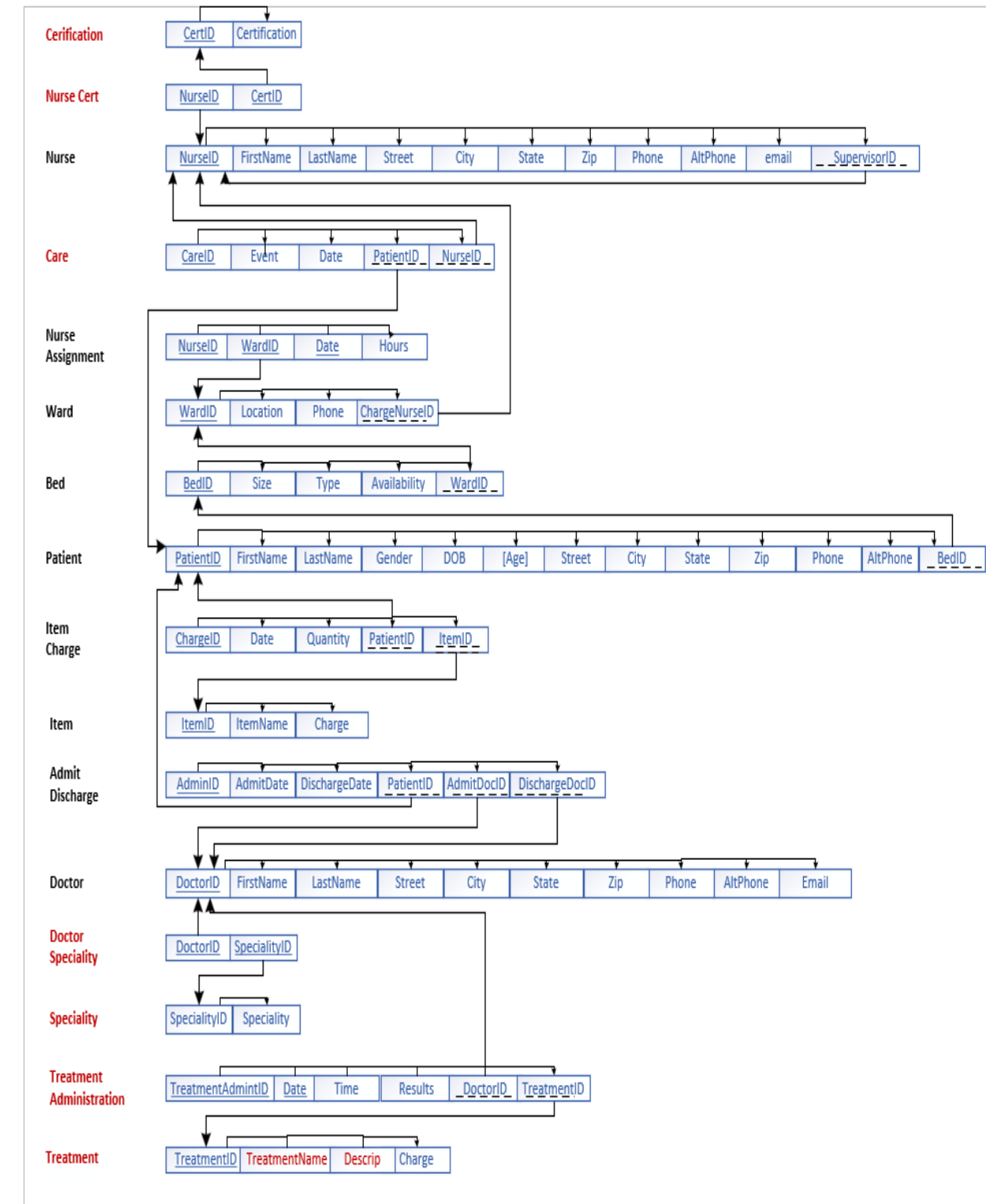
Doctor: Doctors can admit patients and treat patients, or both.

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

EERD

RS

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	50							
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	50							
SupervisorID	Recursive FK ; Synonym for NurselD; 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								
PatientID	FK to the Patient table	int								
NurselD	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	30							
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	50							
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]'		
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	50							
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	50							
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	50							

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
SpecialtyID	PK; Unique specialty ID number	int		Y						Y
Specialty	Doctor's specialties	nvarchar	50							

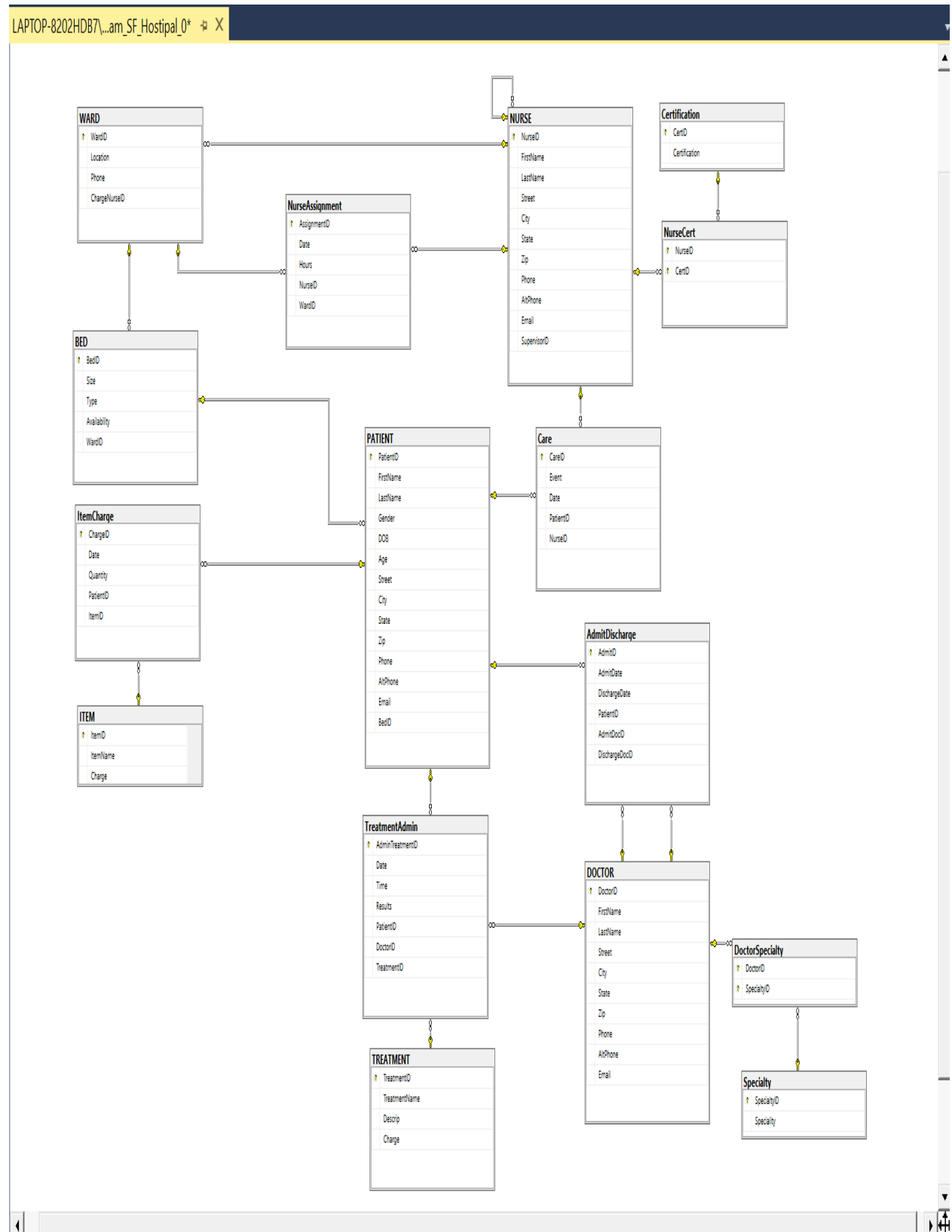
Table: TreatmentAdministration

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	50							
Charge	Charge of the treatment	nvarchar	20							

Database Diagram



Records

Table 1: Certification

Object Explorer: dbo.BED, dbo.Care, dbo.Certification, Columns (CertID (PK, int, not null), Certification (nvarchar(50))), Keys, Constraints, Triggers, Indexes, Statistics, dbo.DOCTOR, dbo.DoctorSpecialty.

Query: SELECT * FROM Certification

Results	CertID	Certification
1	1	CRNA
2	2	CNP
3	3	CCRN
4	4	CEN
5	5	CMSRN
6	6	CPN
7	7	CCN
8	8	CNM
9	9	CNE
10	10	CRNI

Table 2: NurseCert

Object Explorer: Graph Tables, dbo.AdmitDischarge, dbo.BED, dbo.Care, dbo.Certification, dbo.DOCTOR, dbo.DoctorSpecialty, dbo.ITEM, dbo.ItemCharge, dbo.NURSE, dbo.NurseAssignment, dbo.NurseCert, Columns (NurseID (PK, FK, int, not null), CertID (PK, FK, int, not null)), Keys, Constraints, Triggers, Indexes, Statistics.

Query: SELECT * FROM NurseCert

Results	NurseID	CertID
1	72	2
2	73	8
3	74	9
4	75	4
5	76	6
6	77	3
7	78	1
8	79	10
9	80	7
10	81	5

Table 3: NURSE

Object Explorer: dbo.NURSE, Columns (NurseID (PK, int, not null), FirstName (nvarchar(20), not null), LastName (nvarchar(20), not null), Street (nvarchar(30), not null), City (nvarchar(30), not null), State (char(2), not null), Zip (nvarchar(5), not null), Phone (char(14), not null), AltPhone (char(14), not null), Email (nvarchar(50), not null), SupervisorID (FK, int, null)), Keys, Constraints, Triggers, Indexes, Statistics.

Query: SELECT * FROM NURSE

Results	NurseID	FirstName	LastName	Street	City	State	Zip	Phone	AltPhone	Email	SupervisorID
1	72	Madison	Dawson	370 Miriam St	Winter Haven	FL	33890	863-810-2035	863-688-1881	madisondawson@gmail.com	NULL
2	73	David	Staple	5039 Spring St	Barlow	FL	33815	863-821-2077	863-688-9911	davidstaple@gmail.com	NULL
3	74	Elizabeth	Moore	980 Morton St	Winter Haven	FL	33890	863-866-5555	863-688-3314	elizabethmoore@gmail.com	72
4	75	Krista	Hocks	750 Davis St	Winter Haven	FL	33890	863-809-2054	863-688-1771	kristahocks@gmail.com	73
5	76	Rebecca	Flint	2030 Saint St	Barlow	FL	33815	863-780-2019	863-688-1127	rebeccafint@gmail.com	74
6	77	Laura	Watson	3002 First St	Barlow	FL	33815	863-855-2035	863-688-4811	laurawatson@gmail.com	74
7	78	Lexi	Luis	190 Lake St	Barlow	FL	33815	863-799-3335	863-688-1111	lexiluis@gmail.com	72
8	79	Mary	Jane	540 Pete St	Barlow	FL	33815	863-209-9955	863-688-2311	maryjane@gmail.com	75
9	80	Stephanie	Smith	201 Fussell St	Winter Haven	FL	33890	863-829-1115	863-689-4311	stephaniesmith@gmail.com	76
10	81	Hayden	Davids	5023 Grapes St	Winter Haven	FL	33890	863-799-0405	863-655-1221	haydendavids@gmail.com	NULL

Table 4: Care

Object Explorer: Graph Tables, dbo.AdmitDischarge, dbo.BED, dbo.Care, Columns (CareID (PK, int, not null), Event (nvarchar(30), not null), Date (date, not null), PatientID (FK, int, not null), NurseID (FK, int, not null)), Keys, Constraints, Triggers, Indexes, Statistics, dbo.Certification, dbo.DOCTOR, dbo.DoctorSpecialty, dbo.ITEM, dbo.ItemCharge, dbo.NURSE, dbo.NurseAssignment, dbo.NurseCert, dbo.PATIENT, dbo.Specialty, dbo.TREATMENT.

Query: SELECT * FROM Care

Results	CareID	Event	Date	PatientID	NurseID
1	2	MED	2025-03-10	28	72
2	3	WC	2025-03-10	28	72
3	4	MED	2025-03-11	29	73
4	5	MED	2025-03-11	29	73
5	6	MED	2025-03-11	30	74
6	7	AST	2025-03-12	30	75
7	8	FS	2025-03-12	31	75
8	9	MED	2025-03-12	31	76
9	10	AST	2025-03-13	32	76
10	11	MED	2025-03-13	32	77
11	12	WC	2025-03-14	33	77
12	13	MED	2025-03-14	33	78
13	14	OTH	2025-03-14	34	78
14	15	FS	2025-03-15	34	79
15	16	MED	2025-03-15	35	79
16	17	AST	2025-03-16	36	80
17	18	WC	2025-03-16	36	80
18	19	MED	2025-03-17	37	81

Table 9: ItemCharge

SELECT * FROM ItemCharge

ChargeID	Date	Quantity	PatientID	ItemID
1	2025-03-10	1	28	1
2	2025-03-11	2	29	2
3	2025-03-12	5	30	5
4	2025-03-13	1	31	6
5	2025-03-14	2	32	9
6	2025-03-14	14	33	8
7	2025-03-15	3	34	7
8	2025-03-16	1	35	10
9	2025-03-17	2	36	4
10	2025-03-17	1	37	3

Table 10: ITEM

SELECT * FROM ITEM

ItemID	ItemName	Charge
1	Sheets	50.99
2	ToothBrush	15.99
3	ToothPaste	20.99
4	Breakfast	10.99
5	Lunch	14.99
6	Dinner	18.99
7	Gown	8.99
8	Needle	3.99
9	Paper Goods	13.99
10	IV Lines	30.86

Table 11: AdmitDischarge

SELECT * FROM AdmitDischarge

AdmitID	AdmitDate	DischargeDate	PatientID	AdmitDocID	DischargeDocID
1	2025-03-10	2025-03-13	28	1	7
2	2025-03-10	2025-03-17	29	4	1
3	2025-03-11	2025-03-12	30	2	4
4	2025-03-11	2025-03-16	31	9	5
5	2025-03-12	2025-03-14	32	1	8
6	2025-03-13	2025-03-17	33	3	1
7	2025-03-14	2025-03-15	34	10	1
8	2025-03-14	2025-03-17	35	1	5
9	2025-03-15	2025-03-16	36	2	3
10	2025-03-16	2025-03-17	37	1	6

Table 12: DOCTOR

SELECT * FROM DOCTOR

DoctorID	FirstName	LastName	Street	City	State	Zip	Phone	AltPhone	Email
1	Lou	Martin	345 Oaks	Bartow	FL	33809	863-711-1234	863-721-5678	loumartin@gmail.com
2	Mark	Wilson	580 Slow St	Bartow	FL	33809	863-712-2345	863-722-6789	markwilson@gmail.com
3	David	Gay	390 Crazy St	Orlando	FL	33601	863-713-3456	863-723-1234	davidgay@gmail.com
4	Alexis	Grace	5832 Lake St	Polk City	FL	33818	863-714-4567	863-724-2345	alexisgrace@gmail.com
5	Torres	Greg	5071 Spring St	Dade City	FL	33740	863-715-5678	863-725-3456	torresgreg@gmail.com
6	Sloan	Garret	103 Swift St	Mulberry	FL	33813	863-716-6789	863-726-4567	sloangarret@gmail.com
7	Jack	Dark	509 Fussell St	Lakeland	FL	33811	863-717-1234	863-727-5678	jackdark@gmail.com
8	Wyatt	Black	663 Fast Ln	Mulberry	FL	33813	863-718-2345	863-728-1234	wyattblack@gmail.com
9	Marrisa	Smith	733 Morrison Cir	Bartow	FL	33809	863-719-3456	863-729-2345	marrissasmith@gmail.com
10	Sarah	Johnson	880 Second St	Lakeland	FL	33811	863-720-4567	863-730-3009	sarahjohnson@gmail.com

Table 13: DoctorSpecialty

SELECT * FROM DoctorSpecialty

DoctorID	SpecialtyID
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10

Table 14: Specialty

SELECT * FROM Specialty

SpecialtyID	Specialty
1	Cardiology
2	Neurology
3	Pediatric
4	Dermatology
5	Psychiatry
6	Infectious Disease
7	Oncology
8	Orthopedic
9	OB/GYN
10	Critical Care

Table 15: TreatmentAdmin

SELECT * FROM TreatmentAdmin

AdminTreatmentID	Date	Time	Results	PatientID	DoctorID	TreatmentID
3	2025-03-10	08:00:00	Successful	28	1	7
4	2025-03-11	13:00:00	Successful	29	5	2
5	2025-03-12	19:00:00	Successful	31	10	5
6	2025-03-12	03:15:00	Unsuccessful	30	3	9
7	2025-03-13	12:00:00	Successful	33	8	4
8	2025-03-14	05:00:00	Successful	35	6	3
9	2025-03-14	01:09:00	Unsuccessful	32	2	8
10	2025-03-15	10:00:00	Successful	34	9	10
11	2025-03-16	01:30:00	Unsuccessful	36	4	1
12	2025-03-16	09:15:00	Successful	37	7	6

Table 16: TREATMENT

SELECT * FROM TREATMENT

TreatmentID	TreatmentName	Descrip	Charge
1	PT	Physical Therapy	50.00
2	Surgery	General Surgery	12500.98
3	Chemo	Chemotherapy for cancer	400.99
4	Radiation	Radiation for cancer	375.68
5	Dialysis	Filter blood for endstage kidney issue	74.99
6	Counseling	Mental evaluation and analysis	40.79
7	Oxygen	Oxygen therapy to raise levels	30.99
8	Fluids	IV Fluids in vein	20.99
9	Cardiac	Monitor heart	80.99
10	Transfusion	Replacing patients lost blood	700.99