Hospital Database Design Document

Version 1.0

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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.
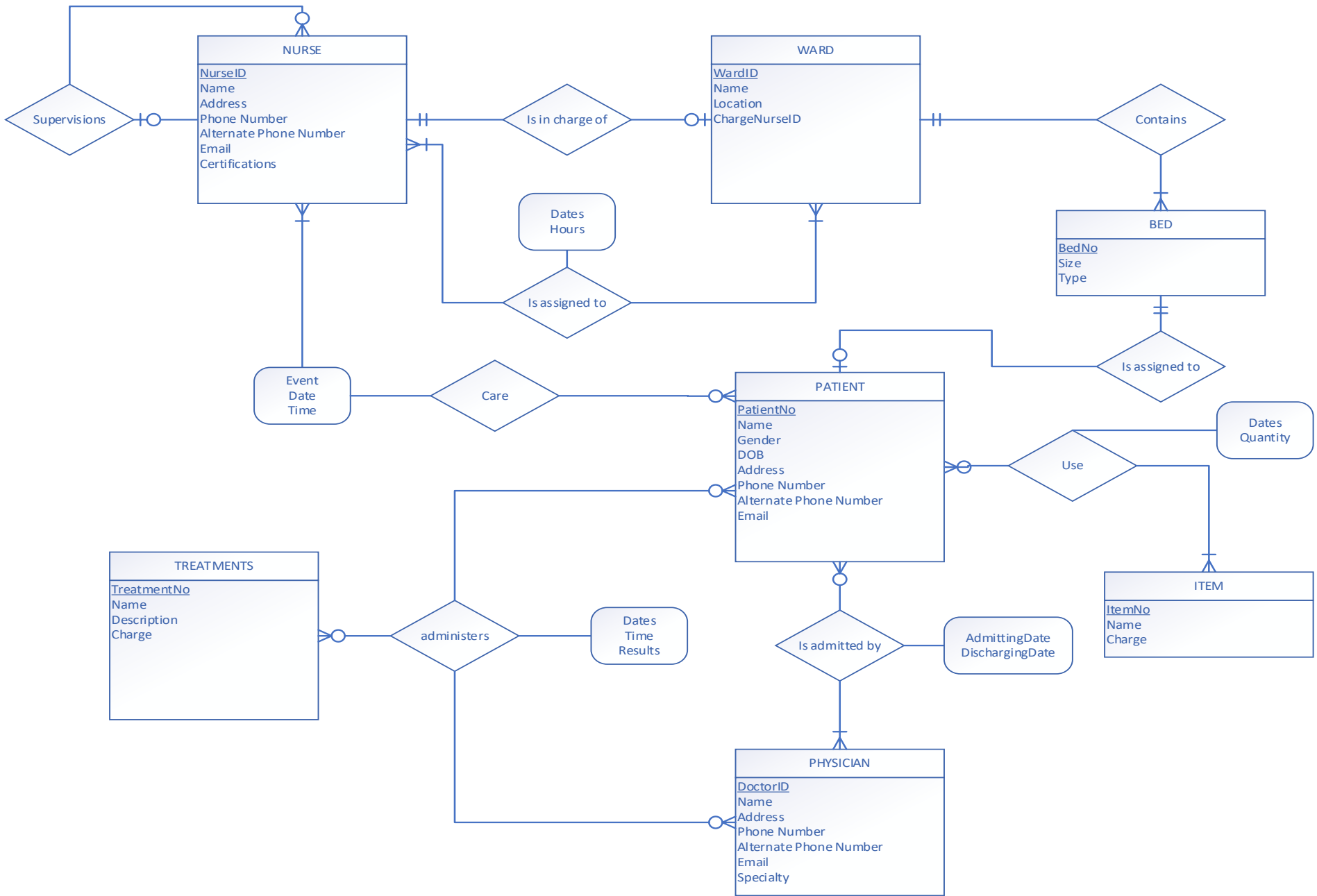
Patient: Patients are assigned to a specific bed. Patients may receive no treatment or may receive many. Some patients may receive their treatments from more than one doctor. Each patient consumes at least one item per stay.
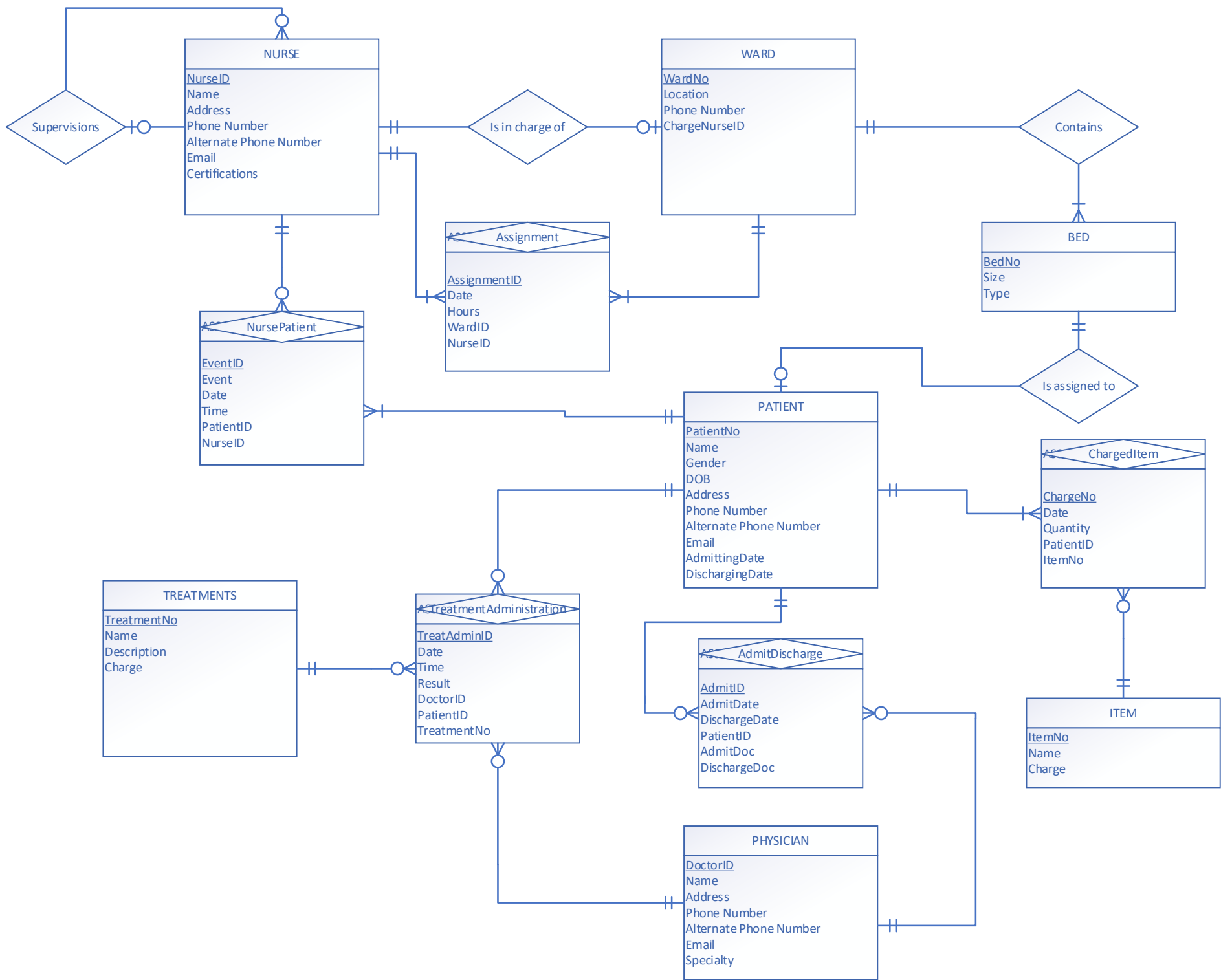
Doctor: Not all doctors admit patients.

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

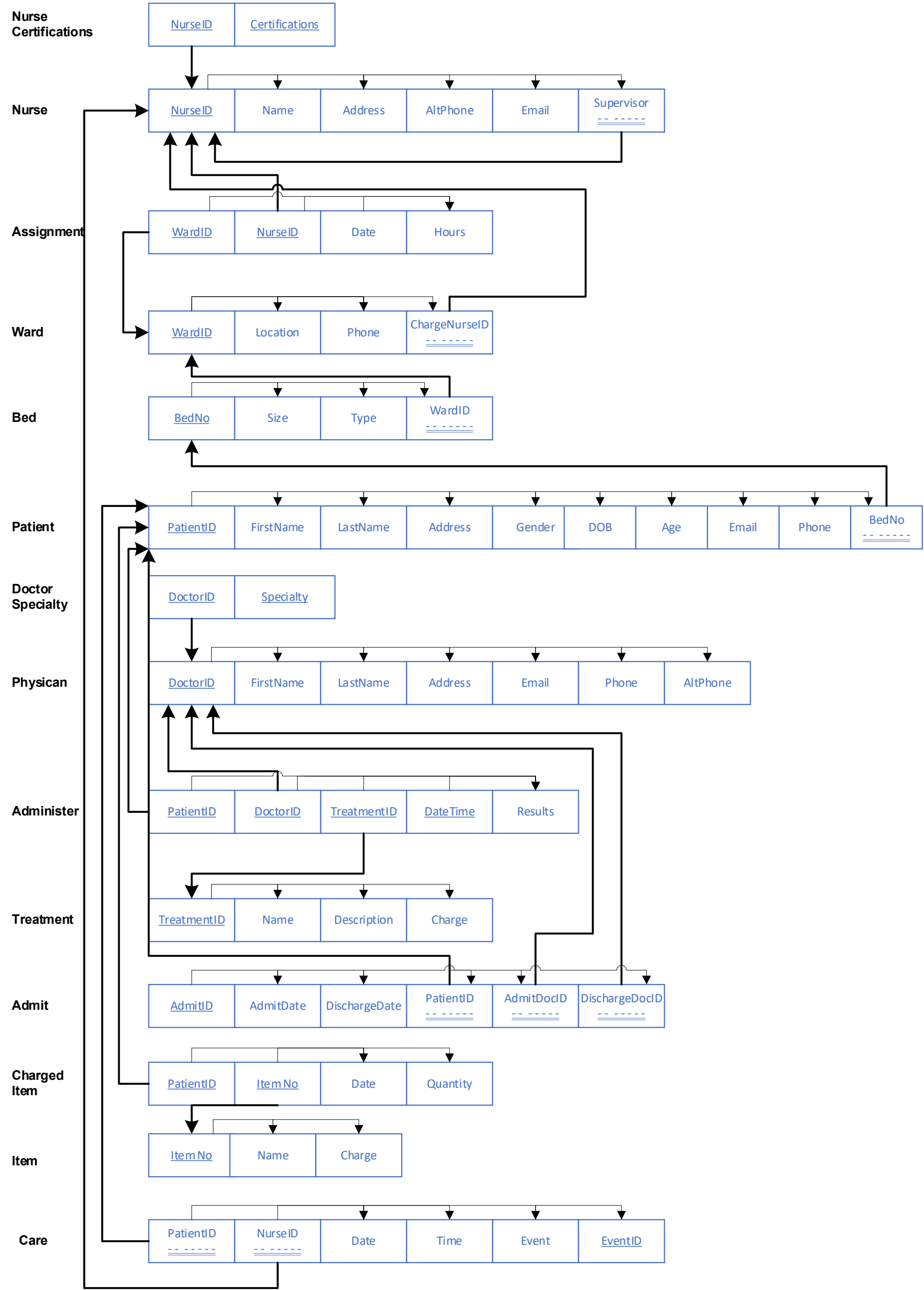Item: Some items are used often while items may be unused.

ERD:

EERD:

Relation Schema:

Nurse Certifications

NurseID	Certifications

Nurse

NurseID	Name	Address	AltPhone	Email	Supervisor

Assignment

WardID	NurseID	Date	Hours

Ward

WardID	Location	Phone	ChargeNurseID

Bed

BedNo	Size	Type	WardID

Patient

PatientID	FirstName	LastName	Address	Gender	DOB	Age	Email	Phone	BedNo

Doctor Specialty

DoctorID	Specialty

Physican

DoctorID	FirstName	LastName	Address	Email	Phone	AltPhone

Administer

PatientID	DoctorID	TreatmentID	DateTime	Results

Treatment

TreatmentID	Name	Description	Charge

Admit

AdmitID	AdmitDate	DischargeDate	PatientID	AdmitDocID	DischargeDocID

Charged Item

PatientID	ItemNo	Date	Quantity

Item

ItemNo	Name	Charge

Care

PatientID	NurseID	Date	Time	Event	EventID

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				Phone Rule			
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				Phone Rule		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				Phone Rule			
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]')		
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				Phone Rule			
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]')		
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
TreatAdminID	**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: