Hospital Database Design Document

Version 1.5

Submittal Date: 02/09/2025

Version History

Version	Changes
1.0	First Released Draft
1.1	Changed discrepancies with some entity confusion for compound attributes, added compound and multivalued attributes to related entities.
1.2	Updated narrative
1.3	Added updated ERD and EERD
1.4	Added RS
1.5	Updated RS and added Data Dictionary

Table of Contents

Purpose:

The purpose of this Database Design Documentation (DBDD) follows the needs of the hospital administrator. 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.

Narrative:

The hospital administrator wants to record each nurse's name and address, phone and alternate phone, email and the medical specialties he or she is certified in. 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, extra-large) and their type (elevated electrically or manually) and if they are available to be assigned to a patient. Most of the beds are large and manual (this is the default setting). The data entry (checks) for beds is limited to S, M, L, XL for size; E or M for type; O for occupied and A for available. Availability defaults to occupied to avoid double booking by mistake. All of these value formats are set by check. 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. In this database we are only tracking bed assignment history and not bed occupancy or availability. Workflow: The admitting official conducts a review of all beds to determine which beds are available to assign to a patient.

Information on patients is recorded: name, gender, dob, address, phone, alternate phone, email. The patient's calculated age is also tracked. 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.

Actors & Roles:

- **Nurses ->** A nurse is assigned to **at least one** ward and rotates obligations among other wards, tracked by date. Each nurse has patient care, involving the full interaction between a nurse and a patient, with a nurse interacting with the same patient multiple times in a day or multiple patients in a day.
- **Wards ->** A nurse is assigned to at least one ward, but a nurse can be a part of many wards. Tracked by the date and hours worked in the specific ward by each nurse on that date.
- **Beds** -> Beds are inventoried to a specific ward, with information on size and type being the most prevalent.
- **Patients** -> Assigned to a specific bed upon admission. Information on the patient is then recorded.
- **Doctors** -> Some are in charge of admitting patients. Doctors serve the treatment to a patient.
- **Treatments** -> Given to patients by doctors. Some patients receive treatments whilst others do not. Some patients can even be on multiple treatments.
- **Items** -> Charges incurred during the patients stay at the hospital. Charges are tracked and stored in Items.

Entities:

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

Entities w/ Nested Attributes:

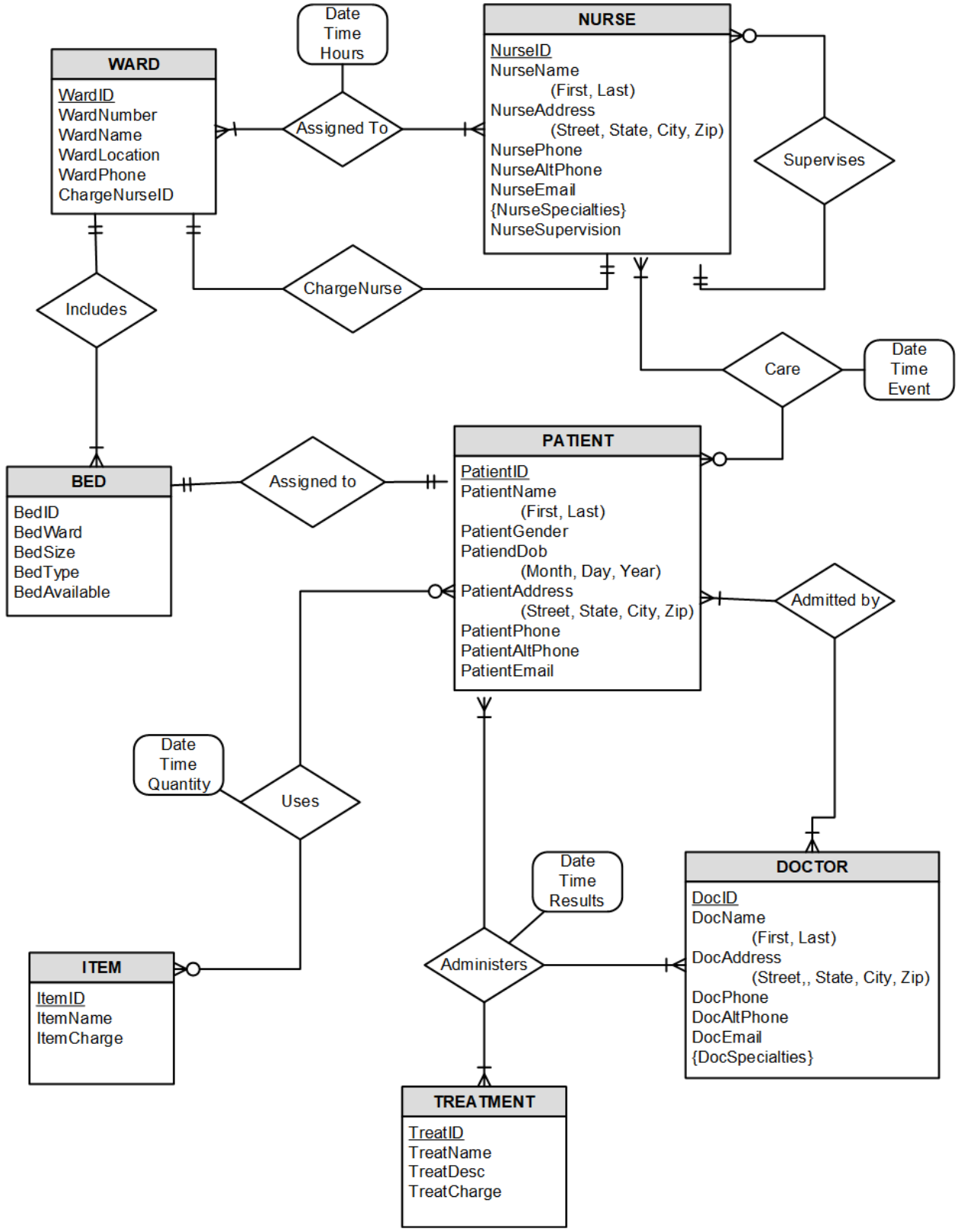
- Nurse
    - NurseID (PK)
    - NurseName
      (First, Last)
    - NurseAddress
      (Street, City, State, Zip)
    - NursePhone
    - NurseAltPhone
    - NurseEmail
    - {NurseSpecialties}
    - NurseSupervision
- Ward
    - WardID (PK)
    - WardNumber
    - WardName
    - WardLocation
    - WardPhone
    - ChargeNurse
- Bed
    - BedID (PK)
    - BedWard
    - BedSize
    - BedType
    - BedAvailable
- Patient
    - PatientID (PK)
    - PatientName
      (First, Last)
    - PatientGender
    - PatientDob
    - [PatientAge]
    - PatientAddress
      (Street, City, State, Zip)
    - PatientPhone
    - PatientAltPhone
    - PatientEmail
- Doctor
    - DocID (PK)
    - DocName
      (First, Last)

    - DocAddress
      (Street, City, State, Zip)
    - DocPhone
    - DocAltPhone
    - DocEmail
    - {DocSpecialties}
- Treatment
    - TreatmentID (PK)
    - TreatmentName
    - TreatmentDescription
    - TreatmentCharge (price)
- Item
    - ItemID (PK)
    - ItemName
    - ItemCharge

Business Rules (optionality, cardinality):

- **Nurse ->** Some nurses supervise one or more other nurses however no nurse is supervised by more than one nurse, other nurses are unsupervised. A nurse can be a charge nurse for a specific ward, only one allowed per each ward. Some nurses will not act in this capacity.
- **Ward ->** Each ward has a charge nurse, the custodian for medical records for the ward. Each ward has only one charge nurse.
- **Bed ->** Large and Manual are the default settings for a bed size (small, large, extra-large) and type (electrical, manual). Each patient is assigned to a certain bed, not all beds are available for use at a given time, and a bed can only be assigned to one patient at a given time.
- **Patient ->** Admitted by some doctors. Some are not given treatment whilst others can be given multiple. Patients can receive treatment from one or more doctors.
- **Doctor ->** Doctors can have one or more patients and supply one or more treatments to a patient.
- **Treatment ->** Some patients receive treatments whilst others do not. Some patients can even be on multiple treatments.
- **Item ->** All patients incur at least one charge for consumable items. Some items are used and others may be new or rarely given to patients.

ERD: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Time
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WardID
WardNumber
WardName
WardLocation
WardPhone
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Assigned To
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NurseName
(First, Last)
NurseAddress
(Street, State, City, Zip)
NursePhone
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NurseEmail
{NurseSpecialties}
NurseSupervision
Supervises
Includes
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Care
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Time
Event
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BedSize
BedType
BedAvailable
Assigned to
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PatientName
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PatientGender
PatiendDob
(Month, Day, Year)
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Quantity
Uses
Date
Time
Results
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TreatID
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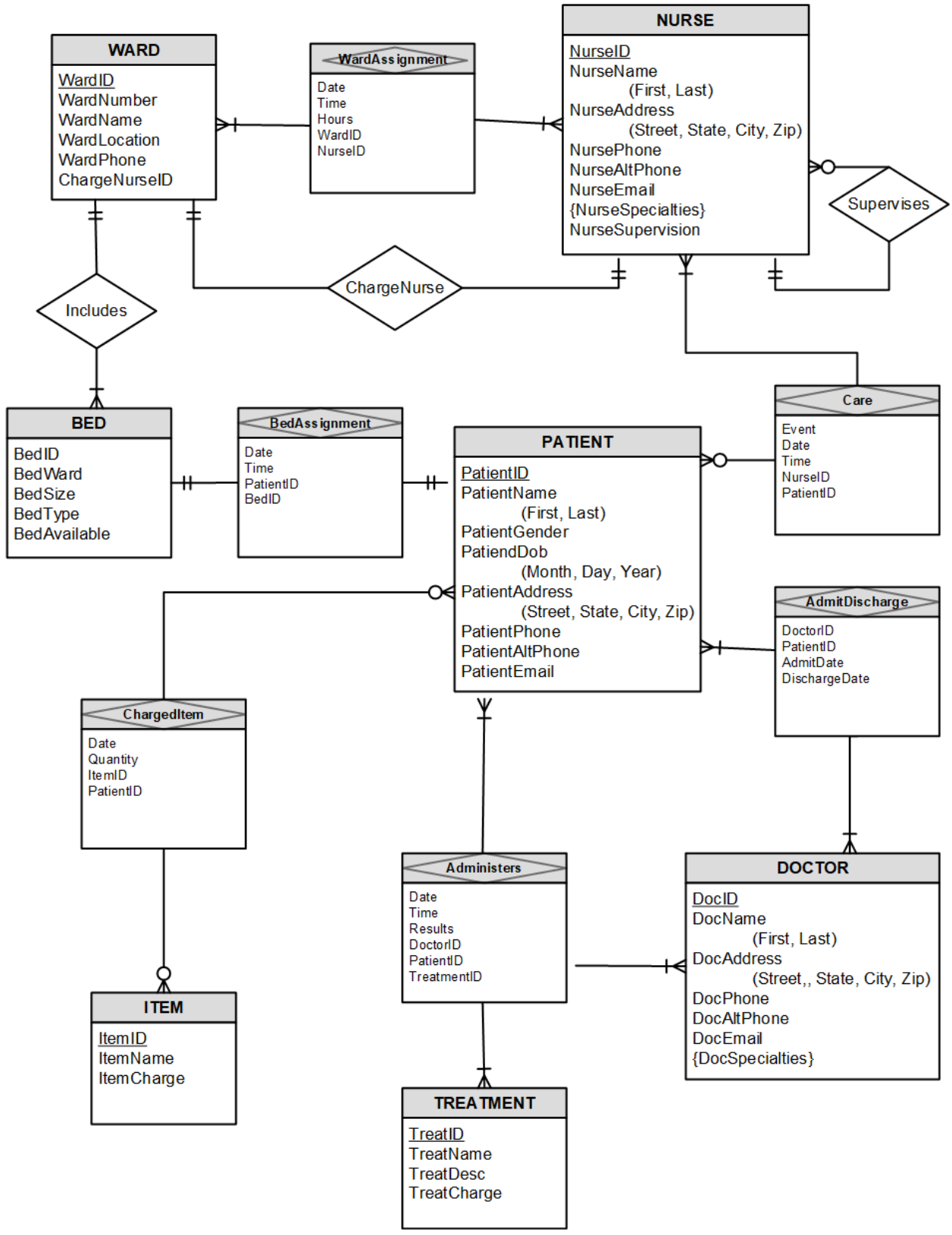
TreatCharge

EERD: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WardAssignment
Date
Time
Hours
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NurseID
NURSE
NurseID
NurseName
(First, Last)
NurseAddress
(Street, State, City, Zip)
NursePhone
NurseAltPhone
NurseEmail
{NurseSpecialties}
NurseSupervision
Supervises
Includes
ChargeNurse
BED
BedID
BedWard
BedSize
BedType
BedAvailable
BedAssignment
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TreatmentID
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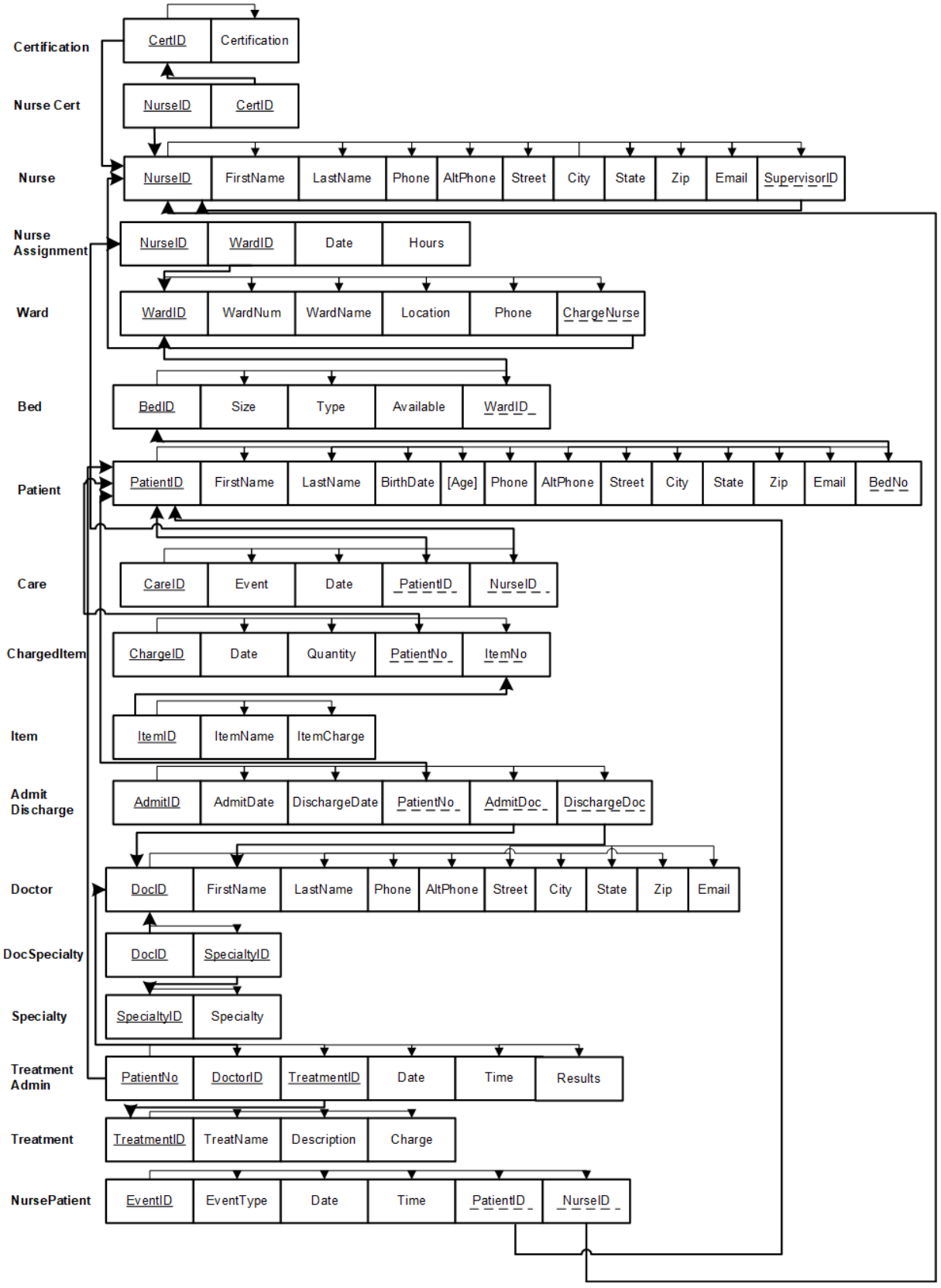
ItemCharge
TREATMENT
TreatID
TreatName
TreatDesc
TreatCharge

RS:


Certification
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Nurse Cert
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LastName
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State
Zip
Email
SupervisorID
Nurse Assignment
NurseID
WardID
Date
Hours
Ward
WardID
WardNum
WardName
Location
Phone
ChargeNurse
Bed
BedID
Size
Type
Available
WardID
Patient
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LastName
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