Project Phase 3

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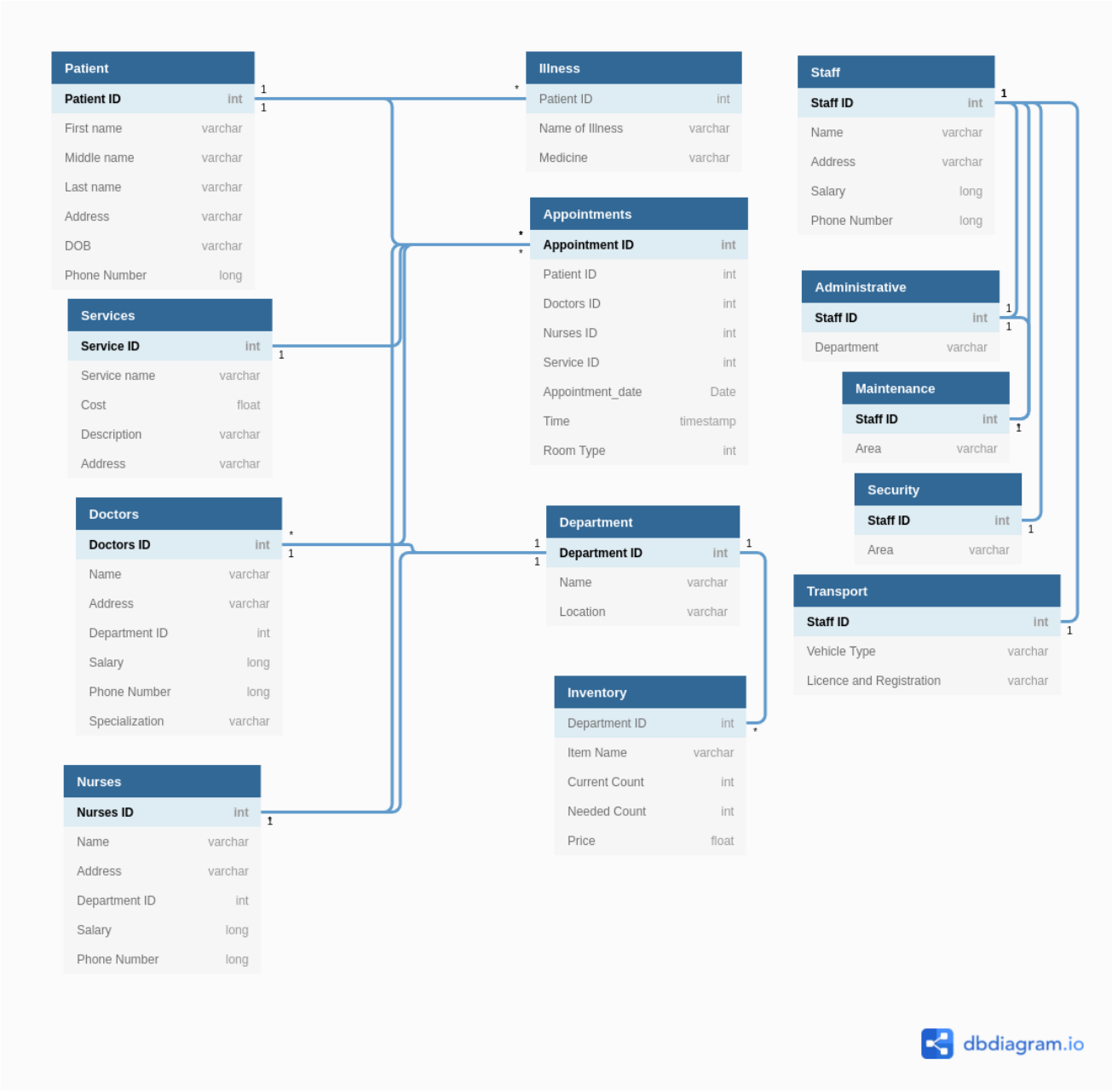


The entities and relationships are represented above corresponding to the ER model.

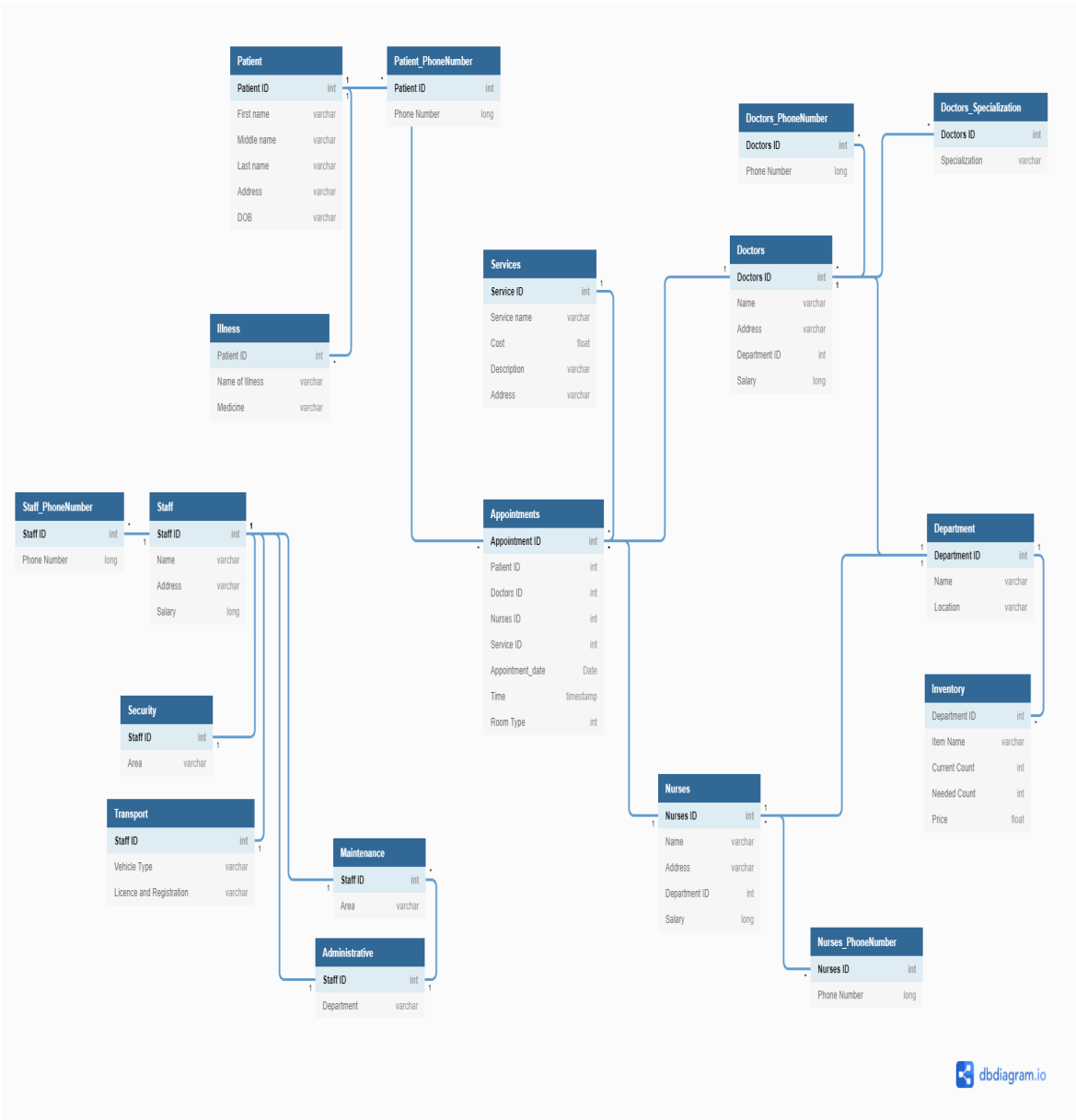
Relational model:

To map the ER diagram to a relational model each entity was mapped to a relation R with its respective attributes.

Composite attributes were listed as their simple component attributes. Eg: Name was included as First Name, Middle Name and Last Name.

Derived attributes were not included in the relations.

For each multivalued attribute A we have created a new relation R. Multi-valued attributes were mapped to a separate relation along with the primary key of the entity. Eg: The phone number attribute in the Patients table was mapped to a separate relation called Patient_PhoneNumber that has Patient ID as the foreign key and the phone number attribute.


Patient
Patient ID int
First name varchar
Middle name varchar
Last name varchar
Address varchar
DOB varchar
Patient_PhoneNumber
Patient ID int
Phone Number long
Doctors_PhoneNumber
Doctors ID int
Phone Number long
Doctors_Specialization
Doctors ID int
Specialization varchar
Services
Service ID int
Service name varchar
Cost float
Description varchar
Address varchar
Doctors
Doctors ID int
Name varchar
Address varchar
Department ID int
Salary long
Illness
Patient ID int
Name of Illness varchar
Medicine varchar
Staff_PhoneNumber
Staff ID int
Phone Number long
Staff
Staff ID int
Name varchar
Address varchar
Salary long
Appointments
Appointment ID int
Patient ID int
Doctors ID int
Nurses ID int
Service ID int
Appointment_date Date
Time timestamp
Room Type int
Department
Department ID int
Name varchar
Location varchar
Inventory
Department ID int
Item Name varchar
Current Count int
Needed Count int
Price float
Security
Staff ID int
Area varchar
Transport
Staff ID int
Vehicle Type varchar
Licence and Registration varchar
Maintenance
Staff ID int
Area varchar
Administrative
Staff ID int
Department varchar
Nurses
Nurses ID int
Name varchar
Address varchar
Department ID int
Salary long
Nurses_PhoneNumber
Nurses ID int
Phone Number long
dbdiagram.io

1NF

The first normal form is the same as the relational model. It has only single(atomic) valued attributes/columns, where values stored in a column are of the same domain. All the columns in a table have unique names and the order in which data is stored, does not matter. So the relation is already in 1NF.

2NF

For a relation to be in 2nd normal form there should be no partial dependency. Partial dependency is when an attribute depends on only part of a key and not the whole key.

In the relation, all the primary keys consist of a single attribute and so there is no dependence on just part of the key, only on the whole key. So there is no partial dependency.

So the relation is already in 2NF because it is in 1NF and there are no partial dependencies.

3NF

For a relation to be in 3NF there should be no non-prime attribute (attribute that is not part of a candidate key) that is transitively dependent on the primary key.

In the relation there are no transitive dependencies, i.e if $X \rightarrow Y$ hold then $X \rightarrow Z$ and $Z \rightarrow Y$ do not hold. All the functional dependencies are dependent on the primary key of the relation itself.

So the relation is already in 3NF because it is in 2NF and there are no transitive dependencies.