
DATA AND APPLICATIONS (CS4.301, MONSOON 2023)

PROJECT PHASE 3: NORMALIZATION

Team 12

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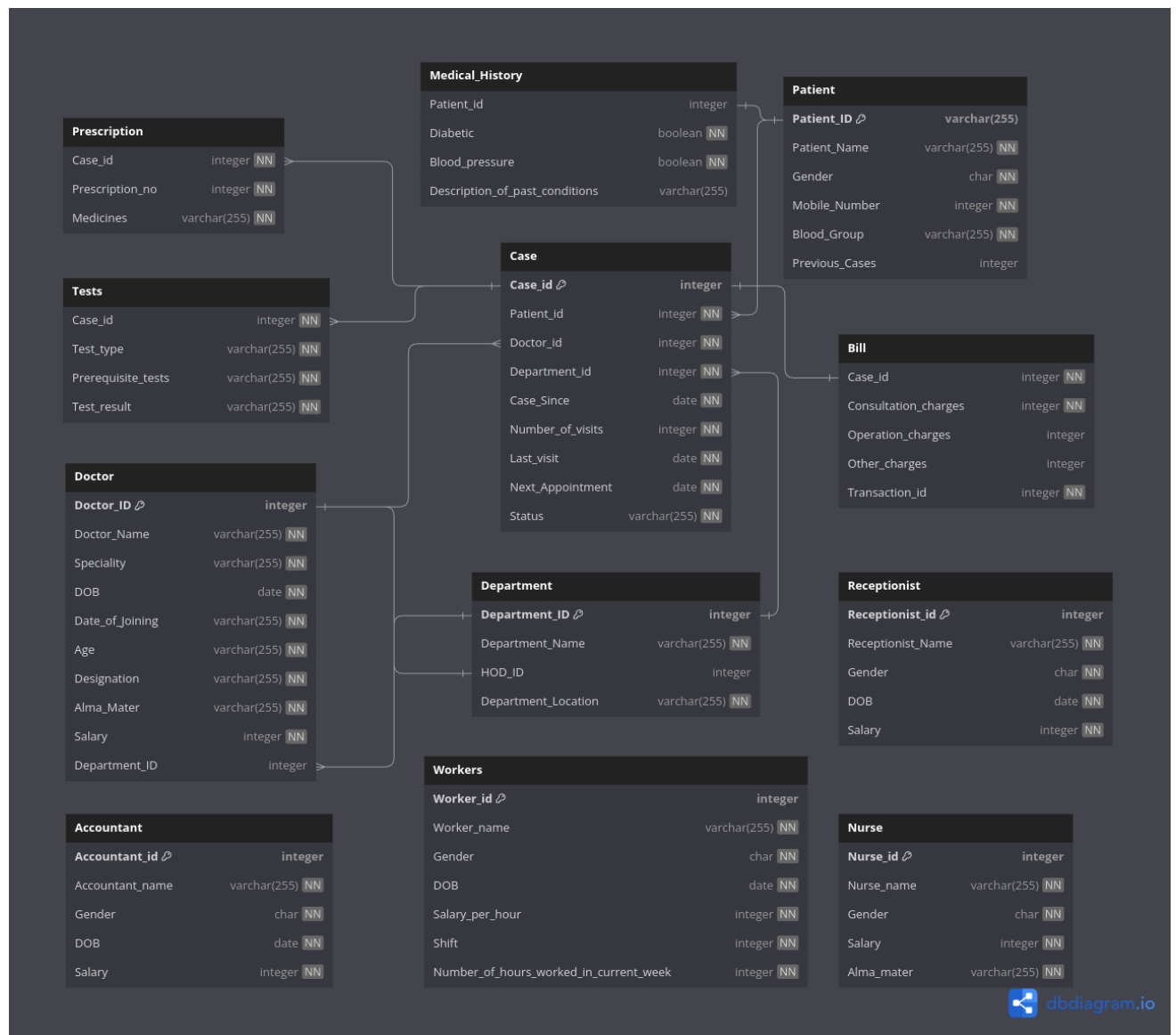
1 Relational Model From ER Diagram

The ER diagram previously made was used to make a Relational Diagram. Use of [dbdiagram](#) was made.

We had followed the following general steps :

1. For each Strong Entity type in the ER schema, we have created a relation that includes all the attributes of that Entity.
2. For each weak entity type in the ER schema a relation has been created which includes all attributes of the weak entity as attributes of relation. Each Relation includes the primary key of the deciding entity as a foreign key.
3. We mapped the Primary keys of all Binary Relations of type 11 and 1N as Foreign Keys in the respective relations.

We have included the link to the relational model for the final model, while screenshots of the intermediate steps are attached and explained for each conversion to the respective normal form.

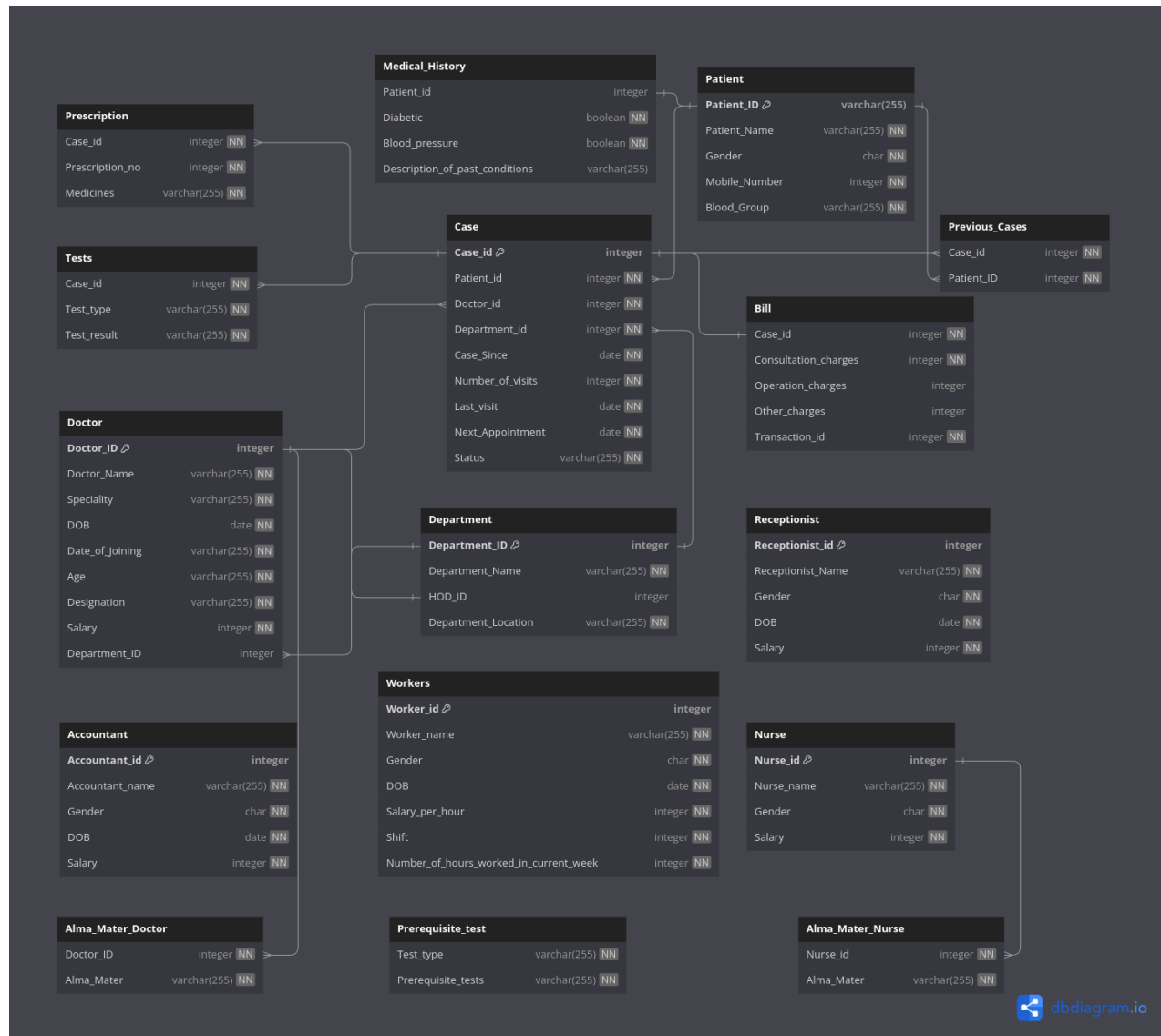


2 Conversion of Relational Model to 1NF

The relational model is already in 1NF as new relations for multivalued attributes were created and composite attributes were converted to atomic attributes in the steps of conversion to the Relational Model. Following are the steps to convert to the 1NF.

1. We identified the **multivalued attributes** from our ER diagram.
2. For each multivalued attribute we identified the attribute(primary key in the case of the strong entity type and partial key in case of weak entity type) and **made a separate table with atomic entries** of each multivalued entry with the same key, which acts as Foreign Key for the newly formed Key.
3. The **Multivalued attribute is marked as normal attribute** which is joining to new table with a constraint: Not-NULL.

NOTE : For the attribute in the weak entity: Prescription, the key is tuple of CaseID and Prescription No. , which are the only attributes other than Medicines (Multivalued). Hence, the entries will be made atomically, but no new tables will be made. The attribute is marked as normal.



3 Conversion of Relational Model to 2NF

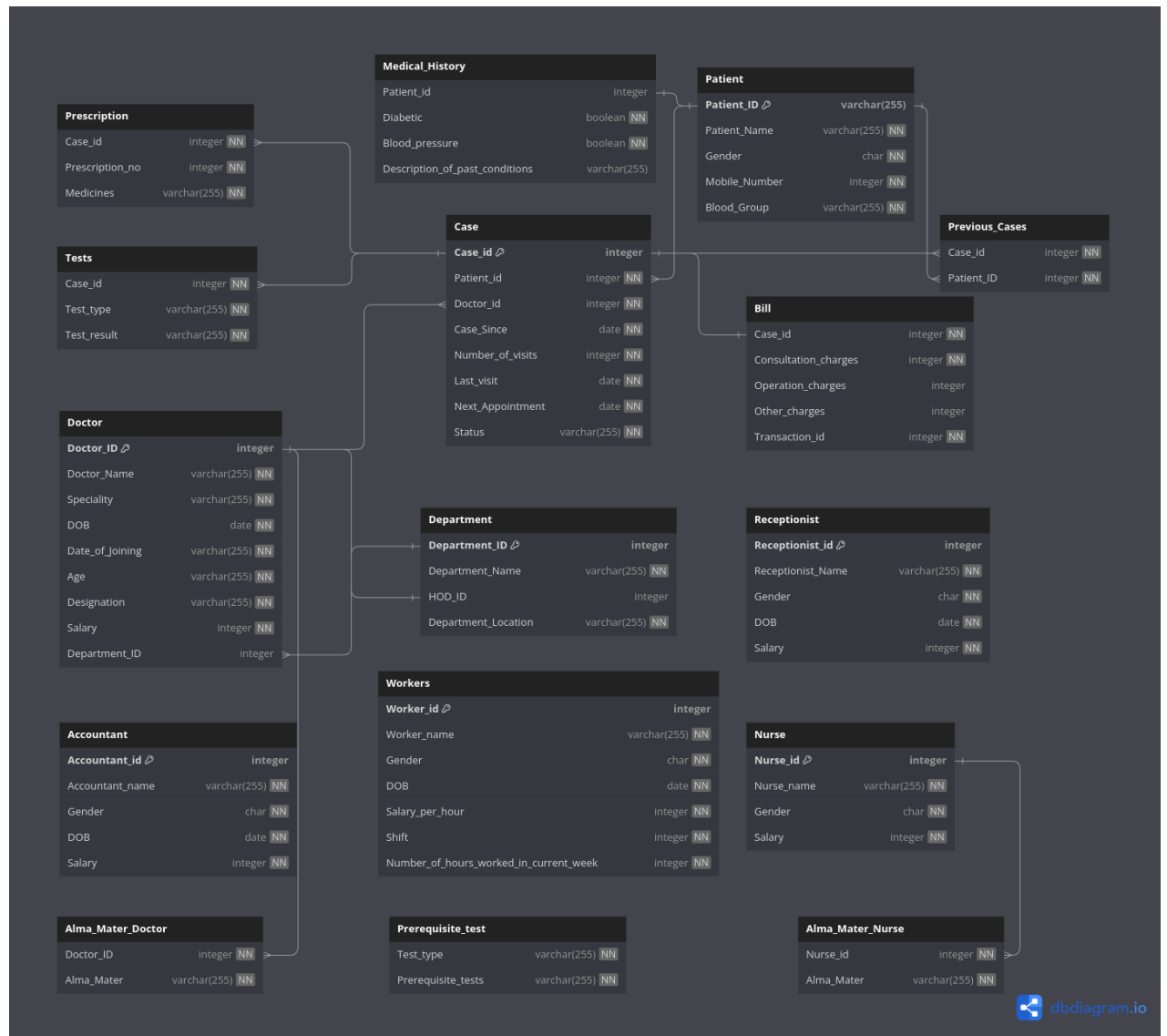
Here after converting our relational model to the 1NF, the model is already in the 2NF form. The reason for this is it does not have any nonprimary attribute that is not fully dependent on it.

4 Conversion of Relational Model to 3NF

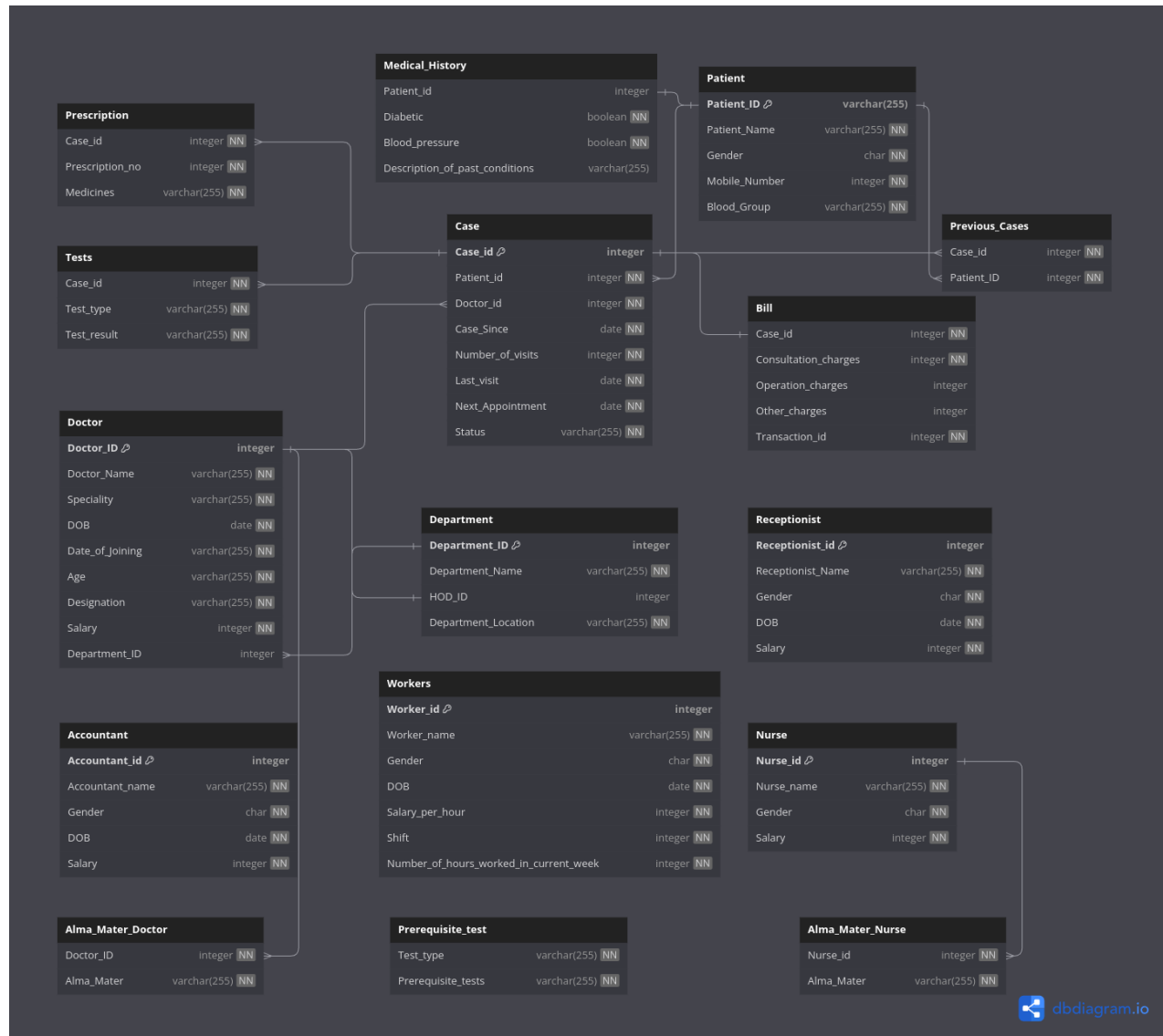
Upon conversion to 2NF, there was one instance of non-3NF table :

Case - Doctor tables

- The Department ID fully depends upon the Doctor (Joined by DoctorID) of the Doctor Table.
- There is also Full dependency of the DoctorID in the Case Table. This creates redundancy in the Case table.
- Hence, by definition of 3rd Normal Form - If DepartmentID is transitively dependent on CaseID, then it should be dropped from Case Table and it now, does not transitively depend on CaseID but instead fully depends only on DoctorID.
- Doing this in the Tables makes the Relational Model in 3 NF.



5 Final Relational Model



Link: [Final Relational Model](#)