

DBMS PROJECT

Step I

Describing the problem and ER model with necessary assumptions

PROBLEM STATEMENT:

The following Entity Relationship(ER) model pictorially represents the working of a JoSAA (Joint Seat Allocation Authority) database which allots seats to students to premier institutes all over the country. JosAA is set up by the MHRD to allot seats in 100 institutes in India based on the RANK obtained in JEE Mains , CATEGORY and PREFERENCES. Several rounds of allotment take place to ensure that there aren't any vacancies. This database simulates the allotment results after one such round in this procedure.

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Legend for ER Diagram:

- The -+ headed arrow directed towards an entity indicates cardinality one.
- The -< headed arrow directed towards an entity indicates cardinality many.
- () around an attribute marks it a compound/ composite attribute.
- The 'o' beside an attribute means it is optional (can be NULL)
- Other formalities follow according to standards mentioned.

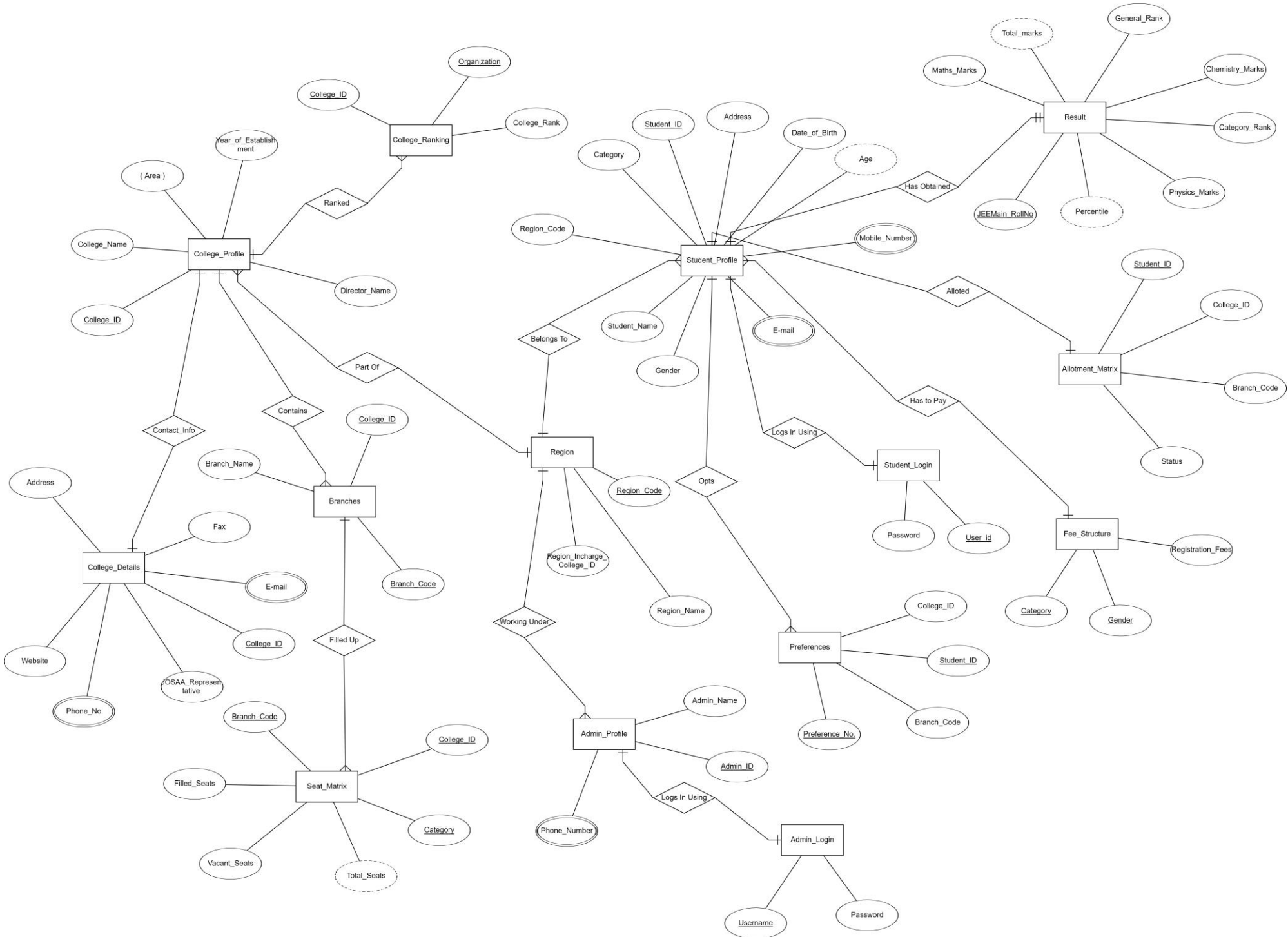
Assumptions

We have made the following assumptions during the creation of our ER Diagram.

- It is assumed that the student has obtained a unique rank in the JEE Mains
- A college can be ranked by multiple organizations so that students can compare different institutes.
- A region comprises of different colleges.
- Students are also categorized into various regions for convenience in administration.
- Administrators are allotted to each region who can log on to their regional part of the Database with their unique User id and password.
- One student is given one username and password only.
- An institute can have many branches.
- Seats in a branch are divided into several categories (EBC/ PWD/GEN)
- Irrespective of the college allotted, all students belonging to a particular category and gender have to pay the same fee at the time of registration.
- A student has the privilege to fill any number of preferences before allotment.
- After all students have filled in their choices they are allotted 1 institute and branch or none.
- They can change their status to FREEZE (Confirm option) or FLOAT (Wait for the next iteration).
- In case all the preferences opted by a candidate are filled up, he will be allotted no seat.

Disclaimer: This mini project is not associated with JoSAA or with the MHRD or any of its associates in any respects. It is for student/course purpose only.

*** ER Diagram overleaf *.**



Step II:

Creating the Relational Schema from the ER Diagram and Normalizing the Tables so obtained

Overleaf are the expected tables that are created by observing the ER Model on the previous page.

Clearly the ER Model does not result in a 1NF Schema. This is due to non atomic attributes including Admin-Phone Number, StudentEmail_Id , Student Phone , College_Phone and College_Phone .(bearing multiple values)

So separate Relations to be created are:

- StudentPhone (Student_ID,PhoneNumber)
- StudentEmail(Student_ID,Email_ID)
- CollegePhone (College_ID,PhoneNumber)
- CollegeEmail(College_ID,Email_ID)
- AdminPhone(Admin_ID,PhoneNumber)
- AdminEmail(Admin_ID,Email_ID)

Now it is clear that the Relational Schema is at least in 1NF.

Checking for the Normal Form of Relations in Schema Overleaf

Based on our assumptions, the primary keys shown in the figure on the next page determine all the other attributes in all relational tables except in the 'Branch_Details' table.

(A detailed list of functional dependencies in all relations is given at the end)

So all the other relations are in BCNF. This will be satisfactory for the present.

In 'Branch_Details' table, we have the following relations.

- Branch_Code->Branch_Name
- Branch_Code,College_ID->Branch_Name

Here there is a partial dependency on key attribute in first dependency.

So there is a need to decompose this relation into two smaller relations

- BranchIndex(Branch_Code, Branch_Name)
- CollegeBranches(College_ID,Branch_Code)

Now the two relations are in BCNF and 3NF.

****Next page is the first set of relational tables followed by Functional Dependencies** (Schema I)**

