CONSTRUCTION OF ER

and

RELATIONAL DATABASE MODELS

OPTIMIZATION THROUGH NORMALIZATION

for

ALL INDIA EXAM COUNSELING AND ADMISSION

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EXAM COUNSELLING AND ADMISSION

Introduction:

Exam Counseling procedure is extremely necessary, considering students from different parts of the country write these examinations.

 Exam Counseling procedure makes it convenient for students, who are eligible to gain admission into colleges participating in the counseling, by informing them of the choices available to them and enabling them to make choices of college and course from the database being updated from all across the country.

They can do all this from a place convenient to them and where the counseling center has been setup.

The process begins by shortlisting the candidates eligible for counseling and putting up this list of candidates on the website. These students then choose to report to the counseling center in their state of eligibility. Here they are shown a list of available colleges and courses they can choose from.

Candidates are allowed to make a maximum of 3 choices in a preference order from among these. The following day they are shown the choice allotted to them, based on their rank and other students who have also locked choices.

The students are then asked to report to the institute which has been allotted to them, and register for the course allotted to them, for their admission into the institute.

Project Purpose:

This project intends to provide a step by step procedure of arriving at the optimum tables for an Exam Counselling database application.

Project Description:

Here we analyse the requirements of the student. Depending on these requirements we list the entities involved and the attributes associated with each one of them.

We then list the relations that each entity has with each other and the cardinality of the relationship.

This is depicted in the ER data model.

We proceed to construct the relational database model from the ER Data model, as a step towards table building.

We then list the functional dependencies involved in the problem statement and use normalization techniques on them to get anomaly free tables.

These procedures have been described further in the project.

Project Scope

The project aims at automating the counselling and admission procedure by maintaining a table of available seats in a particular branch, in a particular institute.

This is done by allowing the reporting candidates to lock their choices, whose log is maintained in a centralized table, till the time they are not allowed to lock their choices.

This table is checked with a table containing recently updated information of available seats in a particular course in a particular institute. From among the students rank, choice, the available choice, his category and state we allot a seat to him.

The table containing seat availability is repeatedly updated for each student in the pile table. The pile table is then refreshed.

 The new updated table is shown to the students from all across the country the following day. The students who have locked choices are shown their allotted institute and branch.

This way we can cater to many students from all across the country by updating the seats available each day and allowing them to choose depending on this data.

Overall Description:

We first list the entities by scanning through the problem statement.

PROBLEM STATEMENT

The process begins by short listing the candidates eligible for counseling and putting up this list of candidates on the website. These students then choose to report to the counseling center in their state of eligibility. Here they are shown a list of available colleges and courses they can choose from.

Candidates are allowed to make a maximum of 3 choices in a preference order from among these. The following day they are shown the choice allotted to them, based on their rank and other students who have also locked choices.

The students are then asked to report to the institute which has been allotted to them to register for the course allotted to them, for their admission into the institute.

LISTING OF ENTITIES

The underlined words (nouns) make up for the entities:

1. Candidates
2. Institute, Course
3. Students choosing to report to the counseling centers
4. Available Colleges and Courses

The above listed entities are shown below with the following change in the names of the entities:

1. Eligible Students
2. Courses in Institute
3. Counseled Students [Subtype of Eligible Students]
4. Seat Availability

Below is described the attributes associated with each entity.

ATTRIBUTES ASSOCIATED WITH EACH ENTITY

Eligible Students Entity:

1. Every eligible student for counseling is associated with a Registration number that he would have received at the time of writing the examination, a state rank which enables him to be given top priority over students from other states in the institute located in his state, recognized by the state of eligibility field.
2. The All India Rank is the rank based on which he is allotted to an institute in a state apart from his state.
3. All students listed in the Eligible students category need not appear at the counseling centers. Thus a subtype of this entity called Counseled students is created with an additional multi-valued attribute Choices with choice number, Courseid, Instituteid which he locks at the counseling center.

Seat Availability Entity:

1. This table is the one that gets updated each day. It has separate entries for categories.

Courses in Institutes:

1. This table keeps a record of the courses offered by various institutes.

Fig1, **Fig2** and **Fig3** show the entities and their attributes.

Below is the identification of relations.
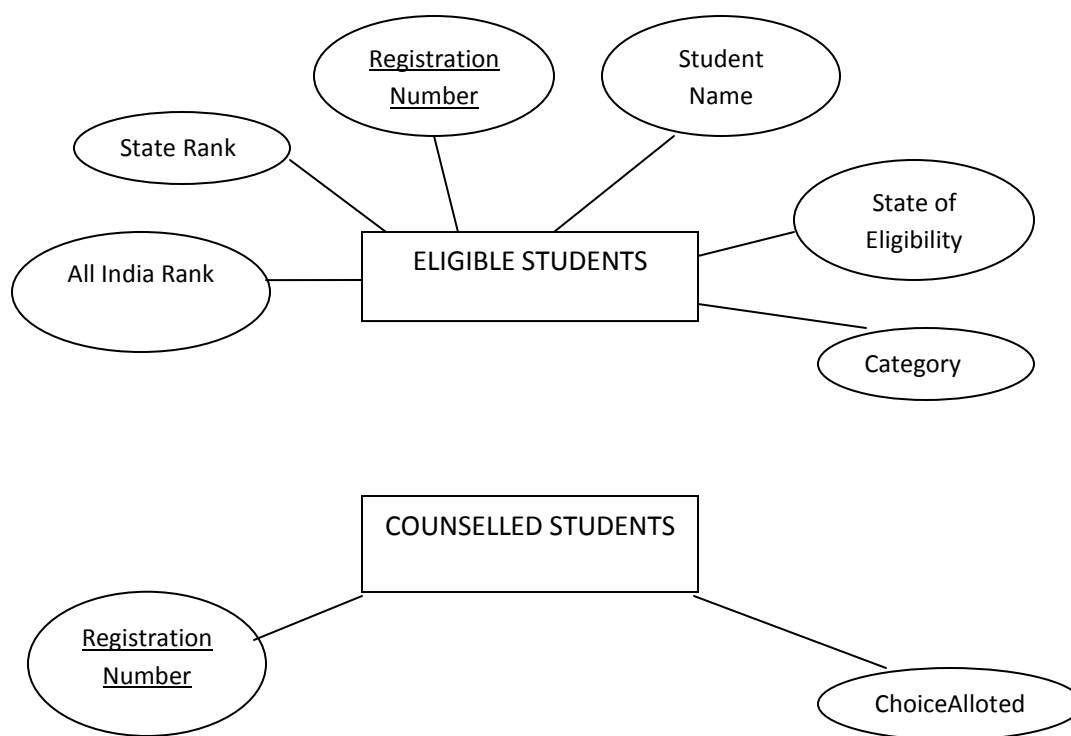
IDENTIFICATION OF RELATIONS

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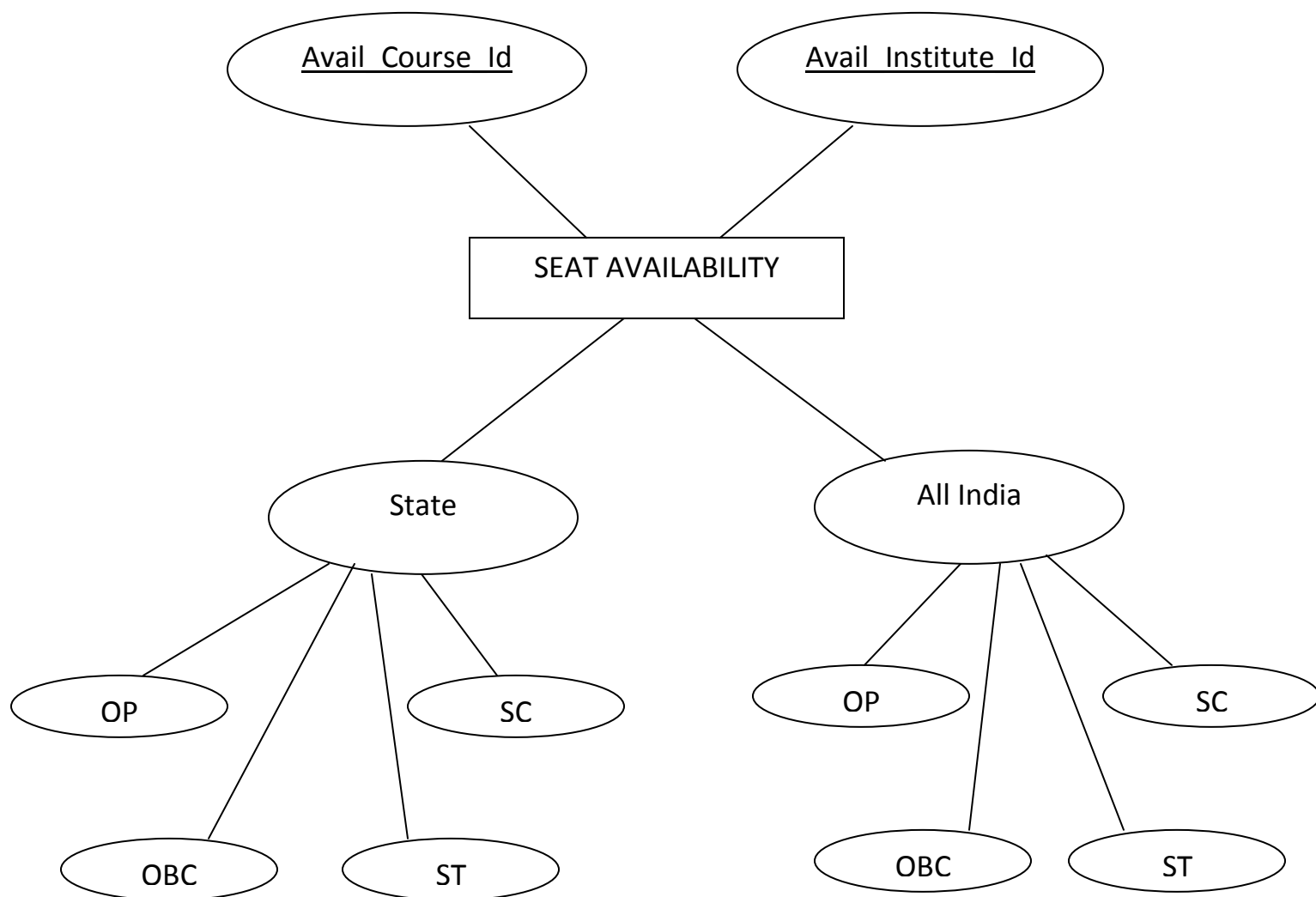
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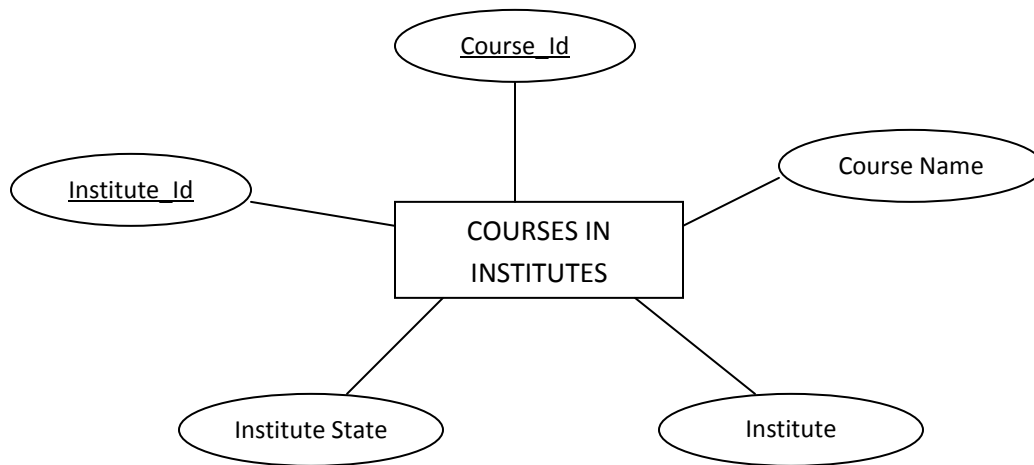
The students are then asked to report to the institute which has been allotted to them, and register for the course allotted to them, for their admission into the institute.

Fig4 shows the relation between the different entities. The explanation for the cardinality between the entities is written below.

1. Counseled students may choose a given maximum but at least one course and institute from the seat availability table.
2. A seat may be chosen by many candidates.
3. A single record in the seat availability table can be associated with many students or no student.
4. A candidate may be allotted a seat or not.
5. Every seat available is chosen from the standard table of courses in institute table. Every record in seat available table is from the courses in institute table and every record in the latter is either present with some number of seats or 0 number of seats.

State Rank

Registration
Number

Student
Name

All India Rank

ELIGIBLE STUDENTS

State of
Eligibility

Category

COUNSELLED STUDENTS

Registration
Number

ChoiceAlloted

Fig1

Fig2

Course_Id

Institute_Id

Course Name

COURSES IN INSTITUTES
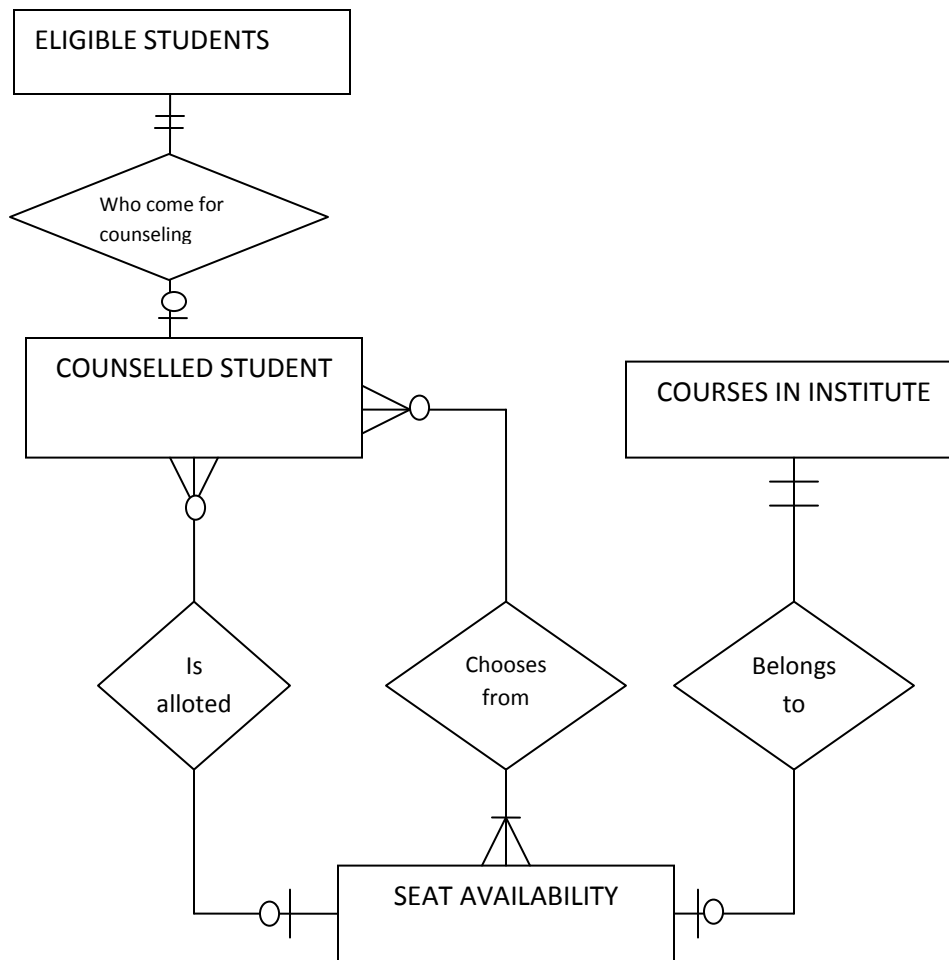
Institute State

Institute

Fig3

Fig4

ER Data Model to Relational Database Model

ELIGIBLE STUDENTS (RegistrationNo, StudentName, StateRank, AllIndiaRank, StateOfEligibility, Category)

COUNSELLED STUDENTS (RegistrationNo, ChoiceAlloted)

COURSES IN INSTITUTES (Institute_Id, Course_Id, InstituteName, CourseName, InstituteState)

SEAT AVAILABILITY (Avail_Institute_Id,Avail_Course_Id, AIOP, AIOBC, AISC, AIST, HSOP, HSOBC, HSSC, HSST)

STUDENT-CHOICE (RegistrationNo, ChoiceNo,Chosen_Institute_Id, Chosen_Course_Id)

Mapping ER model to Relational Database Model

EligibleStudents

RegistrationNo
StudentName
StateRank
AllIndiaRank
StateOfEligibility
Category

CounseledStudents

RegistrationNo
ChoiceAlloted

Student_Choice

Student_Choice
RegistrationNo
ChoiceNo
Chosen_Institute_Id
Chosen_Course_Id

Courses In Institute

Institute_Id
Course_Id
InstituteName
CourseName
InstituteState

SeatAvailability

Avail_Institute_Id
Avail_Course_Id
AIOP
AIOBC
AISC
AIST
HSOP
HSOBC
HSSC
HSST
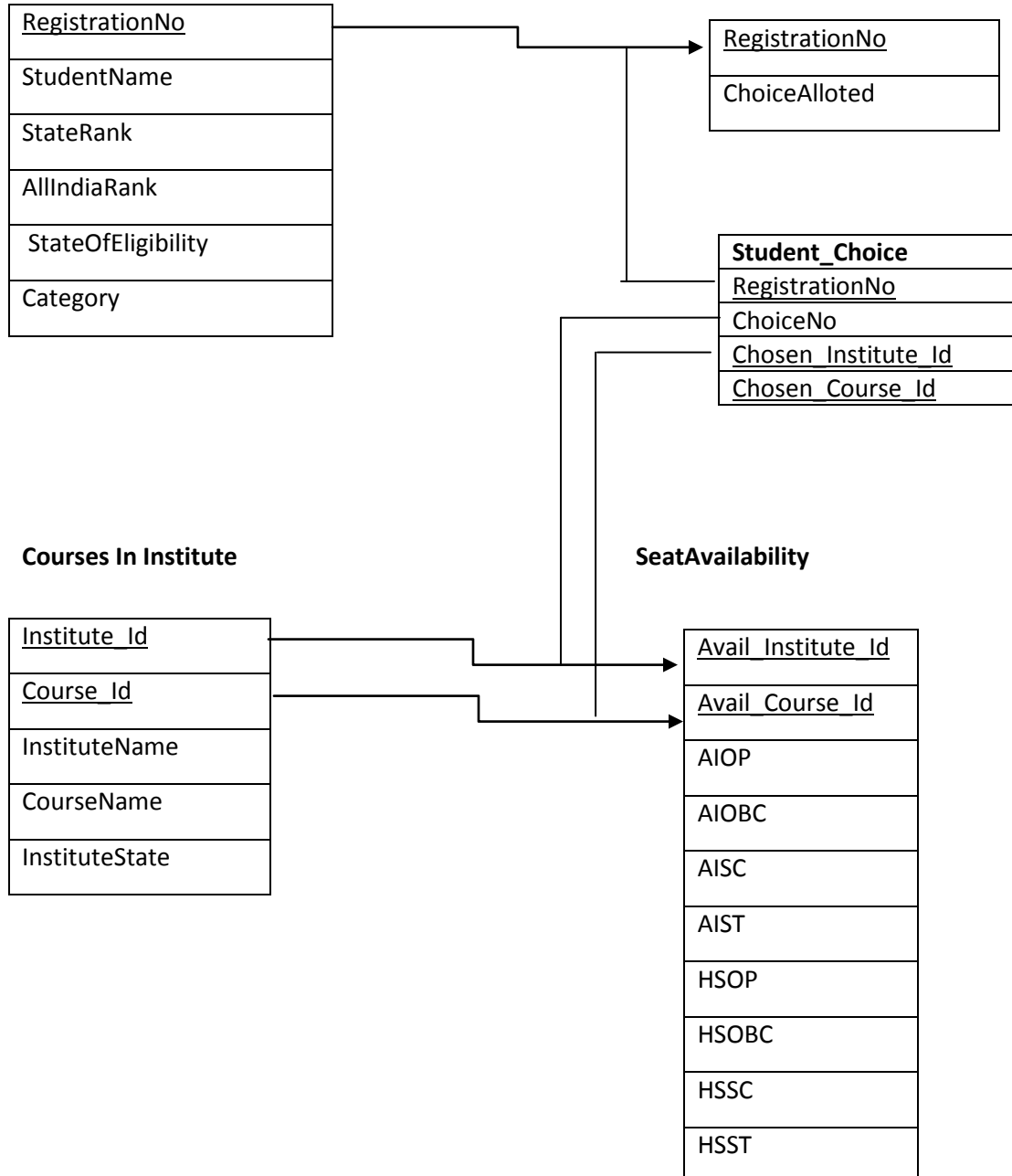
All entities are directly transferred into relations and the attributes into field values.

Entity Student_Choice arises due to many to many relation between CounseledStudents and SeatAvailibility.

FUNCTIONAL DEPENDENCIES:

1. RegistrationNo -> RegistrationNo, StudentName, StateRank, AllIndiaRank, StateOfEligibility, Category
2. RegistrationNo->ChoiceAlloted
3. RegistrationNo,Chosen_Institute_Id,Chosen_Course_Id->ChoiceNo
4. Institute_Id->InstituteState,InstituteName
5. Course_Id->CourseName
6. Institute_Id,Course_Id->InstittuteName, InstituteState, CourseName
7. Avail_Institute_Id,Avail_Course_Id->AIOP, AIOBC, AISC, AIST, HSOP, HSOBC, HSSC, HSST

NORMALIZATION:

1. 1NF: Every attribute is atomic in nature
2. 2NF:
   1. Institute_Id,Course_Id-> InstittuteName, InstituteState, CourseName
   2. Institute_Id-> InstituteState,InstituteName
   3. Course_Id->CourseName

The above normalization leads to the splitting of two tables from Courses in Institute table:

Institute(Institute_Id, InstituteName,InstituteState)

Course(Course_Id, CourseName)

The final list of tables we arrive at are:

FINAL LIST:

1. ELIGIBLE STUDENTS (RegistrationNo, StudentName, StateRank, AllIndiaRank, StateOfEligibility, Category)
2. STUDENT_CHOICE (RegistrationNo, ChoiceNo, Chosen_Institute_Id,Chosen_ Course_Id)

3. COUNSELLED STUDENTS (RegistrationNo, ChoiceAlloted)
4. INSTITUTE(Institute_Id, InstituteName,InstituteState)

5. COURSE(Course_Id, CourseName)
6. SEAT AVAILABILITY (Avail_Institute_Id,Avail_Course_Id, AIOP, AIOBC, AISC, AIST, HSOP, HSOBC, HSSC, HSST)