CS 432: Databases
Assignment 1: DESIGNING THE DBMS

Group Name: La Retro's
Topic: Placement Management

Group Members

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2.1 Responsibility of G1:

1.1 What is the database for?

The placement management database is for centralizing the operations of managing the job placement of students of the institute. It would allow the placement team of the institute to effectively store, access, and update the information that is necessary for their activities. This would enable the stakeholders involved to keep track of their students, resumes, companies, and their selection, leading to an increase in the efficiency of the process. This would help students to apply to companies according to their interests and companies to shortlist the candidates according to their requirements. One key requirement from the Placement dept. is that one student can only be given one placement. We have designed the database to adhere to this requirement.

1.2 What will be its impact, and what is the functional requirement of your database?

The Placement management database can bring sustainable transformation to the placement procedure.

1. **Centralized Information Hub**: The database serves as a centralized repository for all placement-related data, providing a consolidated and easily accessible source for CDS, ensuring data integrity, and reducing redundancies.
2. **Real-time Updates:** With real-time data updates, stakeholders, including recruiters and students, stay informed about the progress of placements, interview schedules, and application statuses, fostering transparency and timely decision-making.
3. **Secure Access Control:** Implementing secure access controls ensures that sensitive placement information is only accessible to authorized personnel, safeguarding the confidentiality and privacy of candidate and company data.
4. **Advanced Data Analysis:** The database is designed to facilitate superior data analysis, enabling a more comprehensive tracking of the placement lifecycle. This, in turn, empowers CDS with enhanced decision-making capabilities.

1.3 Who are the stakeholders involved?

1. Students: They play a pivotal role as the primary stakeholders, actively seeking job and internship opportunities facilitated by the placement process.

2. Companies/Recruiters: They are crucial stakeholders, providing job opportunities to the students participating in the placement process.
3. CDS Employees: These individuals hold a key role in overseeing the placement process. Their responsibilities include gathering and maintaining data on students, companies, and job openings and facilitating matches between students and available job opportunities.

2. Questions asked from the respective stakeholders and individuals.

- CDS

  - Dhairya Shah (PDC Secretary), Aditya Bhujbal (CDS SPM)
    - From the perspective of the Career Development Services, what specific information is crucial to collect from both students and recruiters for efficient job placement?
    - How does the Placement Management System ensure that the information gathered aligns with the diverse needs of both students and recruiters?

  Response: The most important information to collect from students are the academic details (CPI, Discipline, Minors, Dual Majors) and the Resumes of students. The information collected about the companies are eligible disciplines, batches, CPI and Minors Criteria, CTC/Stipend Offered, Core/Non-Core Sector of the company. By collecting the type of company and incentives offered, companies are classified slotwise so that the more aligning company is coming first.

- Students

  - Aman Singh (B.Tech 21 CSE) and Disha Chopra (B.Tech 21 CSE)
    - What is the most frequently requested information when applying for job roles through the Placement Management System?
    - How can the system better cater to individual preferences regarding the type and format of information shared with potential employers?
    - Are there particular challenges you face in providing or updating your information within the system, and what improvements would you suggest?

Response: Information asked for answers similar to the one provided by CDS Team. About the format, it would be better if there was a portal for applications of companies rather than google sheets and google forms used today. Updating information is very tedious and requires a very long process, it would be better if a more smooth way is possible.

- Recruiters
  - Mohammed Nabeel Younus (Recruiter at NVIDIA)
    - What is the most common information asked to students?
    - What challenges do you currently face in submitting and managing job opportunities for potential hires?
    - Are there specific data points or features you believe are crucial for effective candidate matching?

Response: Most common info answer was similar to CDS Team. Challenges faced are that most Placement Cells require digitally signed documents to be filled rather than a form including IIT Gandhinagar which makes it tedious for us. If the recruiters have good idea about the batch size; subjects done, past recruiting history, they'll get more idea.

2.2 Responsibility of G1 and G2:

1. Name all the entities, relationships, and attributes involved in your system.

The entities involved are as follows-

- Student
- Placement
- Academic Info
- Company
- Opportunity
- Selection Round
- Person of Contact

Relationships are as follows-

- Student_Acad_Info (Between Academic_Info and Student)
- Student_Placement (Between Student and Placement)
- Application (Between Student and Opportunity)
- Opportunity_Company (Between Company and Opportunity)
- Opportuntiy_Poc (Between Opportunity and Person_of_Contact)
- Opportunity_Rounds (Between Opportunity and Selection_Rounds)

2. Give examples and justification for points c to g in Design Requirements.

c) At least one primary key and one foreign key.

Student has the primary key of Student_id. This attribute of Student_id also acts as the foreign key for other entity sets, such as Placement and Academic_Info. Similarly, Company_ID is the foreign ID of the opportunity entity set, as it refers to the primary key of Company entity set.

There are many start-ups that are in the field of taking interviews for different companies. Since our database is future-friendly, we allow Company_ID to be set to NULL as the person_of_contact may not be from any of the companies that come from hiring. He/She may be from such third-party companies.

The foreign key constraint also ensures there is no non-sense entry in the database, like opportunity or person_of_contact is not associated with any company, which cannot happen.

d) At least one one-to-one relationship.

Our database design has a one-to-one relationship between Student and Placement (Student_Placement relation) and Student and Academic_Info(Student_Acad_info relation).

This is done because we want a student to be allotted a single placement only. Also, the relation between Student and Academic_Info obviously has to be unique since the same student cannot have multiple academic credentials or vice-versa.

e) At least any/both of (one-to-many, many-to-one) relationships.

Our database design has a one-to-many relationship between company and opportunity (Opportunity_Company relationship).

This is important because a single company can offer various opportunities/roles. For example, a company like Nvidia can offer both software and hardware opportunities. Hence, this relationship should be a one-to-many relationship.

f) At least one many-to-many relationship.

Our database has a many-to-many relationship between Opportunity and Person of contact (Opportunity_Poc relation).

This is important because a single opportunity can have multiple persons of contact. For example, for an engineering opportunity, multiple people can be involved in the interview rounds. Hence, all of them can be categorised as persons of contact. Similarly, one person can handle multiple opportunities too. For example the HR of the company might be involved with all the opportunities. Hence, this relationship should be a many-to-many relationship.

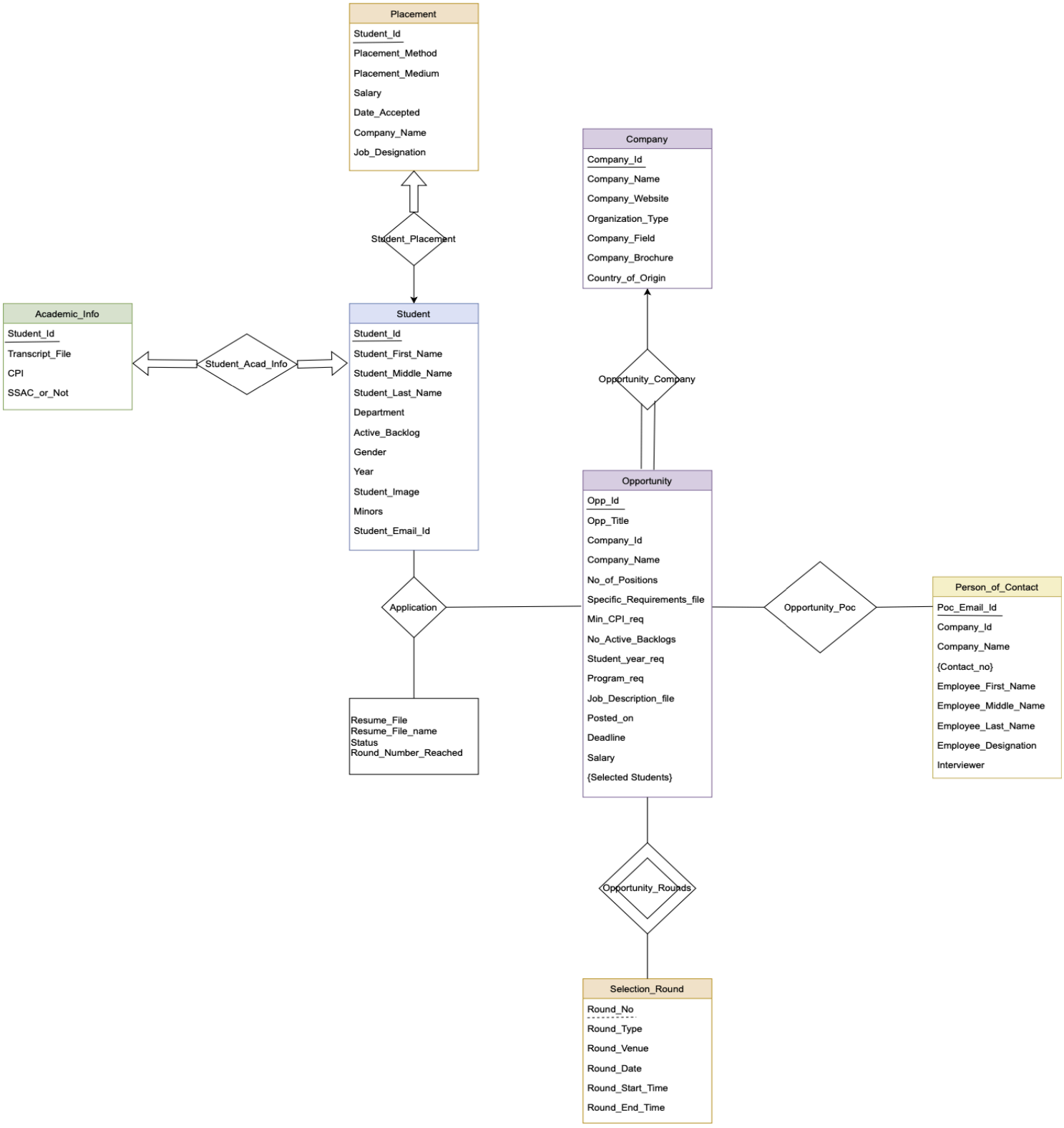
g) At least one of each (total & partial) participation constraint.

Our database has a total participation constraint between opportunity and company (from the opportunity side). We also have partial participation constraints between students and opportunities.

This is important because an opportunity has to be from some company; that is, an opportunity cannot exist in isolation hence, the relationship between opportunity and company should have total participation constraint from the opportunity side. It is important to have a partial participation constraint between the student and the opportunity because a student might decide not to apply for any opportunity; hence this relationship should have a partial participation constraint on the student side. Also, it can happen that for a particular opportunity, no student applies. Therefore, there is partial participation on the opportunity side.

2.2.2 ER diagram for our system

Links: PDF, ER diagram on Draw.io



2.3 Responsibility of G2:

1) Convert the ER Diagram into Relational schemas

- Student (Student_id, Student_first_name, Student_middle_name, Student_last_name, Department, Active_backlogs, Gender, Year, Student_image, Minors, Student_Email_Id)
- Academic_Info (Student_Id, Transcript_File, CPI, SSAC_or_Not)
- Company (Company_Id, Company_Name, Company_Website, Organization_Type, Company_field, Company_Broucher, Country_of_Origin)
- Opportunity (Opp_Id, Opp_Title, Company_Id, Company_Name, No_of_Positions, Specific_Requirements_file, Min_CPI_req, No_Active_Backlogs, Student_year_req, Program_req, Job_Description_file, Posted_on, Deadline, Salary, {Selected Students})
- Person_of_Contact (Poc_Email_Id, Company_Id, {Contact_no}, Employee_First_Name, Employee_Middle_Name, Employee_Last_Name, Employee_Designation, Interviewer, Company_Name)
- Placement (Student_Id, Placement_Method, Placement_Medium, Salary, Date_Accepted, Company_Name, Job_Designation)
- Selection_round (Round_No, Round_Type, Round_Venue, Round_Date, Round_Start_Time, Round_End_Time)

2) Your design should contain primary keys and foreign keys for the schemas.

The Primary and Foreign keys of the Schemas are as follows:-

- **Student**
  Student_Id - `PRIMARY_KEY`
- **Academic_Info**
  Student_Id - `PRIMARY_KEY`, `FOREIGN_KEY`
- **Company**
  Company_Id - `PRIMARY_KEY`

- **Opportunity**
  Opp_Id - PRIMARY_KEY
  Company_Id - FOREIGN_KEY

- **Person_of_Contact**
  Poc_Email_Id - PRIMARY_KEY
  Company_Id - FOREIGN_KEY

- **Placement**
  Student_Id - PRIMARY_KEY, FOREIGN_KEY

- **Selection_round**
  Round_No - PSUEDO_KEY

3) The constraints that your schema has as key constraints (such as PRIMARY KEY, FOREIGN KEY, NOT NULL, UNIQUE, DEFAULT, & CHECK) all should be listed and explained: "Why it is needed."

- **Student**
  Attributes:-
  Student_id, Student_First_Name, Student_Middle_Name, Student_Last_Name, Department, Active_backlogs, Gender, Year, Student_image, Minors, Student_Email_Id
  Constraints
  Student_Id - PRIMARY_KEY
  Student_first_name - NOT_NULL
  Student_Email_Id - UNIQUE

The Student_first_name is a NOT_NULL attribute, as whenever we make a student's entry, we must put some name of the student, hence compulsory. Also, the middle and last names can be NULL, as some students do not have any.
The Student Email ID is essential to the database as it is used for communicating with the student, and each student has a unique student ID provided by the institute.

- **Academic_Info**
  Attributes
  Student_Id, Transcript_File, CPI, SSAC_or_Not
  Constraints
  Student_Id - PRIMARY_KEY, FOREIGN_KEY

The Student_ID is a Foreign key, as the academic info must belong to a student of the institute/

- **Company**
  Attributes
  Company_Id, Company_Name, Company_Website, Organization_Type, Company_field, Company_Broucher, Country_of_Origin
  Constraints
  Company_Id - `PRIMARY_KEY`
  Company_Name - `NOT_NULL`

The Company_Name attribute must not be NULL, as it is essential for the company to declare it name while applying.

- **Opportunity**
  Attributes
  Opp_Id, Opp_Title, Company_Id, Company_Name, No_of_Positions, Specific_Requirements_file, Min_CPI_req, No_Active_Backlogs, Student_year_req, Program_req, Job_Description_file, Posted_on, Deadline, Salary, {Selected Students}
  Constraints
  Opp_Id - `PRIMARY_KEY`
  Company_Id - `FOREIGN_KEY`, `NOT_NULL`

Here, the Company_ID is a foreign key as it must be from the companies that have registered with CDS; also this column cannot be left empty, hence NOT_NULL

- **Person_of_Contact**
  Attributes
  Poc_Email_Id, Company_Id, {Contact_no}, Employee_First_Name, Employee_Middle_Name, Employee_Last_Name, Employee_Designation, Interviewer, Company_Name
  Constraints
  Poc_Email_Id - `PRIMARY_KEY`
  Employee_First_Name - `NOT_NULL`

Here, the Employee_first_name is NOT_NULL, as the employee has to declare their name when they have been allocated as a person of Contact. Furthermore, Company ID could have been a foreign key, as the person of contact may not be from any company but from some intermediary firm that takes the interviews, hence it is not put as a Foreign key.

- **Placement**
  Attributes
  Student_Id, Placement_Method, Placement_Medium, Salary, Date_Accepted, Company_Name, Job_Designation
  Constraints
  Student_Id - PRIMARY_KEY, FOREIGN_KEY
  Company_Name - NOT_NULL

The Student_ID is obviously a Foreign key, as it has to belong to a student from the institute. The Company name is NOT_NULL, as we require the name of the company to which the student has been placed.

- **Selection_round**
  Attributes
  Round_No, Round_Type, Round_Venue, Round_Date, Round_Star_Time, Round_End_Time
  Constraints
  Round_No - PSUEDO_KEY
  Resume_File_name -Default

Resume file name is default attribute as it can be taken from the Resume file that the student submits.

4) List all the mapping cardinalities.

- Student_Placement (Student_Id)
  One-to-one relationship
  Student_Id - `PRIMARY_KEY` (Student)
  Student_Id - `PRIMARY_KEY`, `FOREIGN_KEY` (Placement)

- Student Acad Info (Student_Id)
  One-to-one relationship
  Student_Id - `PRIMARY_KEY` (Student)
  Student_Id - `PRIMARY_KEY`, `FOREIGN_KEY` (Academic_Info)

- Application (Student_Id, Opp_Id, Resume_File, Resume_File_name, Status, Round_Number_Reached)
  Many-to-Many relationship
  Student_Id - `PRIMARY_KEY` (Student)
  Opp_Id - `PRIMARY_KEY` (Opportunity)

- Opportunity_Company (Company_Id, Opp_Id)
  One-to-Many relationship
  Company_Id - `PRIMARY_KEY` (Company), `FOREIGN_KEY` (Opportunity)
  Opp_Id - `PRIMARY_KEY` (Opportunity)

- CP_of_Opportunity (Opp_Id, Poc_Email_Id)
  Many-to-Many relationship
  Poc_Email_Id - `PRIMARY_KEY` (Person_of_Contact)
  Opp_Id - `PRIMARY_KEY` (Opportunity)
  Company_Id - `FOREIGN_KEY` (Person_of_Contact)

- Opportunity_Rounds (Opp_Id, Round_No, Round_Type, Round_Venue, Round_Date, Round_Start_Time, Round_End_Time)
  Many-to-Many relationship
  Opp_Id - `PRIMARY_KEY` (Opportunity)
  Round_No - `PSUEDO_KEY` (Selection_Round)

Contributions:

Name	Group	Roll Number	Contribution
Anugu Arun Reddy	G1	21110029	• Wrote the introduction section. • Brainstormed key requirements of the database. • Justified and gave examples for c-g points of the design requirements in question 2.2.1
Aditya Deshmukh	G1	21110014	• Interacted with stakeholders to grasp their requirements and understand their needs. • Contributed in suggesting entities, relationships, and attributes within the system.
Abhay Kumar Upparwal	G1	21110004	• Identified and outlined the potential impact of the database on organizational processes and efficiency. • Identified database stakeholders for comprehensive project understanding. • Brainstormed the required attributes.
Aaryan Darad	G1	21110001	• Interacted with Stakeholders from CDS and Recruiters to understand which aspects are important for building the Student-Recruiter database. • Came up with the right questions in order to ask the stakeholders which would be required in order to make the appropriate DBMS without missing it.
Gaurav Joshi	G2	21110065	• Discussion and brainstorming on the Enity, Relationships. • Making the ER Diagram in

			Draw.io
Adit Kaushik	G2	21110010	• Discussion and brainstorming on the Enity, Relationships. • Contributed to parts c-g points design requirements in question 2.2.1
More Rutwik	G2	21110133	• Converted the ER Diagram into Relational schemas. • Defined all constraints for attributes of the relational schema • Listed down all the mapping cardinalities of relational schema
Ahaan Giriya	G2	21110015	• Formatting the document • Contributed in converting the ER Diagram to Relational schemas • Helped in suggesting attributes, and relationships