Indian Institute of Technology Gandhinagar

CS 432: Databases

Assignment 1: Database Design and ER Diagrams

Outlet Database Management System

Team Members

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Under The Guidance Of

Prof. Mayank Singh

Responsibilities of Group 1:

01. What is your database for, what will be its impact, who are the stakeholders involved, and what is the functional requirement of your database? Along with these, any other information which is necessary for your database should be mentioned in the description. Answer within 200 words.

Answer:

Our outlet database management system is a database that stores information about the outlets which are currently present in the institute. The database will manage the outlets and contain all the other necessary information regarding the operation of the outlets. The database will include the outlet details such as its name, outlet ID, Contact details and many more attributes for the smooth run of the outlets.

Its impact is multifaceted, enhancing efficiency in inventory management, and facilitating finance tracking, warnings and penalties. The main stakeholders include the person who manages the outlet within the institution and is responsible for all the related work. We talked to some of the stakeholders for the information related to the database among them are:

Mr. Nakul - A student looking after the outlet management
Mr. Ramshingh - Caretaker.
Mr. Prasad Makhana - Campus development
Mr . Darshan Patel - Hostel management

To get a general knowledge about the working and management of the outlets within the campus.

The functional requirements look after storing outlet details (name, location, contact), inventory management (Item ID, name, price), personnel data (employee details, roles), stakeholders, customers, transaction records and survey details, contracts of the outlets etc.

The database's significance lies in empowering decision-making through comprehensive insights by taking regular surveys and feedback from the students. Regular surveys lead to the proper functioning of the outlets and if something is

found to be against the rules and advisory then warnings and penalties are to be given to the owners of the outlets through the stakeholders.
And also this will help the administration to continue with outlets or not for the welfare of students.

02. Mention the questions that you asked from the respective stakeholders or individuals. Write the names of the individuals with whom you have interacted.

Answer:

The questions we asked the PORs

1. Could you please tell us about the electricity bills, tax, rent, etc that the outlet owners pay? How are all these data stored and managed? How is the payment done and who manages all these?
2. How much of the profits generated by the outlet is provided to IITGN? Can this detail be provided to us or is it confidential?
3. Is it possible for you to handle all the information regarding the Google form feedback that you take from all the users regarding the feedback and complaints about the outlet? How frequently is this done?
4. Is there any record of how much area and space a particular outlet is taking into account? Is this valid information that will be helpful in any way for people using our website at the end? If not then let's skip it. But yes of course location in maps is a need
5. Do we have permission to go and collect details about the outlet's owner and availability?
6. What are the operating hours of every outlet here and how many working days and holidays do they take for every occasion?
7. We can also collect the staff working details (Number of staff and their availability and requirements if the recruitment process is going on) from the owner.
8. How often do temporary outlets set up by external people in the Ijokha hostel take place? We even see them taking feedback and also from the institute side, we see feedback being taken. So how is this feedback put into use? Can we get access to them, please?

9. If there are any newly upcoming outlets/someone from our IITGN community wants to set up a new stall as a part of their business, what is the procedure for it? If there is some data associated with ithow can this be useful to us as an attribute?
10. How often are the outlets maintained and serviced?
11. We have seen student-based outlets that are occasionally set on campus. Could you please give us some more information about it?
12. Inventory Management: Tracking inventory levels of products sold at the outlet or current stock available in the outlet.
13. We have seen that Soda and other fizzy drinks cannot be sold on campus. What other restrictions are posed?
14. How often is the survey (checking that everything is going perfectly alright) done? Who does all the surveys? What all is checked during a survey? If something is not good and against the ethics, how is the warning/ penalty provided?
15. What are some rules imposed on the outlets, are they issued any kind of notice if they do something wrong?
16. How much is the Penalty?

Responsibility of G1 and G2:

01. Entities and Attributes:

1. **Outlet:** with attributes (Outlet_ID, stakeholder_ID, Outlet_Name, Location_Name, Contact_No, Timings, Rating)
2. **Contract:** with attributes Contract (Contract_ID, Outlet_ID, Document_No, Start_Date, End_Date, Contract_Status)
3. **Inventory:** with attributes (Item_ID, Outlet_ID, Item_Name, Price)
4. **Employees:** with attributes (Employee_ID, Outlet_ID, Employee_Name, Role, Mobile_No, Shift_Time)
5. **Rent_payment**: with attributes (Payment_ID, Transaction_ID, Outlet_ID, Mode_of_Payment, Paid_Amount, Rent_From, Rent_To,Due _Amount)

6. **Customer_Feedback**: with attributes (Customer_ID, Outlet_ID, Customer_Email, Rating)
7. **Stakeholders:** with attributes (Stakeholder_ID, Stakeholder_Name, Email, Position, Entry_Date, Exit_Date)
8. **Survey:** with attributes (Survey_ID, Stakeholder_ID, Outlet_ID, Date_Of_Survey, Description, Penalty_Amount, Warning_Issued)

Relationships among the entity are listed below:

1. **Pay:** Relating outlet and Rent Payment
2. **Takes:** Relating survey and Stakeholders.
3. **Status:** Relation between survey and outlet.
4. **Having:** Relating Stakeholders and outlets.
5. **Gives:** Relating customer feedback and Outlet.
6. **Get:** Relation between the contract and outlet.
7. **Raw Material:** Relation between inventory and outlet.
8. **Manpower:** Relation between outlet and Employees.

02. Examples and justification for points c to g in Design Requirements:

Answer for c:
At least one primary key and one foreign key:

Outlet (Outlet_ID, Stackholder_ID, Outlet_Name, Location_Name, Contact_No, Timings, Rating)
PRIMARY KEY = Outlet_ID
FOREIGN KEY = Stakeholder_ID

Justification: Each outlet has a different Outlet_ID and that is a unique key. Stakeholder_ID is the primary key of the stakeholder entity and if we have taken Stakeholder_ID as an attribute of the outlet entity then that will be a foreign key for the Outlet entity set.

Answer for d:
At least one one-to-one relationship:

Get: This is a *one-to-one* relationship between the **outlet** and the **contract.** Each outlet is associated with only one contract and Each contract is associated with only one outlet.

Answer for e:
At least any/both of (one-to-many, many-to-one) relationships:

Man_Power: This is a *one-to-many* relationship between the **outlet** and the **employee.** In a particular outlet, many employees will work. However, an employee is working for only one particular outlet.

Pay: This is a *many-to-one* relationship between **Rent_payment** and **Outlet.** An Outlet can make multiple payments in a year.

Answer for f:
At least one many-to-many relationship:

Gives: This is a *many-to-many* relationship between **outlet** and **customer feedback.** A customer can give feedback to many outlets and each outlet has feedback from many customers.

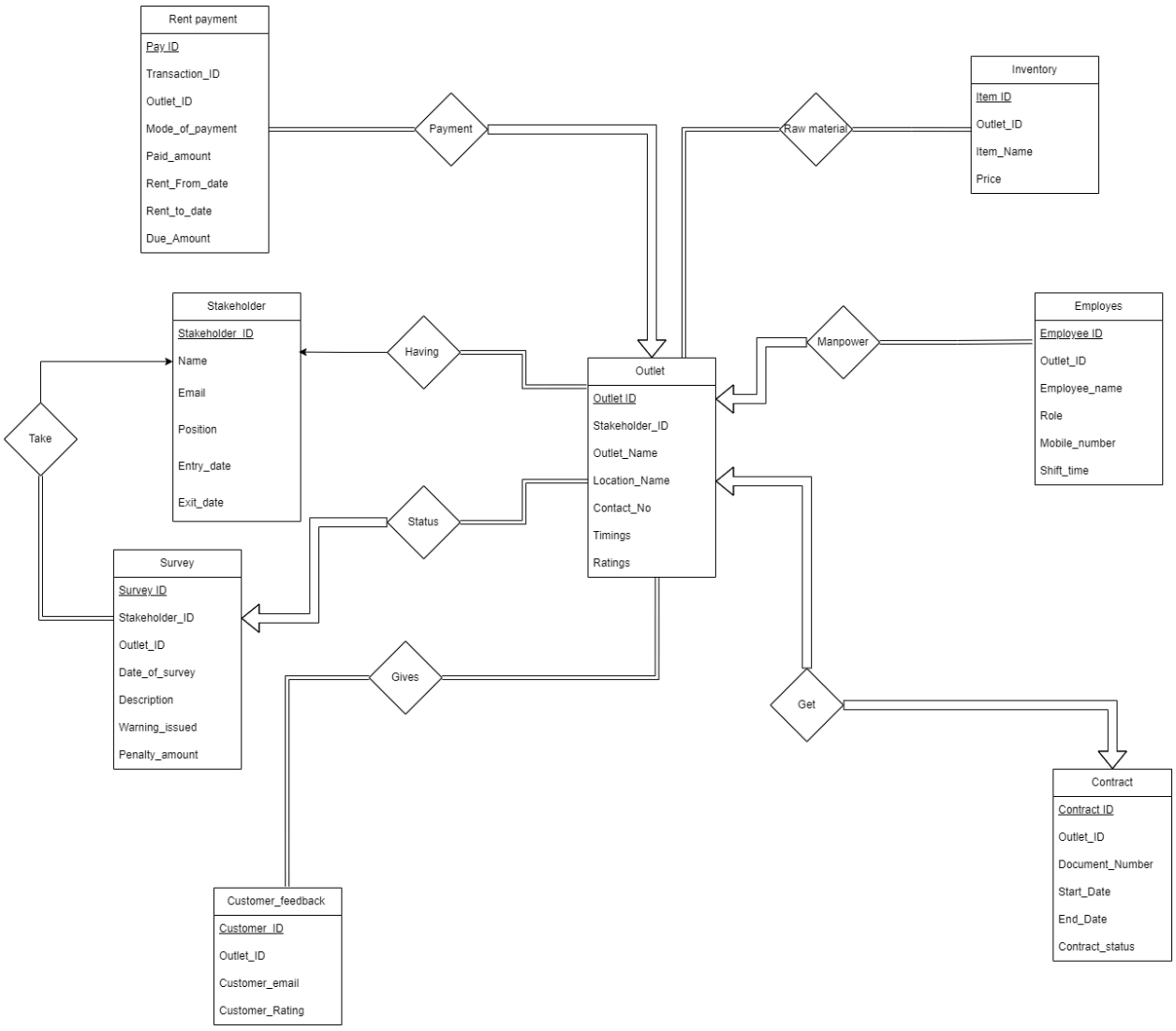
Answer for g:
At least one of each (total & partial) participation constraint:

Relation: Man_Power
Employee: **Total participation**
Outlet: **Total participation**
Each employee is working for at least one outlet and each outlet has at least one employee.

Relation: Having
Outlet: **Total participation**
Stakeholder: **Partial participation**
Not all stakeholders in charge of outlets. But, all outlets have a stakeholder.

ER diagram of the system using the software draw.io:

Link to the ER diagram:
ER diagram.drawio.png



Responsibility of G2:

Entities Relational Schemas:

- Outlet (Outlet_ID, Stakeholder_ID, Outlet_Name, Location_Name, Contact_No, Timings, Rating)

  PRIMARY KEY: Outlet_ID
  FOREIGN KEY: Stakeholder_ID
  Contact_No: Mobile_No: CHECK (< 1000000000 and >= 10000000000)

  Constraints:
  Outlet_Name: NOT NULL (Name of the outlet must be present to have well-organized database)
  Location_Name: NOT NULL (Every Outlet must have a temporary or permanent location)

- Contract (Contract_ID, Outlet_ID, Document_No, Start_Date, End_Date, Contract_Status)

  PRIMARY KEY: Contract_ID
  FOREIGN KEY: Outlet_ID

  Constraints:
  Document_No: NOT NULL (Document No must be present to have well-organized database)

- Inventory (Item_ID, Item_Name, Outlet_ID, Price)

  PRIMARY KEY: Item_ID
  FOREIGN Key: Outlet_ID

- Employees (Employee_ID, Employee_Name, Outlet_ID, Role, Mobile_No, Shift_Time)

  PRIMARY KEY: Employee_ID
  FOREIGN KEY: Outlet_ID

  Constraints:
  Employee_Name: NOT NULL (Name of the employee must be present to have well-organized database)
  Mobile_No: CHECK (< 1000000000 and >= 10000000000)

- Rent_Payment (Payment_ID, Transaction_ID, Outlet_ID, Mode_of_Payment, Paid_Amount, Rent_From, Rent_To, Due _Amount)

  PRIMARY KEY: Payment_ID
  FOREIGN KEY: Outlet_ID

  Constraints:
  Transaction_ID: UNIQUE (Every Transaction ID must be Unique)

- Customer_Feedback (Customer_ID, Outlet_ID, Customer_Email, Customer_Rating)

  PRIMARY KEY: Customer_ID
  FOREIGN KEY: Outlet_ID

  Constraints:
  Customer_Email: CHECK = NULL

- Stakeholders (Stakeholder_ID, Stakeholder_Name, Stakeholder_Email, Position, Entry_Date, Exit_Date)

  PRIMARY KEY: Stakeholder_ID

Constraints:
Stakeholder_Email: UNIQUE (Every Email ID is Unique)
Stakeholder_Name: NOT NULL (Name of the stakeholder must be present to have well-organized database)
Position: NOT NULL (Position must be present for every stakeholder to understand the hierarchy)

- Survey (Survey_ID, Stakeholder_ID, Outlet_ID, Date_Of_Survey, Description, Penalty_Amount, Warning_Issued)

  PRIMARY KEY: Survey_ID
  FOREIGN KEY: Outlet_ID, Stakeholder_ID

Relationship Sets Relationship schemas:

- Pay (Pay_ID, Outlet_ID, Payment_Status)
  Primary Key = Pay_ID
  Foreign Key = Outlet_ID

  Why is it needed?
  To establish an association between Outlet and Rent_Payment Entities77, to get the payment status of the outlet.

  Mapping Cardinality:
  An Outlet can make multiple payments in a year. Hence it is a **One-to-many Relationship.**
  Hence Pay_Id is the primary key, As Rent_Payment is on the Many side.

- Takes (Survey_id, Stakeholder_id)

  Primary Key = Survey_id
  Foreign Key = Stakeholder_id

Why is it needed?
To establish an association between the Stakeholder and the Survey, the Stakeholder will take surveys of the outlets.

Mapping cardinality:
A single stakeholder takes surveys of Multiple outlets, hence a **One-to-many relationship.** Hence Survey_id is the Primary Key.

- Status (Outlet_id, Survey_id, Remark)

Primary Key = Outlet_id
Foreign Key = Survey_id

Why is it needed?
To establish an association between the Survey and the Outlet, to keep track of whether the survey is done or not.

Mapping Cardinality: A single outlet can have multiple surveys. Hence **one-to-many relationship.** Hence Outlet_id is the Primary key.

- Having (Outlet_id, Stakeholder_id)

Primary Key = Outlet_id
Foreign Key = Stakeholder_id

Why is it needed?
To have an association between Outlet and the Stakeholder, who looks after that outlet.

Mapping Cardinality: A single stakeholder can have multiple outlets. Hence **One-to-Many Relationships** and Outlet_id is the primary key as it is on the Many side.

- Gives (Customer_ID, Outlet_id)

Primary Key = Customer_ID
Foreign Key = Outlet_ID

Why is it needed?
To have an association between Customer Feedback and Outlet.

Mapping Cardinality: A single customer can give feedback to many outlets, and an Outlet can receive feedback from many customers. Hence it is a **Many-to-many Relationship**.

- Get (Contract_ID, Outlet_ID)
  Primary Key = Contract_ID
  Foreign Key = Outlet_ID

  Why is it needed?
  To have an association between Outlet_ID and Contract_ID

  Mapping Cardinality: Every Outlet is associated with a unique contact number but not every outlet has the same contact number. Hence it is a **one-to-one relationship**.

- Raw material (Item_ID,Outlet_ID)
  Primary Key = Item_ID
  Foreign Key = Outlet_ID

  Why is it needed?
  To have an association between Item_ID and Outlet_ID

  Mapping Cardinality: Every Outlet can have multiple Inventories and also every Inventory can have multiple Outlets. Hence it is a **Many-to-many relationship**.

- Manpower(Outlet_ID, Employee_ID)

Primary Key = Employee_ID
Foreign Key = Outlet_ID

Why is it needed?
To have an association between Employees and Outlet_ID

Mapping Cardinality: In a particular outlet, many employees will work. However, an employee is working for only one particular outlet. Hence it is a **one-to-many relationship.**

Contribution details by each group member:

DHARAVATH MAHESH(22110073): Group(G2)

- Leading the team Listing all entities, relationships, and attributes involved in your system
- Ideated the need for entities, relationships, and attributes to conceptual that E R Diagram for the project
- contributions in the documentation
- Brainstormed and built a sketch of ER diagram, and relationship sets.
- contributions to the reduction of ER diagrams into relational schemas

SHUBHAM KSHIRSAGAR : Group(G2)

- Leading the team, Brainstormed together about the requirements of the Outlet Management System.
- Got the contacts from the senators and Welfare secretary.
- Conception and Reduction of the ER Diagram, Converting the Relationship Sets into its Schema, and Identifying Primary and Foreign Keys.
- Helped in Mapping Cardinality and Participation Constraints.

MALLEPOGULA CHARAN TEJA(22110136): Group(G2)

- Brainstormed the entity, attributes, and relations in the ER diagram
- Helped in finding participation constraints
- Written answers for c to g points
- Found the cardinality of various entities and given appropriate justification
- Helped in the drawing of the ER diagram

SHIPRA KETHWALIA(23210091): Group(G2)

- Conceptualization of Entity sets and attributes.
- Brainstormed and built a sketch of ER diagrams, and relationship sets.
- Converting ER diagram into Relational schemas.
- Worked on deciding primary and foreign keys for all entity sets and relationship sets.
- Inferring the mapping cardinalities and the participation constraints among the relationship sets.

Harsh Kumar Keshri (22110094): Group(G1)

- Collating data from the stakeholders and ideating with them about the use case of the database
- Helping in the documentation for assignment
- Formulated for answer -1 in group (G1)
- Brainstormed to identify the entities and attributes

Krish Raj (20110160): Group(G1)

- Arranging meetings with stakeholders and collating data from stakeholders.
- Helping in identifying and listing all entities, relationships, and attributes.
- Worked on deciding primary and foreign keys for entity sets.
- Helping in the documentation for assignment

Susmita (22110265) : Group(G1)

- Making the questions that you asked from the respective stakeholders or individuals
- Brainstormed to identify the entities and attributes
- Worked on designing the ER diagram on draw.io
- Helped in Mapping Cardinality and Participation Constraints

Yajurveda Bodala (19110077) : Group(G1)

- Collating data from the stakeholders and ideating with them about the use case of the database
- Helping in the documentation for assignment
- Brainstormed to identify the entities and attributes

Reference:

1. **http://draw.io**
2. **https://www.octawian.ro/fisiere/situri/asor/build/html/_downloads/1fcab53a6d916e39c715fc20a9a9c2a8/Silberschatz_A_databases_6th_ed.pdf**