Project phase 1 - Conceptual Modeling

Travel Reimbursement- Group-6

A summarization of the domain and the requirements that your conceptual model is designed for

The conceptual model for travel reimbursement at the University of Kentucky is designed to facilitate efficient payments to both employees and non-employees. This system enables travelers to submit travel-related documents to departmental administrators for authorization. Departmental budget officers then manage fund allocation and audit payments based on policies and regulations set by the University's Financial Services. The process ensures that payments are processed and reimbursed to travelers efficiently, streamlining the reimbursement process. Key aspects of the system include:

- **Travel Authorization**: Prior to travel, authorization forms must be filled out and approved [1].

- **Expense Reporting**: Travelers submit expense reports, including receipts, for reimbursement.

- **Payment Processing**: Departmental budget officers manage fund allocation and audit payments.

- **Reimbursement**: Payments are processed and reimbursed to travelers.

A clear and concise narrative description of your entity classes, relationships, and attributes

Narrative Description - Travel Reimbursement

- **Traveler :**
  - Every traveler has a TravelID, Name, Email, SSN. It is further disjointed into the type of traveler- Student or Employee, wherein student has the attribute *Degree type*, signifying the level of education(Bachelors, masters etc) and the year of the course he/she is in and employee has the attribute *position* which tells us the designation of the employee.
  - Each traveler is uniquely identified by their TravelID.
- **Reimbursement:**
  - Each traveler requests for a reimbursement from the **Reimbursement entity(One-to-One)**. Reimbursement entity gathers the following data of the traveler: Travel ID, Amount and the travel documents.
  - The Reimbursement entity is a weak entity, since it takes the primary key ,Travel lD, of theTraveler entity and also because, without the traveler there is no reimbursement. There is a total participation of the reimbursement entity.

- The **Department Administrator** having the name, UIN and Travel ID information, performs the auditing of the proposed request(**One-to-Many**). The reimbursement process is taken ahead after the traveler is deemed compliant.
- The **Department of Budgeting office** has Department ID, location, Travel ID, and budget allocation as its attributes. This entity approves the reimbursement (**One-to-Many**) after verifying the policies(**One-to-Many**) associated with it.
- **Policies** consist of ID, Name and Description. This entity is managed by (**One-to-Many**) the University Financial Services entity.
- **University Financial services :** includes Travel ID, Transaction type, beneficiary account number, and Officer to overlook the processes. This entity finally reimburses (**One-to-Many**) the expense to any traveler claiming the reimbursement.

A discussion of important controversies that arose in your design and how you made your decisions

Controversies/ Main conflicts:

- **Identifying whether travel vendor is an entity or not**
  Solution- Travel vendors are agents through which the traveler books tickets. However, since they have no further role in the reimbursement process, it was determined that the Travel Vendor does not need to be a separate entity.

- **Trying to identify primary keys of each entity especially traveler entity**
  Solution- The Traveler entity had multiple potential candidate keys, such as UIN, SSN, or email, that could serve as primary keys. However, since one traveler can make multiple trips and claim numerous reimbursements. Using SSN or UIN as the primary key would prevent tracking specific reimbursements. Therefore, we decided to generate a unique Travel ID as the primary key for travelers, ensuring it acts as a distinct primary element.

- **Deciding whether policy entity is weak or strong**
  Solution- The Policy entity was initially considered weak, as it lacked its own primary key and depended on the University of Financial Services. However, since multiple policies can exist for different categories, such as air travel policies, accommodation policies, etc., we decided to introduce a primary key, Policy ID, for the Policy entity. This allows for the independent identification of each policy, regardless of its relationship with the University of Financial Services.

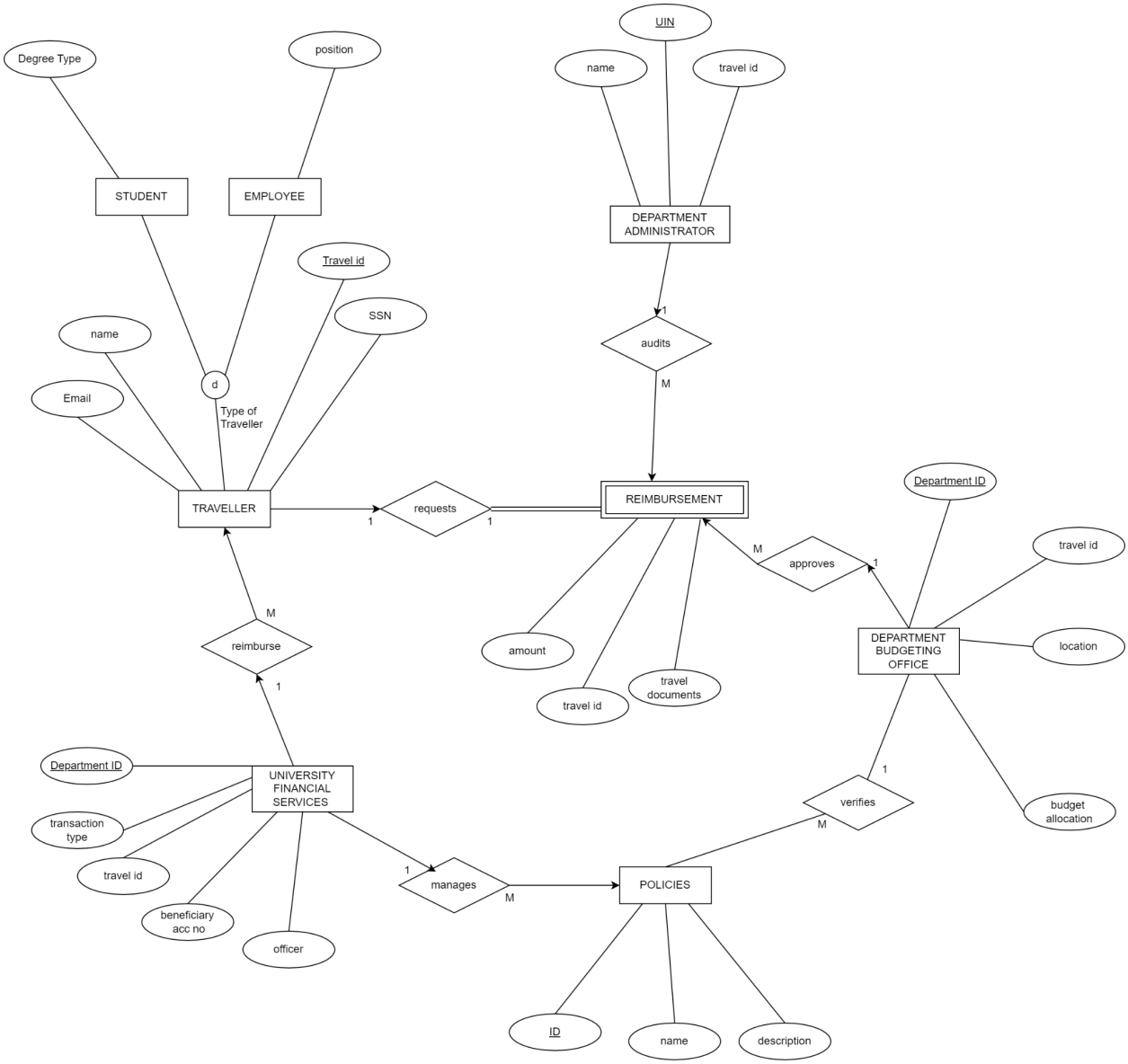
- **Deciding which entity is responsible for reimbursement**
  Solution- A confusion emerged regarding which department would be responsible for processing reimbursements. To resolve this, we created a real-life scenario where one of us would be receiving reimbursement. This exercise led us to realize that, in any

organization, reimbursements are typically processed by the payroll department, which, in our use case, corresponds to University Financial Services.

- **Identifying the hidden entity which resolves the issue of more than two relations between entities**
  Solution - To resolve this, we introduced an additional entity called Reimbursement. We then directed the Traveler to this entity for submitting reimbursement requests, which subsequently got approved. This design change eliminated the multiple relationships previously existing between Traveler, Department Administrator, and Department Budget Officer.

Group Member Contributions:

- All the group members were actively involved in identification of entities, relationships and their attributes.
- The E-R diagram on canvas was drawn by Vraj.
- Srivalli worked on creating a report on all the entities, their various relationships with each other and the attributes which were decided.
- Emmima created a report on domain and requirement analysis of our given use case along with how that maps to the ER diagram we created.
- Vasistha worked on creating a report on the various discussions and conflicts which arose during the time of identification of entities or relationships or attributes.


Degree Type
position
STUDENT
EMPLOYEE
UIN
name
travel id
DEPARTMENT ADMINISTRATOR
Travel id
SSN
name
Email
d
Type of Traveller
audits
1
M
TRAVELLER
requests
1
1
REIMBURSEMENT
Department ID
travel id
M
approves
1
reimburse
M
1
amount
travel id
travel documents
DEPARTMENT BUDGETING OFFICE
location
Department ID
UNIVERSITY FINANCIAL SERVICES
transaction type
travel id
beneficiary acc no
officer
1
manages
M
POLICIES
verifies
1
M
budget allocation
ID
name
description