



B.TECH. (CSE)

V SEMESTER

UE19CS301 – DATABASE MANAGEMENT SYSTEM
ER DIAGRAM FOR AIRLINE RESERVATION SYSTEM

TEAM NO: 13

TOPIC: AIRLINE RESERVATION SYSTEM

SUBMITTED BY

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PROBLEM STATEMENT:

Day by day, IT is becoming an important part of our life. The way we manage our travel is no longer the same. Considering the impact of IT on Airline Reservation Systems, we present one of the most practical scenarios of Airline Reservation System where users tend to book their tickets nowadays.

We start with the airport. **Airport** is an independent entity, which is uniquely identified by a **code with address** as an important attribute. Address contains different attributes under it; we make this as a composite attribute. Similarly we will define the primary attributes and other attributes for different entities in the report subsequently. We will lay more stress on the relationships.

Now we move to **airline**. We uniquely **identify the plane and assume that a plane has an access to the airport or not**. First we thought of giving the access to Airline Company but practically, it is a very strict criterion. Sometimes planes might be landed on an airport because of emergency landing or other issues and because the company is not allowed, it might lead to a disaster. So we limit it to a plane. If we give access to a company, we are giving the access to all the planes of that company. So we state our first assumption:

1) The **access to an airport is dependent on the airplane and not the airline company**. An airport can give access to multiple planes and a plane can have access to multiple airports.

Moving to Airline Company, **every company owns multiple planes and every plane must belong to a company**. We assume that every airplane belongs to a company and needs to be classified like that for properly managing the data. Even the private jets and chartered flights belong to some company.

So we state our second assumption:

2) **Every plane must belong to an airline company**. So a full participation of plane is justified. A company can have multiple planes but a plane must belong to one company. A plane cannot be shared across multiple companies as this scenario is very rarely observed. Users should have the freedom to choose the company and each airplane must belong to a unique company.

Seat in a plane is the basic element of ticket reservation. The mode of travel is airplane. So we assume **every seat belongs to an airplane**.

Otherwise there might be some other mode of travel, which can have seats. But as we strictly provide air travel services to our customers using this database, each seat belongs to a plane and a plane can have multiple seats. Its number and the airline number can define each seat. The reason is that different airlines can have same seat

numbers. So only a combination of seat number and the plane number can define a seat uniquely.

So we state our third assumption:

3) Each seat belongs to a plane and plane has multiple seats. Without a plane, seat cannot exist. Seat is a dependent attribute (plane). We introduce an entity called **traveller who occupies the seat**. Please note that it is not the user because **a user can be agent or anybody booking the tickets on behalf of the traveller**. A traveller is a person for whom the ticket has been booked and he is travelling in a flight trip. Hence he will occupy a seat.

So we state our next assumption:

4) Each traveller must have a seat. However, seats can be empty so its not necessary that every seat belongs to a traveller but the opposite is possible. So a full participation of traveller is justified. Before understanding the definition of a flight trip, let's understand what a hop is. A travel from A to C can be via B. So we define a **hop as a travel between a take-off and immediate next landing**. So this trip has two hops: A-B and B-C. **Each hop has a ID** and is not dependent on that trip because we do not know if this hop belongs to multiple journeys or not. Some traveller may be traveling from B-C in the same plane at the same time but his journey might be B-C-D. So each hop has a unique ID (with a take-off and landing airport). Every hop **must have a departure airport, arrival airport and a plane**. These are the elements, which define a hop.

To be more pragmatic, these airports, plane and timestamp will define a hop but this will involve too many attributes as a part of PK. So we define a hop ID. Please note that it has a base fare also, which will be used subsequently.

So we assume:

5) **A unique hop can belong to multiple trips and a trip can have multiple hops**. Every hop has a departure airport, arrival airport and a plane. Now, a flight trip is a journey with all possible details against traveller(s) (with multiple hops). It is like a transaction but a transaction contains many more details, which we are not including because of complexities and this may get out of context, as it will involve banks and intermediate merchants. This is where our database gives the flexibility of expansion. We can further link the airline reservation system with other systems and then make a complete, more complex system. **Each flight trip has a fare and obviously, a fare cannot be defined without a flight trip**. Each trip can have multiple hops and a hop has a base fare. **When a user books a flight trip, the total fare can be calculated as the sum of the fares of all the hop-fares minus discount**.

Now as all travellers are defined against a trip, no traveller can exist without a trip.

So:

6) **Traveller and fare cannot exist without a trip and a trip has one fare and multiple travellers** (depending on for how many travellers, the user books). Finally, the **user is the one who is booking the trip and has a unique id**. He can book as many flight trips he wants (agent) for as many travellers.

User can be of three types:

a) Agent: Usually books for multiple travellers regularly.

b) Traveller: Usually books for himself or at most family/friends.

c) Airline agent: Can be found at company counter usually at the airport.

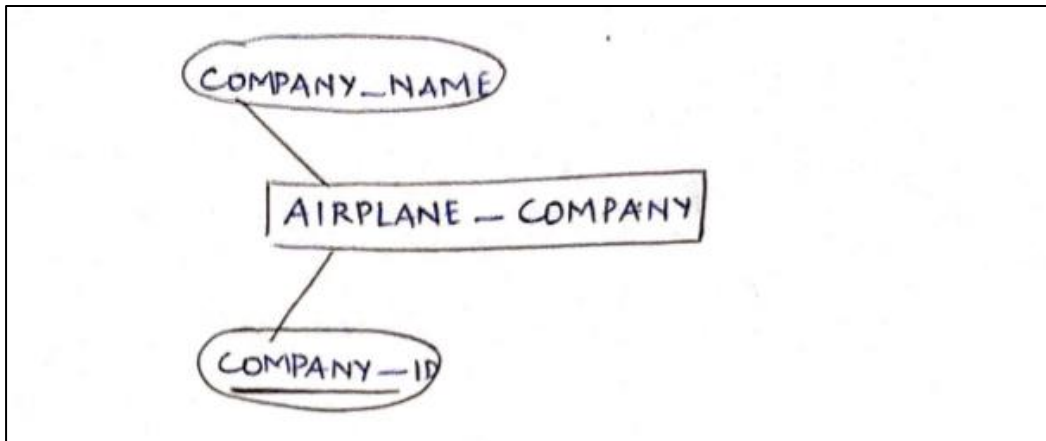
Following assumption arises:

7) A user books tickets for multiple travellers and is an independent entity unlike traveller.

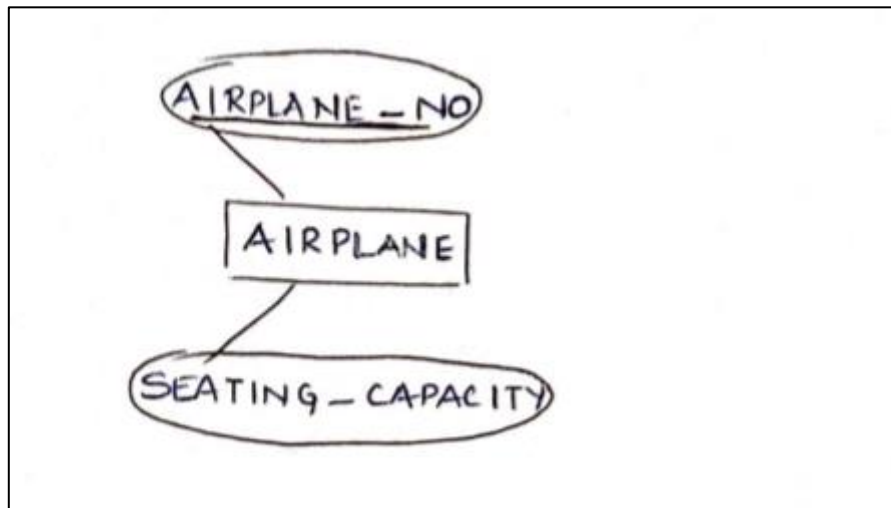
VARIOUS STAGES OF ER DIAGRAMS USING PEN AND PAPER

- STRONG ENTITIES

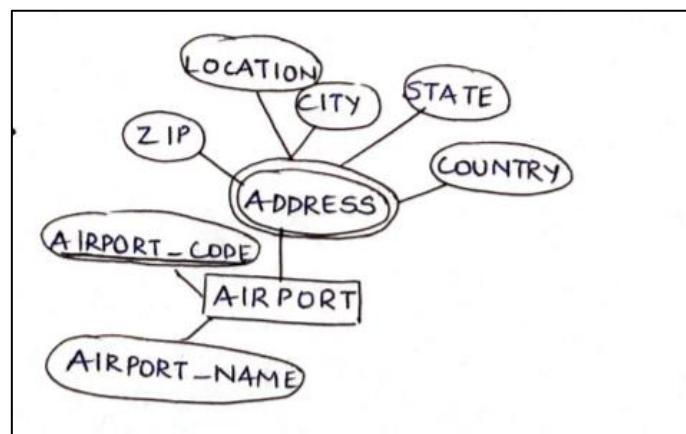
1. AIRLINE_COMPANY ENTITY



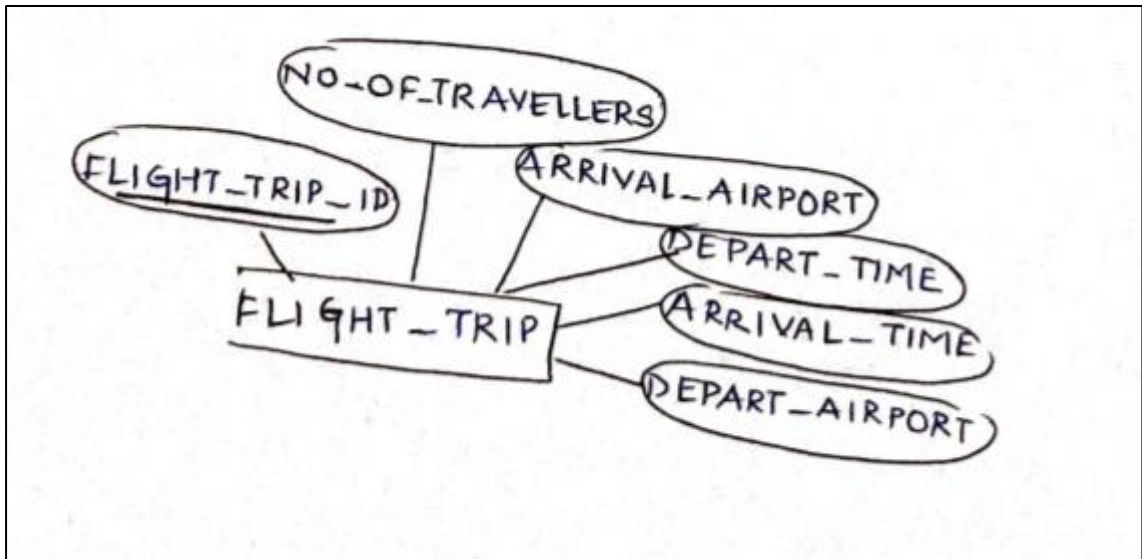
2. AIRPLANE ENTITY



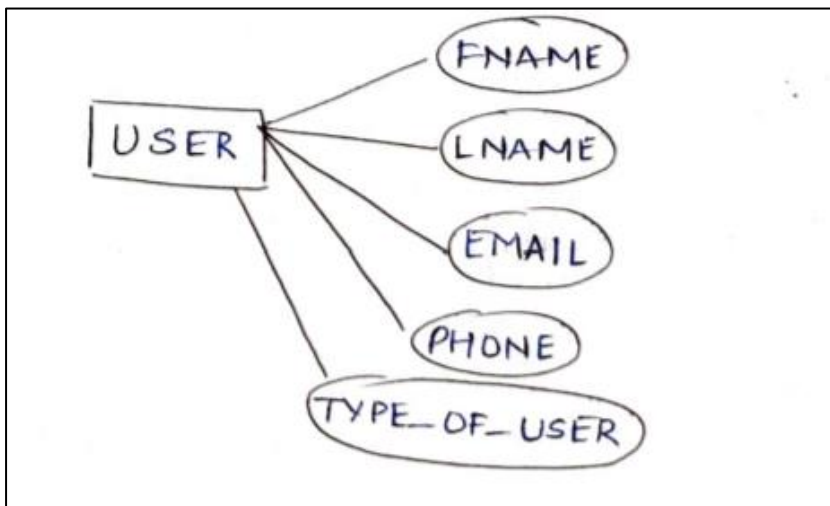
3. AIRPORT ENTITY



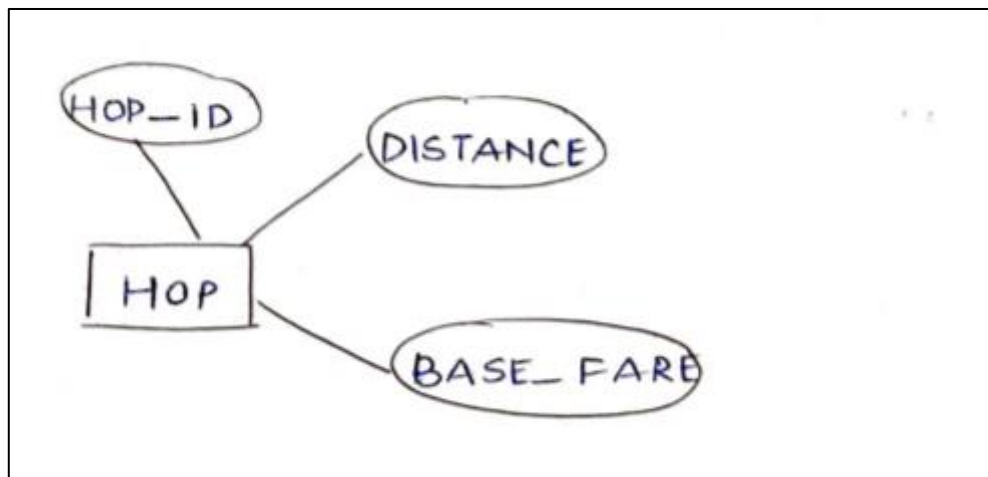
4. FLIGHT TRIP ENTITY



5. USER ENTITY

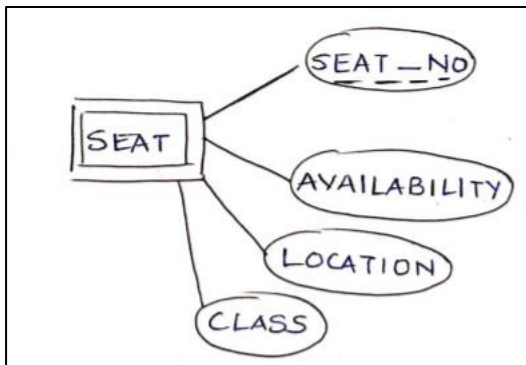


6. HOP ENTITY

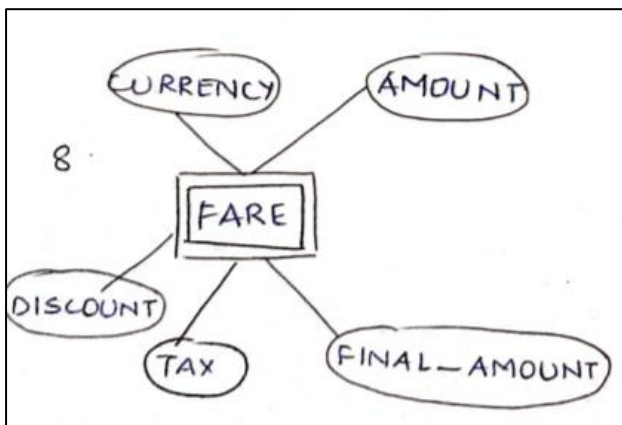


- WEAK ENTITIES

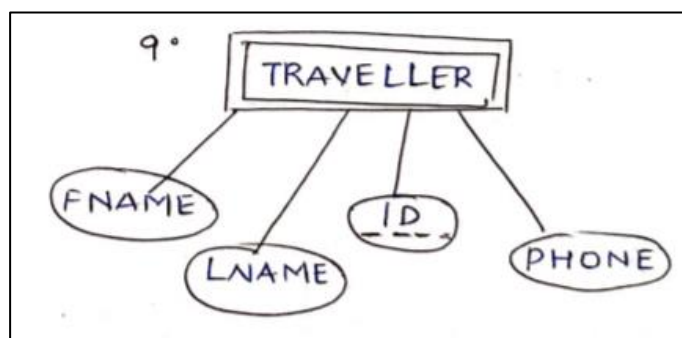
7. SEAT ENTITY



8. FARE ENTITY



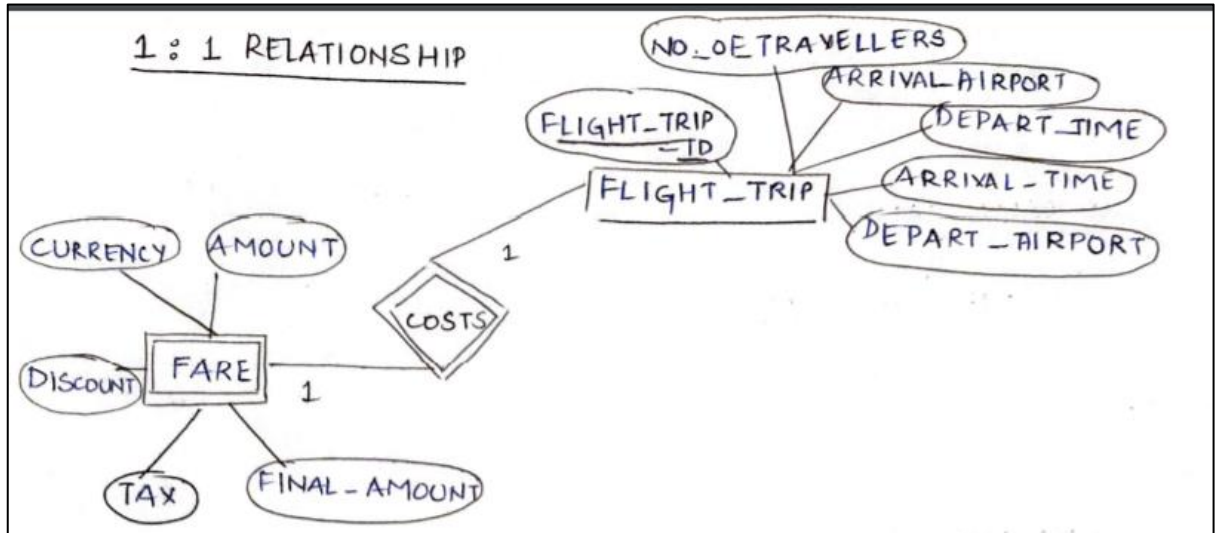
9. TRAVELLER ENTITY



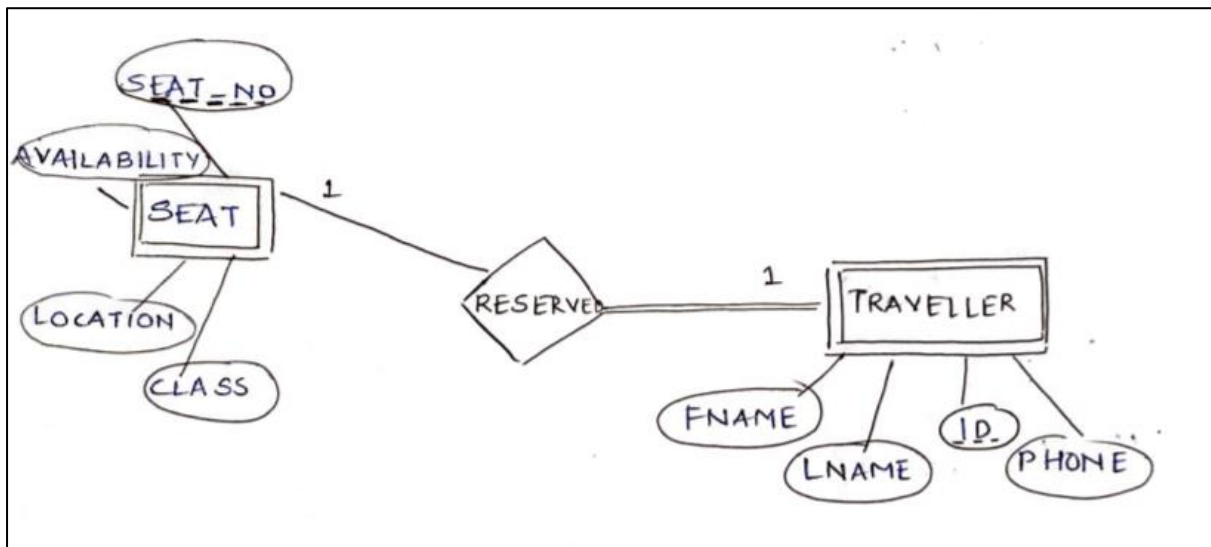
- RELATIONSHIPS

1. 1:1 RELATIONSHIP

- A. COSTS (IDENTIFYING RELATIONSHIP)

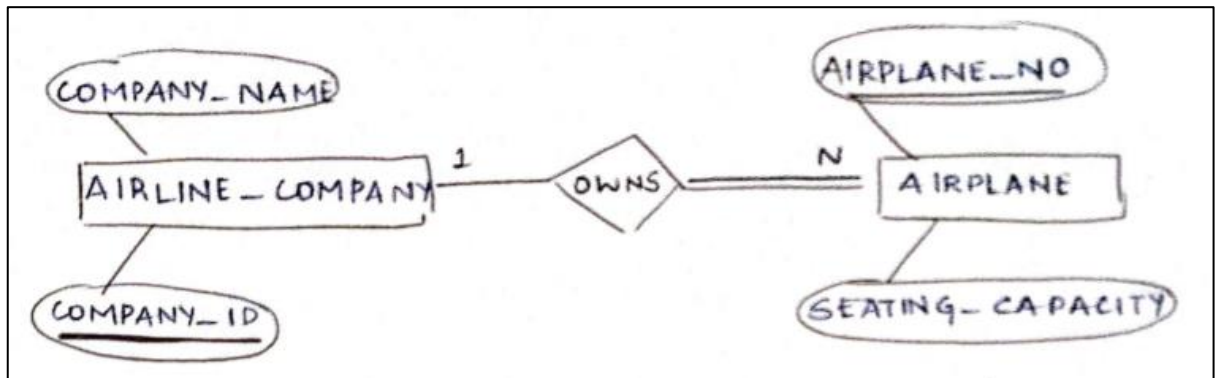


- B. RESERVED

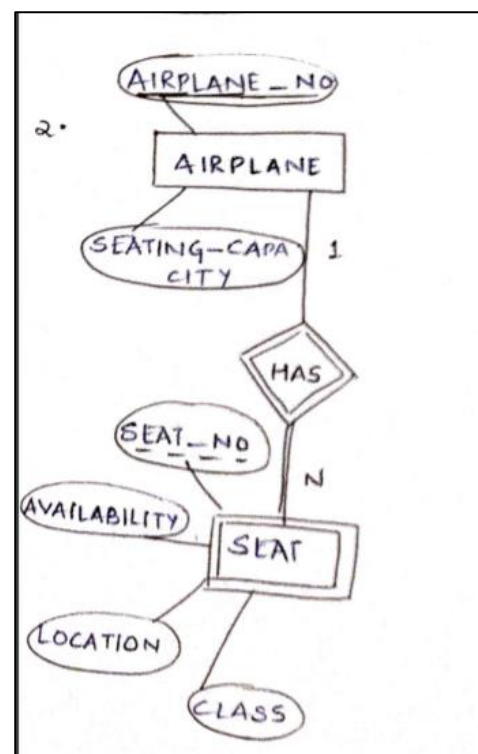


2. 1:N RELATIONSHIP

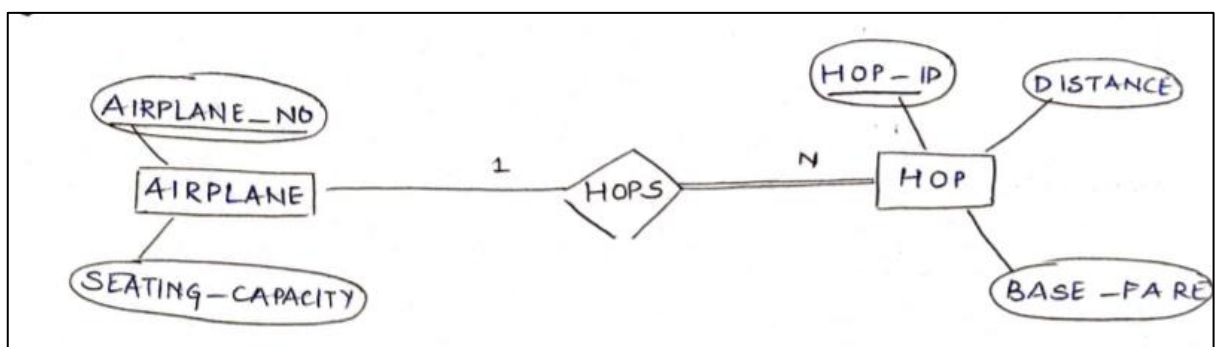
A. OWNS



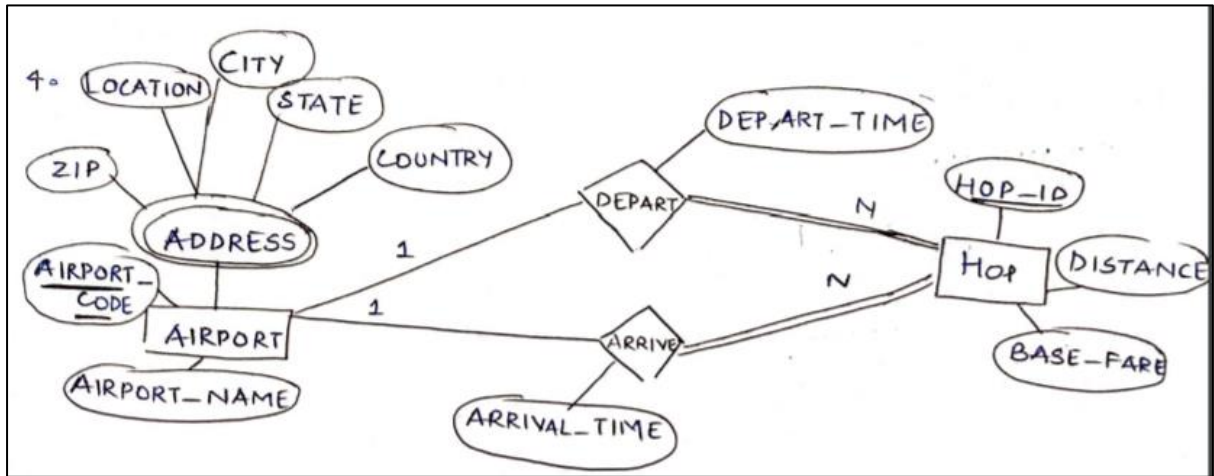
B. HAS (IDENTIFYING RELATIONSHIP)



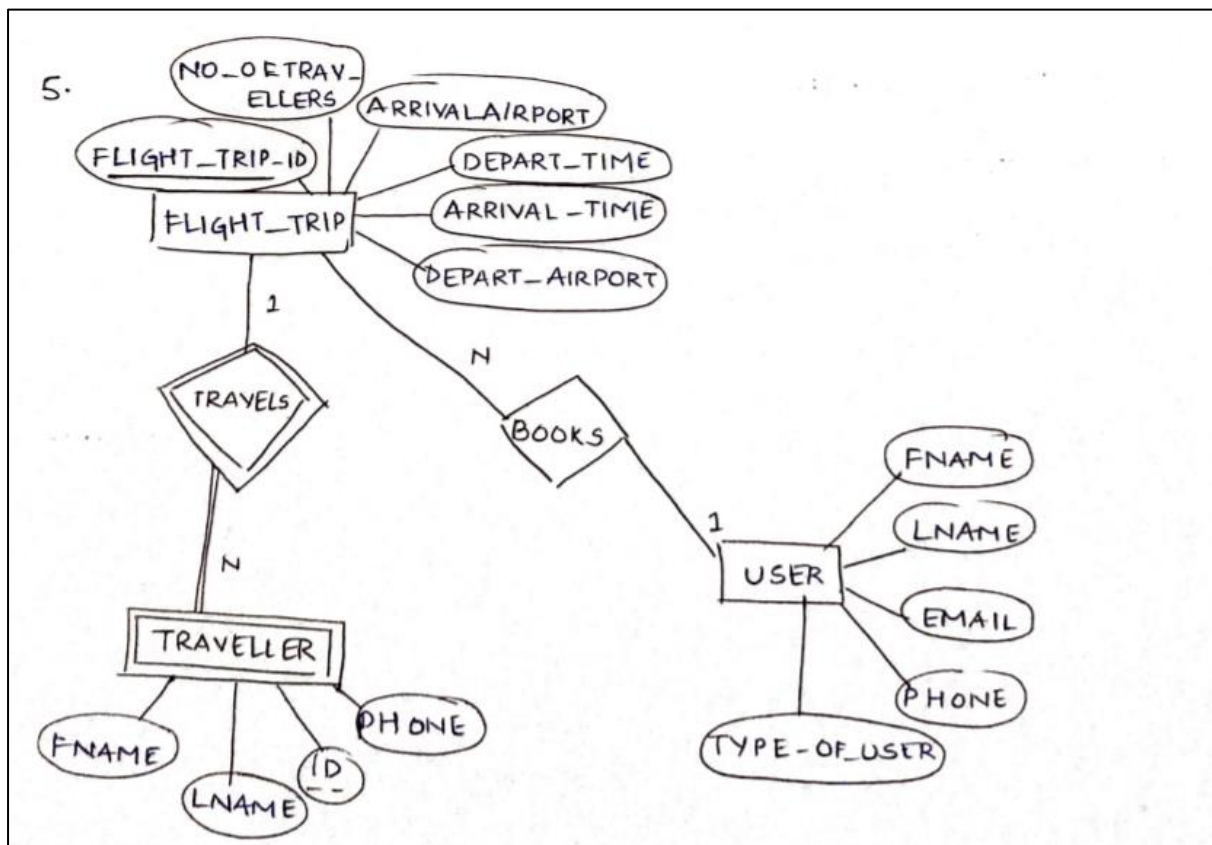
C. HOPS



D. ARRIVE AND DEPART

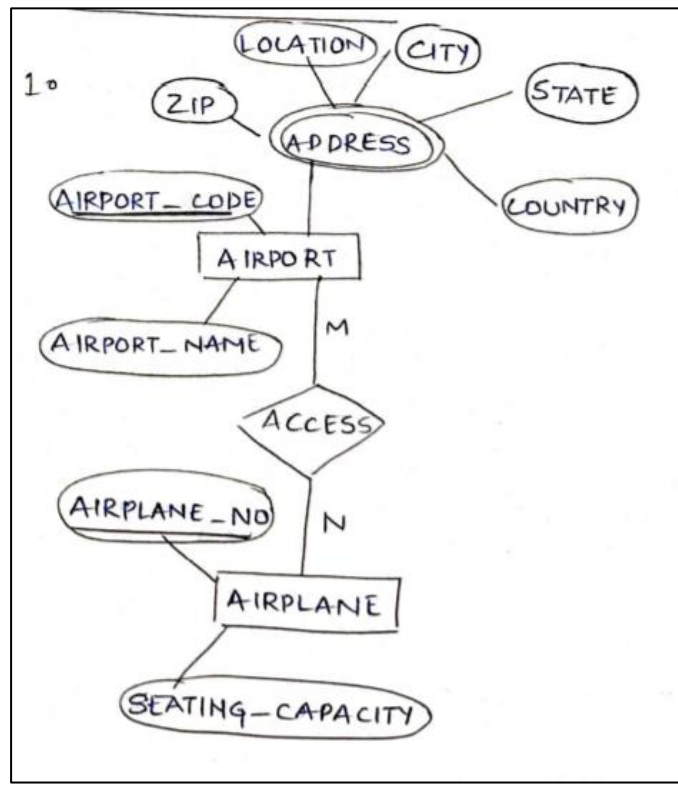


E. BOOKS AND TRAVELS (IDENTIFYING RELATIONSHIP)

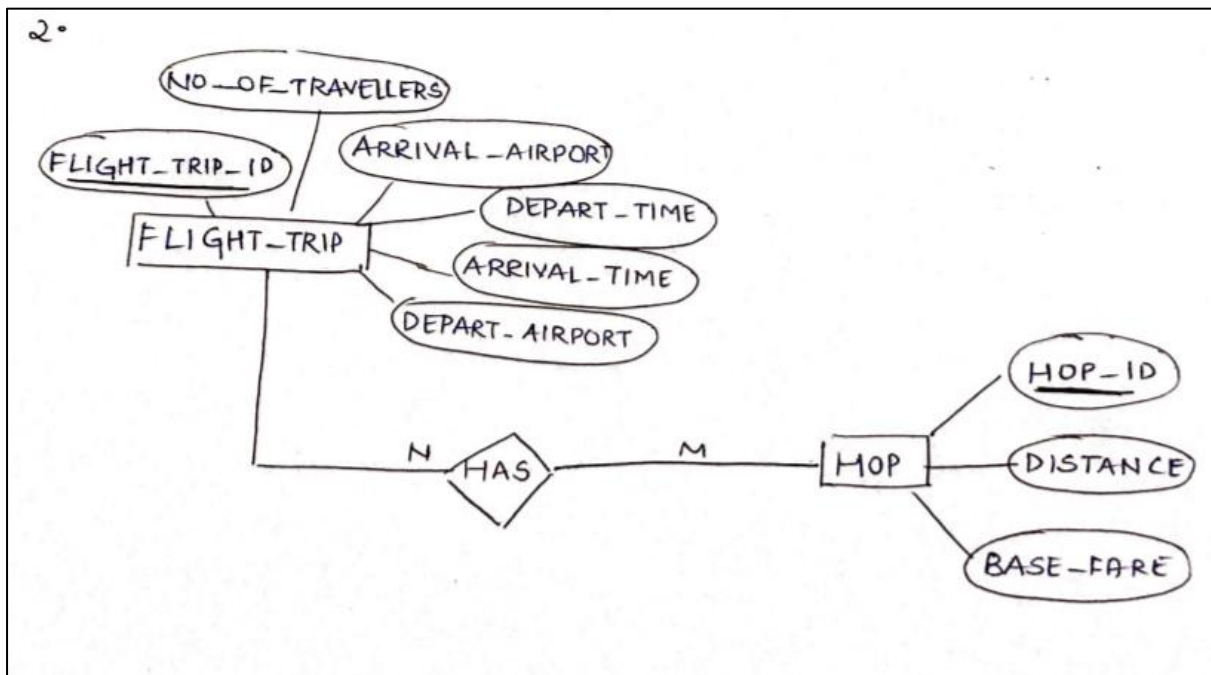


3. M:N RELATIONSHIP

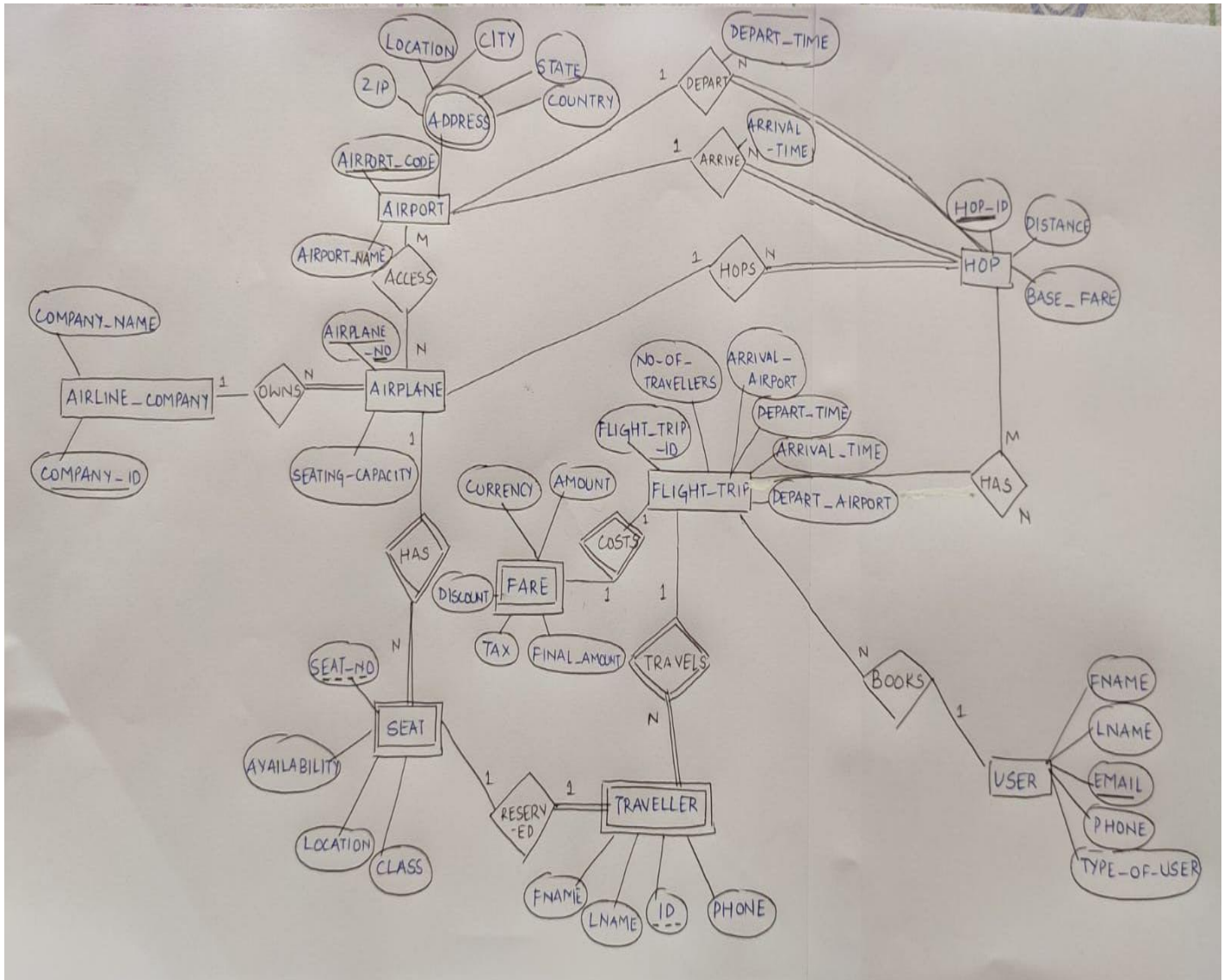
A. ACCESS



B. HAS



COMPLETE ER DIAGRAM OF AIRLINE RESERVATION SYSTEM



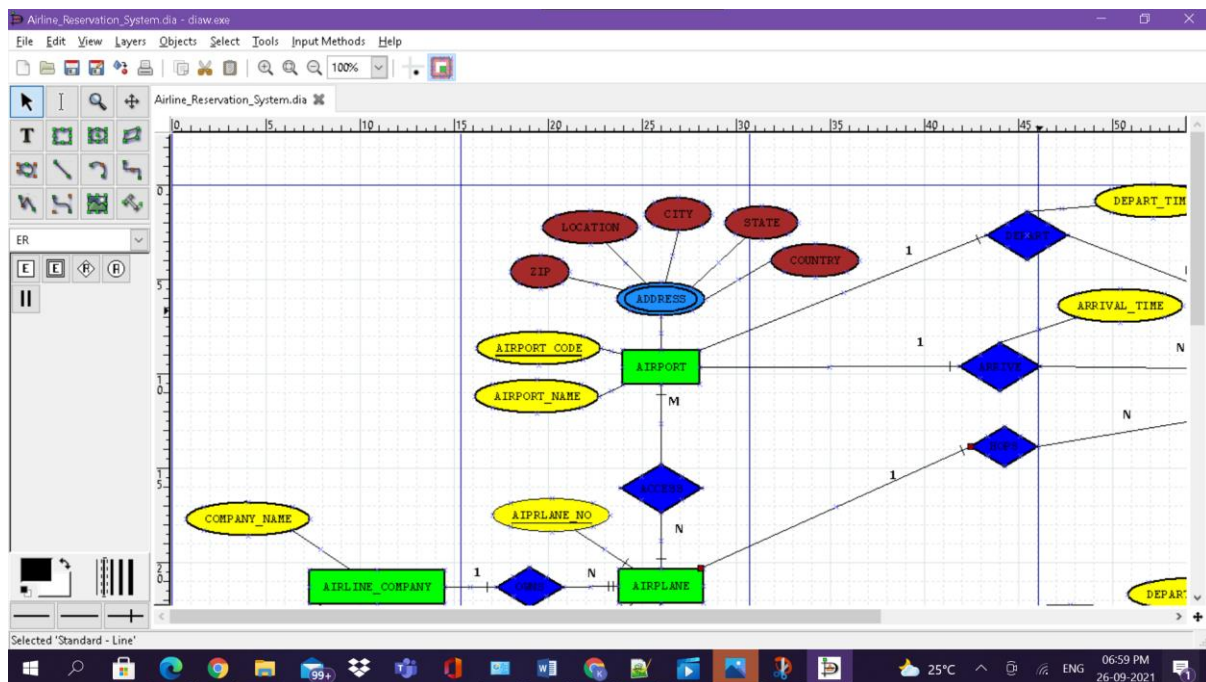
ER DIAGRAM USING DIA DIAGRAM(ER TOOL):

Dia Diagram is a free open source software used for creating technical diagrams (like UML diagram, flowcharts, class diagram, er diagram etc.). We choose this tool because it is easy to use. Compatible with windows , MacOS, Linux. It provides all the tools required to make an entity relationship model. It provides drag and drop of the various shapes with properties like making a weak entity, key attribute, adding colour, changing font size etc. Provides the capability of importing and exporting it to various file formats like png, svg etc.

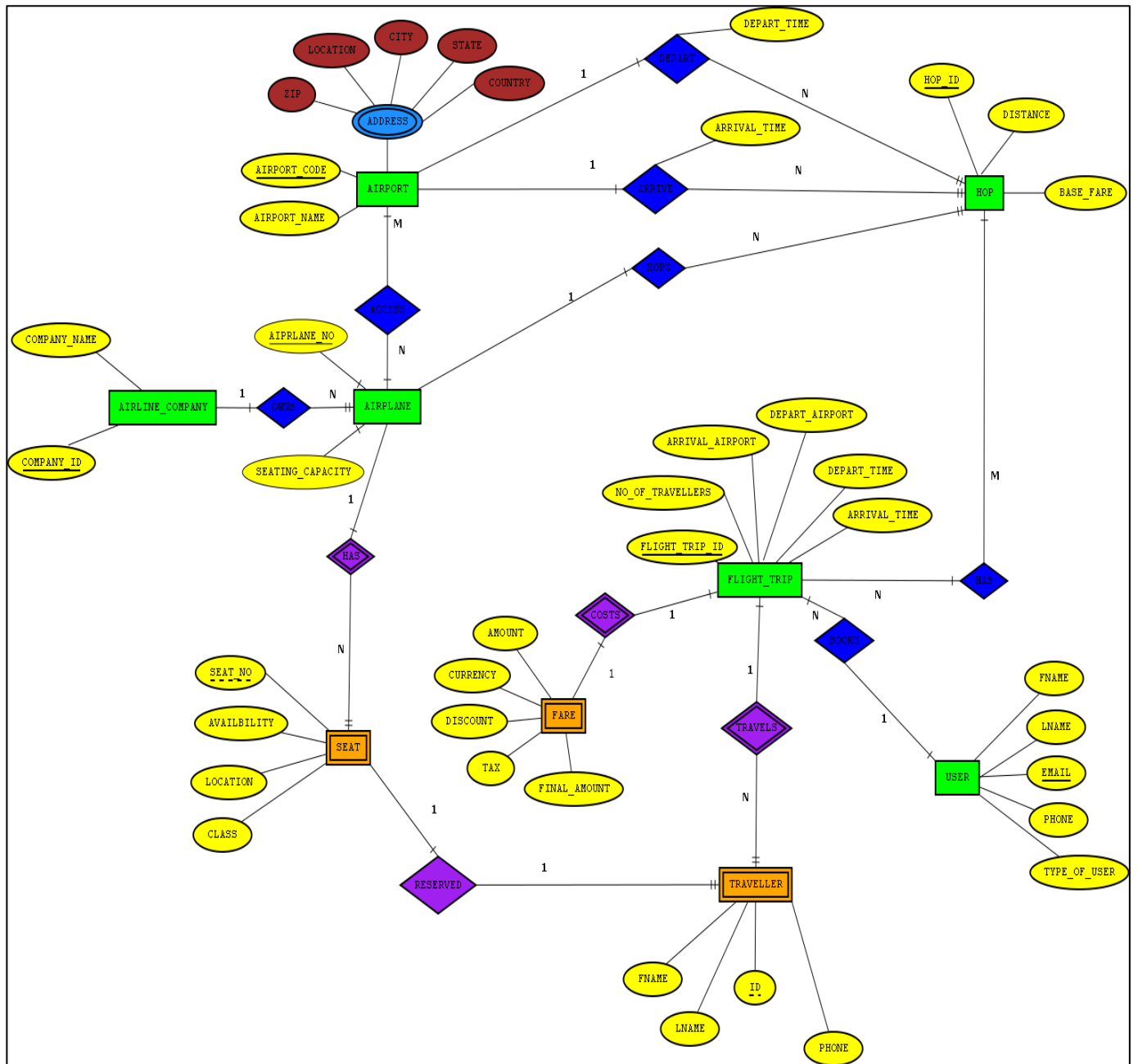
Installation Link for the given software:

<https://sourceforge.net/projects/dia-installer/>

VIEW OF IDE OF DIA DIAGRAM SOFTWARE



ER DIAGRAM OF AIRLINE RESERATION SYSYTEM USING DIA DIAGRAM



CONTRIBUTIONS:

- **Problem Statement->**
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