

Breaking down our ER Model according to steps:

1) Strong Entities

1. **payment_information**(credit_card_number, security_key, expiration_date, credit_provider)
2. **address**(street_number, street_name, apt_number, city, state, zip_code, country)
3. **customer**(email_address, first_name, middle_name, last_name, date_of_birth)
4. **booking**(booking_id, total_cost)
5. **mileage_account**(mileage_number, mile_count)
6. **airline**(airline_code, name, country_of_origin)
7. **airport**(IATA, name, country, state)
8. **flight**(flight_number, miles)

2) Weak Entities

1. **flight_instance**(departure_date_and_time, arrival_date_and_time, flight_number, max_1st_class_seats, max_economy_seats, cost_for_1st_class, cost_for_economy)

flight_number is foreign key to flight ***this attribute has to be NOT NULL

3) 1-to-1 relationships

1. There are none

4) One-to-many relationships

1. **flight_instance**(departure_date_and_time, arrival_date_and_time, flight_number, max_1st_class_seats, max_economy_seats, cost_for_1st_class, cost_for_economy)
 - flight_number is foreign key to flight ***this attribute has to be NOT NULL
2. **flight**(flight_number, miles, departing_IATA, arriving_IATA, airline_code)
 - departing_IATA is foreign key to airport ***this attribute has to be NOT NULL
 - arriving_IATA is foreign key to airport ***this attribute has to be NOT NULL
 - airline_code is a foreign key to airline ***this attribute has to be NOT NULL
3. **mileage_account**(mileage_number, mile_count, airline_code, email_address)
 - airline_code is a foreign key to airline ***this attribute has to be NOT NULL
 - email_address is a foreign key to customer ***this attribute has to be NOT NULL
4. **customer**(email_address, first_name, middle_name, last_name, date_of_birth, IATA)
 - IATA is a foreign key to airport ***this attribute has to be NOT NULL
5. **booking**(booking_id, total_cost, credit_card_number, email_address)
 - credit_card_number is a foreign key to payment_information ***this attribute has to be NOT NULL
 - email_address is a foreign key to customer ***this attribute has to be NOT NULL

5) Many to many relationships

1. **flights_booked** (departure_date_and_time, arrival_date_and_time, flight_number, booking_id , class) Ask if class should be a primary key?

- departure_date_and_time, arrival_date_and_time, flight_number is a foreign key to flight_instance ***these attribute have to be NOT NULL
- booking_id is a foreign key to flight_instance ***this attribute has to be NOT NULL

2. **payment_stored_to_account** (credit_card_number, email_address)

- credit_card_number is a foreign key to payment_information ***this attribute has to be NOT NULL
- email_address is a foreign key to customer ***this attribute has to be NOT NULL

3. **address_in_profile** (street_number, street_name, apt_number, city, state, country, email_address)

- street_number, street_name, apt_number, city, state, country is a foreign key to address ***this attribute has to be NOT NULL
- email_address is a foreign key to customer ***this attribute has to be NOT NULL

4. **payment_in_profile** (credit_card_number, street_number, street_name, apt_number, city, state, country)

- street_number, street_name, apt_number, city, state, country is a foreign key to address ***this attribute has to be NOT NULL
- credit_card_number is a foreign key to payment_information ***this attribute has to be NOT NULL

ALL TOGETHER:

payment_information(credit_card_number, security_key, expiration_date, credit_provider)

address(street_number, street_name, apt_number, city, state, zip_code, country)

airline(airline_code, name, country_of_origin)

airport(IATA, name, country, state)

flight_instance(departure_date_and_time, arrival_date_and_time, flight_number,
max_1st_class_seats, max_economy_seats, cost_for_1st_class, cost_for_economy)

- flight_number is foreign key to flight ***this attribute has to be NOT NULL

customer(email_address, first_name, middle_name, last_name, date_of_birth, IATA)

- IATA is a foreign key to airport ***this attribute has to be NOT NULL

mileage_account(mileage_number, mile_count, airline_code, email_address)

- airline_code is a foreign key to airline ***this attribute has to be NOT NULL
- email_address is a foreign key to customer ***this attribute has to be NOT NULL

flight(flight_number, miles, departing_IATA, arriving_IATA, airline_code)

- departing_IATA is foreign key to airport ***this attribute has to be NOT NULL
- arriving_IATA is foreign key to airport ***this attribute has to be NOT NULL
- airline_code is a foreign key to airline ***this attribute has to be NOT NULL

booking(booking_id, total_cost, credit_card_number, email_address)

- credit_card_number is a foreign key to payment_information ***this attribute has to be NOT NULL
- email_address is a foreign key to customer ***this attribute has to be NOT NULL

flights_booked (departure_date_and_time, arrival_date_and_time, flight_number, booking_id ,
class) Ask if class should be a primary key?

- departure_date_and_time, arrival_date_and_time, flight_number is a foreign key to flight_instance ***these attribute have to be NOT NULL
- booking_id is a foreign key to flight_instance ***this attribute has to be NOT NULL

payment_stored_to_account (credit_card_number, email_address)

- credit_card_number is a foreign key to payment_information ***this attribute has to be NOT NULL
- email_address is a foreign key to customer ***this attribute has to be NOT NULL

address_in_profile (street_number, street_name, apt_number, city, state, country,
email_address)

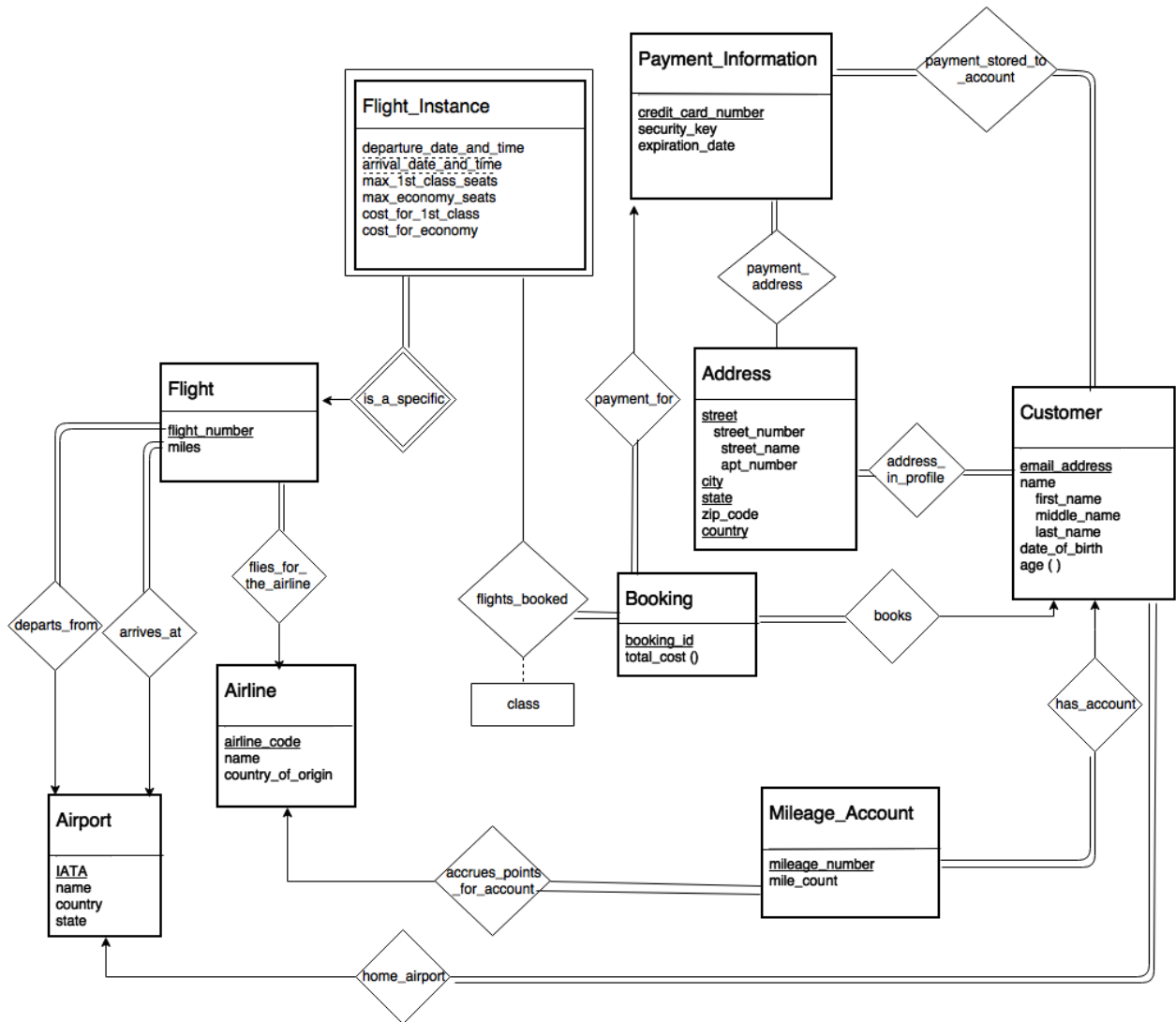
- street_number, street_name, apt_number, city, state, country is a foreign key to address ***this attribute has to be NOT NULL

- email_address is a foreign key to customer ***this attribute has to be NOT NULL

payment_in_profile (credit_card_number, street_number, street_name, apt_number, city, state, country)

- street_number, street_name, apt_number, city, state, country is a foreign key to address ***this attribute has to be NOT NULL
- credit_card_number is a foreign key to payment_information ***this attribute has to be NOT NULL

ER Model:



SQL translation from ER Model:

```
Create Table payment_information(  
Credit_card_number numeric(16,0) PRIMARY KEY NOT NULL,  
Security_key numeric(4,0) NOT NULL,  
Expiration_date varchar(5) NOT NULL  
);
```

```
Create Table address(  
street_number int NOT NULL,  
street_name varchar(30) NOT NULL,  
apt_number int,  
city varchar(50) NOT NULL,  
state char(2),  
zip_code int,  
country char(2) NOT NULL,  
PRIMARY KEY ( street_number, street_name, apt_number, city, state, country)  
);
```

```
Create Table airline(  
airline_code char(2) PRIMARY KEY,  
name varchar(20),  
country_of_origin char(2)  
);
```

```
Create Table airport(  
IATA char(3) PRIMARY KEY,  
name varchar(20),  
country char(2),  
state char(2)  
);
```

```
Create table flight(  
flight_number int PRIMARY KEY,
```

```
miles int,  
departing_IATA char(3),  
arriving_IATA char(3),  
airline_code char(2) REFERENCES airline (airline_code),  
FOREIGN KEY (departing_IATA) REFERENCES airport (IATA),  
FOREIGN KEY (arriving_IATA) REFERENCES airport (IATA)  
);
```

```
Create Table flight_instance(  
Departure_date_and_time TIMESTAMP NOT NULL,  
Arrival_date_and_time TIMESTAMP NOT NULL,  
flight_number int NOT NULL,  
max_1st_class_seats int NOT NULL,  
max_economy_seats int NOT NULL,  
cost_for_1st_class numeric(10,2) NOT NULL,  
cost_for_economy numeric(10,2) NOT NULL,  
FOREIGN KEY (flight_number) REFERENCES flight(flight_number),  
PRIMARY KEY (Departure_date_and_time, Arrival_date_and_time, flight_number)  
);
```

```
Create table customer(  
email_address varchar(50) PRIMARY KEY,  
first_name varchar(20),  
middle_name varchar(20),  
last_name varchar(20),  
date_of_birth varchar(20),  
IATA char(3) NOT NULL REFERENCES airport (IATA)  
);
```

```
Create table mileage_account(  
mileage_number int PRIMARY KEY,  
mile_count int,  
airline_code char(2) NOT NULL REFERENCES airline (airline_code),  
email_address varchar(50) NOT NULL REFERENCES customer (email_address)  
);
```

```
Create table booking(  
booking_id int PRIMARY KEY,  
credit_card_number numeric(16,0) NOT NULL,  
email_address varchar(50) NOT NULL,  
FOREIGN KEY (credit_card_number) REFERENCES payment_information  
(credit_card_number),  
FOREIGN KEY (email_address) REFERENCES customer (email_address)
```

);

```
Create table flights_booked(  
departure_date_and_time TIMESTAMP NOT NULL,  
arrival_date_and_time TIMESTAMP NOT NULL,  
flight_number int NOT NULL,  
booking_id int NOT NULL,  
class varchar(10),  
FOREIGN KEY (departure_date_and_time, arrival_date_and_time, flight_number)  
REFERENCES flight_instance (departure_date_and_time, arrival_date_and_time,  
flight_number),  
FOREIGN KEY (booking_id) REFERENCES booking(booking_id),  
PRIMARY KEY (departure_date_and_time, arrival_date_and_time, flight_number, booking_id ,  
class)  
);
```

```
Create table payment_stored_to_account(  
credit_card_number numeric(16) NOT NULL,  
email_address varchar(50) NOT NULL,  
FOREIGN KEY (credit_card_number) REFERENCES payment_information  
(credit_card_number),  
FOREIGN KEY (email_address) REFERENCES customer (email_address),  
PRIMARY KEY (credit_card_number, email_address)  
);
```

```
Create table address_in_profile(  
street_number int NOT NULL,  
street_name varchar(30) NOT NULL,  
apt_number int NOT NULL,  
city varchar(50) NOT NULL,  
state char(2) NOT NULL,  
country char(2) NOT NULL,  
email_address varchar(50) NOT NULL,  
FOREIGN KEY (street_number, street_name, apt_number, city, state, country) REFERENCES  
address (street_number, street_name, apt_number, city, state, country),  
FOREIGN KEY (email_address) REFERENCES address (email_address),  
PRIMARY KEY (street_number, street_name, apt_number, city, state, country, email_address)  
);
```

```
Create table payment_in_profile(  
credit_card_number numeric(16) NOT NULL,  
street_number int NOT NULL,  
street_name varchar(30) NOT NULL,
```



```
apt_number int NOT NULL,  
city varchar(50) NOT NULL,  
state char(2) NOT NULL,  
country char(2) NOT NULL,  
FOREIGN KEY (street_number, street_name, apt_number, city, state, country) REFERENCES  
address (street_number, street_name, apt_number, city, state, country),  
FOREIGN KEY (credit_card_number) REFERENCES payment_information  
(credit_card_number),  
PRIMARY KEY (credit_card_number, street_number, street_name, apt_number, city, state,  
country)  
);
```

Works without errors:

```
Create Table payment_information(  
credit_card_number numeric(16) NOT NULL PRIMARY KEY,  
security_key numeric(4) NOT NULL,  
Expiration_date DATE NOT NULL  
);
```

```
Create Table address(  
street_number int NOT NULL,  
street_name varchar(30) NOT NULL,  
apt_number int,  
city varchar(50) NOT NULL,  
state char(2),  
zip_code varchar(15) NOT NULL,  
country char(2) NOT NULL,  
PRIMARY KEY ( street_number, street_name, apt_number, city, state, country)  
);
```

```
Create Table airline(  
airline_code char(2) NOT NULL PRIMARY KEY,  
name varchar(20),  
country_of_origin char(2)  
);
```

```
Create Table airport(  
IATA char(3) NOT NULL PRIMARY KEY,  
name varchar(20) NOT NULL,  
country char(2) NOT NULL,  
state char(2)  
);
```

```
Create table flight(  
flight_number int NOT NULL PRIMARY KEY,  
miles int NOT NULL,  
departing_IATA char(3) NOT NULL,  
arriving_IATA char(3) NOT NULL,  
airline_code char(2) NOT NULL REFERENCES airline (airline_code),  
FOREIGN KEY (departing_IATA) REFERENCES airport (IATA),  
FOREIGN KEY (arriving_IATA) REFERENCES airport (IATA)  
);
```

```
Create Table flight_instance(  
Departure_date_and_time TIMESTAMP NOT NULL,  
Arrival_date_and_time TIMESTAMP NOT NULL,  
flight_number int NOT NULL,  
max_1st_class_seats int NOT NULL,  
max_economy_seats int NOT NULL,  
cost_for_1st_class numeric(10,2) NOT NULL,  
cost_for_economy numeric(10,2) NOT NULL,  
FOREIGN KEY (flight_number) REFERENCES flight(flight_number),  
PRIMARY KEY (Departure_date_and_time, Arrival_date_and_time, flight_number)  
);
```

```
Create table customer(  
email_address varchar(50) NOT NULL PRIMARY KEY,  
first_name varchar(20) NOT NULL,  
middle_name varchar(20),  
last_name varchar(20) NOT NULL,  
date_of_birth DATE NOT NULL,  
IATA char(3) NOT NULL REFERENCES airport (IATA)  
);
```

```
Create table mileage_account(  
mileage_number int PRIMARY KEY NOT NULL,  
mile_count int NOT NULL,  
airline_code char(2) NOT NULL REFERENCES airline (airline_code),  
email_address varchar(50) NOT NULL REFERENCES customer (email_address)  
);
```

```
Create table booking(  
booking_id numeric(16) NOT NULL PRIMARY KEY,  
total_cost int,  
credit_card_number numeric(16) NOT NULL,  
email_address varchar(50) NOT NULL,  
FOREIGN KEY (credit_card_number) REFERENCES payment_information  
(credit_card_number),  
FOREIGN KEY (email_address) REFERENCES customer (email_address)  
);
```

```
Create table flights_booked(  
departure_date_and_time TIMESTAMP NOT NULL,  
arrival_date_and_time TIMESTAMP NOT NULL,  
flight_number int NOT NULL,
```

```

booking_id int NOT NULL,
class varchar(10) NOT NULL,
FOREIGN KEY (departure_date_and_time, arrival_date_and_time, flight_number)
REFERENCES flight_instance (departure_date_and_time, arrival_date_and_time,
flight_number),
FOREIGN KEY (booking_id) REFERENCES booking(booking_id),
PRIMARY KEY (departure_date_and_time, arrival_date_and_time, flight_number, booking_id ,
class)
);

```

```

Create table payment_stored_to_account(
credit_card_number numeric(16) NOT NULL,
email_address varchar(50) NOT NULL,
FOREIGN KEY (credit_card_number) REFERENCES payment_information
(credit_card_number),
FOREIGN KEY (email_address) REFERENCES customer (email_address),
PRIMARY KEY (credit_card_number, email_address)
);

```

```

Create table address_in_profile(
street_number int NOT NULL,
street_name varchar(30) NOT NULL,
apt_number int,
city varchar(50) NOT NULL,
state char(2),
country char(2) NOT NULL,
email_address varchar(50) NOT NULL,
FOREIGN KEY (street_number, street_name, apt_number, city, state, country) REFERENCES
address (street_number, street_name, apt_number, city, state, country),
FOREIGN KEY (email_address) REFERENCES customer (email_address),
PRIMARY KEY (street_number, street_name, apt_number, city, state, country, email_address)
);

```

```

Create table payment_address(
credit_card_number numeric(16,0) NOT NULL,
street_number int NOT NULL,
street_name varchar(30) NOT NULL,
apt_number int,
city varchar(50) NOT NULL,
state char(2),
country char(2) NOT NULL,
FOREIGN KEY (street_number, street_name, apt_number, city, state, country) REFERENCES
address (street_number, street_name, apt_number, city, state, country),

```

```
FOREIGN KEY (credit_card_number) REFERENCES payment_information
(credit_card_number),
PRIMARY KEY (credit_card_number, street_number, street_name, apt_number, city, state,
country)
);
```