Information Communication Technologies

Individual Project: Cashier of Aeroflot

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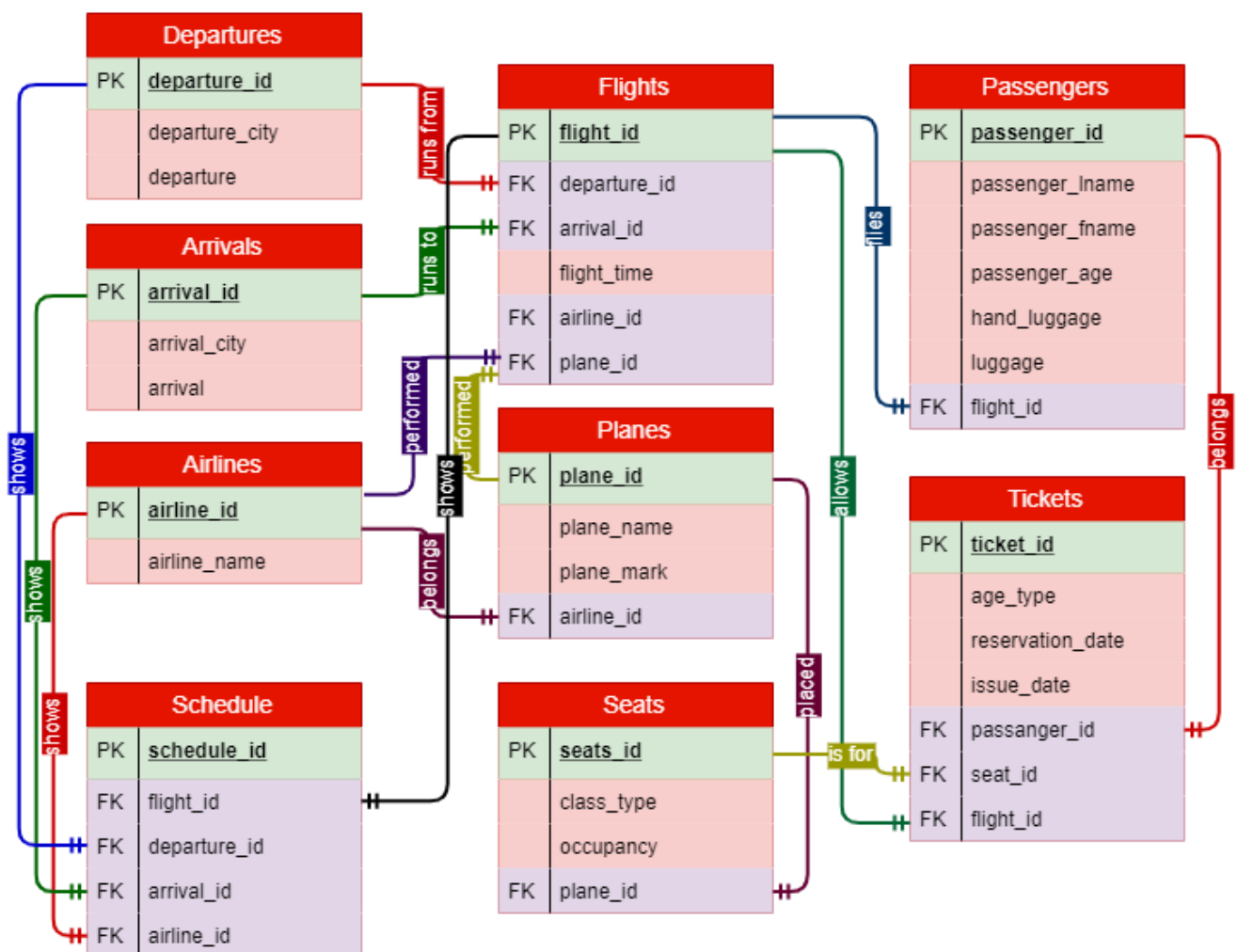Tutor Name: Smayil Assel Maralbayevna

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Layout

Information we need to include:

- information about passanger
- information about flight
- information about seat
- information about schedule

Also we need another information that will complement or connect informations above.

ERD

Database

```sql
1   create table Airlines(
2       airline_id int,
3       airline_name varchar(32) not null,
4       constraint airline_pk primary key(airline_id),
5       constraint airline_uk1 unique(airline_name)
6   );

7   create table Planes(
8       plane_id int,
9       plane_name varchar(32),
10      plane_mark varchar(32) not null,
11      airline_id int,
12      constraint plane_pk primary key(plane_id),
13      constraint plane_fk1 foreign key(airline_id) references Airlines(airline_id)
14      on update cascade on delete cascade,
15      constraint plane_uk1 unique(plane_name)
16  );

17  create table Departures(
18      departure_id int,
19      departure_city varchar(32) not null,
20      departure timestamp not null,
21      constraint departure_pk primary key(departure_id)
22  );
23  create table Arrivals(
24      arrival_id int,
25      arrival_city varchar(32) not null,
26      arrival timestamp not null,
27      constraint arrival_pk primary key(arrival_id)
28  );
29  create table Flights(
30      flight_id int,
31      departure_id int,
32      arrival_id int,
33      flight_time interval not null,
34      airline_id int,
35      plane_id int,
36      constraint flight_pk primary key(flight_id),
37      constraint flight_fk1 foreign key(airline_id) references Airlines(airline_id)
38      on update cascade on delete cascade,
39      constraint flight_fk2 foreign key(plane_id) references Planes(plane_id)
40      on update cascade on delete cascade,
41      constraint flight_fk3 foreign key(arrival_id) references Arrivals(arrival_id)
42      on update cascade on delete cascade,
43      constraint flight_fk4 foreign key(departure_id) references Departures(departure_id)
44      on update cascade on delete cascade
45  );
```

```sql
46  create table Seats(
47      seat_id int,
48      class_type varchar(32) not null,
49      occupancy bool not null,
50      plane_id int,
51      constraint seat_pk primary key(seat_id),
52      constraint seat_fk1 foreign key(plane_id) references Planes(plane_id)
53      on update cascade on delete cascade
54  );

55  create table Passengers(
56      passenger_id int,
57      passenger_lname varchar(32) not null,
58      passenger_fname varchar(32) not null,
59      passenger_age int not null,
60      hand_luggage bool not null,
61      luggage bool not null,
62      flight_id int,
63      constraint passenger_pk primary key(passenger_id),
64      constraint passenger_fk1 foreign key(flight_id) references Flights(flight_id)
65      on update cascade on delete cascade
66  );

67  create table Tickets(
68      ticket_id int,
69      age_type varchar(32) not null,
70      reservation_date date,
71      issue_date date not null,
72      flight_id int,
73      passenger_id int,
74      seat_id int,
75      constraint ticket_pk primary key(ticket_id),
76      constraint ticket_fk1 foreign key(flight_id) references Flights(flight_id)
77      on update cascade on delete cascade,
78      constraint ticket_fk2 foreign key(passenger_id) references Passengers(passenger_id)
79      on update cascade on delete cascade,
80      constraint ticket_fk3 foreign key(seat_id) references Seats(seat_id)
81      on update cascade on delete cascade
82  );
```

```
83  create table Schedule(
84      schedule_id int,
85      flight_id int,
86      departure_id int,
87      arrival_id int,
88      airline_id int,
89      constraint schedule_pk primary key(schedule_id),
90      constraint schedule_fk1 foreign key(flight_id) references Flights(flight_id)
91      on update cascade on delete cascade,
92      constraint schedule_fk2 foreign key(departure_id) references Departures(departure_id)
93      on update cascade on delete cascade,
94      constraint schedule_fk3 foreign key(arrival_id) references Arrivals(arrival_id)
95      on update cascade on delete cascade,
96      constraint schedule_fk4 foreign key(airline_id) references Airlines(airline_id)
97      on update cascade on delete cascade
98  );
```

Alter table

```
alter table Tickets add column price int;
alter table Airlines drop constraint airline_uk1;
alter table Airlines add constraint airline_uk1 unique(airline_name);
alter table Tickets drop column price;
alter table Seats add column price int not null;
```

DML

Inserts

```
insert into Airlines(airline_id, airline_name) values
(4, 'Quantum Air'),
(5, 'Eminent Airlines'),
(7, 'Gojets Airline'),
(11, 'Osprey');
insert into Planes(plane_id, plane_name, plane_mark, airline_id) values
(23, 'Skynova', 'Airbus A300', 7),
(16, 'Shadowfreak', 'Boeing 787 Dreamliner', 11),
(30, null, 'Airbus A330', 4),
(7, 'Diligent Mosquito', 'Boeing 787 Dreamliner', 11);
```

```sql
insert into Departures(departure_id, departure_city, departure) values
(275, 'Sao Joao de Meriti', '2019-12-14 14:00:00'),
(234, 'Wokingham', '2019-12-07 12:45:00'),
(156, 'Sargodha', '2020-01-03 08:30:00'),
(157, 'Tuxtla Gutiérrez', '2019-12-27 23:00:00');
insert into Arrivals(arrival_id, arrival_city, arrival) values
(275, 'Cheboksary', '2019-12-15 06:00:00'),
(234, 'Rugao', '2019-12-07 21:30:00'),
(156, 'Otsu', '2020-01-03 12:15:00'),
(157, 'Vigo', '2019-12-28 08:00:00');

insert into Flights
(flight_id, departure_id, arrival_id, flight_time, airline_id, plane_id) values
(46, 234, 234, '0 days 08:45:00', 11, 7),
(75, 275, 275, '0 days 16:00:00', 11, 16),
(14, 156, 156, '0 days 03:45:00', 4, 30),
(32, 157, 157, '0 days 09:00:00', 7, 7);
insert into Seats(seat_id, class_type, occupancy, price, plane_id) values
(732, 'business', true, 105, 7),
(745, 'economy', true, 87, 7),
(1603, 'first', true, 122, 16),
(3007, 'business',true, 108, 30);


insert into Passengers
(passenger_id, passenger_lname, passenger_fname, passenger_age,
hand_luggage, luggage, flight_id) values
(32, 'Braelyn', 'Wilkins', 27, true, false, 46),
(14, 'Alicia', 'Holmes', 22, true, true, 14),
(56, 'Elliot', 'Willis', 30, false, true, 75),
(30, 'Mitchell', 'Hendrix', 25, true, true, 32);
insert into Tickets
(ticket_id, age_type, reservation_date, issue_date,
passenger_id, seat_id, flight_id) values
(47, 'adult', null, '2019-12-01', 32, 732, 46),
(150, 'adult', '2019-12-03', '2019-12-03', 14, 3007, 14),
(78, 'adult', null, '2019-11-27', 56, 1603, 75),
(56, 'adult', null, '2019-12-10', 30, 745, 32);

insert into Schedule(schedule_id, flight_id, departure_id, arrival_id, airline_id) values
(12, 46, 234, 234, 11),
(13, 75, 275, 275, 11),
(14, 14, 156, 156, 4),
(15, 32, 157, 157, 7);
```

Update and Delete

```
update Departures SET departure_city = 'Tuxtla Gutierrez';
delete from Tickets where reservation_date = '2019-12-03';
```

Normalization

Unnormalized

flight_id	departure_city	departure	arrival_city	arrival	flight_time	passenger_id	passenger_lname	passenger_fname
46	Wokingham	2019-12-07 12:45:00	Rugao	2019-12-15 6:00:00	0 days 08:45:00	32, 56	Braelyn, Elliot	Wilkins, Willis
75	Sao Joao de Meriti	2019-12-14 14:00:00	Cheboksary	2019-12-07 21:30:00	0 days 16:00:00			
14	Sargodha	2020-01-03 8:30:00	Otsu	2020-01-03 12:15:00	0 days 03:45:00	14	Alicia	Holmes
32	Tuxtla Gutierrez	2019-12-27 23:00:00	Vigo	2019-12-28 8:00:00	0 days 09:00:00	30	Mitchell	Hendrix

1NF

flight_id	departure_city	departure	arrival_city	arrival	flight_time	passenger_id	passenger_lname	passenger_fname
46	Wokingham	2019-12-07 12:45:00	Rugao	2019-12-15 6:00:00	0 days 08:45:00	32	Braelyn	Wilkins
46	Wokingham	2019-12-07 12:45:00	Rugao	2019-12-15 6:00:00	0 days 08:45:00	56	Elliot	Willis
75	Sao Joao de Meriti	2019-12-14 14:00:00	Cheboksary	2019-12-07 21:30:00	0 days 16:00:00			
14	Sargodha	2020-01-03 8:30:00	Otsu	2020-01-03 12:15:00	0 days 03:45:00	14	Alicia	Holmes
32	Tuxtla Gutierrez	2019-12-27 23:00:00	Vigo	2019-12-28 8:00:00	0 days 09:00:00	30	Mitchell	Hendrix

Delete: If we delete Braelyn Wilkins, we lost data about Wokingham

Update: If we update data about Rugao, we have to update 2 rows

Insert: We can't insert passenger who doesn't have any flight

2NF

flight_id	departure_city	departure	arrival_city	arrival	flight_time
46	Wokingham	2019-12-07 12:45:00	Rugao	2019-12-15 6:00:00	0 days 08:45:00
75	Sao Joao de Meriti	2019-12-14 14:00:00	Cheboksary	2019-12-07 21:30:00	0 days 16:00:00
14	Sargodha	2020-01-03 8:30:00	Otsu	2020-01-03 12:15:00	0 days 03:45:00
32	Tuxtla Gutierrez	2019-12-27 23:00:00	Vigo	2019-12-28 8:00:00	0 days 09:00:00

passenger_id	passenger_lname	passenger_fname	flight_id
32	Braelyn	Wilkins	46
56	Elliot	Willis	75
14	Alicia	Holmes	14
30	Mitchell	Hendrix	32

Delete: We can't delete city Sargodha, because we also delete city Otsu

Update: If we update Wolkingham, we have to update 2 rows

Insert: we can't insert new passenger

3NF

flight_id	departure_id	arrival_id	flight_time
46	1	1	0 days 08:45:00
75	2	2	0 days 16:00:00
14	3	3	0 days 03:45:00
32	4	4	0 days 09:00:00

passenger_id	passenger_lname	passenger_fname	flight_id
32	Braelyn	Wilkins	46
56	Elliot	Willis	75
14	Alicia	Holmes	14
30	Mitchell	Hendrix	32

departure_id	departure_city	departure
1	Wokingham	2019-12-07 12:45:00
2	Sao Joao de Meriti	2019-12-14 14:00:00
3	Sargodha	2020-01-03 8:30:00
4	Tuxtla Gutierrez	2019-12-27 23:00:00

arrival_id	arrival_city	arrival
1	Rugao	2019-12-15 6:00:00
2	Cheboksary	2019-12-07 21:30:00
3	Otsu	2020-01-03 12:15:00
4	Vigo	2019-12-28 8:00:00

All tables

	airline_id [PK] integer	airline_name character varying (32)
1	4	Quantum Air
2	5	Eminent Airlines
3	7	Gojets Airline
4	11	Osprey

	plane_id [PK] integer	plane_name character varying (32)	plane_mark character varying (32)	airline_id integer
1	23	Skynova	Airbus A300	7
2	16	Shadowfreak	Boeing 787 Dreamliner	11
3	30	[null]	Airbus A330	4
4	7	Diligent Mosquito	Boeing 787 Dreamliner	11

	departure_id [PK] integer	departure_city character varying (32)	departure timestamp without time zone
1	157	Tuxtla Gutierrez	2019-12-27 23:00:00
2	275	Sao Joao de Meriti	2019-12-14 14:00:00
3	234	Wokingham	2019-12-07 12:45:00
4	156	Sargodha	2020-01-03 08:30:00

	arrival_id [PK] integer	arrival_city character varying (32)	arrival timestamp without time zone
1	275	Cheboksary	2019-12-15 06:00:00
2	234	Rugao	2019-12-07 21:30:00
3	156	Otsu	2020-01-03 12:15:00
4	157	Vigo	2019-12-28 08:00:00

flight_id [PK] integer	departure_id integer	arrival_id integer	flight_time interval	airline_id integer	plane_id integer
1	46	234	234 08:45:00	11	7
2	75	275	275 16:00:00	11	16
3	14	156	156 03:45:00	4	30
4	32	157	157 09:00:00	7	7

seat_id [PK] integer	class_type character varying (32)	occupancy boolean	plane_id integer	price integer
1	732 business	true	7	105
2	745 economy	true	7	87
3	1603 first	true	16	122
4	3007 business	true	30	108

passenger_id [PK] integer	passenger_lname character varying (32)	passenger_fname character varying (32)	passenger_age integer	hand_luggage boolean	luggage boolean	flight_id integer
1	32 Braelyn	Wilkins	27 true	false	46
2	14 Alicia	Holmes	22 true	true	14
3	56 Elliot	Willis	30 false	true	75
4	30 Mitchell	Hendrix	25 true	true	32

ticket_id [PK] integer	age_type character varying (32)	reservation_date date	issue_date date	flight_id integer	passenger_id integer	seat_id integer
1	47 adult	[null]	2019-12-01	46	32	732
2	78 adult	[null]	2019-11-27	75	56	1603
3	56 adult	[null]	2019-12-10	32	30	745
4	150 adult	2019-12-03	2019-12-03	14	14	3007

schedule_id [PK] integer	flight_id integer	departure_id integer	arrival_id integer	airline_id integer
1	12	46	234	234	11
2	13	75	275	275	11
3	14	14	156	156	4
4	15	32	157	157	7

Queries

```
1  select airline_name
2  as Airline from Airlines
3  where (airline_id > 4)
4  and (airline_id between 7 and 11);
```

airline character varying (32)
1 Gojets Airline
2 Osprey

```
1  select airline_name as airline
2  from Airlines where airline_name =
3  'Osprey' or airline_name = 'Flysky';
```

airline character varying (32)
1 Osprey

```
1  select plane_name as plane
2  from Planes where plane_mark
3  like 'Airbus A%';
```

plane character varying (32)
1 Skynova
2 [null]

```
1  select count(flight_id) as flight
2  from Flights join Planes on
3  Planes.plane_id = Flights.plane_id
4  where Flights.plane_id = 7;
```

| flight |
bigint
1	2

Subqueries

```
1  select passenger_lname, passenger_fname
2  from Passengers where passenger_age > any(
3      select passenger_age from Passengers
4  );
```

	passenger_lname character varying (32)	passenger_fname character varying (32)
1	Braelyn	Wilkins
2	Elliot	Willis
3	Mitchell	Hendrix