



ER SCHEMA

type_rating(type_rating_id, rating_name)
 has_rating(type_rating_id, aircraft_type_id)
 aircraft_family(family_id, family_name, manufacturer)
 part_of(family_id, aircraft_type_id)
 aircraft_type(aircraft_type_id, variant_name, family_id, type_rating_id, manufacturer, max_range)
 assigned_type(aircraft_type_id, aircraft_id)
 aircraft(aircraft_id, pilot_capacity, cabin_crew_capacity, passenger_capacity)
 staff(staff_id, first_name, last_name, birth_date, language, password_hash, role, rank, gender, nationality)
 licensed_on(staff_id, type_rating_id)
 can_cook(staff_id, dish_id)
 dish(dish_id, dish_name)
 operating_on(staff_id, flight_id)
 flight(flight_id, date, departure_time, departure_airport, arrival_time, arrival_airport, gate, status, flight_number, boarding_time)
 on_aircraft(flight_id, aircraft_id)
 connected_flight(flight_id, ticket_id)
 flight_ticket(ticket_id, flight_id, seat_number, class)
 owns_ticket(ticket_id, passenger_id)
 passenger(passport_number, first_name, last_name, birth_date, gender, nationality, has_allergy, disability_assistance)

Cardinality

Relation	Type	Reason
part_of	1(aircraft_family):1(aircraft_type)	As aircraft family is a parent and parents must be partial to avoid disallow egg problem As aircraft type must belong to 1 aircraft family
has_rating	1(type_rating):1(aircraft_type)	Multiple aircraft types can share a type rating As aircraft type must only have a single type rating
assigned_type	1(aircraft_type):1(aircraft)	As aircraft type may be assigned to more than 1 aircraft As aircraft can only have 1 aircraft type
licensed_on	1(type_rating):1(staff)	As type rating may have many staff who are licensed on it Many staff can be licensed on the same type rating
can_cook	1(dish):1(staff)	As dish can have multiple staff who can cook it A staff could cook more than 1 dish
operating_on	1(staff):1(flight)	As flight can have multiple staff assigned to it As staff can be assigned to multiple flights at different times
on_aircraft	1(flight):1(aircraft)	As flight may only have 1 aircraft assigned to it As aircraft may have multiple flights assigned to it at different times
connected_flight	1(flight_ticket):1(flight)	As flight ticket can be associated with multiple flights allowing transfer / shared flights As flight can have multiple flight tickets
owns_ticket	1(passenger):1(flight_ticket)	As passenger may own multiple flight tickets As flight ticket can be owned by only 1 passenger

Participation

Relation	Type	Reason
part_of	1(aircraft_family):1(aircraft_type)	As aircraft family is a parent and parents must be partial to avoid disallow egg problem As aircraft type must belong to 1 aircraft family
has_rating	1(type_rating):1(aircraft_type)	As type rating is a parent and parents must be partial to avoid disallow egg problem As aircraft type must have a type rating
assigned_type	1(aircraft_type):1(aircraft)	As every aircraft type has to have an aircraft Every aircraft has to have a type
licensed_on	1(type_rating):1(staff)	As every type rating has staff who are licensed on it As every staff has to have a type rating
can_cook	1(dish):1(staff)	As every dish can be cooked by a staff As every staff is able to cook
operating_on	1(staff):1(flight)	Every flight has to have staff assigned to it As every staff is assigned to a flight
on_aircraft	1(flight):1(aircraft)	Every flight must have an aircraft assigned to it As every aircraft is assigned to a flight
connected_flight	1(flight_ticket):1(flight)	Every flight ticket must be connected to a flight As every flight has flight tickets
owns_ticket	1(passenger):1(flight_ticket)	As every passenger has a flight ticket Every flight ticket is owned by a passenger

Relational Schema

type_rating(type_rating_id, rating_name)
 aircraft_family(family_id, family_name, manufacturer)
 aircraft_type(aircraft_type_id, variant_name, family_id, type_rating_id, max_range)
 aircraft(aircraft_id, pilot_capacity, cabin_crew_capacity, passenger_capacity)
 staff(staff_id, first_name, last_name, birth_date, password_hash, role, rank, gender, nationality)
 speaks(staff_id, language)
 licensed_on(staff_id, type_rating_id)
 can_cook(staff_id, dish_id)
 dish(dish_id, dish_name)
 operating_on(staff_id, flight_id)
 flight(flight_id, date, departure_time, departure_airport, arrival_time, arrival_airport, gate, status, flight_number, boarding_time)
 connected_flight(flight_id, ticket_id)
 flight_ticket(flight_id, passenger_id, seat_number, class)
 passenger(passport_number, first_name, last_name, birth_date, gender, nationality, has_allergy, disability_assistance)

SNAPSHOT

type_rating		aircraft_family				aircraft_type				aircraft				
type_rating_id	rating_name	family_id	family_name	manufacturer	aircraft_type_id	variant_name	family_id	type_rating_id	max_range	aircraft_id	aircraft_type_id(fk)	pilot_capacity	cabin_crew_capacity	passenger_capacity
1	3PP/3P/3C	1	3PP	Boeing	1	320	1	1	4,500	1	1	1	1	150
2	3PP/3P/3C	1	3PP	Boeing	2	320	1	1	4,500	2	1	1	1	150
3	3PP/3P/3C	1	320	Boeing	3	320XLR	1	1	4,500	3	1	1	1	150
4	3PP/3P/3C	1	3PP	Boeing	4	320XLR	1	1	4,500	4	1	1	1	150
5	3PP/3P/3C	1	3PP	Boeing	5	320XLR	1	1	4,500	5	1	1	1	150
6	3PP/3P/3C	1	3PP	Boeing	6	320XLR	1	1	4,500	6	1	1	1	150

staff

staff_id	first_name	last_name	birth_date	password_hash	role	rank	gender	nationality
1	James	Bond	1950-03-01	12345678	Pilot	Senior	Male	Turkish
2	John	Doe	1980-01-01	87654321	Engineer	Junior	Female	British
3	John	Doe	1980-01-01	87654321	Engineer	Senior	Male	Turkish
4	John	Doe	1980-01-01	87654321	Engineer	Junior	Female	Turkish
5	John	Doe	1980-01-01	87654321	Engineer	Senior	Male	Turkish

speaks

licensed_on		can_cook		operating_on	
staff_id	language	staff_id	type_rating_id	staff_id	dish_id
1	Turkish	1	1	1	1
2	Turkish	1	2	1	2
3	Turkish	1	3	1	3
4	Turkish	1	4	1	4

Flight

flight_id	aircraft_id	date	departure_time	arrival_time	aircraft_type_id	gate	status	flight_id	boarding_time
1	1	2020/01/01	08:00	12:00	320	10A	On-time	1	08:00
2	1	2020/01/01	09:00	13:00	320	11A	Delayed	2	09:00
3	1	2020/01/01	09:30	13:30	320	11A	On-time	3	09:30
4	6	2020/01/01	13:00	17:00	320	12A	Cancelled	4	13:00
5	6	2020/01/01	13:30	17:30	320	12A	On-time	5	13:30

connected_flight

flight_id	ticket_id
1	1
2	2
3	3
4	4

Flight Ticket

ticket_id	passenger_number (PK)	start_number	class
1	1	000000000000	12A
2	1	000000000000	24B
3	1	000000000000	24A
4	1	000000000000	24C

passenger

passport_number	first_name	last_name	birth_date	gender	last_offset	nationality
1	James	Bond	01/02/1950	Male	UTC+03:00	Turkish
2	John	Doe	01/01/1980	Female	no offset	British
3	John	Doe	01/01/1980	Male	UTC+03:00	Turkish
4	John	Doe	01/01/1980	Female	no offset	Turkish
5	John	Doe	01/01/1980	Male	UTC+03:00	Turkish