



### ER SCHEMA

type\_rating(type\_rating\_id, rating\_name)  
 aircraft\_family(aircraft\_family\_id, aircraft\_type\_id)  
 aircraft\_type(aircraft\_type\_id, variant\_name, family\_id, type\_rating\_id, manufacturer, max\_range)  
 aircraft(aircraft\_id, aircraft\_type\_id, variant\_name, family\_id, type\_rating\_id, manufacturer, max\_range)  
 assigned\_type(aircraft\_type\_id, aircraft\_id)  
 aircraft(aircraft\_id, date, departure\_time, departure\_airport, arrival\_time, arrival\_airport, gate, status, flight\_number, boarding\_time)  
 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, flight\_id)  
 dsh(dsh\_id, dsh\_name)  
 operating\_on(staff\_id, flight\_id)  
 flight(flight\_id, aircraft\_id, date, departure\_time, departure\_airport, arrival\_time, arrival\_airport, gate, status, flight\_number, boarding\_time)  
 on\_aircraft(staff\_id, aircraft\_id)  
 connected\_flight(flight\_id, ticket\_id)  
 flight\_ticket(ticket\_id, flight\_id, seat\_number, class)  
 owns\_ticket(ticket\_id, passenger\_number)  
 passenger(passport\_number, first\_name, last\_name, birth\_date, gender, nationality, has\_allergy, disability\_assistance)  
 guardian(passport\_number, child\_passport)

### Cardinality

Relation	Type	Reason
part_of	1(Naircraft_family)1(Naircraft_type)	do aircraft family can have more than 1 aircraft type do aircraft type can only belong to 1 aircraft family
has_rating	1(Ntype_rating)1(Naircraft_type)	do aircraft type can have a type rating do aircraft type only have a single type rating
assigned_type	1(Naircraft_type)1(Naircraft)	do aircraft type may be assigned to more than 1 aircraft do aircraft can only have 1 aircraft type
licensed_on	1(Nstaff)1(Ntype_rating)	if type rating may have many staff who are licensed on it every staff can be licensed on the same type rating
can_cook	1(Nstaff)1(Nflight)	if dsh can have multiple staff who can cook it if dsh could cook more than 1 dsh
operating_on	1(Nflight)1(Nstaff)	if flight can have multiple staff assigned to it if staff can be assigned to multiple flights at different times
on_aircraft	1(Nflight)1(Naircraft)	if flight may only have 1 aircraft assigned to it do aircraft may have multiple flights assigned to it at different times
connected_flight	1(Nflight_ticket)1(Nflight)	if flight ticket can be associated with multiple flights allowing transfer / shared flights if flight can have multiple flight tickets
owns_ticket	1(Npassenger)1(Nflight_ticket)	if passenger may own multiple flight tickets if flight ticket can be owned by only 1 passenger

### Participation

Relation	Type	Reason
part_of	1(Naircraft_family)1(Naircraft_type)	do aircraft family is a parent and parents must be partial to avoid chicken egg problem do aircraft type must belong to an aircraft family
has_rating	1(Ntype_rating)1(Naircraft_type)	if type rating is a parent and parents must be partial to avoid chicken egg problem do aircraft type must have a type rating
assigned_type	1(Naircraft_type)1(Naircraft)	not every aircraft type has to have an aircraft every aircraft has to have a type
licensed_on	1(Ntype_rating)1(Nstaff)	not every type rating has staff who are licensed on it not every staff has a license on a type rating
can_cook	1(Nstaff)1(Nflight)	not every dsh can be cooked by a staff not every staff is able to cook
operating_on	1(Nflight)1(Nstaff)	every flight has to have staff assigned to it not every staff is assigned to a flight
on_aircraft	1(Nflight)1(Naircraft)	every flight must have an aircraft assigned to it not every aircraft is assigned to a flight
connected_flight	1(Nflight_ticket)1(Nflight)	every flight ticket must be associated to a flight not every flight has flight tickets
owns_ticket	1(Npassenger)1(Nflight_ticket)	not 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(aircraft\_family\_id, variant\_name, family\_id, type\_rating\_id, manufacturer)  
 aircraft\_type(aircraft\_type\_id, variant\_name, family\_id, type\_rating\_id, max\_range)  
 aircraft(aircraft\_id, aircraft\_type\_id, variant\_name, family\_id, type\_rating\_id, manufacturer, max\_range)  
 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, flight\_id)  
 dsh(dsh\_id, dsh\_name)  
 operating\_on(staff\_id, flight\_id)  
 flight(flight\_id, aircraft\_id, date, departure\_time, departure\_airport, arrival\_time, arrival\_airport, gate, status, flight\_number, boarding\_time)  
 connected\_flight(flight\_id, ticket\_id)  
 flight\_ticket(ticket\_id, flight\_id, seat\_number, class)  
 passenger(passport\_number, first\_name, last\_name, birth\_date, gender, nationality, has\_allergy, disability\_assistance)  
 guardian(passport\_number, child\_passport)

### SNAPSHOT

type_rating					aircraft_family					aircraft_type					aircraft				
type_rating_id	rating_name	aircraft_family_id	variant_name	manufacturer	aircraft_type_id	variant_name	family_id	type_rating_id	max_range	aircraft_id	aircraft_type_id	variant_name	family_id	type_rating_id					
1	EF2000/REF (empty)	1	REF	Boeing	1	2000	1	1	5,000	1	1	2000	1	1					
2	EF2000/REF (empty)	2	REF	Boeing	2	3000	2	1	6,000	2	2	3000	2	1					
3	EF2000	3	EF2000	Boeing	3	4000	3	1	7,000	3	3	4000	3	1					
4	EF2000	4	EF2000	Boeing	4	5000	4	1	8,000	4	4	5000	4	1					
5	EF2000	5	EF2000	Boeing	5	6000	5	1	9,000	5	5	6000	5	1					

staff								
staff_id	first_name	last_name	birth_date	password_hash	role	rank	gender	nationality
1	John	Doe	1980-12-21	12345678	Pilot	Captain	Male	Turkish
2	John	Doe	1980-12-21	12345678	Pilot	Captain	Female	Turkish
3	John	Doe	1980-12-21	12345678	Pilot	Captain	Male	Turkish
4	John	Doe	1980-12-21	12345678	Pilot	Captain	Female	Turkish

speaks					licensed_on		can_cook		operating_on	
staff_id	language	staff_id	type_rating_id	staff_id	flight_id	staff_id	flight_id	staff_id	flight_id	
1	Turkish	1	1	1	1	1	1	1	1	
2	Turkish	2	1	2	2	2	2	2	2	
3	Turkish	3	1	3	3	3	3	3	3	
4	Turkish	4	1	4	4	4	4	4	4	

flight										
flight_id	aircraft_id	date	departure_time	departure_airport	arrival_time	arrival_airport	gate	status	flight_number	boarding_time
1	1	2020-12-21	08:30	IST	09:30	LHR	1A	On-time	1000	08:30
2	1	2020-12-21	09:30	LHR	10:30	IST	1A	On-time	1000	09:30
3	2	2020-12-21	08:30	LHR	09:30	IST	1A	On-time	1000	08:30
4	2	2020-12-21	09:30	IST	10:30	LHR	1A	On-time	1000	09:30

connected_flight					flight_ticket					
flight_id	ticket_id	passport_number (PK)	seat_number	class	flight_id	ticket_id	passport_number (PK)	seat_number	class	
1	100000	100000	100000000000	10A	Business	1	100000	100000000000	10A	Business
2	100000	100000000000	100000000000	10A	Business	2	100000	100000000000	10A	Business
3	200000	200000000000	200000000000	20A	Business	3	200000	200000000000	20A	Business
4	200000	200000000000	200000000000	20A	Business	4	200000	200000000000	20A	Business

passenger							
passport_number	first_name	last_name	birth_date	gender	has_allergy	disability_assistance	nationality
100000	John	Doe	1980-12-21	Male	no	no	Turkish
200000	John	Doe	1980-12-21	Female	no	no	Turkish
300000	John	Doe	1980-12-21	Male	yes	yes	Turkish
400000	John	Doe	1980-12-21	Female	no	no	Turkish

guardian	
guardian_passport	child_passport
100000	200000
200000	300000
300000	400000
400000	100000