ER SCHEMA

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

Cardinality

Relation	Type	Reason
part_of	T(aircraft_family):M(aircraft_type)	An aircraft family can have more than 1 variant/type. An aircraft type can only belong to 1 aircraft family.
has_rating	T(type_rating):M(aircraft_type)	Multiple aircraft types can share a type rating. An aircraft type must only have a single type rating.
assigned_type	T(aircraft_type):M(aircraft)	An aircraft type may be assigned to more than 1 aircraft. An aircraft can only have 1 aircraft type.
licensed_on	M(type_rating):M(staff)	A type rating may have many staff who are licensed on it. Many staff can be licensed on the same type rating.
can_cook	M(dish):M(staff)	A dish can have multiple staff who can cook it. A staff could cook more than 1 dish.
operating_on	M(flight):M(staff)	A flight can have multiple staff assigned to it. A staff can be assigned to multiple flights at different times!
on_aircraft	M(flight):1(aircraft)	A flight may only have 1 aircraft assigned to it. An aircraft may have multiple flights assigned to it at different times!
connected_flight	M(flight_ticket):1(flight)	A flight ticket can be only be associated with 1 flight for transit a different ticket needs to be issued. A flight can have multiple flight tickets.
owns_ticket	1(passenger):M(flight_ticket)	A passenger may own multiple flight tickets. A flight ticket can be owned by only 1 passenger.

Participation   P= partial participation / T = total participation

Relation	Type	Reason
part_of	M(aircraft_family):T(aircraft_type)	An aircraft family is a parent and parents must be partial to avoid chicken egg problem. An aircraft type must belong to an aircraft family.
has_rating	M(type_rating):T(aircraft_type)	A type rating is a parent and parents must be partial to avoid chicken egg problem. An aircraft type must have a type rating.
assigned_type	P(aircraft_type):T(aircraft)	Not every aircraft type has to have an aircraft. Every aircraft has to have a type.
licensed_on	P(type_rating):P(staff)	Not every type rating has staff who are licensed on it. Not every staff have a license on = type rating.
can_cook	P(dish):P(staff)	Not every dish can be cooked by a staff. Not every staff is able to cook.
operating_on	T(flight):P(staff)	Every flight has to have staff assigned to it. Not every staff is assigned to a flight.
on_aircraft	T(flight):1(aircraft)	Every flight must have an aircraft assigned to it. Not every aircraft is assigned to a flight.
connected_flight	T(flight_ticket):P(flight)	Every flight ticket must be connected to a flight. Not every flight has flight tickets.
owns_ticket	P(passenger):T(flight_ticket)	Not every passenger has a flight ticket. Every flight ticket is owned by a passenger.

Relational Schema

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

SNAPSHOT

type_rating

type_rating_id	rating_name
1	B757/767 Common
2	A320 Family
3	B777
4	B777X

aircraft_family

family_id	family_name	manufacturer
1	757	Boeing
2	767	Boeing
3	A320	Airbus
4	777	Boeing

aircraft_type

aircraft_type_id	variant_name	family_id	type_rating_id	max_range
1	-200	1	1	5,800
2	-300	1	1	6,300
3	-300ER	2	1	11,070
4	neo	3	2	6,500
5	-300ER	4	3	13,650
6	-9	4	4	16,190

aircraft

aircraft_id	airplane_type_id(Fk)	pilot_capacity	cabin_crew_capacity	economy_passenger_capacity	business_passenger_capacity	economy_passenger_layout	business_passenger_layout
1	1	4	100	50		{3,3}	{2,2}
2	4	6	110	70		{2,3}	{2,2}
3	2	4	7	200	80	{3,3}	{2,2}
4	3	6	4	140	100	{3,3}	
5	4	2	8	148	148		{3,3}	{2,2}
6	5	4	16	400	60		{3,3}	{2,2}
7	6	4	14	300	40		{3,3}	{2,2}

staff

staff_id	first_name	last_name	birth_date	password_hash	role	rank	gender	nationality
1	James	Bond	1965-12-01	ehoha2s2hg	Pilot		Male	Turkish
2	John	Doe	1979-05-21	ahgetgena	Cabin Crew	Senior	Female	Turkish
3	Jackie	Chan	1999-01-02	19thsgena	Pilot	Senior	Male	Turkish
4	Johannes	Kepler	2005-07-14	geoqudgse	Cabin Crew	Trainee	Male	Turkish
5	Isaac	Newton	2006-07-14	aqj6t23laq	Cabin Crew	Senior	Male	Turkish

speaks

staff_id	language
1	English
1	Turkish
2	English
2	Japanese

licensed_on

staff_id	type_rating_id
1	1
1	2
2	1
2	2

can_cook

staff_id	dish_id
1	1
1	2
2	1
2	2

operating_on

staff_id	flight_id
1	1
1	2
2	1
2	2

flight

flight_id	aircraft_id (fk)	date	departure_time	departure_airport	arrival_time	arrival_airport	gate	status	flight_number	boarding_time
1	1	25/10/2026	03:30	IST	05:30	LHR	12A	Enroute	AK251	03:10
2	1	25/10/2026	15:45	LHR	17:45	IST	5B	Boarding	AK111	15:25
3	2	25/10/2026	03:30	LHR	05:30	IST	8B	Landed	AK878	03:10
4	4	26/10/2026	12:30	SAW	2:30	LHR	PC	Scheduled	AK123	12:10
5	6	26/10/2026	11:00	SAW	1:00	LHR	9A	Deboarding	AK456	10:30

connected_flight

flight_id	ticket_id
1	111111111
1	222222222
1	333333333
2	999999999

flight_ticket

ticket_id	passport_number (fk)	seat_number	class
111111111	19465641564	12A	Economy
222222222	19465641564	24B	Economy
333333333	19616866659	32A	Economy
999999999	19616866659	01C	Business

passenger

passport_number	first_name	last_name	birth_date	gender	has_allergy	disability_assistance	nationality
N1291	James	Bond	01/12/1991	Male	yes nuts	yes wheelchair	Turkish
N5678	John	Doe	21/05/1979	Female	yes milk	yes blind	Turkish
N7826	Jackie	Chan	02/01/1988	Male	yes milk	yes deaf	Turkish
N7611	Johannes	Kepler	14/7/2005	Male	no	no	Turkish
N7177	Isaac	Newton	14/7/2006	Male	no	no	Turkish

guardian

guardian_passport	child_passport
N1291	N7177
N1291	N7611
N7826	N7177
N7826	N5678