



SQL Project

-Airline Booking System

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INTRODUCTION

- This project involves designing and building an Airline Ticket Booking System database.
- Assumed company name is Iris Airlines.
- Airline Ticket Booking System involves data related to passenger details, flight schedules, ticket and trip details, payments, etc.



ENTITIES INVOLVED

- Flight - Travel path + schedule from Airport A to Airport B
- Trip - Each leg of the itinerary is a trip
- Ticket - A passenger's itinerary
- Passenger - Contains details about person traveling
- Crew - Contains details about person assigned to work on flight
- Payment - Contains details like payment amount, payment date
- Airport - Describes Airport's properties like location, type
- Airplane - Describes Airplane's properties like model, capacity

BUSINESS RULES

Each Passenger must have at least one Ticket

Each Ticket must belong to only one Passenger

Each Ticket must belong to one or more Trips

Each Trip must belong to only one Ticket

Each Ticket must have only one Payment

Each Payment must belong to at least one Ticket

Each Flight must have two Airports

Each Airport may have many Flights

Each Flight must have one Airplane

Each Airplane may be used in multiple Flights

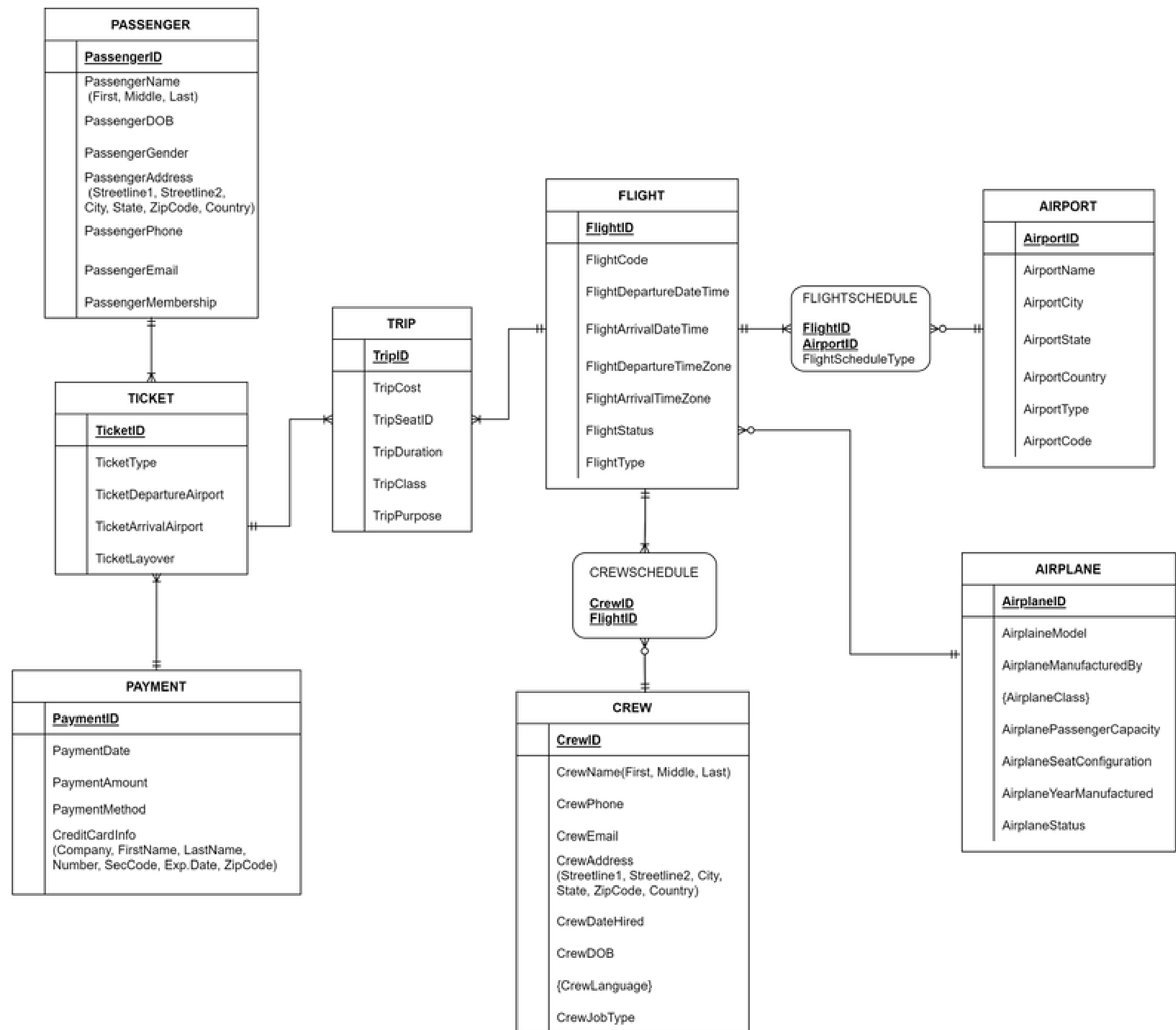
Each Trip must have only one Flight

Each Flight must have many Trips

Each Flight must have multiple Crew

Each Crew can work on multiple Flights

ENTITY- RELATIONSHIP MODEL





3NF RELATIONAL MODEL

IRIS AIRLINES' FLIGHT BOOKING SYSTEMS DATA

Airport

AirportID	AirportName	AirportCity	AirportState	AirportCountry	AirportType	AirportCode
1	Dallas/ Fort Worth International Airport	Dallas	TX	United States	International	DFW
2	San Francisco International Airport	San Francisco	CA	United States	International	SFO
3	Denver International Airport	Denver	CO	United States	International	DEN

Airplane

AirplaneID	AirplaneModel	AirplaneManufacturedBy	AirplanePassengerCapacity	AirplaneSeatConfiguration	AirplaneYearManufactured	AirplaneStatus
1	777-300ER	Boeing	396	ABCDEFGHJK1	2005	Inactive
2	787-9	Boeing	250	ABCDEF1	2013	Active
3	777-300ER	Boeing	396	ABCDEFGHJK1	2015	Active

Crew

CrewID	CrewNameFirst	CrewNameMiddleInitial	CrewNameLast	CrewPhone	CrewEmail	CrewAddressStreetLine1	CrewAddressStreetLine2	CrewAddressCity	CrewAddressState	CrewAddressZipCode	CrewAddressCountry	CrewDateHired	CrewDateOfBirth	CrewJobType
1	Markela	NULL	Hysenlari	415-666-0058	markela.hys@gmail.com	1 GrandView	NULL	San Francisco	CA	11144	USA	2020-05-25	1991-05-15	Steward
2	Oliver	NULL	Walker	650-623-5876	Oliver.wal@gmail.com	52 Grand	NULL	San Jose	CA	56852	USA	2020-12-03	1980-12-12	Pilot
3	Margaret	NULL	Ronald	655-695-8755	Mag.Ronald@gmail.com	856 Mason	NULL	Daly City	FL	59666	USA	2021-05-28	1975-11-25	Steward

Passenger

PassengerID	PassengerNameFirst	PassengerNameMiddleInitial	PassengerNameLast	PassengerDOB	PassengerGender	PassengerAddressStreetline 1	PassengerAddressStreetline2	PassengerAddressCity	PassengerAddressState	PassengerAddressCountry	PassengerAddressZipcode	PassengerPhone	PassengerEmail	PassengerM
1	Nikitha	R	Bodigam	1997-05-05	Female	200 Park Plaza Drive	apt 45	San Francisco	CA	United States of America	94015	16287588491	nbodigam@sfsu.edu	Yes
2	Eddie	M	Albert	1978-01-24	Male	438 Geary Blvd	3rd ave	Washington DC	NULL	United States of America	95614	14387488632	edalbert@gmail.com	No
3	Fiona	A	Margret	1988-11-14	Female	185 Estancia St	unit 145	Los Angeles	CA	United States of America	90974	14387488632	fmargert@gmail.com	No

Payment

PaymentID	PaymentDate	PaymentAmount	PaymentMethod	PaymentCreditCardCompany	PaymentCreditCardFirstName	PaymentCreditCardLastName	PaymentCreditCardNumber	PaymentCreditCardSecCode	PaymentCreditCardExpirationDate	PaymentCreditcardZipCode
101	2021-05-06	252.34	CreditCard	Visa	Anthony	King	1234567891234567	222	02/23	91445
201	2022-01-02	1213.12	CreditCard	Visa	Maria	Charles	5321456987523654	123	02/25	65987
301	2021-05-01	184.39	CreditCard	Visa	Anthony	King	442256565645454	555	11/25	54236

Flight

FlightID	FlightCode	FlightDepartureDateTime	FlightDepartureTimeZone	FlightArrivalDateTime	FlightArrivalTimeZone	FlightStatus	FlightType	AirplaneID
1	RZ6319	2022-01-03 07:15:00	UTC-8	2022-01-03 08:40:24	UTC-8	Completed	0	2
2	RZ1182	2022-01-03 10:35:22	UTC-8	2022-01-04 15:30:28	UTC+9	Completed	1	3
3	RZ3342	2022-01-04 17:15:45	UTC+9	2022-01-04 21:33:54	UTC+8	Completed	1	5

Ticket

TicketID	PassengerID	PaymentID	TicketDepartureAirport	TicketArrivalAirport	TicketLayoverTime	TicketType
TCK1	1	101	SFO	LAX	NULL	RoundTrip
TCK10	4	1001	SFO	LAX	NULL	One-Way
TCK11	6	1101	ORD	JFK	175	One-Way

Trip

TripID	TicketID	FlightID	TripSeatID	TripClass	TripCost	TripDuration	TripPurpose
TRP1	TCK1	1	02B	First	138.00	94	Vacation
TRP10	TCK6	1	22B	First	138.00	94	Business
TRP11	TCK6	4	12C	Second	98.00	82	Business

FlightSchedule

FlightID	AirportID	FlightScheduleType
1	2	0
1	4	1
2	4	0


CrewSchedule

CrewID	FlightID
1	1
2	1
1	2
2	2
3	3


Data Sorting

```
#Creating a FlightSchedule view using a self join in order to get a Departure Airport ID and an Arrival Airport ID
CREATE VIEW FlightSchedule AS (SELECT FS1.FlightID,FS1.AirportID AS DepartureAirportID,FS2.AirportID AS ArrivalAirportID
FROM Flight_Schedule FS1, Flight_Schedule FS2
WHERE FS1.FlightID=FS2.FlightID AND
FS1.AirportID!=FS2.AirportID AND
FS1.FlightScheduleType=0 AND FS2.FlightScheduleType=1);
```

```
#Using FlightSchedule View and adding Depature and Arrival Airport Cities and DateTime fields
CREATE VIEW FlightSchedulewithAirportCity AS (SELECT F.FlightID, FlightDepartureDateTime,
DepartureAirportID, A1.AirportCity AS DepartureAirportCity, FlightArrivalDateTime, ArrivalAirportID,
A2.AirportCity AS ArrivalAirportCity
FROM FlightSchedule F
JOIN Airport A1 ON F.DepartureAirportID=A1.AirportID
JOIN Airport A2 ON F.ArrivalAirportID=A2.AirportID
JOIN Flight ON F.FlightID=Flight.FlightID);
```



FlightID	DepartureAirportID	ArrivalAirportID
1	2	4
2	4	17
3	17	11
4	4	2
5	8	13
6	17	4
7	11	17
8	3	6
9	6	10
10	10	12
11	13	8



FlightID	FlightDepartureDateTime	DepartureAirportID	DepartureAirportCity	FlightArrivalDateTime	ArrivalAirportID	ArrivalAirportCity
1	2022-01-03 07:15:00	2	San Francisco	2022-01-03 08:40:24	4	Los Angeles
2	2022-01-03 10:35:22	4	Los Angeles	2022-01-04 15:30:28	17	Narita
3	2022-01-04 17:15:45	17	Narita	2022-01-04 21:33:54	11	Beijing
4	2022-01-08 08:45:34	4	Los Angeles	2022-01-08 10:05:12	2	San Francisco

The Iris Airlines collects about 20% taxes along with the trip fares.
The accountant wants to verify if this is true.

#Creating View with approximate calculations

```
CREATE VIEW Amount AS SELECT Ticket.TicketID,SUM(TripCost) AS TicketCost,  
ROUND((SUM(TripCost)+0.2*SUM(TripCost)),2) AS TicketCostwithApproxTax  
FROM Trip, Ticket  
WHERE Trip.TicketID=Ticket.TicketID GROUP BY TicketID;
```

#Calculating and displaying the Verification Status

```
SELECT T.TicketID, T.PaymentID, TicketCostwithApproxTax, PaymentAmount,  
CASE WHEN ((ABS(PaymentAmount-TicketCostwithApproxTax))/PaymentAmount)<0.05 THEN 'accepted' ELSE 'not accepted' END AS VerifyStatus  
FROM Amount A, Payment P, Ticket T  
WHERE A.TicketID= T.TicketID AND P.PaymentID=T.PaymentID;
```

TicketID	PaymentID	TicketCostwithApproxTax	PaymentAmount	VerifyStatus
TCK1	101	283.20	252.34	not accepted
TCK10	1001	162.00	161.36	accepted
TCK11	1101	1500.00	1496.50	accepted
TCK12	1201	378.00	377.35	accepted
TCK13	1301	126.00	125.12	accepted
TCK14	1401	126.00	123.25	accepted
TCK2	201	1320.00	1213.12	not accepted
TCK3	301	186.00	184.39	accepted
TCK4	401	2616.00	2609.83	accepted
TCK5	501	294.00	293.36	accepted
TCK6	601	283.20	282.50	accepted
TCK7	701	324.00	324.35	accepted
TCK8	801	168.00	170.12	accepted
TCK9	901	1800.00	1789.25	accepted

Iris Airlines has been informed that a passenger who travelled from SFO to LA on March 1st 2022 with a possibly deadly infection. The airline wants list of all the passengers and crew who travelled from SFO to LA on this date to warn them.

```
SELECT P.PassengerID, PassengerNameFirst, PassengerNameMiddleInitial, PassengerNameLast, PassengerAddressStreetline1,
PassengerAddressStreetline2, PassengerAddressCity, PassengerAddressState, PassengerAddressCountry,
PassengerAddressZipcode, PassengerPhone, PassengerEmail
FROM Passenger P, Ticket, Trip
WHERE Trip.TicketID= Ticket.TicketID AND Ticket.PassengerID=P.PassengerID AND
FlightID=(SELECT FlightID FROM FlightSchedulewithAirportCity
WHERE DepartureAirportCity='San Francisco' AND ArrivalAirportCity='Los Angeles' AND
DATE(FlightDepartureDateTime)='2022-01-03');
```

	PassengerID	PassengerNameFirst	PassengerNameMiddleInitial	PassengerNameLast	PassengerAddressStreetline1	PassengerAddressStreetline2	PassengerAddressCity	PassengerAddressState	PassengerAddressCountry	PassengerAddressZipcode	PassengerPhone	PassengerEmail
▶	1	Nikitha	R	Bodigam	200 Park Plaza Drive	apt 45	San Francisco	CA	United States of America	94015	16287588491	nbodigam@sfsu.edu
	5	Anna	M	Martin	42 Vicente Dr	apt 56	London	England	United Kingdom	DA	443764589331	annamartin@gmail.com
	3	Fiona	A	Margret	185 Estancia St	unit 145	Los Angeles	CA	United States of America	90974	14387488632	fmargert@gmail.com
	4	Dennis	R	Reynolds	25 Poncieta Dr	5th St	New York City	NY	United States of America	94123	15165678945	dennis333@gmail.com

Iris Airlines is known for its sense of time, and it wants to maintain this reputation. The airline tracks information if a flight time (departure or arrival) is changed from the scheduled time.

Trigger to log Flight delays - departures and arrivals

```
DELIMITER $$
CREATE TRIGGER Flight_DateTime_Update
AFTER UPDATE ON Flight
) FOR EACH ROW BEGIN
) IF (Old.FlightDepartureDateTime <> New.FlightDepartureDateTime) THEN
    INSERT INTO Flight_Delay(FlightID,FlightCode, OldDateTime, NewDateTime,FlightType, FlightScheduleType, UpdateDate)
    VALUES (Old.FlightID, Old.FlightCode, Old.FlightDepartureDateTime, New.FlightDepartureDateTime, Old.FlightType, 'Departure',SYSDATE()); END IF;
) IF (Old.FlightArrivalDateTime <> New.FlightArrivalDateTime) THEN
    INSERT INTO Flight_Delay(FlightID,FlightCode, OldDateTime, NewDateTime, FlightType, FlightScheduleType, UpdateDate)
    VALUES (Old.FlightID, Old.FlightCode, Old.FlightArrivalDateTime, New.FlightArrivalDateTime, Old.FlightType, 'Arrival',SYSDATE()); END IF;
- END $$
DELIMITER ;
```


...and now the Airlines wants to know more information on the delays.

Average delay time for international flights in 2022

```
SELECT AVG(DifferenceDateTimeMin)
FROM(
    SELECT TIMESTAMPDIFF(Minute, OldDateTime, NewDateTime) AS DifferenceDateTimeMin
    FROM Flight_Delay
    WHERE FlightType = 1 and Year(OldDateTime) = '2022') AS InternationalDelayTime;
```

Output

AVG(DifferenceDateTimeMin)
27.0000

Count of delays by airport

```
SELECT AirportName, COUNT(FlightDelayID)
FROM Flight_Delay
INNER JOIN Flight_Schedule ON Flight_Delay.FlightID = Flight_Schedule.FlightID
INNER JOIN Airport ON Flight_Schedule.AirportID = Airport.AirportID
WHERE Year(OldDateTime) = '2022'
Group By AirportName
ORDER BY COUNT(FlightDelayID) DESC;
```

Output

AirportName	COUNT(FlightDelayID)
John F Kennedy International Airport	5
Denver International Airport	3
Los Angeles International Airport	2
Narita International Airport	2
London Heathrow International Airport	2

Iris Airlines wants to provide loyalty points to the passengers who have trusted and used its services.

```
SELECT passenger.passengerid, PassengerNameFirst as FirstName, PassengerNameLast as LastName,  
        PassengerPhone as Phone, PassengerEmail as Email, flightdeparturedatetime, sum(tripduration)  
FROM Passenger, Trip, Ticket, flight  
WHERE Passenger.PassengerID=Ticket.PassengerID  
AND ticket.ticketId=trip.ticketID  
AND flight.flightid=trip.flightid  
GROUP BY passengerid  
HAVING sum(tripduration)>2400;
```

Passengers who travelled more than 40 hours in 2022

FirstName	LastName	Phone	Email	flightdeparturedatetime	sum(tripduration)
Eddie	Albert	14387488632	edalbert@gmail.com	2022-01-03 10:35:22	2720
Maxwell	Rivera	16147587685	maxwell34@gmail.com	2022-03-14 19:49:39	2592

Iris Airlines wants to know its most frequent route so it can dedicate more flights to that route.

```
#Iris Airline wants to identify its most frequent route so that it can dedicate more airplanes for that route.  
SELECT flightcode, departureairportcity, arrivalairportcity, COUNT(flightcode)  
FROM flight, flightschedulewithairportcity  
WHERE flight.flightid=FlightSchedulewithAirportCity.flightid  
GROUP BY flightcode  
ORDER BY COUNT(flightcode) DESC;
```

flightcode	DepartureAirportCity	ArrivalAirportCity	COUNT(fligh
RZ6320	Los Angeles	San Francisco	6
RZ1182	Los Angeles	Narita	5
RZ8956	San Francisco	Denver	3

Action: Add more flights from LA to San Francisco

Iris Airlines wants keep track of the languages spoken by its crew members to assign them accordingly to foreign destinations. For a flight to Beijing, we need to identify the crew members who can speak Mandarin.

```
Select Crew.CrewNameFirst, Crew.CrewNameLast, Crew_Language.CrewLanguage  
from Crew, Crew_Language where Crew.CrewID= Crew_Language.CrewID and Crew_Language.CrewLanguage= 'Mandarin';
```

CrewNameFirst	CrewNameLast	CrewLanguage
Oliver	Walker	Mandarin
Margaret	Ronald	Mandarin

Iris Airline will hold an End of Year party where the oldest employed crew member who worked on the most flights will get a special award. We need to identify this crew member, the number of flights he worked in his tenure and his years of experience until now.

- `Create View CrewTenure as (select CrewID,Crew.CrewNameFirst, Crew.CrewNameLast, TIMESTAMPDIFF(year, Crew.CrewDateHired, CURDATE()) as Tenure from Crew);`
- `Create View CrewwithHighestTenure as (select *from CrewTenure where Tenure=(Select max(Tenure) from CrewTenure));`
- `Create View ABC as (SELECT CHT.CrewID,CHT.CrewNameFirst, CHT.CrewNameLast, count(FlightID) as NumberofFlights FROM Crew_Schedule CS JOIN CrewwithHighestTenure CHT ON CS.CrewID=CHT.CrewID group by CHT.CrewID) LIMIT 1;`

	CrewID	CrewNameFirst	CrewNameLast	NumberofFlig...
▶	1	Markela	Hysenllari	3
	2	Oliver	Walker	2
	4	Melvin	Barr	2
	5	Susan	Noval	1

	CrewID	CrewNameFirst	CrewNameLast	Numero
▶	1	Markela	Hysenllari	3



THANK
YOU