# Exam Preparation

A problem for exam preparation for the ["Databases Basics - MSSQL" course @ Software University](https://softuni.bg/trainings/3965/ms-sql-january-2023)

Submit your solutions in the SoftUni Judge system [here](https://judge.softuni.org/Contests/3301/Databases-MSSQL-Server-Retake-Exam-10-Dec-2021)

# Section 1. DDL (30 pts)

You have been given the E/R Diagram of the **Airport**



Create a database called **Airport**. You need to create **7 tables**:

* **Passengers** – contains information about the **passenger**
  + Each passenger has a full name column and an email column.
* **Pilots** – contains information about the **pilot**
  + Each pilot has first and last name columns, an age column, and a rating column.
* **AircraftTypes** – contains information about the **aircraft type**
  + Contains the name of the type of aircraft.
* **Aircraft** – contains information about the **aircraft**
  + Each aircraft has a **manufacturer**, a model column, a year column, a **flight hours** column, a condition column, and an **aircraft type** column.
* **PilotsAircraft** – a many to many mapping tables between the **aircraft** and the **pilots**
  + Have composite primary key from the **AircraftId** column and the **PilotId** column.
* **Airports** – contains information about airport **name** and the **country.**
* **FlightDestinations** – contains information about the **flight destination**
  + Each **flight destination** has an **airport Id** column, a start column, an **aircraft** Id column, a passenger Id column, and a price of the ticket column.

**NOTE: Please keep in mind that in case you have to work with a date, you have to use the exact same data type, described in the models tables. For example, data type Date means that you have to use Date, DateTime means that you have to use DateTime. If you don't use the correct type, the Judge system won't accept your submission as correct.**

**NOTE: Keep in mind that Judge doesn't accept "ALTER" statement and square brackets naming (when the names are not keywords).**

You have been tasked to create the tables in the database by the following models:

### Passengers

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Data Type** | **Constraints** |
| **Id** | **Integer** from **0** to **2,147,483,647** | PK, Unique table identification, Identity |
| **FullName** | **String** up to **100** symbols | Unique, **NULL** is **not** allowed |
| **Email** | **String** up to **50** symbols | Unique, **NULL** is **not** allowed. |

### Pilots

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Data Type** | **Constraints** |
| **Id** | **Integer** from **0** to **2,147,483,647** | PK, Unique table identification, Identity |
| **FirstName** | **String** up to **30** symbols | Unique, **NULL** is **not** allowed |
| **LastName** | **String** up to **30** symbols | Unique, **NULL** is **not** allowed |
| **Age** | **TinyInt** | Age should be between **21** and **62** both inclusively, **NULL** is **not** allowed |
| **Rating** | **Floating-point** number | Rating should be between **0.0** and **10.0** both inclusively, **NULL** **is** allowed. |

### AircraftTypes

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Data Type** | **Constraints** |
| **Id** | **Integer** from **0** to **2,147,483,647** | PK, Unique table identification, Identity |
| **TypeName** | **String** up to **30** symbols | Unique, **NULL** is **not** allowed. |

### Aircraft

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Data Type** | **Constraints** |
| **Id** | **Integer** from **0** to **2,147,483,647** | PK, Unique table identification, Identity |
| **Manufacturer** | **String** up to **25** symbols | **NULL** is **not** allowed. |
| **Model** | **String** up to **30** symbols | **NULL** is **not** allowed. |
| **Year** | **Integer** from **0** to **2,147,483,647** | **NULL** is **not** allowed. |
| **FlightHours** | **Integer** from **0** to **2,147,483,647** | **NULL** **is** allowed. |
| **Condition** | **A character** that shows the **condition** of the aircraft. One character. | **NULL** is **not** allowed. |
| **TypeId** | **Integer** from **0** to **2,147,483,647** | Relationship with table **AircraftTypes**, **NULL** is **not** allowed. |

### PilotsAircraft

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Data Type** | **Constraints** |
| **AircraftId** | **Integer** from **0** to **2,147,483,647** | PK, Unique table identification, Relationship with table **Aircraft**, **NULL** **is not** allowed |
| **PilotId** | **Integer** from **0** to **2,147,483,647** | PK, Unique table identification, Relationship with table **Pilots**, **NULL** **is not** allowed |

### Airports

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Data Type** | **Constraints** |
| **Id** | **Integer** from **0** to **2,147,483,647** | PK, Unique table identification, Identity |
| **AirportName** | **String** up to **70** symbols | Unique, **NULL** is **not** allowed |
| **Country** | **String** up to **100** symbols | Unique, **NULL** is **not** allowed |

### FlightDestinations

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Data Type** | **Constraints** |
| **Id** | **Integer** from **0** to **2,147,483,647** | PK, Unique table identification, Identity |
| **AirportId** | **Integer** from **0** to **2,147,483,647** | Relationship with table **Airports**., **NULL** is **not** allowed |
| **Start** | The **DateTime** when the flight starts | **NULL** is **not** allowed |
| **AircraftId** | **Integer** from **0** to **2,147,483,647** | Relationship with table **Aircraft**, **NULL** is **not** allowed |
| **PassengerId** | **Integer** from **0** to **2,147,483,647** | Relationship with table **Passengers**, **NULL** is **not** allowed |
| **TicketPrice** | **DECIMAL**, up to **18 digits**, **2** of which after the **decimal point**. | **The DEFAULT value** is **15**, **NULL** is **not** allowed |

## Database design

Submit all of your **created** **statements** to Judge (only creation of tables).

# Section 2. DML (10 pts)

**Before you start you have to import "01.DDL\_Dataset.sql". If you have created the structure correctly the data should be successfully inserted.**

In this section, you have to do some data manipulations:

## Insert

Write a query to insert data into the **Passengers** table, based on the **Pilots** table.For all **Pilots** with an **id between 5 and 15** (**both** **inclusive**), **insert data** in the **Passengers** table with the **following values**:

* **FullName**  –get the first and last name of the pilot separated by a single space
  + **Example** – **'Lois Leidle'**
* **Email** – set it to start with **full name with no space** and add **'@gmail.com' - 'FullName@gmail.com'**
  + **Example** – **'LoisLeidle@gmail.com'**

## Update

Update all **Aircraft, which**:

* Have a condition of **'C'** or **'B'**
* Have **FlightHours Null** or **up to** **100 (inclusive)**
* Have **Year** after 2013 **(inclusive)**

By setting their **condition** to **'A'**.

## Delete

Delete every passenger whose **FullName** **is up to** **10** characters (**inclusive) long**.

# Section 3. Querying (40 pts)

**You need to start with a fresh dataset, so recreate your DB and import the sample data again ("01. DDL\_Dataset.sql").**

## Aircraft

Extract information about all the **Aircraft**. **Order** the results by **aircraft's FlightHours descending.**

Required columns:

* **Manufacturer**
* **Model**
* **FlightHours**
* **Condition**

### Example

|  |  |  |  |
| --- | --- | --- | --- |
| **Manufacturer** | **Model** | **FlightHours** | **Condition** |
| Northrop Grumman | Bat | 149039 | C |
| Airbus | A330 | 999 | B |
| Rolls-Royce Holdings | Trent 900 | 958 | B |
| GE Aviation | CF6 | 936 | C |
| Boeing | BBJ | 925 | C |
| Northrop Grumman | X-47A Pegasus | 906 | B |
| … | … | … | … |

## Pilots and Aircraft

Select **pilots** and **aircraft** that they operate. Extract the pilot's **First**, **Last** names, **aircraft's Manufacturer**, **Model,** and **FlightHours**. **Skip** all plains with **NULLs and up to 304 FlightHours**. **Order** the result by the **FlightHours** in **descending** order, then by the pilot's **FirstName** **alphabetically**.

Required columns:

* **FirstName**
* **LastName**
* **Manufacturer**
* **Model**
* **FlightHours**

### Example

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **FirstName** | **LastName** | **Manufacturer** | **Model** | **FlightHours** |
| Genna | Jaquet | Safran | SaM146 | 303 |
| Jaynell | Kidson | Safran | SaM146 | 303 |
| Lexie | Salasar | Safran | SaM146 | 303 |
| Roddie | Gribben | Safran | SaM146 | 303 |
| Delaney | Stove | GE Aviation | CT10 | 275 |
| Crosby | Godlee | Lockheed Martin | F-22 Raptor | 271 |
| … | … | … | … | … |

## Top 20 Flight Destinations

Select top **20 flight destinations**, where **Start** **day** is an even number. Extract **DestinationId, Start date**, **passenger's FullName**, **AirportName,** and **TicketPrice**. Order the result by **TicketPrice descending**, then by **AirportName ascending**.

Required columns:

* **DestinationId**
* **Start**
* **FullName (passenger)**
* **AirportName**
* **TicketPrice**

### Example

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DestinationId** | **Start** | **FullName** | **AirportName** | **TicketPrice** |
| 95 | 2020-07-02 15:27:47.000 | Cullan Dogerty | Kisangani Bangoka International Airport | 5048.89 |
| 9 | 2020-02-06 22:32:14.000 | Lanita Crockatt | Providenciales Airport | 4100.49 |
| 56 | 2021-02-20 21:04:53.000 | Gaye Sillars | Netaji Subhas Chandra Bose International Airport | 4002.21 |
| 55 | 2021-02-28 13:13:55.000 | Zeke Rowston | Sir Seretse Khama International Airport | 3700.65 |
| 32 | 2020-09-10 01:55:19.000 | Jacquelynn Plackstone | Bujumbura International Airport | 3690.22 |
| 38 | 2020-11-28 17:58:40.000 | Jeralee Tue | Winnipeg James Armstrong Richardson International Airport | 3390.81 |
| … | … | … | … | … |

## Number of Flights for Each Aircraft

Extract information about all the **Aircraft** and the **count** of their **FlightDestinations**. Display **average** **ticket price** (**AvgPrice**) of each flight destination by the **Aircraft**, rounded to the second digit. **Take only** the aircraft with **at least 2** **FlightDestinations**. **Order** the results by **count** of **flight destinations descending,** then bythe **aircraft's id ascending**.

Required columns:

* **AircraftId**
* **Manufacturer**
* **FlightHours**
* **FlightDestinationsCount**
* **AvgPrice**

### Example

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **AircraftId** | **Manufacturer** | **FlightHours** | **FlightDestinationsCount** | **AvgPrice** |
| 13 | Safran | 849 | 4 | 3208.200000 |
| 80 | Lockheed Martin | 714 | 4 | 1743.140000 |
| 1 | Safran | 559 | 3 | 1347.710000 |
| 8 | Safran | 527 | 3 | 1366.200000 |
| 25 | Northrop Grumman | 414 | 3 | 452.960000 |
| 37 | GE Aviation | 4 | 3 | 896.950000 |
| … | … | … | … | … |

## Regular Passengers

Extract **all passengers**, who have flown in **more than one aircraft** and have an '**a**' as the second letter of their full name. Select the **full name**, the **count of aircraft** that he/she traveled, and the total sum which was **paid**.

Order the result by passenger's **FullName**.

Required columns:

* FullName
* CountOfAircraft
* TotalPayed

### Example

|  |  |  |
| --- | --- | --- |
| **FullName** | **CountOfAircraft** | **TotalPayed** |
| Danny Simoneau | 2 | 7587.68 |
| Haven Seaton | 2 | 5390.92 |
| Jacquelynn Plackstone | 2 | 4398.36 |
| Kaylee Coushe | 4 | 4286.71 |
| Lanita Crockatt | 2 | 4704.12 |
| Parker McGeorge | 4 | 3896.57 |
| … | … | … |

## Full Info for Flight Destinations

Extract information about **all flight destinations** which **Start** between hours: **6:00** and **20:00** (both inclusive) and have ticket prices **higher than 2500**. Select the **airport's name, time of the day,** **price of the ticket**, passenger's **full name**, **aircraft** **manufacturer**, and aircraft **model**. Order the result by **aircraft model ascending**.

Required columns:

* AirportName
* DayTime
* TicketPrice
* FullName (passenger)
* Manufacturer
* Model

### Example

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **AirportName** | **DayTime** | **TicketPrice** | **FullName** | **Manufacturer** | **Model** |
| N'Djamena International Airport | 2020-09-12 18:14:55.000 | 3096.19 | Owen Strivens | Boeing | 737 |
| Hosea Kutako International Airport | 2020-08-02 15:43:34.000 | 3010.46 | Courtnay Devoy | Boeing | 787 |
| Winnipeg James Armstrong Richardson International Airport | 2020-11-28 17:58:40.000 | 3390.81 | Jeralee Tue | Airbus | A330 |
| Monastir Habib Bourguiba International Airport | 2020-08-23 14:33:46.000 | 4807.43 | Danny Simoneau | Northrop Grumman | B-21 Raider |
| Modibo Keita International Airport | 2021-02-04 14:38:44.000 | 2930.91 | Abbey Pedrinson | Rolls-Royce Holdings | EJ200 |
| King Mswati III International Airport | 2020-06-13 10:53:40.000 | 3190.57 | Juane Gorrynsen | Lockheed Martin | F-117 Nighthawk |
| … | … | … | … | … | … |

# Section 4. Programmability (20 pts)

## Find all Destinations by Email Address

Create a **user-defined function** named **udf\_****FlightDestinationsByEmail(@email)** that receives a **passenger's email address** and returns the number of **flight destinations** that the passenger has in the database.

### Examples

|  |
| --- |
| **Query** |
| SELECT dbo.udf\_FlightDestinationsByEmail ('PierretteDunmuir@gmail.com') |
| **Output** |
| 1 |

|  |
| --- |
| **Query** |
| SELECT dbo.udf\_FlightDestinationsByEmail('Montacute@gmail.com') |
| **Output** |
| 3 |

|  |
| --- |
| **Query** |
| SELECT dbo.udf\_FlightDestinationsByEmail('MerisShale@gmail.com') |
| **Output** |
| 0 |

## Full Info for Airports

Create a **stored procedure**, named **usp\_SearchByAirportName,** which accepts the following parameters:

* airportName(with max length 70)

Extract information about the **airport locations** with the given **airport name.** The needed data is the **name** of the **airport**, **full name** of the **passenger**, **level of the ticket price** (depends on flight destination's ticket price: **'Low'**– lower than **400** (inclusive), **'Medium'** – between **401** and **1500** (inclusive), and **'High' –** more than **1501**), **manufacturer** and **condition** of the aircraft, and the **name** of the **aircraft type**.

**Order** the result by **Manufacturer,** then by passenger's **full** **name**.

Required columns:

* AirportName
* FullName (passenger)
* LevelOfTickerPrice
* Manifacturer
* Condition
* **TypeName (aircraft type)**

### Example

|  |
| --- |
| **Query** |
| EXEC usp\_SearchByAirportName 'Sir Seretse Khama International Airport' |

### Result

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **AirportName** | **FullName** | **LevelOfTickerPrice** | **Manufacturer** | **Condition** | **TypeName** |
| Sir Seretse Khama International Airport | Alyson Jankowski | Low | Airbus | B | Private Single Engine |
| Sir Seretse Khama International Airport | Bev Wrigglesworth | Medium | Airbus | B | Private Single Engine |
| Sir Seretse Khama International Airport | Kelcy Viccary | High | Airbus | B | Mid-Size Passenger Jets |
| Sir Seretse Khama International Airport | Courtnay Devoy | Low | GE Aviation | B | Heavy Business Jets |
| Sir Seretse Khama International Airport | Joyann Garrettson | Low | Lockheed Martin | A | Twin Turboprops |
| Sir Seretse Khama International Airport | Zeke Rowston | High | Lockheed Martin | A | Private Single Engine |