# Database Basics (MSSQL) Demo Exam

# Colonial Journey

2000 years from now, the known space is colonized by the human race. However, the four Citadel Council races are planning to populate new home worlds in the SoftUnia Galaxy as part of a strategy called the SoftUnia Initiative. 20000 citizens are send aboard space transportation vessels. The Council has asked you to create a Colonization Management system so they can keep track of the colonists' journeys trough the stars.

## Database Overview

You have given an Entity / Relationship Diagram of the CJMS Database:



The **ColonialJourney** Database holds information about colonists, their travel cards, information about the journeys, types of space vessels and destination planets. Your task is to create a database called **ColonialJourney**. Then you will have to create several **tables**.

* **Planets** – contains information about **planets**.
* **Spaceports** – contains information about **space ports**.
* **Spaceships –** contains information about **space ships**.
* **Colonists –** contains information about **colonists**.
* **Journeys –** contains information about **journeys**.
* **TravelCards –** contains information about **travel cards**.

Make sure you implement the whole database correctly on your local machine, so that you could work with it.

The instructions you are given will be the minimal needed for you to implement the database.

# Section 1. DDL (30 pts)

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

### Planets

|  |  |  |
| --- | --- | --- |
| **Column** | **Data Type** | **Constraints** |
| Id | **Integer,** from **1** to **2,147,483,647.** | Unique table **identificator**, **Identity** |
| Name | **String** up to 30 symbols. Non Unicode | **NULL** is **not** allowed |

### Spaceports

|  |  |  |
| --- | --- | --- |
| **Column** | **Data Type** | **Constraints** |
| Id | **Integer,** from **1** to **2,147,483,647.** | Unique table **identificator**, **Identity** |
| Name | **String** up to 50 symbols. Non Unicode | **NULL** is **not** allowed |
| PlanetId | **Integer,** from **1** to **2,147,483,647.** | **NULL** is **not** allowed, Relationship with table Planets |

### Spaceships

|  |  |  |
| --- | --- | --- |
| **Column** | **Data Type** | **Constraints** |
| Id | **Integer** from **0** to **2,147,483,647** | Unique table **identificator**, **Identity** |
| Name | **String** up to 50 symbols. Non Unicode | **NULL** is **not** allowed |
| Manufacturer | **String** up to 30 symbols. Non Unicode | **NULL** is **not** allowed |
| LightSpeedRate | **Integer** from **0** to **2,147,483,647** | Has a **default value** of 0. |

### Colonists

|  |  |  |
| --- | --- | --- |
| **Column** | **Data Type** | **Constraints** |
| Id | **Integer** from **0** to **2,147,483,647** | Unique table **identificator**, **Identity** |
| FirstName | **String** up to 20 symbols. Non Unicode | **NULL** is **not** allowed |
| LastName | **String** up to 20 symbols. Non Unicode | **NULL** is **not** allowed |
| Ucn | **String** up to 10 symbols. Non Unicode | **NULL** is **not** allowed **UNIQUE** values. |
| BirthDate | **Date** | **NULL** is **not** allowed |

### Journeys

|  |  |  |
| --- | --- | --- |
| **Column** | **Data Type** | **Constraints** |
| Id | **Integer** from **0** to **2,147,483,647** | Unique table **identificator**, **Identity** |
| JourneyStart | **DateTime** | **NULL** is **not** allowed |
| JourneyEnd | **DateTime** | **NULL** is **not** allowed |
| Purpose | **String** up to 11 symbols. Non Unicode | Should **only** contain one of the following purposes: “**Medical**”, “**Technical**”, “**Educational**”, “**Military**” |
| DestinationSpaceportId | **Integer** from **0** to **2,147,483,647** | **NULL** is **not** allowed, Relationship with table Spaceports. |
| SpaceshipId | **Integer** from **0** to **2,147,483,647** | **NULL** is **not** allowed, Relationship with table Spaceships |

### TravelCards

|  |  |  |
| --- | --- | --- |
| **Column** | **Data Type** | **Constraints** |
| Id | **Integer** from **0** to **2,147,483,647** | Unique table **identificator**, **Identity** |
| CardNumber | A **string** containing exactly **10 characters**.Non Unicode | **NULL** is **not** allowed **UNIQUE** values. |
| JobDuringJourney | **String** up to 8 symbols. Non Unicode | Should **only** contain one of the following jobs: “**Pilot**”, “**Engineer**”, “**Trooper**”, “**Cleaner**”, “**Cook**” |
| ColonistId | **Integer** from **0** to **2,147,483,647** | **NULL** is **not** allowed, Relationship with table Colonists |
| JourneyId | **Integer** from **0** to **2,147,483,647** | **NULL** is **not** allowed, Relationship with table Journeys |

## Database Design

Submit all of yours **create** **statements** to the **Judge** system.

# Section 2. DML (10 pts)

**Before you start, you must import “**DataSet-ColonialJourney.sql**”. If you have created the structure correctly, the data should be successfully inserted without any errors.**

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

## Insert

**Insert** sample data into the database. Write a query to add the following records into the corresponding tables. **All Ids should be auto-generated**.

**Planets**

|  |
| --- |
| **Name** |
| Mars |
| Earth |
| Jupiter |
| Saturn |

**Spaceships**

|  |  |  |
| --- | --- | --- |
| **Name** | **Manufacturer** | **LightSpeedRate** |
| Golf | VW | 3 |
| WakaWaka | Wakanda | 4 |
| Falcon9 | SpaceX | 1 |
| Bed | Vidolov | 6 |

## Update

Update all spaceships light speed rate with 1where the **Id** is between **8** and **12.**

## Delete

Delete first three inserted **Journeys** (be careful with the relationships).

# Section 3. Querying (40 pts)

**You need to start with a fresh dataset, so recreate your DB and import the sample data again (**DataSet-ColonialJourney.sql**).**

## Select all travel cards

Extract from the database, all **travel cards.** Sort the results by **card number ascending.**

### Required Columns

* **CardNumber**
* **JobDuringJourney**

### Example

|  |  |
| --- | --- |
| **CardNumber** | **JobDuringJourney** |
| **0032031181** | Engineer |
| 0037637193 | Engineer |
| ... | ... |

## Select all colonists

Extract from the database, all **colonists.** Sort the results by **first name**, then by **last name**, and finally by **id** in **ascending** order.

### Required Columns

* **Id**
* **FullName**
* **Ucn**

### Example

|  |  |  |
| --- | --- | --- |
| **Id** | **FullName** | **Ucn** |
| 35 | Aigneis McConville | 9225403496 |
| 92 | Althea Kelinge | 9998159318 |
| ... | ... | ... |

## Select all military journeys

Extract from the database, all **Military** journeys. Sort the results **ascending** by **journey start.**

### Required Columns

* **Id**
* **JourneyStart**
* **JourneyEnd**

### Example

|  |  |  |
| --- | --- | --- |
| **Id** | **JourneyStart** | **JourneyEnd** |
| 7 | 04/01/2019 | 09/12/2049 |
| 3 | 21/02/2019 | 03/01/2049 |
| ... | ... | ... |

## Select all pilots

Extract from the database all colonists, which have a **pilot job.** Sort the result by **id, ascending.**

### `Required Columns

* **Id**
* **FullName**

### Example

|  |  |
| --- | --- |
| **id** | **full\_name** |
| 6 | Clark Cowan |
| 18 | Wald Bim |
| ... | ... |

## Count colonists

Count all colonists that are on **technical journey.**

### Required Columns

* **Count**

### Example

|  |
| --- |
| **count** |
| 16 |

## Select the fastest spaceship

Extract from the database the fastest **spaceship** and its destination **spaceport name**. In other words, the ship with the **highest** light speed rate.

### Required Columns

* **SpaceshipName**
* **SpaceportName**

### Example

|  |  |
| --- | --- |
| **SpaceshipName** | **SpaceportName** |
| SSE Priestess | Yggdrasil Station |

## Select spaceships with pilots younger than 30 years

Extract from the database those **spaceships**, which have pilots, **younger** than 30 years old. In other words, 30 years from 01/01/2019. Sort the results **alphabetically** by spaceship **name**.

### Required Columns

* **Name**
* **Manufacturer**

### Example

|  |  |
| --- | --- |
| **Name** | **Manufacturer** |
| Anarchy | Fivebridge |
| ... | ... |

## Select all educational mission planets and spaceports

Extract from the database names of all **planets** and their **spaceports**, which have **educational** missions. Sort the results by **spaceport name** in **descending** order.

### Required Columns

* **PlanetName**
* **SpaceportName**

### Example

|  |  |
| --- | --- |
| **PlanetName** | **SpaceportName** |
| Kascarth | Yggdrasil Station |
| Lescore | Tartarus |
| ... | ... |

## Select all planets and their journey count

Extract from the database all **planets’ names** and their **journeys count**. Order the results by journeys **count**, **descending** and by **planet name ascending**.

### Required Columns

* **PlanetName**
* **JourneysCount**

### Example

|  |  |
| --- | --- |
| **PlanetName** | **JourneysCount** |
| Otroyphus | 4 |
| Eipra | 2 |
| ... | ... |

## Select the shortest journey

Extract from the database the **shortest** **journey,** its destination **spaceport** **name**, **planet name** and **purpose**.

### Required Columns

* **Id**
* **PlanetName**
* **SpaceportName**
* **JourneyPurpose**

### Example

|  |  |  |  |
| --- | --- | --- | --- |
| **Id** | **PlanetName** | **SpaceportName** | **JourneyPurpose** |
| 3 | Casmadus | Minerva Station | Military |

## Select the less popular job

Extract from the database the **less popular job** in the **longest journey**. In other words, the job with less assign colonists.

### Required Columns

* **JourneyId**
* **JobName**

### Example

|  |  |
| --- | --- |
| **JourneyId** | **JobName** |
| 7 | Engineer |

## Select Second Oldest Important Colonist

Find all colonists and their job during journey with rank 2. Keep in mind that all the selected colonists with rank 2 must be the oldest ones. You can use ranking over their job during their journey.

### Required Columns

* **JobDuringJourney**
* **FullName**
* **JobRank**

### Example

|  |  |  |
| --- | --- | --- |
| **JobDuringJourney** | **FullName** | **JobRank** |
| Cleaner | Hale O'Doireidh | 2 |
| Cook | Laurie Askin | 2 |
| … | … | … |

## Planets and Spaceports

Find all planets and all of their spaceports. Select planet name and the count of the spaceports. Sort them by spaceports count (descending), then by name (ascending).

### Required Columns

* **Name**
* **Count**

### Example

|  |  |
| --- | --- |
| **Name** | **Count** |
| Kascarth | 4 |
| Jeayama | 3 |
| … | … |

# Section 4. Programmability (20 pts)

## Get Colonists Count

Create a **user defined function** with the name **dbo.udf\_GetColonistsCount(PlanetName VARCHAR (30))** that receives **planet name** and returns the count of all colonists sent to that planet.

### Example

|  |  |
| --- | --- |
| **Query** | |
| SELECT dbo.udf\_GetColonistsCount('Otroyphus') | |
| PlanetName | Count |
| **Otroyphus** | **35** |

## Change Journey Purpose

Create a **user defined stored procedure**, named **usp\_ChangeJourneyPurpose(@JourneyId, @NewPurpose)**, that receives an **journey id** and **purpose**, and attempts to **change the purpose of that journey**. An purpose will only be changed if all of these conditions **pass**:

* If the **journey id** doesn’t exists, then it **cannot be changed.** **Raise an error** with the message “The journey does not exist!”
* If the **journey** has already that purpose, **raise an error** with the message “You cannot change the purpose!”

If all the above conditions pass, **change the purpose of that journey**.

### Example

|  |  |
| --- | --- |
| **Query** | **Output** |
| **EXEC usp\_ChangeJourneyPurpose 1, 'Technical'** **SELECT \* FROM Journeys** | **998**  **2455** |
| **EXEC usp\_ChangeJourneyPurpose 2, 'Educational'** | **You cannot change the purpose!** |
| **EXEC usp\_ChangeJourneyPurpose 196, 'Technical'** | **The journey does not exist!** |

## Deleted Journeys

Create a new table **“DeletedJourneys**” with columns **(Id, JourneyStart, JourneyEnd, Purpose, DestinationSpaceportId, SpaceshipId)**. Create a **trigger**, which fires when journey is deleted. After deleting the journey, **insert all of the data into the new table “DeletedJourneys”**.

Note: Submit only your **CREATE TRIGGER** statement!

### Example

|  |
| --- |
| **Query** |
| **DELETE FROM TravelCards**  **WHERE JourneyId = 1**  **DELETE FROM Journeys**  **WHERE Id = 1** |
| **Response** |
| **(5 rows affected)**  **(1 rows affected)**  **(1 rows affected)** |