# Exercises: Data Definition and Data Types

This document defines the **exercise assignments** for the ["Databases Basics - MSSQL" course @ Software University.](https://softuni.bg/courses/databases-basics-ms-sql-server)

<https://www.youtube.com/watch?v=YoAgndBj2_k&t=3s>

<https://www.youtube.com/watch?v=YoAgndBj2_k>

## Create Database

You now know how to create database using the GUI of the SSMS. Now it’s time to create it using SQL queries. In that task (and the several following it) you will be required to create the database from the previous exercise **using only SQL queries**. Firstly, just **create new database named Minions.**

## Create Tables

In the newly created database Minions add table **Minions (Id, Name, Age)**. Then add new table **Towns (Id, Name).** Set **Id** columns of both tables to be **primary key** as **constraint**.

## Alter Minions Table

Change the structure of the Minions table to have **new column TownId** that would be of the same type as the **Id** column of **Towns table**. Add **new constraint** that makes **TownId** **foreign key** and references to **Id** column of **Towns** table.

## Insert Records in Both Tables

**Populate both tables** with sample records given in the table below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Minions** | | | |  | **Towns** | |
| **Id** | **Name** | **Age** | **TownId** |  | **Id** | **Name** |
| 1 | Kevin | 22 | 1 |  | 1 | Sofia |
| 2 | Bob | 15 | 3 |  | 2 | Plovdiv |
| 3 | Steward | NULL | 2 |  | 3 | Varna |

Use only SQL queries. Insert the Id manually (don’t use identity).

## Truncate Table Minions

**Delete all the data** from the Minions table using **SQL query.**

## Drop All Tables

**Delete all tables** from the Minions database using **SQL query**.

## Create Table People

Using **SQL query** create table **People** with columns:

* **Id** – unique number for every person there will be **no more than 231-1** **people.** (Auto incremented)
* **Name** – full name of the person will be **no more than 200 Unicode characters**. (Not null)
* **Picture** – image with **size up to** **2 MB.** (Allow nulls)
* **Height** – In meters. Real number precise up to **2 digits** after floating point. (Allow nulls)
* **Weight** – In kilograms. Real number precise up to **2 digits** after floating point. (Allow nulls)
* **Gender** – Possible states are **m** or **f.** (Not null)
* **Birthdate –** (Not null)
* **Biography** – detailed biography of the person it can contain **max allowed Unicode characters.** (Allow nulls)

Make **Id** primary key. Populate the table with only **5 records**. Submit your **CREATE** and **INSERT statements** as Run queries & check DB.

## Create Table Users

Using **SQL query** create table **Users** with columns:

* **Id** – unique number for every user. There will be **no more than 263-1 users.** (Auto incremented)
* **Username** – unique identifier of the user will be **no more than 30 characters (non Unicode).** (Required)
* **Password** – password will be **no longer than 26 characters (non Unicode).** (Required)
* **ProfilePicture** – image with **size up to 900 KB.**
* **LastLoginTime**
* **IsDeleted** – shows if the user deleted his/her profile. Possible states are **true** or **false**.

Make **Id** primary key. Populate the table with exactly **5 records**. Submit your **CREATE** and **INSERT statements** as Run queries & check DB.

## Change Primary Key

Using **SQL queries** modify table **Users** from the previous task. First **remove current primary key** then create **new primary key** that would be the **combination** of fields **Id** and **Username**.

## Add Check Constraint

Using **SQL queries** modify table **Users**. Add **check constraint** to ensure that the values in the Password field are **at least 5 symbols** long.

## Set Default Value of a Field

Using **SQL queries** modify table **Users**. Make the **default value** of **LastLoginTime** field to be the **current time.**

## Set Unique Field

Using **SQL queries** modify table **Users**. Remove **Username** field from the primary key so only the field **Id** would be primary key. Now **add unique constraint** to the **Username** field to ensure that the values there are **at least 3 symbols** long.

## Movies Database

Using **SQL queries** create **Movies** database with the following entities:

* **Directors** (Id, DirectorName, Notes)
* **Genres** (Id, GenreName, Notes)
* **Categories** (Id, CategoryName, Notes)
* **Movies** (Id, Title, DirectorId, CopyrightYear, Length, GenreId, CategoryId, Rating, Notes)

Set most **appropriate data types** for each column. **Set primary key** to each table. Populate each table with exactly **5 records**. Make sure the columns that are present in 2 tables would be of the **same data type**. Consider which fields are always required and which are optional. Submit your **CREATE TABLE** and **INSERT statements** as Run queries & check DB.

## Car Rental Database

Using **SQL queries** create **CarRental** database with the following entities:

* **Categories** (Id, CategoryName, DailyRate, WeeklyRate, MonthlyRate, WeekendRate)
* **Cars** (Id, PlateNumber, Manufacturer, Model, CarYear, CategoryId, Doors, Picture, Condition, Available)
* **Employees** (Id, FirstName, LastName, Title, Notes)
* **Customers** (Id, DriverLicenceNumber, FullName, Address, City, ZIPCode, Notes)
* **RentalOrders** (Id, EmployeeId, CustomerId, CarId, TankLevel, KilometrageStart, KilometrageEnd, TotalKilometrage, StartDate, EndDate, TotalDays, RateApplied, TaxRate, OrderStatus, Notes)

Set most **appropriate data types** for each column. **Set primary key** to each table. Populate each table with only **3 records**. Make sure the columns that are present in 2 tables would be of the **same data type**. Consider which fields are always required and which are optional. Submit your **CREATE TABLE** and **INSERT statements** as Run queries & check DB.

## Hotel Database

Using **SQL queries** create **Hotel** database with the following entities:

* **Employees** (Id, FirstName, LastName, Title, Notes)
* **Customers** (AccountNumber, FirstName, LastName, PhoneNumber, EmergencyName, EmergencyNumber, Notes)
* **RoomStatus** (RoomStatus, Notes)
* **RoomTypes** (RoomType, Notes)
* **BedTypes** (BedType, Notes)
* **Rooms** (RoomNumber, RoomType, BedType, Rate, RoomStatus, Notes)
* **Payments** (Id, EmployeeId, PaymentDate, AccountNumber, FirstDateOccupied, LastDateOccupied, TotalDays, AmountCharged, TaxRate, TaxAmount, PaymentTotal, Notes)
* **Occupancies** (Id, EmployeeId, DateOccupied, AccountNumber, RoomNumber, RateApplied, PhoneCharge, Notes)

Set most **appropriate data types** for each column. **Set primary key** to each table. Populate each table with only **3 records**. Make sure the columns that are present in 2 tables would be of the **same data type**. Consider which fields are always required and which are optional. Submit your **CREATE TABLE** and **INSERT statements** as Run queries & check DB.

## Create SoftUni Database

Now create bigger database called **SoftUni.** You will use same database in the future tasks. It should hold information about // CREATE DIFF TABLES AS FOLLOWS

* **Towns** (Id, Name)
* **Addresses** (Id, AddressText, TownId)
* **Departments** (Id, Name)
* **Employees** (Id, FirstName, MiddleName, LastName, JobTitle, DepartmentId, HireDate, Salary, AddressId)

**Id** columns are **auto incremented** starting from 1 and increased by 1 (1, 2, 3, 4…). Make sure you **use appropriate data types** for each column. Add **primary** and **foreign keys** **as constraints** for each table. Use **only SQL queries**. Consider which fields are always required and which are optional.

**auto incremented = INDENTITY // I DONT FILL THEM, THE SYSTEM FILLS THEM AUTOMATICALLY WHEN I ENTER NEW HORIZONTAL RECORD !**

## Backup Database

Backup the database **SoftUni** from the previous tasks into a file named “**softuni-backup.bak**”. Delete your database from SQL Server Management Studio. Then restore the database from the created backup.

**Hint:** [**https://support.microsoft.com/en-gb/help/2019698/how-to-schedule-and-automate-backups-of-sql-server-databases-in-sql-se**](https://support.microsoft.com/en-gb/help/2019698/how-to-schedule-and-automate-backups-of-sql-server-databases-in-sql-se)

## Basic Insert

Use the **SoftUni** database and insert some data **using SQL queries**.

* **Towns:** Sofia, Plovdiv, Varna, Burgas
* **Departments:** Engineering, Sales, Marketing, Software Development, Quality Assurance
* **Employees:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Job Title** | **Department** | **Hire Date** | **Salary** |
| Ivan Ivanov Ivanov | .NET Developer | Software Development | 01/02/2013 | 3500.00 |
| Petar Petrov Petrov | Senior Engineer | Engineering | 02/03/2004 | 4000.00 |
| Maria Petrova Ivanova | Intern | Quality Assurance | 28/08/2016 | 525.25 |
| Georgi Teziev Ivanov | CEO | Sales | 09/12/2007 | 3000.00 |
| Peter Pan Pan | Intern | Marketing | 28/08/2016 | 599.88 |

## Basic Select All Fields

Use the **SoftUni** database and first select all records from the **Towns**, then from **Departments** and finally from **Employees** table. Use SQL queries and submit them to Judge at once. Submit your query statements as Prepare DB & Run queries.

## selectBasic Select All Fields and Order Them

Modify queries from previous problem by sorting:

* **Towns** - alphabetically by name
* **Departments** - alphabetically by name
* **Employees** - descending by salary

Submit your query statements as Prepare DB & Run queries.

## Basic Select Some Fields

Modify queries from previous problem to show only **some of the columns**. For table:

* **Towns** – Name
* **Departments** – Name
* **Employees** – FirstName, LastName, JobTitle, Salary

**Keep the ordering** from the previous problem. Submit your query statements as Prepare DB & Run queries.

## Increase Employees Salary

Use **SoftUni** database and **increase the salary** of all employees by **10%.** Then show **only Salary** column for all in the **Employees** table. Submit your query statements as Prepare DB & Run queries.

## Decrease Tax Rate

Use **Hotel** database and **decrease tax rate by** **3%** to all payments. Then select **only** **TaxRate** column from the **Payments** table. Submit your query statements as Prepare DB & Run queries.

## Delete All Records

Use **Hotel** database and **delete all records** from the **Occupancies** table. Use SQL query. Submit your query statements as Run skeleton, run queries & check DB.

///

CREATE TABLE Towns(

Id INT PRIMARY KEY IDENTITY,

[Name] VARCHAR(20) NOT NULL

)

CREATE TABLE Addresses(

Id INT PRIMARY KEY IDENTITY,

AddressText VARCHAR(20) NOT NULL,

TownId INT FOREIGN KEY REFERENCES Towns(Id)

)

CREATE TABLE Departments(

Id INT PRIMARY KEY IDENTITY,

[Name] VARCHAR(30) NOT NULL

)

CREATE TABLE Employees (

Id INT PRIMARY KEY IDENTITY,

FirstName VARCHAR(30),

MiddleName VARCHAR(30),

LastName VARCHAR(30),

Jobtitle VARCHAR(30)NOT NULL,

DepartmentId INT FOREIGN KEY REFERENCES Departments(Id),

HireDate DATETIME NOT NULL,

Salary DECIMAL(15,2)NOT NULL,

AddressId INT FOREIGN KEY REFERENCES Addresses(Id)

)

INSERT INTO Towns ([Name])

VALUES('Sofia'),('Plovdiv')

--• Departments: Engineering, Sales, Marketing, Software Development, Quality Assurance

INSERT INTO Departments ([Name])

VALUES ('Engineering'),

('Sales'),

('Marketing'),

('Software Development'),

('Quality Assurance')

-- eMPLOYEES -> Name Job Title Department Hire Date Salary

INSERT INTO Employees(FirstName, Jobtitle, DepartmentId, HireDate, Salary)

VALUES('Ivan Ivanov Ivanov', '.NET Developer', 4 , 01/02/2013, 3500.00),

('Petar Petrov Petrov', 'Senior Engineer', 1 , 02/03/2004, 4000.00),

('Maria Petrova Ivanova', 'Intern', 5 , 28/08/2016, 525.25),

('Georgi Teziev Ivanov', 'CEO', 2, 09/12/2007, 3000.00),

('Peter Pan Pan', 'Intern', 3, 28/08/2016, 599.88)

SELECT \* FROM Towns

SELECT \* FROM Departments

SELECT \* FROM Employees

SELECT \* FROM Towns

ORDER BY Name

SELECT \* FROM Departments

ORDER BY Name

SELECT \* FROM Employees

ORDER BY Salary DESC

SELECT Name FROM Towns

ORDER BY Name

SELECT Name FROM Departments

ORDER BY Name

SELECT FirstName, LastName , Jobtitle ,Salary FROM Employees

ORDER BY Salary DESC

UPDATE Employees

SET Salary += Salary \* 0.10;

SELECT Salary FROM Employees

UPDATE Employees

SET Salary -= Salary \* 0.03

SELECT Salary FROM Employees

TRUNCATE TABLE Employees

--truncate we delete the content of the table not the thable itself, We shorten tghee content of the table, the delete some of the content

TRUNCATE Table Towns

//HOW TO DELETE pk from a table

ALTER TABLE Minions

DROP CONSTRAINT [PK\_\_Minions\_\_3214EC0792EAE5AF] --removing prtimary key -see keys code from folder keys

How to add pk into a table

ALTER TABLE Minions

ADD CONSTRAINT PK\_Minions PRIMARY KEY (Id) --adding a primary key

/////

///

--CREATE DATABASE Practice

CREATE TABLE Users

(

Id BIGINT,

Username VARCHAR(30),

Password VARCHAR(26),

ProfilePicture VARBINARY(MAX),

LastLoginTime DATE,

IsDeleted BIT

)

--ALTER TABLE Users

--ALTER COLUMN Id INT NOT NULL

--ADD CONSTRAINT PK\_Users PRIMARY KEY (Id)

--ADD PRIMARY KEY (Id)

ALTER TABLE Users

ADD CONSTRAINT CH\_PictureSize CHECK (DATALENGTH(ProfilePicture) < 900 \* 1024)

DECLARE @C VARCHAR(MAX) = '|'

DECLARE @ProfilePicture VARBINARY(MAX) = CONVERT(VARBINARY(MAX),REPLICATE(@C,(921500)))

INSERT INTO Users (Id , Username, Password, ProfilePicture)

VALUES

(2, 'Gosho', 'Pass123', @ProfilePicture)

ALTER TABLE Users

--ALTER COLUMN Username VARCHAR(30) NOT NULL

ADD CONSTRAINT UQ\_Username UNIQUE (Username)

ALTER TABLE Users

ADD CONSTRAINT CH\_USERNAME CHECK (Username = 'm' OR Username = 'f')

ALTER TABLE Users

DROP CONSTRAINT CH\_USERNAME

INSERT INTO Users (Id, Username, Password)

VALUES(3,'m','123'

)

Till task 10 /

ALTER TABLE Users

ADD CONSTRAINT CH\_PasswordLength CHECK(LEN (Password) >= 5)