# Database Basics MS SQL Exam Preparation

Submit your solutions in the SoftUni Judge system at [Judge](https://judge.softuni.org/Contests/4801/MS-SQL-Regular-Exam-16-June-2024).

# Library Database

# Section 1. DDL (30 pts)

You have been given the E/R Diagram of the **LibraryDb** database.



Create a database called **LibraryDb**. You need to create **6 tables**:

* **Books** – contains information about each book;
* **Authors** – contains information about the authors of the books;
* **Libraries** – contains information about each library;
* **Genres** – contains information about the book’s category;
* **Contacts** – contains information about the contact methods with the libraries or the authors;
* **LibrariesBooks** - manages the many-to-many relationship between libraries and books, indicating which libraries store specific books and which books are stored in a specific library;

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

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

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

### ****Books****

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Data Type** | **Constraints** |
| **Id** | **Integer** from **0** to **2,147,483,647** | PK, Unique table identification, Identity |
| **Title** | **String** up to **100** symbols, **Unicode** | **Null** is **not** allowed |
| **YearPublished** | **Integer** from **0** to **2,147,483,647** | **Null** is **not** allowed |
| **ISBN** | **String** up to **13** symbols, **Unicode** | **Unique, Null** is **not** allowed |
| **AuthorId** | **Integer** from **0** to **2,147,483,647** | **Relationship** with table **Authors**, **Null** is **not** allowed |
| **GenreId** | **Integer** from **0** to **2,147,483,647** | **Relationship** with table **Genres**, **Null** is **not** allowed |

### Authors

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Data Type** | **Constraints** |
| **Id** | **Integer** from **0** to **2,147,483,647** | PK, Unique table identification, Identity |
| **Name** | **String** up to **100** symbols, **Unicode** | **Null** is **not** allowed |
| **ContactId** | **Integer** from **0** to **2,147,483,647** | **Relationship** with table **Contacts**, **Null** is not allowed |

### Libraries

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Data Type** | **Constraints** |
| **Id** | **Integer** from **0** to **2,147,483,647** | PK, Unique table identification, Identity |
| **Name** | **String** up to **50** symbols, **Unicode** | **Null** is **not** allowed |
| **ContactId** | **Integer** from **0** to **2,147,483,647** | **Relationship** with table **Contacts**, **Null** is **not** allowed |

### ****Genres****

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

### Contacts

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Data Type** | **Constraints** |
| **Id** | **Integer** from **0** to **2,147,483,647** | PK, Unique table identification, Identity |
| **Email** | **String** up to **100** symbols, **Unicode** | **Null** is allowed |
| **PhoneNumber** | **String** up to **20** symbols, **Unicode** | **Null** is allowed |
| **PostAddress** | **String** up to **200** symbols, **Unicode** | **Null** is allowed |
| **Website** | **String** up to **50** symbols, **Unicode** | **Null** is allowed |

### ****LibrariesBooks****

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Data Type** | **Constraints** |
| **LibraryId** | **Integer** from **0** to **2,147,483,647** | PK, Unique table identification, Relationship with table **Libraries**, **Null** is not allowed |
| **BookId** | **Integer** from **0** to **2,147,483,647** | PK, Unique table identification, Relationship with table **Books**, **Null** is not allowed |

## Database design

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

# Section 2. DML (10 pts)

**Before you start, you have to import "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

Let's **insert** some sample data into the database. Write a query to add the following records to the corresponding tables. All IDs (Primary Keys) should be **auto-generated**.

### ****Contacts****

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Id** | **Email** | **PhoneNumber** | **PostAddress** | **Website** |
| 21 | NULL | NULL | NULL | NULL |
| 22 | NULL | NULL | NULL | NULL |
| 23 | 'stephen.king@example.com' | '+4445556666' | '15 Fiction Ave, Bangor, ME' | 'www.stephenking.com' |
| 24 | 'suzanne.collins@example.com' | '+7778889999' | '10 Mockingbird Ln, NY, NY' | 'www.suzannecollins.com' |

### ****Authors****

|  |  |  |
| --- | --- | --- |
| **Id** | **Name** | **ContactId** |
| 16 | 'George Orwell' | 21 |
| 17 | 'Aldous Huxley' | 22 |
| 18 | 'Stephen King' | 23 |
| 19 | 'Suzanne Collins' | 24 |

### ****Books****

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Id** | **Title** | **YearPublished** | **ISBN** | **AuthorId** | **GenreId** |
| 36 | '1984' | 1949 | '9780451524935' | 16 | 2 |
| 37 | 'Animal Farm' | 1945 | '9780451526342' | 16 | 2 |
| 38 | 'Brave New World' | 1932 | '9780060850524' | 17 | 2 |
| 39 | 'The Doors of Perception' | 1954 | '9780060850531' | 17 | 2 |
| 40 | 'The Shining' | 1977 | '9780307743657' | 18 | 9 |
| 41 | 'It' | 1986 | '9781501142970' | 18 | 9 |
| 42 | 'The Hunger Games' | 2008 | '9780439023481' | 19 | 7 |
| 43 | 'Catching Fire' | 2009 | '9780439023498' | 19 | 7 |
| 44 | 'Mockingjay' | 2010 | '9780439023511' | 19 | 7 |

### ****LibrariesBooks****

|  |  |
| --- | --- |
| **LibraryId** | **BookId** |
| 1 | 36 |
| 1 | 37 |
| 2 | 38 |
| 2 | 39 |
| 3 | 40 |
| 3 | 41 |
| 4 | 42 |
| 4 | 43 |
| 5 | 44 |

## Update

For **all authors who do not have a website listed in their contact information**, update their contact information to include a website. The website should be in the format: **"www."** + **"authorname"** + **".com"**

**'authorname' -> in lowercase without spaces**

**'George Orwell' -> www.georgeorwell.com**

## Delete

You are required to **delete 'Alex Michaelides' from the Authors table**. This is challenging because the **Authors** table is **referenced by the Books table**, which in turn is **referenced by the LibrariesBooks table**. Therefore, you need to handle these references correctly to maintain the integrity of the database.

# Section 3. Querying (40 pts)

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

## Books by Year of Publication

Select all **books,** ordered by **year** of publication – **descending**, and then by **title** - alphabetically.

Required columns:

* **Book Title**
* **ISBN**
* **YearReleased**

### Example

|  |  |  |
| --- | --- | --- |
| **Book Title** | **ISBN** | **YearReleased** |
| 'The Silent Patient' | '9781250301697' | 2019 |
| 'Becoming' | '9781524763138' | 2018 |
| 'Educated' | '9780399590504' | 2018 |
| 'The Great Alone' | '9780312577230' | 2018 |
| 'Where the Crawdads Sing' | '9780735219090' | 2018 |
| 'A Storm of Swords' | '9780553106633' | 2000 |
| … | … |  |

## Books by Genre

Select all **books** with **'Biography'** or **'Historical Fiction'** genres. Order results by **Genre**, and then by **book title** – **alphabetically**.

Required columns:

* **Id**
* **Title**
* **ISBN**
* **Genre**

### Example

|  |  |  |  |
| --- | --- | --- | --- |
| **Id** | **Title** | **ISBN** | **Genre** |
| 3 | Becoming | 9781524763138 | Biography |
| 25 | Anna Karenina | 9780143035008 | Historical Fiction |
| 33 | Crime and Punishment | 9780140449136 | Historical Fiction |
| … | … | … | … |

## Libraries Missing Specific Genre

Select all **libraries that do not have any books of a specific genre** (**'Mystery'**). Order the results by the name of the library in ascending order.

Required columns:

* **Library**
* **Email**

### Example

|  |  |
| --- | --- |
| **Library** | **Email** |
| Politics and Prose | politics@example.com |
| Powell's City of Books | powells@example.com |
| Strand Bookstore | strand@example.com |
| Tattered Cover | tattered@example.com |

## First 3 Books

Your task is to write a query to select the first 3 books from the library database (LibraryDb) that meet the following criteria:

* The book was **published after the year 2000** **and** **contains the letter 'a' in the book title**,
* OR
* The book was **published before 1950** **and the genre name contains the word 'Fantasy'**.

The results should be **ordered by the book title in ascending order**, and **then by the year published in descending** order.

Required columns:

* **Title**
* **Year**
* **Genre**

### Example

|  |  |  |
| --- | --- | --- |
| **Title** | **Year** | **Genre** |
| Educated | 2018 | Memoir |
| The Great Alone | 2018 | Historical Fiction |
| The Hobbit | 1937 | Fantasy |

## Authors from the UK

Your task is to write a query to **select all authors from the UK** (their PostAddress contains 'UK'). The address information is stored in the Contacts table under the PostAddress column. The results should be **ordered by the author's name in ascending order**.

Required columns:

* **Author**
* **Email**
* **Address**

### Example

|  |  |  |
| --- | --- | --- |
| **Author** | **Email** | **Address** |
| J.K. Rowling | jk@example.com | 100 Kings Rd, London, UK |
| J.R.R. Tolkien | jrr@example.com | 221B Baker St, London, UK |

## Fictions in Denver

Your task is to write a query to **select details for books of a specific genre -'Fiction', and are sold in libraries located in Denver - their PostAddress contains 'Denver'**. **Order** the result **by book title** – alphabetically.

Required columns:

* **Author**
* **Title**
* **Library**
* **Library Address**

### Example

|  |  |  |  |
| --- | --- | --- | --- |
| **Author** | **Title** | **Library** | **Library Address** |
| Charles Dickens | A Tale of Two Cities | Tattered Cover | 2526 E Colfax Ave, Denver, CO |
| Charles Dickens | Great Expectations | Tattered Cover | 2526 E Colfax Ave, Denver, CO |

# Section 4. Programmability (20 pts)

## Authors with Books

Create a user-defined function, named **udf\_AuthorsWithBooks(@name)** that receives an author's name.

* The function will accept an **author's name as a parameter**
* It will join the relevant tables to **count the total number of books by that author available in all libraries**

### Example

|  |
| --- |
| **Query** |
| **SELECT dbo.udf\_AuthorsWithBooks('J.K. Rowling')** |
| **Output** |
| **3** |

## Search for Books from a Specific Genre

Create a **stored procedure**, named **usp\_SearchByGenre(@genreName)** that receives a genre name as a parameter. The procedure must print full information about **all books that belong to the specific genre**.Order them by **book title – alphabetically**.

Required columns:

* **Title**
* **Year**
* **ISBN**
* **Author**
* **Genre**

### Example

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Query** | | | | |
| **EXEC usp\_SearchByGenre 'Fantasy'** | | | | |
| **Output** | | | | |
| **Title** | **Year** | **ISBN** | **Author** | **Genre** |
| Harry Potter and the Chamber of Secrets | 1998 | 9780747538493 | J.K. Rowling | Fantasy |
| Harry Potter and the Prisoner of Azkaban | 1999 | 9780747542155 | J.K. Rowling | Fantasy |
| … | … | … | … | … |

## Genre Filter

Create a user-defined function, named **udf\_GenreFilter(@genre)** that returns all books of a given genre. The function should accept a **genre name** as input and return a table with the following columns:

* BookTitle
* YearPublished
* ISBN
* LibraryNametas

### Example

|  |
| --- |
| **Query** |
| **SELECT dbo.udf\_GenreFilter('Fiction')** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **BookId** | **Title** | **YearPublished** | **ISBN** | **Author** | **Library** |
| 2 | Where the Crawdads Sing | 2018 | 9780735219090 | Delia Owens | City Lights |
| 27 | Moby-Dick | 1851 | 9780142437247 | Herman Melville | City Lights |
| … | … | … | … | … | … |