# Exercises: Indices and Data Aggregation

This document defines the **exercise assignments** for the ["Databases Basics - MSSQL" course @ Software University.](https://softuni.bg/trainings/3491/ms-sql-september-2021)

Mr. Bodrog is a greedy small goblin who is in charge of **Gringotts** – the biggest wizard bank. His most precious possession is a small database of the deposits in the wizard’s world. Taking money is his hobby. He wants your money as well but unfortunately, you are not a wizard. The only magic you know is how to work with **databases**. That’s how you got access to the precious data. Mr. Bodrog wants you to send him some reports otherwise he will send a pack of hungry werewolves after you. You don’t want to confront a pack of hungry werewolves, do you?

Before going on the next task make sure to download the **Gringotts** database.

## Records’ Count

Import the database and send the **total count of records** from the one and only table to Mr. Bodrog. Make sure nothing got lost.

### Example:

|  |
| --- |
| **Count** |
| 162 |

USE [Gringotts]

SELECT COUNT(\*) AS [COUNT] FROM [WizzardDeposits]

## Longest Magic Wand

Select the **size** of the **longest magic wand**. Rename the new column appropriately.

### Example:

|  |
| --- |
| **LongestMagicWand** |
| 31 |

SELECT MAX([MagicWandSize]) AS [LongestMagicWand] FROM [WizzardDeposits]

## Longest Magic Wand Per Deposit Groups

For wizards in **each deposit group** show the **longest magic wand**. Rename the new column appropriately.

### Example:

|  |  |
| --- | --- |
| **DepositGroup** | **LongestMagicWand** |
| Blue Phoenix | 31 |
| … | … |

SELECT [DepositGroup] AS [DepositGroup],

MAX([MagicWandSize]) AS [LongestMagicWand]

FROM [WizzardDeposits]

GROUP BY [DepositGroup]

## \* Smallest Deposit Group Per Magic Wand Size

Select the **two deposit groups** with the **lowest average wand size**.

### Example:

|  |
| --- |
| **DepositGroup** |
| Troll Chest |
| Venomous Tongue |

SELECT TOP(2) [DepositGroup] AS [DepositGroup]

FROM [WizzardDeposits]

GROUP BY [DepositGroup]

ORDER BY AVG([MagicWandSize])

## Deposits Sum

Select **all deposit groups** and their **total deposit sums**.

### Example:

|  |  |
| --- | --- |
| **DepositGroup** | **TotalSum** |
| Blue Phoenix | 819598.73 |
| Human Pride | 1041291.52 |
| … | … |

SELECT [DepositGroup],

SUM([DepositAmount]) AS [TotalSum]

FROM [WizzardDeposits]

GROUP BY [DepositGroup]

## Deposits Sum for Ollivander Family

Select **all deposit groups** and their **total deposit sums** but **only for the wizards** who have their magic wands **crafted by Ollivander family**.

### Example:

|  |  |
| --- | --- |
| **DepositGroup** | **TotalSum** |
| Blue Phoenix | 52968.96 |
| Human Pride | 188366.86 |
| … | … |

SELECT [DepositGroup],

SUM([DepositAmount]) AS [TotalSum]

FROM [WizzardDeposits]

WHERE [MagicWandCreator] = 'Ollivander family'

GROUP BY [DepositGroup]

## Deposits Filter

Select **all deposit groups** and their total deposit sums but **only for the wizards** who have their magic wands **crafted by Ollivander family**. **Filter** total **deposit amounts lower than 150000**. Order by **total deposit amount** in **descending** order.

### Example:

|  |  |
| --- | --- |
| **DepositGroup** | **TotalSum** |
| Troll Chest | 126585.18 |
| … | … |

SELECT [DepositGroup],

SUM([DepositAmount]) AS [TotalSum]

FROM [WizzardDeposits]

WHERE [MagicWandCreator] = 'Ollivander family'

GROUP BY [DepositGroup]

HAVING SUM([DepositAmount]) < 150000

ORDER BY [TotalSum] DESC

## Deposit Charge

Create a query that selects:

* **Deposit group**
* **Magic wand creator**
* Minimum **deposit charge** for each group

Select the data in **ascending** ordered by **MagicWandCreator** and **DepositGroup**.

### Example:

|  |  |  |
| --- | --- | --- |
| **DepositGroup** | **MagicWandCreator** | **MinDepositCharge** |
| Blue Phoenix | Antioch Peverell | 30.00 |
| … | … |  |

SELECT [DepositGroup], [MagicWandCreator],

MIN([DepositCharge]) AS [MinDepositCharge]

FROM [WizzardDeposits]

GROUP BY [DepositGroup], [MagicWandCreator]

## Age Groups

Write down a query that creates 7 different groups based on their **age**.

**Age groups** should be as follows:

* [0-10]
* [11-20]
* [21-30]
* [31-40]
* [41-50]
* [51-60]
* [61+]

The query should return

* **Age groups**
* **Count** of wizards in it

### Example:

|  |  |
| --- | --- |
| **AgeGroup** | **WizardCount** |
| [11-20] | 21 |
| … | … |

SELECT [AgeGroup], COUNT([AgeGroup]) AS [WizzardCountFROM] FROM

(SELECT

CASE

WHEN Age BETWEEN 0 AND 10 THEN '[0-10]'

WHEN Age BETWEEN 11 AND 20 THEN '[11-20]'

WHEN Age BETWEEN 21 AND 30 THEN '[21-30]'

WHEN Age BETWEEN 31 AND 40 THEN '[31-40]'

WHEN Age BETWEEN 41 AND 50 THEN '[41-50]'

WHEN Age BETWEEN 51 AND 60 THEN '[51-60]'

ELSE '[61+]'

END AS [AgeGroup]

FROM [WizzardDeposits]

) AS [AgeGroupQuery]

GROUP BY [AgeGroup]

## First Letter

Create a query that returns **all unique wizard first letters** of their **first names** only if they have **deposit of type Troll Chest**. Order them **alphabetically**. Use GROUP BY for uniqueness.

### Example:

|  |
| --- |
| **FirstLetter** |
| A |
| … |

SELECT DISTINCT LEFT(FirstName, 1) AS FirstLetter

FROM WizzardDeposits

WHERE DepositGroup = 'Troll Chest'

## Average Interest

Mr. Bodrog is highly interested in profitability. He wants to know the **average interest** of all **deposit groups** split by whether the deposit has **expired or not**. But that’s not all. He wants you to select deposits with **start date after** 01/01/1985. Order the data **descending** by **Deposit Group** and **ascending** by **Expiration Flag**.

The output should consist of the following columns:

### Example:

|  |  |  |
| --- | --- | --- |
| **DepositGroup** | **IsDepositExpired** | **AverageInterest** |
| Venomous Tongue | 0 | 16.698947 |
| … | … |  |

SELECT [DepositGroup], [IsDepositExpired], AVG(DepositInterest)

FROM [WizzardDeposits]

WHERE [DepositStartDate] > '1985-01-01'

GROUP BY [IsDepositExpired], [DepositGroup]

ORDER BY [DepositGroup] DESC, [IsDepositExpired]

## \* Rich Wizard, Poor Wizard

Mr. Bodrog definitely likes his werewolves more than you. This is your last chance to survive! Give him some data to play his favorite game Rich Wizard, Poor Wizard. The rules are simple: You **compare** the **deposits of every wizard** with the **wizard after him**. If a wizard is the last one in the database, simply **ignore it**. In the end you have to **sum** the **difference between the deposits**.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Host Wizard** | **Host Wizard Deposit** | **Guest Wizard** | **Guest Wizard Deposit** | **Difference** |
| Harry | 10 000 | Tom | 12 000 | -2000 |
| Tom | 12 000 | … | … | … |

At the end your query should return a **single value**: the SUM of all differences.

### Example:

|  |
| --- |
| **SumDifference** |
| 44393.97 |

SELECT

SUM([Host Wizard Deposit] - [Guest Wizard Deposit]) AS [SumDifference] FROM

(SELECT [FirstName] AS [Host Wizzard],

[DepositAmount] AS [Host Wizard Deposit],

LEAD ([FirstName]) OVER ( ORDER BY Id) AS [Guest Wizard],

LEAD ([DepositAmount]) OVER (ORDER By id) AS [Guest Wizard Deposit]

FROM [WizzardDeposits]) AS [DepositTable]

## Departments Total Salaries

That’s it! You no longer work for Mr. Bodrog. You have decided to find a proper job as an analyst in SoftUni.   
It’s not a surprise that you will use the **SoftUni** database. Things get more exciting here!

Create a query that shows the **total sum** of **salaries** for **each department**. **Order** by **DepartmentID**.  
Your query should return:

* **DepartmentID**

### Example:

|  |  |
| --- | --- |
| **DepartmentID** | **TotalSalary** |
| 1 | 241000.00 |
| … | … |

SELECT [DepartmentID], SUM(Salary) AS [TotalSalary]

FROM [Employees]

GROUP BY [DepartmentID]

ORDER BY [DepartmentID]

## Employees Minimum Salaries

Select the **minimum salary** from the **employees** for **departments** with **ID** (2, 5, 7) but **only** for those hired **after** 01/01/2000.  
Your query should return:

* **DepartmentID**

### Example:

|  |  |
| --- | --- |
| **DepartmentID** | **MinimumSalary** |
| 2 | 25000.00 |
| 5 | 12800.00 |
| … | … |

SELECT [DepartmentID], MIN([Salary]) AS [MinimumSalary]

FROM [Employees]

WHERE [HireDate] > '2000-01-01'AND [DepartmentID] IN (2,5,7)

GROUP BY [DepartmentID]

## Employees Average Salaries

Select all **employees** who earn **more than** 30000 **into a new table.** Then **delete** all **employees** who have **ManagerID = 42** (in the new table). Then **increase the salaries** of all employees with **DepartmentID=1** by 5000. Finally, select the **average salaries** in **each department**.

### Example:

|  |  |
| --- | --- |
| **DepartmentID** | **AverageSalary** |
| 1 | 45166.6666 |
| … | … |

SELECT \* INTO [AverageSalary]

FROM [Employees]

WHERE [Salary] > 30000

DELETE FROM [AverageSalary] WHERE [ManagerID] = 42

UPDATE [AverageSalary ]

SET [Salary] += 5000

WHERE [DepartmentID] = 1

SELECT DepartmentID , AVG(Salary) AS [AverageSalary]

FROM [AverageSalary]

GROUP BY [DepartmentID]

## Employees Maximum Salaries

Find the **max salary** for **each department**. **Filter** those, which have **max salaries** **NOT** in the **range** 30000 – 70000.

### Example:

|  |  |
| --- | --- |
| **DepartmentID** | **MaxSalary** |
| 2 | 29800.00 |
| … | … |

## Employees Count Salaries

**Count** the salaries of all **employees** who don’t have a **manager**.

### Example:

|  |
| --- |
| **Count** |
| 4 |

## \*3rd Highest Salary

Find the **third highest salary** in **each department** if there is such.

### Example:

|  |  |
| --- | --- |
| **DepartmentID** | **ThirdHighestSalary** |
| 1 | 36100.00 |
| … | … |

## \*\*Salary Challenge

Create a query that returns:

* **FirstName**
* **LastName**
* **DepartmentID**

Select all **employees** who have salary **higher than the average salary** of their respective **departments**. Select **only** the first **10 rows**. **Order** by **DepartmentID**.

### Example:

|  |  |  |
| --- | --- | --- |
| **FirstName** | **LastName** | **DepartmentID** |
| Roberto | Tamburello | 1 |
| … | … |  |