# Basic CRUD in SQL Server

Create, Read, Update, Delete

using SQL Queries


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# Questions

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# #csharp-db

# Query Basics

## SQL and T-SQL Introduction

# What Are SQL and T-SQL?

- **Structured Query Language**
  - Declarative language
  - Close to regular English

```
SELECT FirstName, LastName, JobTitle FROM Employees
```

  - Supports definition, manipulation and access control of records
- **Transact-SQL (T-SQL)** – SQL Server's version of SQL
  - Supports control flow (**if**-statements, **loops**)
  - Designed for writing **logic** inside the database

# SQL – Examples

```
SELECT FirstName, LastName, JobTitle FROM Employees
```

```
SELECT * FROM Projects WHERE StartDate = '1/1/2006'
```

```
INSERT INTO Projects(Name, StartDate)
     VALUES ('Introduction to SQL Course', '1/1/2006')
```

```
UPDATE Projects
   SET EndDate = '8/31/2006'
 WHERE StartDate = '1/1/2006'
```

```
DELETE FROM Projects
      WHERE StartDate = '1/1/2006'
```

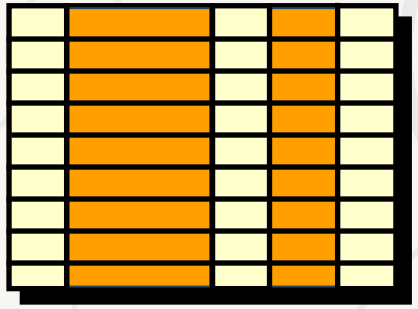
# Retrieving Data

## Using SQL SELECT

# Capabilities of SQL SELECT

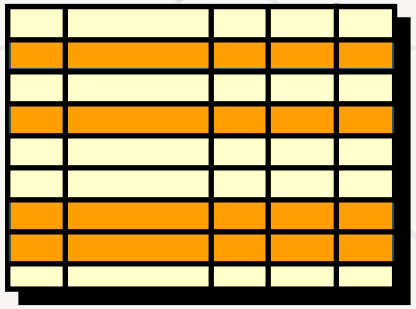
## Projection

Take a subset of the columns



## Selection

Take a subset of the rows



## Join

Combine tables by some column

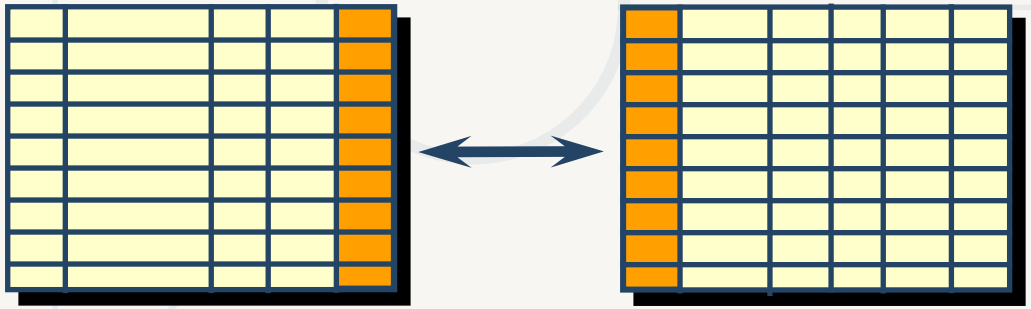


Table 1 Table 2

# SELECT – Example

- Selecting **all** columns from the "Departments" table

```
SELECT * FROM Departments
```

| DepartmentID | Name | ManagerID |
|---|---|---|
| 1 | Engineering | 12 |
| 2 | Tool design | 4 |
| 3 | Sales | 273 |
| … | … | … |

- Selecting **specific** columns

```
SELECT DepartmentId, Name
  FROM Departments
```

| DepartmentID | Name |
|---|---|
| 1 | Engineering |
| 2 | Tool design |
| 3 | Sales |
| … | … |

# Column Aliases

- **Aliases** rename a table or a column heading

Display Name

```
SELECT EmployeeID AS ID,
       FirstName,
       LastName
  FROM Employees
```

| ID | FirstName | LastName |
|---|---|---|
| 1 | Guy | Gilbert |
| 2 | Kevin | Brown |
| … | … | … |

- You can shorten fields or clarify abbreviations

```
SELECT c.Duration,
       c.ACG AS 'Access Control Gateway'
FROM Calls AS c
```

# Concatenation Operator

- You can **concatenate** column names using the **+** operator
  - **String literals** are enclosed in **single quotes**
  - Column names containing **special symbols** use **brackets**

```
SELECT FirstName + ' ' + LastName AS [Full Name],
       EmployeeID AS [No.]
  FROM Employees
```

| Full Name | No. |
|---|---|
| Guy Gilbert | 1 |
| Kevin Brown | 2 |
| … | … |

# Problem: Employee Summary

- Find information about all employees, listing their **full name**, **job title** and **salary**
  - Use **concatenation** to display first and last names as **one field**

| | Full Name | JobTitle | Salary |
|---|---|---|---|
| 1 | Guy Gilbert | Production Technician | 12500.00 |
| 2 | Kevin Brown | Marketing Assistant | 13500.00 |
| 3 | Roberto Tamburello | Engineering Manager | 43300.00 |
| 4 | Rob Walters | Senior Tool Designer | 29800.00 |
| 5 | Thierry D'Hers | Tool Designer | 25000.00 |
| 6 | David Bradley | Marketing Manager | 37500.00 |
| 7 | JoLynn Dobney | Production Supervisor | 25000.00 |
| 8 | Ruth Ellerbrock | Production Technician | 13500.00 |
| 9 | Gail Erickson | Design Engineer | 32700.00 |

  - Note: Query **`SoftUni`** database

# Solution: Employee Summary

Concatenation

```
SELECT FirstName + ' ' + LastName
    AS [Full Name],
       JobTitle,
       Salary
  FROM Employees
```

Column Alias

# Filtering the Selected Rows

- Use **DISTINCT** to eliminate **duplicate** results

```
SELECT DISTINCT DepartmentID
  FROM Employees
```

- Filter rows by specific **conditions** using the **WHERE** clause

```
SELECT LastName, DepartmentID
  FROM Employees
 WHERE DepartmentID = 1
```

- Other **logical operators** can be used for greater control

```
SELECT LastName, Salary FROM Employees
 WHERE Salary <= 20000
```

# Other Comparison Conditions

- Combine conditions using **NOT**, **OR**, **AND** and **brackets**

```
SELECT LastName FROM Employees
WHERE NOT (ManagerID = 3 OR ManagerID = 4)
```

- Using **BETWEEN** operator to **specify a range**

```
SELECT LastName, Salary FROM Employees
 WHERE Salary BETWEEN 20000 AND 22000
```

- Using **IN** / **NOT IN** to specify **a set of values**

```
SELECT FirstName, LastName, ManagerID
  FROM Employees
 WHERE ManagerID IN (109, 3, 16)
```

# Comparing with NULL

- **NULL** is a special value that means missing value
  - Not the same as **0** or a **blank space**
- Checking for **NULL** values

```
SELECT LastName, ManagerId FROM Employees
 WHERE ManagerId = NULL
```

This is always **false**!

```
SELECT LastName, ManagerId FROM Employees
 WHERE ManagerId IS NULL
```

```
SELECT LastName, ManagerId FROM Employees
 WHERE ManagerId IS NOT NULL
```

# Sorting Result Sets

- Sort rows with the **ORDER BY** clause
  - **ASC**: ascending order, default
  - **DESC**: descending order

```
  SELECT LastName, HireDate
    FROM Employees
ORDER BY HireDate
```

| LastName | HireDate |
|---|---|
| Gilbert | 1998-07-31 |
| Brown | 1999-02-26 |
| Tamburello | 1999-12-12 |
| … | … |

```
  SELECT LastName, HireDate
    FROM Employees
ORDER BY HireDate DESC
```

| LastName | HireDate |
|---|---|
| Valdez | 2005-07-01 |
| Tsoflias | 2005-07-01 |
| Abbas | 2005-04-15 |
| … | … |

# Views

- Views are **named** (**saved**) **queries**
  - **Simplify** complex queries
  - **Limit access** to data for certain users

- Example: Get employee **names** and **salaries**, by department

```
CREATE VIEW v_EmployeesByDepartment AS
SELECT FirstName + ' ' + LastName AS [Full Name],
       Salary
  FROM Employees
```

Executes query

```
SELECT * FROM v_EmployeesByDepartment
```

# Problem: Highest Peak

- Create a **view** that selects all information about the **highest peak**
  - Name the view **v_HighestPeak**

```
SELECT * FROM v_HighestPeak
```

| | Id | PeakName | Elevation | MountainId |
|---|---|---|---|---|
| 1 | 68 | Everest | 8848 | 9 |

  - Note: Query **Geography** database

# Solution: Highest Peak

- TOP(x) selects the first x values

```
CREATE VIEW v_HighestPeak
        AS
    SELECT TOP (1) *
      FROM Peaks
  ORDER BY Elevation DESC
```

Sorting column

Greatest value first

# Writing Data in Tables

Using SQL INSERT

# Inserting Data

- The SQL **INSERT** command

```
INSERT INTO Towns VALUES (33, 'Paris')
```

```
INSERT INTO Projects (Name, StartDate)
     VALUES ('Reflective Jacket', GETDATE())
```

- **Bulk data** can be recorded in a single query, separated by comma

```
INSERT INTO EmployeesProjects
     VALUES (229, 1),
            (229, 2),
            (229, 3), …
```

# Inserting Data (2)

- Inserting rows into existing table:

List of columns

```
INSERT INTO Projects (Name, StartDate)
     SELECT Name + ' Restructuring', GETDATE()
       FROM Departments
```

- Using existing records to create a **new table**:

```
SELECT CustomerID, FirstName, Email, Phone
  INTO CustomerContacts
  FROM Customers
```

New table name

Existing source

# Sequences

- **Sequences** are **special object** in SQL Server
  - Similar to **IDENTITY** fields
- Returns an **incrementing value** every time it's used

```
CREATE SEQUENCE seq_Customers_CustomerID
                AS INT
       START WITH 1
     INCREMENT BY 1
```

```
SELECT NEXT VALUE FOR seq_Customers_CustomerID
```

# Modifying Existing Records

## Using SQL UPDATE and DELETE

# Deleting Data

- Deleting specific rows from a table

```
DELETE FROM Employees WHERE EmployeeID = 1
```

Condition

- Note: Don't forget the **WHERE** clause!

- Delete all rows from a table (works faster than **DELETE**):

```
TRUNCATE TABLE Users
```

# Updating Data

- The SQL **UPDATE** command

New values

```
UPDATE  Employees
   SET  LastName = 'Brown'
 WHERE  EmployeeID = 1
```

```
UPDATE  Employees
   SET  Salary = Salary * 1.10,
        JobTitle = 'Senior' + JobTitle
 WHERE  DepartmentID = 3
```

- Note: Don't forget the **WHERE** clause!

# Problem: Update Projects

- Mark **all unfinished** Projects as being **completed today**
  - Hint: Unfinished projects have their **`EndDate`** set to **NULL**

| Name | EndDate |
|---|---|
| Classic Vest | NULL |
| HL Touring Frame | NULL |
| LL Touring Frame | NULL |
| … | … |

| Name | EndDate |
|---|---|
| Classic Vest | 2017-01-23 |
| HL Touring Frame | 2017-01-23 |
| LL Touring Frame | 2017-01-23 |
| … | … |

- Note: Query **`SoftUni`** database

# Solution: Update Projects

```
UPDATE Projects
   SET EndDate = GETDATE()
 WHERE EndDate IS NULL
```

Filter only records with no value

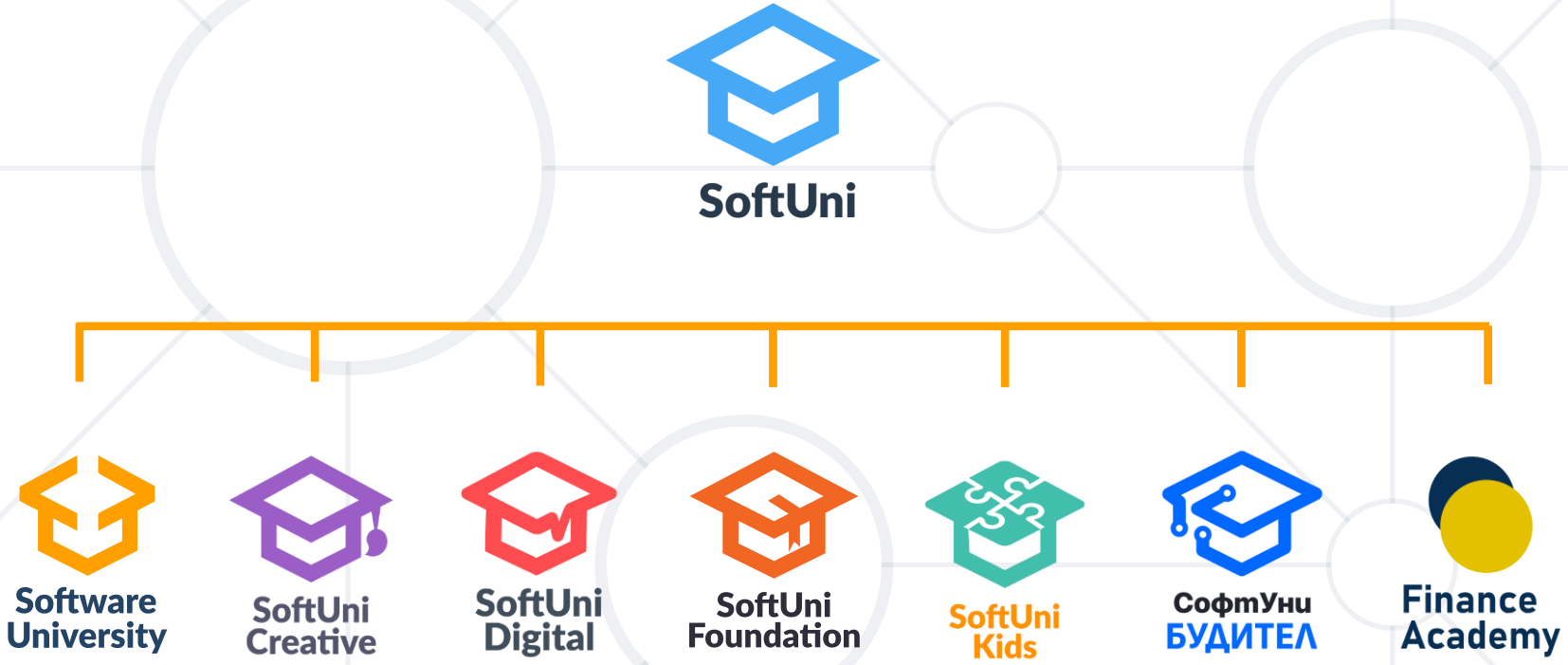
# Summary

- **T-SQL** is the language of **SQL Server**

```
SELECT *
  FROM Projects
 WHERE StartDate = '1/1/2006'
```

- Queries provide a **flexible** and **powerful method** to **manipulate records**
- **Views** allow us to **store queries** for easier use

# Questions?



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