Basic CRUD in MySQL Server

Create, Retrieve, Update, Delete - using SQL queries

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#JavaDB

Query Basics

SQL Introduction

SQL Queries – Few Examples

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- Select first, last name and job title about employees:

```
SELECT first_name, last_name, job_title FROM employees;
```

- Select projects which start on 01-06-2003:

```
SELECT * FROM projects WHERE start_date='2003-06-01';
```

- Inserting data into table:

```
INSERT INTO projects(name, start_date)
VALUES('Introduction to SQL Course', '2006-01-01');
```

SQL Queries – Few Examples

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- Update end date of specific projects:

```
UPDATE projects
   SET end_date = '2006-08-31'
 WHERE start_date = '2006-01-01';
```

- Delete specific projects:

```
DELETE FROM projects
       WHERE start_date = '2006-01-01';
```

Retrieving Data

Using SQL SELECT

Capabilities of SQL SELECT

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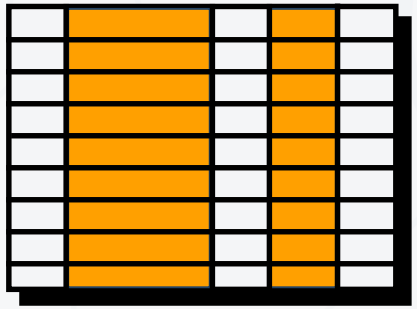
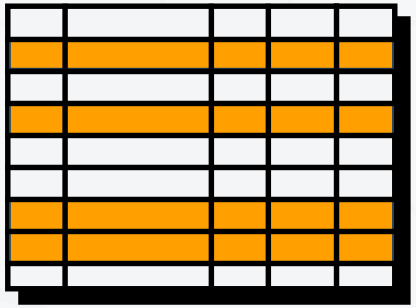
Projection

Take a subset of the columns



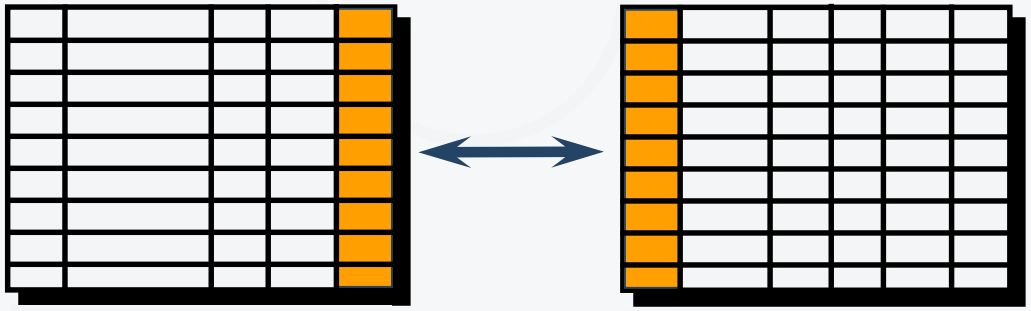
Selection

Take a subset of the rows



Join

Combine tables by some column



SELECT – Examples

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- Selecting all columns from the "employees" table

id	first_name	last_name	job_title	department_id	salary
1	John	Smith	Therapist	1	900
2	John	Johnson	Acupuncturist	1	880
3	Smith	Johnson	Technician	2	1100
…	…	…	…	…	…

```
SELECT * FROM employees;
```

List of columns (* for all)

Table name

Problem: Select Employee Information

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- Write a query to **select** all employees from "hospital" database
  - **Retrieve** information about their **id, first_name, last_name** and **job_title**
  - **Ordered** by id
- Note: Query **Hospital** database

id	first_name	last_name	job_title
1	John	Smith	Therapist
2	John	Johnson	Acupuncturist
3	Smith	Johnson	Technician
…	…	…	…

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/731#0

Solution: Select Employee Information

```
SELECT id, first_name, last_name, job_title
FROM employees
ORDER BY id;
```

List of columns

Table name

Aliases rename a table or a column heading:

```
SELECT e.id AS 'No.',
e.first_name AS 'First_Name',
e.last_name AS 'Last_Name',
e.job_title AS 'Job_Title'
FROM employees AS e ORDER BY id;
```

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/731#0

Concatenation

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- You can concatenate column names or strings using the **concat()** function
- **concat()** - returns the string that results from concatenating the arguments.
  - String literals are enclosed in ['](**single quotes**)
  - Table and column names containing special symbols use [`] (**backtick**)

```
SELECT concat(`first_name`,' ',`last_name`) AS 'full_name',
     `job_title` as  'Job Title',
      `id` AS 'No.'
  FROM `employees`;
```

Concatenation(2)

- Another function of concatenation is **concat_ws()** - stands for concatenate with **separator** and is a special form of CONCAT().

Separator

Arguments

```
SELECT concat_ws(' ', `first_name`, `last_name`, `job_title`)
AS 'full_name',
`job_title` AS  'Job Title',
`id` AS 'No.'
  FROM `employees`;
```

- Skip any **NULL** values after the separator argument.

Problem: Select Employees with Filter

- Find information about all employees, listing their:
  - **Full Name**
  - **Job title**
  - **Salary**

- Use **concatenation** to display first and last names as **one field**
- Note: Query **Hospital** database

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/731#1

Solution: Select Employees with Filter

Concatenation

```
SELECT concat(`first_name`,' ',`last_name`) AS
    'full_name',
    `job_title` AS 'job_title',
      `salary` AS 'salary'
  FROM `employees` WHERE salary > 1000;
```

Column alias

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/731#1

Filtering the Selected Rows

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- Use **DISTINCT** to eliminate duplicate results

```
SELECT DISTINCT `department_id`
  FROM `employees`;
```

- You can filter rows by specific conditions using the **WHERE** clause

```
SELECT `last_name`, `department_id`
FROM `employees`
WHERE `department_id` = 1;
```

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

```
SELECT `last_name`, `salary`
FROM `employees`
WHERE `salary` <= 20000;
```

Other Comparison Conditions

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- Conditions can be combined using **NOT**, **OR**, **AND** and brackets

```
SELECT `last_name` FROM `employees`
WHERE NOT (`manager_id` = 3 OR `manager_id` = 4);
```

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

```
SELECT `last_name`, `salary` FROM `employees`
WHERE `salary` BETWEEN 20000 AND 22000;
```

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

```
SELECT `first_name`, `last_name`, `manager_id`
FROM `employees`
WHERE `manager_id` IN (109, 3, 16);
```

Problem: Select Employees by Multiple Filters

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- Write a query to **retrieve** information about employees, order by id
  - who are in **department 4**
  - have salary **higher or equal to 1600**

id	first_name	last_name	job_title	department_id	salary
7	Jack	Jackson	Epidemiologist	4	1800
9	Nikolay	Ivanov	Nutrition Technician	4	1600

```
SELECT * FROM employees AS e
WHERE e.department_id = 4 AND e.salary >= 1600;
```

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/731#4

Comparing with NULL

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

```
SELECT `last_name`, `manager_id`
FROM `employees`
WHERE `manager_id` = NULL;
```

This is always false!

```
SELECT `last_name`, `manager_id`
FROM `employees`
WHERE `manager_id` IS NULL;
```

```
SELECT `last_name`, `manager_id`
FROM `employees`
WHERE `manager_id` IS NOT NULL;
```

Sorting with ORDER BY

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

ASC is the default sorting order

```
SELECT `last_name`, `hire_date`
FROM `employees`
ORDER BY `hire_date`;
```

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

```
SELECT `last_name`, `hire_date`
FROM `employees`
ORDER BY `hire_date` DESC;
```

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

Views

- Views are **virtual tables** made from others tables, views or joins between them
- Usage:
  - To simplify writing complex queries
  - To limit access to data for certain users

Views (2)

Table 1		
Column 1	Column 2	Column 3

Table 2		
Column 1	Column 2	Column 3

v_table1_table2		
Column 1	Column 2	Column 3

Views - Example

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- Get employee names and salaries, by department

```
CREATE VIEW `v_hr_result_set` AS
SELECT
    CONCAT(`first_name`,' ',`last_name`) AS 'Full Name', `salary`
FROM `employees` ORDER BY `department_id`;
```

```
SELECT * FROM `v_hr_result_set`;
```

Problem: Top Paid Employee

- Create a **view** that selects all information about the **top paid employee**
  - Name the view **`v_top_paid_employee`**
  - Note: Query **hospital** database

	id	first_name	last_name	job_title	department_id	salary
▶	8	Pedro	Petrov	Medical Director	3	2100

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/731#3

Solution: Top Paid Employee

```sql
CREATE VIEW `v_top_paid_employee`
AS
    SELECT * FROM `employees`
    ORDER BY `salary` DESC LIMIT 1;
```

Sorting column

Greatest value first

```sql
SELECT * FROM `v_top_paid_employee`;
```

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/731#3

Writing Data in Tables

Using SQL INSERT

Inserting Data

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- The SQL **INSERT** command

```
INSERT INTO `towns` VALUES (33, 'Paris');
```

Values for all columns

```
INSERT INTO projects(`name`, `start_date`)
     VALUES ('Reflective Jacket', NOW())
```

Specify columns

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

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

Inserting Data (2)

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- You can use existing records to create a **new table**

```
CREATE TABLE `customer_contacts`
AS SELECT `customer_id`, `first_name`, `email`, `phone`
FROM `customers`;
```

New table name

Existing source

- Or into an existing table

List of columns

```
INSERT INTO projects(name, start_date)
SELECT CONCAT(name,' ', ' Restructuring'), NOW()
FROM departments;
```

Modifying Existing Records

Using SQL UPDATE and DELETE

Updating Data

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- The SQL **UPDATE** command

New values

```
UPDATE `employees`
   SET `last_name` = 'Brown'
 WHERE `employee_id` = 1;
```

```
UPDATE `employees`
   SET `salary` = `salary` * 1.10,
       `job_title` = CONCAT('Senior',' ', `job_title`)
 WHERE `department_id` = 3;
```

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

Problem: Update Employees Salary

- **Update** all employees salaries whose **job_title** is "**Therapist**" by **10%**.
  - **all salaries ordered ascending**

salary
880
990
1089
1100
1100
1500.23
1600
1800
2100

```
UPDATE employees
SET salary = salary + (salary * 0.1)
WHERE job_title = 'Therapist';
SELECT salary
FROM employees
ORDER BY salary ASC;
```

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/731#2

Deleting Data

- Deleting specific rows from a table

Condition

```
DELETE FROM `employees`
WHERE `employee_id` = 1;
```

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

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

```
TRUNCATE TABLE users;
```

Problem: Delete From Table

- **Delete** all employees from the "**employees**" table who are in d epartment **2 or 1**.
- **Order** by id.

	id	first_name	last_name	job_title	department_id	salary
▶	4	Peter	Petrov	Supervisor	3	1100
	5	Peter	Ivanov	Dentist	4	1500.23
	7	Jack	Jackson	Epidemiologist	4	1800
	8	Pedro	Petrov	Medical Director	3	2100
	9	Nikolay	Ivanov	Nutrition Technician	4	1600

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/731#5

Solution: Delete From Table

Delete Data

```
DELETE FROM employees
WHERE department_id = 1
OR department_id = 2;
SELECT * FROM employees
```

OR Condition

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/731#5

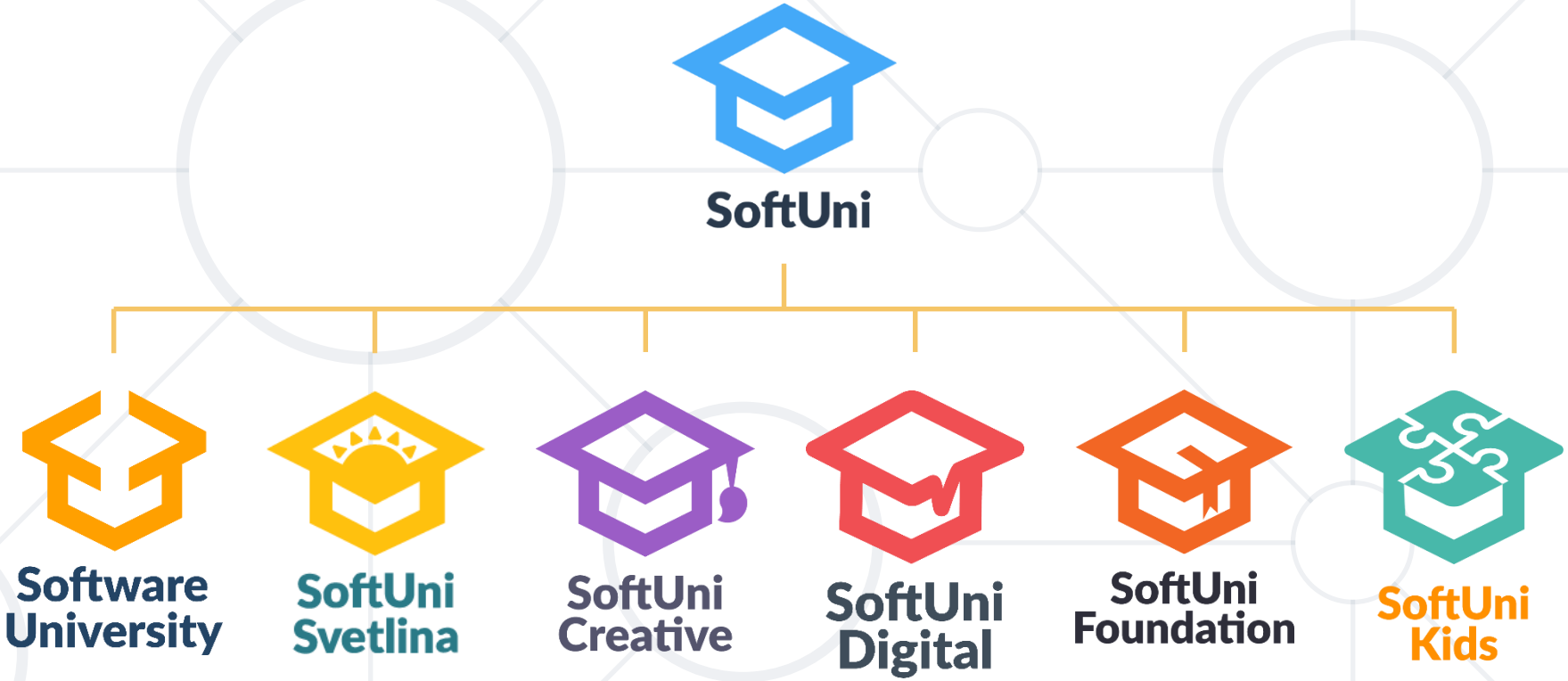
Summary

- We can easy manipulate our database with SQL queries

```
SELECT *
  FROM `projects`
 WHERE `start_date` = '2006-01-01';
```

- Queries provide a flexible and powerful method to manipulate records

Questions?



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