

# SQL

## (Structured Query Language)



ICS4U - Mr. Emmell

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## It was actually called SEQUEL

"Structured **E**nglish **Q**uery Language" before being formally standardized

Originally developed at IBM in the 1970s as a means of accessing large data sets

SQL itself is a formal guideline for structured queries. Many different software packages have been built to implement them - and have added more programming functionality. Some popular ones include:

- MariaDB, MySQL, PostgreSQL, Oracle, and more

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## We will be using MySQL

While the exact syntax of the commands we will use is particular to MySQL, all other SQL packages work mostly the same way.

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## How is Data Stored?

- Data is stored in tables, within databases.
- Your whole project is typically within one database, and it is filled with tables that each contains information about one aspect.
  - Example: A car dealer database might contain the following tables:
    - CarInventory
    - CarManufacturers
    - Buyers
    - BuyerAddresses
    - BuyerPhoneNumbers

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## How is Data Stored?

- Imagine that the entire database is like a giant Excel spreadsheet file.
- The database is the entire file
- The tables are like the tabs to choose between, each containing rows of data
- Similar to a spreadsheet, each row is broken up into columns of datums

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## How is Data Stored? - Tables in a database

Example, your grad databases stores information in these tables:

```
+-----+
| Tables_in_pdcgrad |
+-----+
| awards             | //a list of graduate awards
| config             | //system configuration info
| logs               | //keeping logs of who does what
| messages           | //if someone sends me an error message
| preshow_slides    | //a list of what slides to show before the main event
| users              | //all the users (that's me, and guidance, etc)
| students           | //all the students and their info
+-----+
```

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## How is Data Stored? - Columns in a table

Example, your students table contains the following columns:

- varchar(1000) means 1000 characters of text
- tinyint(1) is a way of indicating a boolean
  - It's a 1 bit integer

Can you picture your giant spreadsheet with rows of students, each with these data fields?

Name	Type
studentId	int
studentNum	varchar(10)
password	varchar(50)
lastName	varchar(50)
firstName	varchar(50)
awards	varchar(1000)
scholarships	varchar(1000)
memMoment	varchar(2000)
futurePlans	varchar(1000)
completed	tinyint(1)
enabled	tinyint(1)
flagged	tinyint(1)
numSubmits	int

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## How is Data Stored? - Columns in a table

('password' & 'completed' fields omitted)

studentId	studentNum	lastName	firstName	awards	scholarships	memMoment	futurePlans	enabled	flagged	numSubmits
226	S199845901	Oliver	Orion	Technology Certificate*SHSM - Information and Comm...		<p style="text-align: left;">I remember that time ...	Victory Lap	1	0	7
227	S199757833	Olsen-Neill	Alec	Ontario Scholar*Honour Roll	Admission Scholarship	<p>Spending time with the boys, and doing alright ...	Ottawa University *History and Political Science	1	0	13
228	S332683499	Osman	Farah	Fine Arts Certificate*Award of Distinction in Univ...	Merrit Scholarship	<ul><li>Chicken Nuggets :)</li><li>Slaying ever...	University of Ottawa*Human Rights and Conflict Stu...	1	0	8
229	S346895089	Ottens	Jesse	WCSS Staff Book Award*Ontario Scholar		<p> Grade 11 Outdoor Ed. trip.</p><span>		1	0	2
230	S346644933	Owen	James			<p>Winning the high school championship for lacros...	Victory Lap	1	0	2
231	S346647249	Ozaeta	Marianne			<p>High school taught me that if tomorrow isn't th...	University	1	0	3

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## How do we Access / Manipulate this data?

Strictly speaking of MySQL commands (integration with PHP to come later...)

We will focus to these four concepts:

- SELECT                      To obtain data
- INSERT                     To add data
- UPDATE                    To change data
- DELETE                    To delete data

Each command works by specifying:

- A table
- What to do
- What to match to operate on

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## How do we Access / Manipulate this data? - SELECT

The SELECT command is used to extract data from a given table (or tables)

Ex: `SELECT * FROM students`

- This will return an array of all the students, and all their columns each

Ex: `SELECT studentNum FROM students`

- This will return an array of all the students, and only their studentNum column

Ex: `SELECT * FROM students WHERE studentNum="s123456789"`

- This will return an array of only students with that studentNum, and all their columns

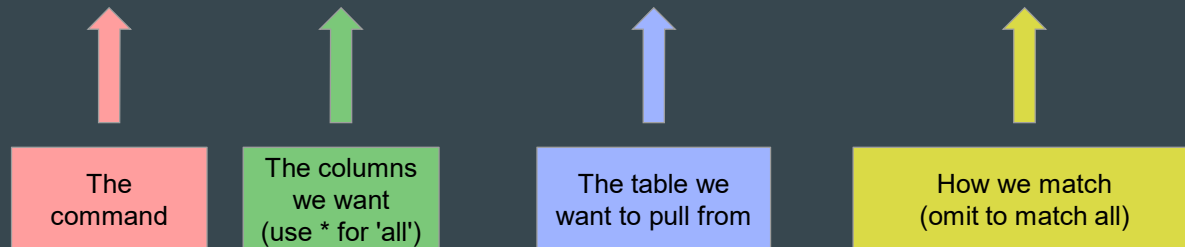
Ex: `SELECT firstName,lastName FROM students WHERE studentNum="s123456789"`

- This will return an array of only students with that studentNum, and only the firstName & lastName columns

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## How do we Access / Manipulate this data? - SELECT

```
SELECT firstName, lastName FROM students WHERE studentNum="s123456789"
```



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## How do we do this in PHP?

Good question!

- Open a connection to the database //taken care of for us!
- Create a query (the actual MySQL command)
- Execute the query
- Pull the results

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## How do we do this in PHP?

```
require ("database.php"); ← Always provided, check  
/examples/databases folder on server for an example
```

This creates a variable for us like an open file.

\$pdo

We use it to create queries, execute, and retrieve data.

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## How do we do this in PHP?

```
<?php  
    require("database.php");  
  
    $query = $pdo->prepare("SELECT * FROM test");  
  
    $query->execute();  
  
    $results = $query->fetchAll(PDO::FETCH_ASSOC);  
    print_r($results);  
?>
```

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