

# Databases

Group tutorials – Session 8 (Week 9)

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# Definition of Databases



# Definition of Databases



**What is a  
database?**

# Definition of Databases



**Why is it  
important?**

**What is a  
database?**

# What is it all about...

- When you write a program all your data disappears after the program ends
  - ▶ Unless we save it somewhere
- SQL Databases are a sensible choice for where to save your data
  - ▶ Highly optimized storage of tabular data
  - ▶ Fast and well-understood query language
  - ▶ Fault tolerant protocols

# What is a database?

- Super fancy spreadsheet
  - ▶ Each database will contain tables that store data
  - ▶ Data in tables can be queried using a language called SQL
  - ▶ Data in tables can be joined with data in other tables to answer questions
- Designing them so you don't tie yourself in knots is tricky!

So why not just use Spreadsheets?

- ▶ See Matt Parker's excellent Stand-up Maths video: UK Government loses data because of Excel mistake.

# Types of databases

- Relational Databases
- Non-Relational Databases

# SQL (Structured Query Language)



# SQL

- Query language for asking questions about databases from 1974
  - ▶ Standardized in 1986 in the US and 1987 everywhere else
  - ▶ Still the dominant language for queries today

# Standardized?

- You would be so lucky!
  - ▶ In theory, yes
  - ▶ In practice, absolutely not
- Every database engine has small differences...
  - ▶ Some have quite big ones too!
- Lots have differences in performance
  - ▶ Some are good with strings, most prefer numbers
- Managing these differences used to be an entire degree/job in its own right!
  - ▶ Now we just manage databases badly!

To get started – download SQL server

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<https://dev.mysql.com/downloads/mysql/>

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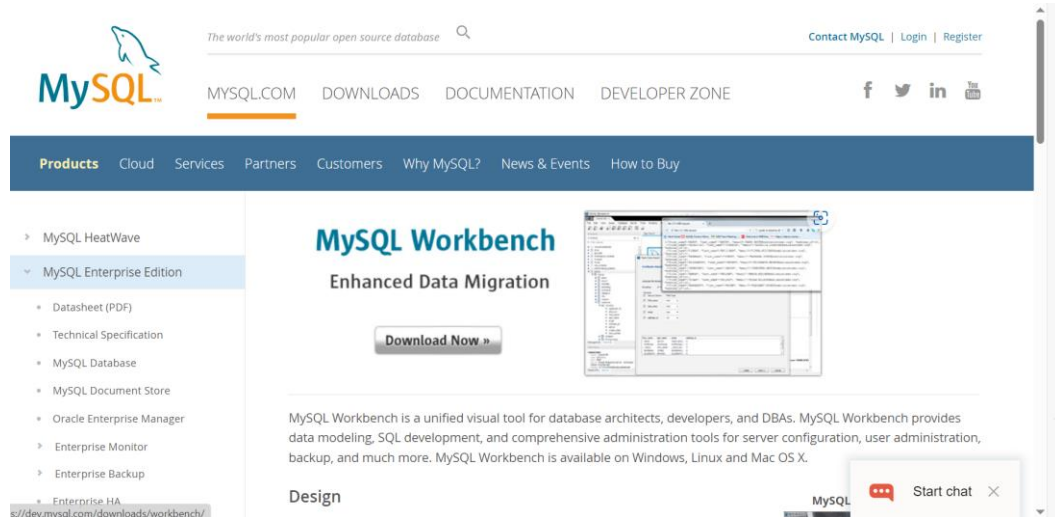
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# To get started – download SQL

- <https://www.mysql.com/products/workbench/>



**Let's practice**



-- EXAMPLE 1 --

CREATE

CREATE TABLE students (

student\_id int PRIMARY KEY,

first\_name VARCHAR(50),

last\_name VARCHAR(50),

DOB DATE

);

RENAME TABLE students TO xyz;

DROP TABLE xyz; (deletes the table so

don't go ahead with this one)

ALTER TABLE students

ADD phone\_number VARCHAR(15);

ALTER TABLE students

RENAME COLUMN phone\_number TO email;

ALTER TABLE students

MODIFY COLUMN email VARCHAR(15);

ALTER TABLE students

MODIFY email VARCHAR(100)

AFTER last\_name;

ALTER TABLE students

MODIFY email VARCHAR(100)

FIRST;

ALTER TABLE students

DROP COLUMN email;

INSERT INTO students

VALUES (\*\*values for each entry\*\*)

SELECT \* FROM students