CORONAVIRUS SPECIAL

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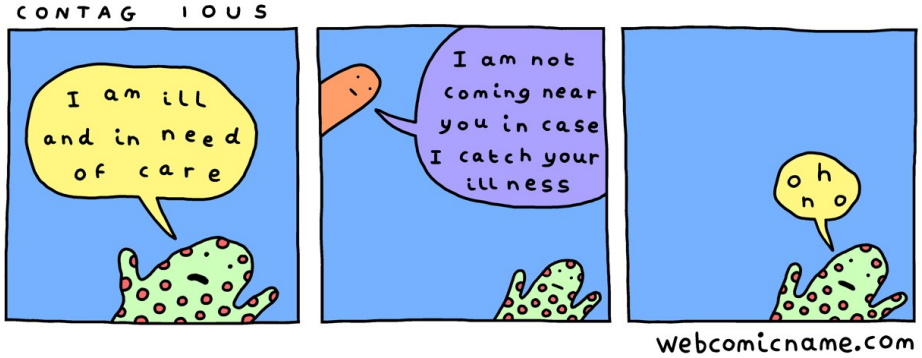
COMP1204: Modelling and SQL

Oli Bills

ofb@ecs.soton.ac.uk



This week

- Modelling Part II
- Introduction to SQL
  - This lecture
- Advanced SQL
  - In the next lecture
- Coursework is set!
  - Stay tuned – it's at the end of this lecture
  - (Or you can just skip to the end…)

Where were we last year?

MPs vote to take control of business and hold indicative votes

25 March 2019

The House of Commons has voted to approve a motion in the name of the Prime Minister, setting out the next steps in the Brexit process.

The Government lost a second 'meaningful vote' on 12 March, requiring it to make a statement setting out how it intended to proceed, and to put forward a motion in the Commons for debate. This motion was debated on Monday 25 March 2019.

MPs had the opportunity to table amendments to the Government motion, three of which were selected by the Speaker and debated. Amendment (a), in the name of Oliver Letwin, was approved by MPs ahead of the approval of the main motion.

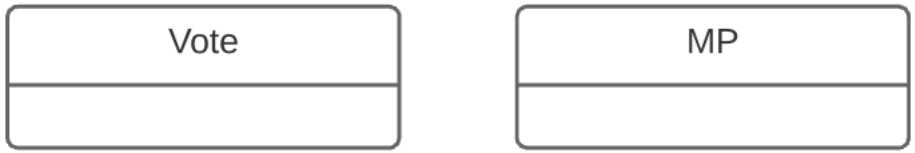
The day MPs took control away from the government

Let’s model what happened last ~~night~~ year

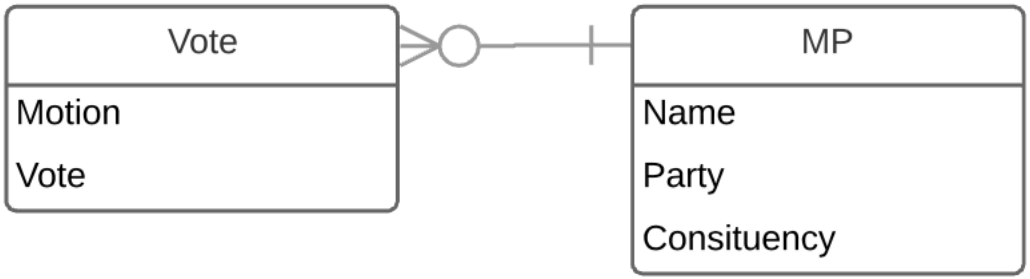
- Background
  - 3 significant votes in house of commons
  - An amendable motion to decide what happens next with Brexit
    - Amendment A: Parliament takes control (passed)
    - Amendment F: Vote before No Deal Brexit (failed)
    - Amendment D (Didn’t happen)
    - The amendable motion itself (passed)
  - 631 MPs took part

- We want to model and explore how MPs voted

Begin the Modelling

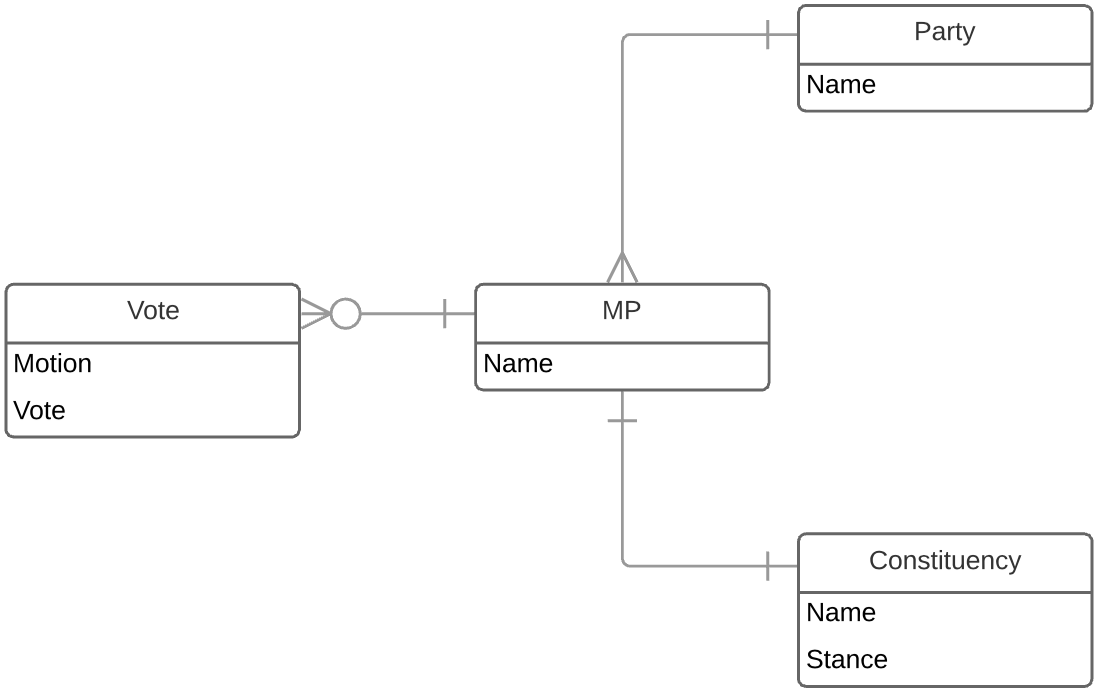


Grow the model



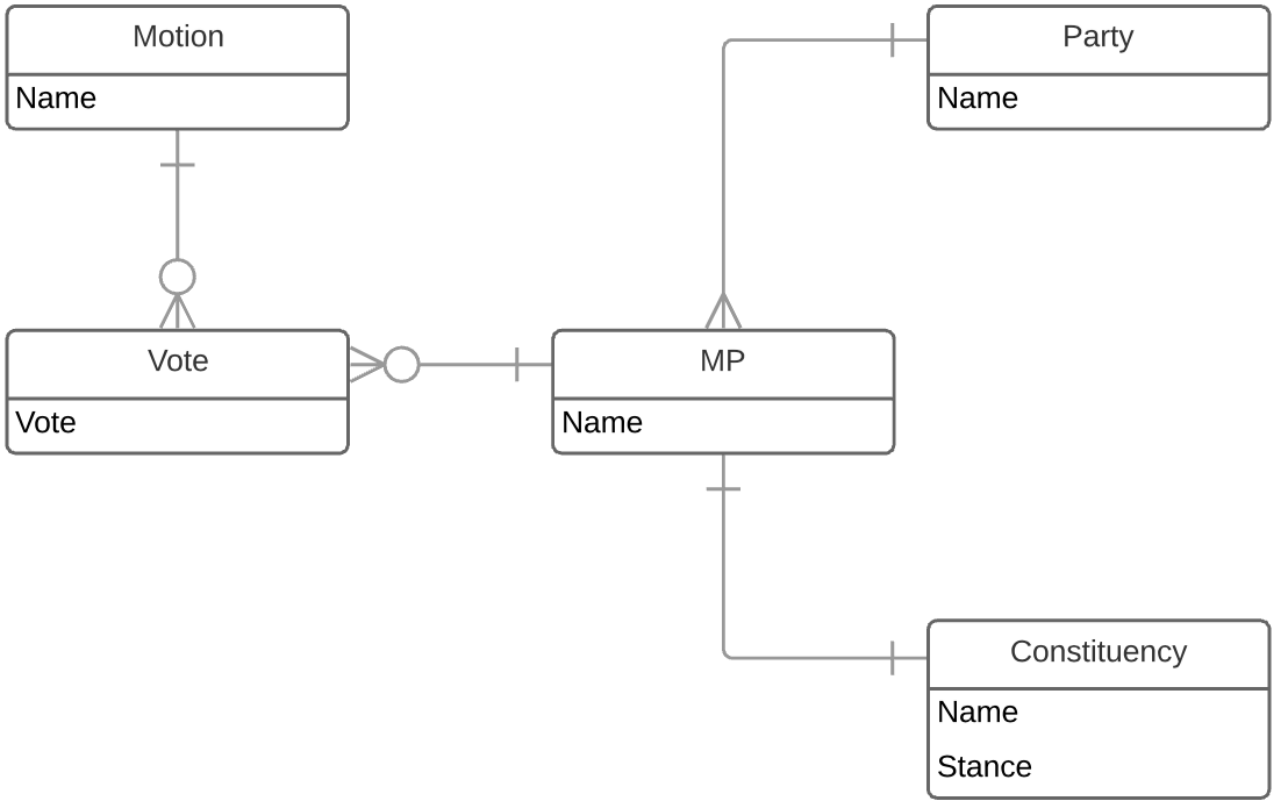
A vote is associated with one MP
An MP can have 0 or more votes

Grow the model



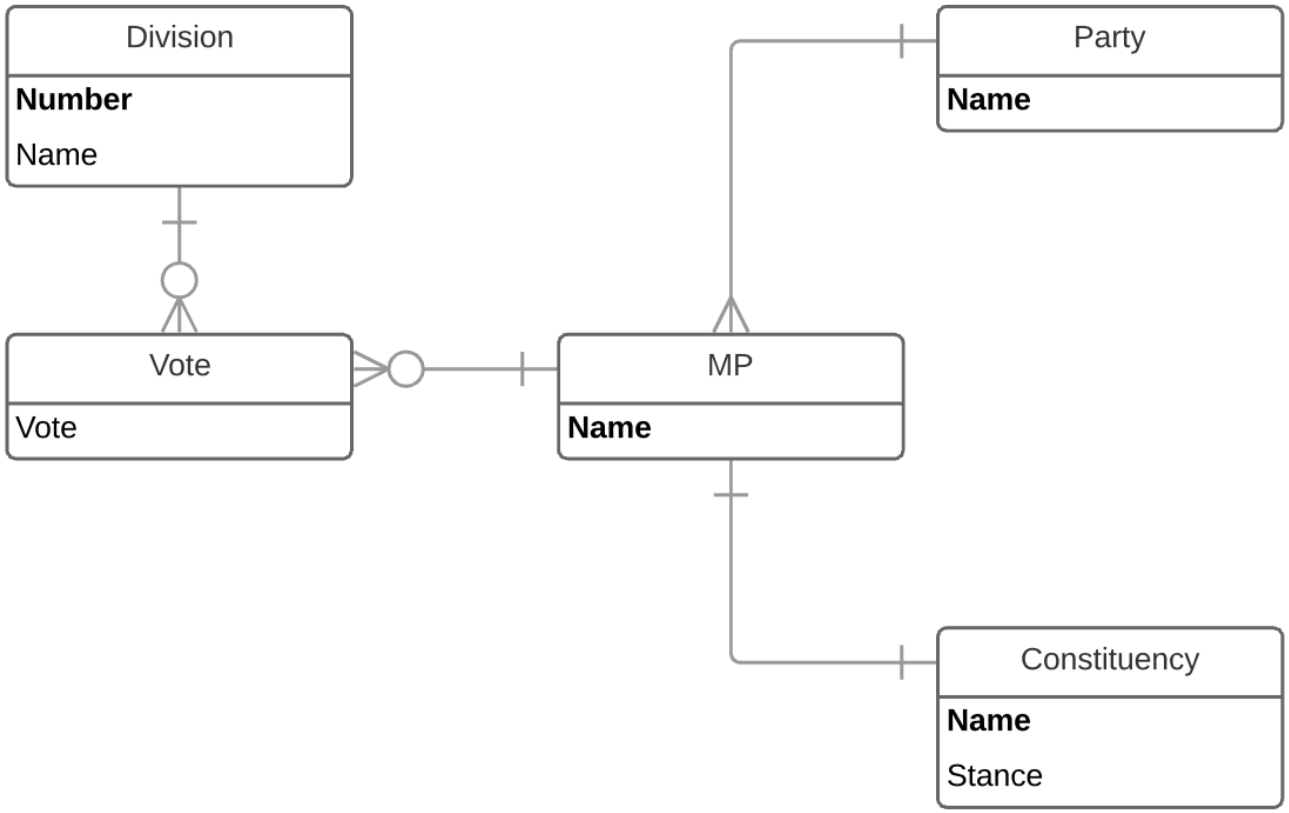
MPs have one constituency and one party
A constituency is represented by one MP
A party can have many MPs, must have at least one

Grow the model



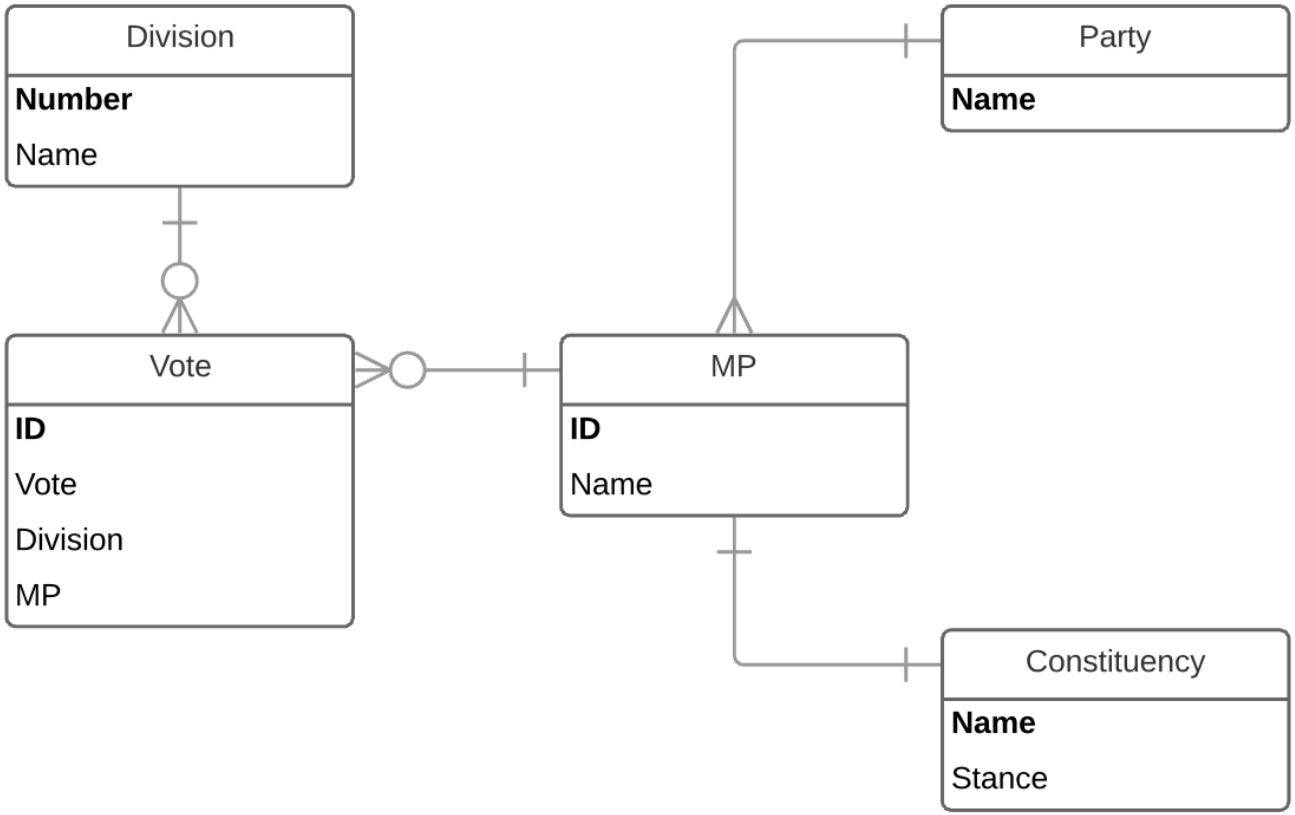
A motion starts off with no votes
Votes are for one motion by one MP

Grow the model



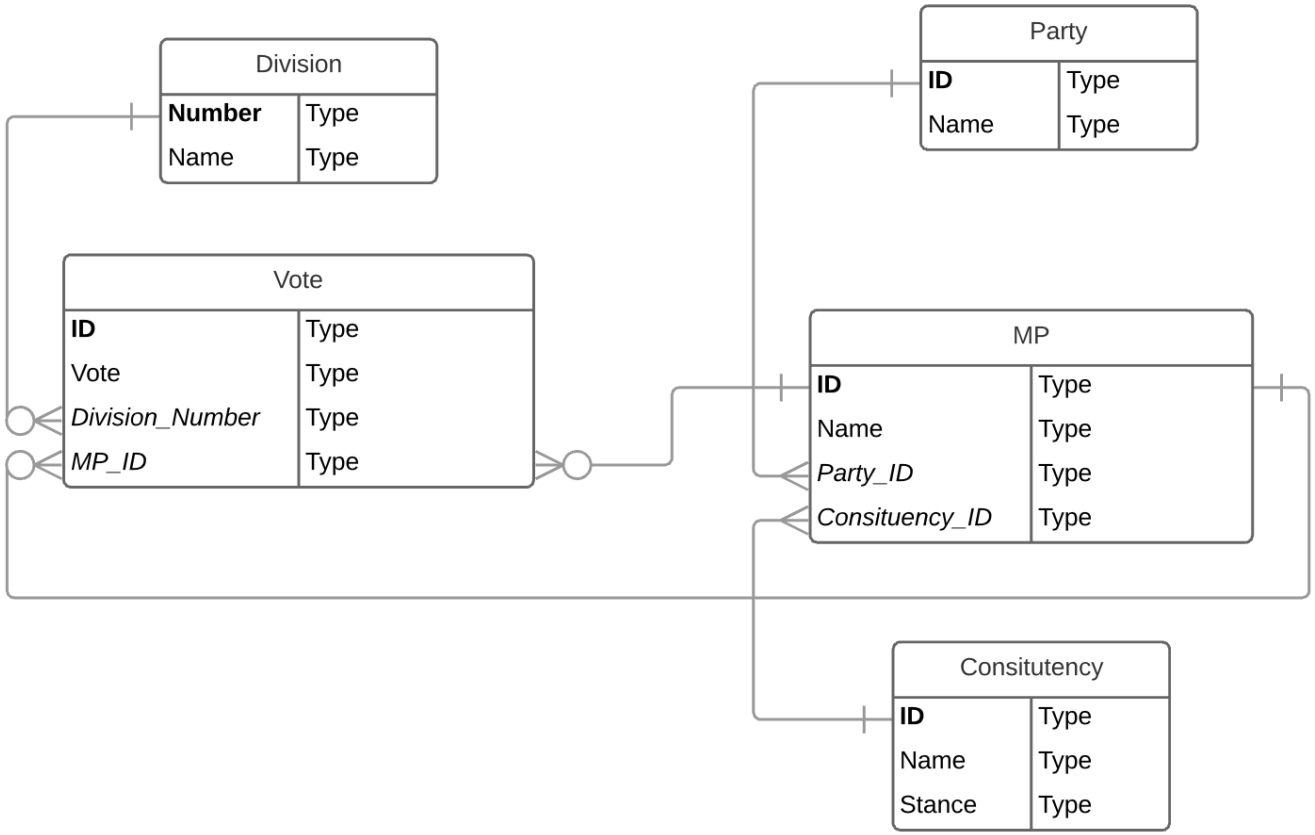
The parliamentary term for when a vote occurs is a division
Divisions have a division number for the record
We identify the natural keys

Grow the model



Introduced IDs where the natural keys were insufficient
Two MPs could have the same name

Grow the model: Towards Physical

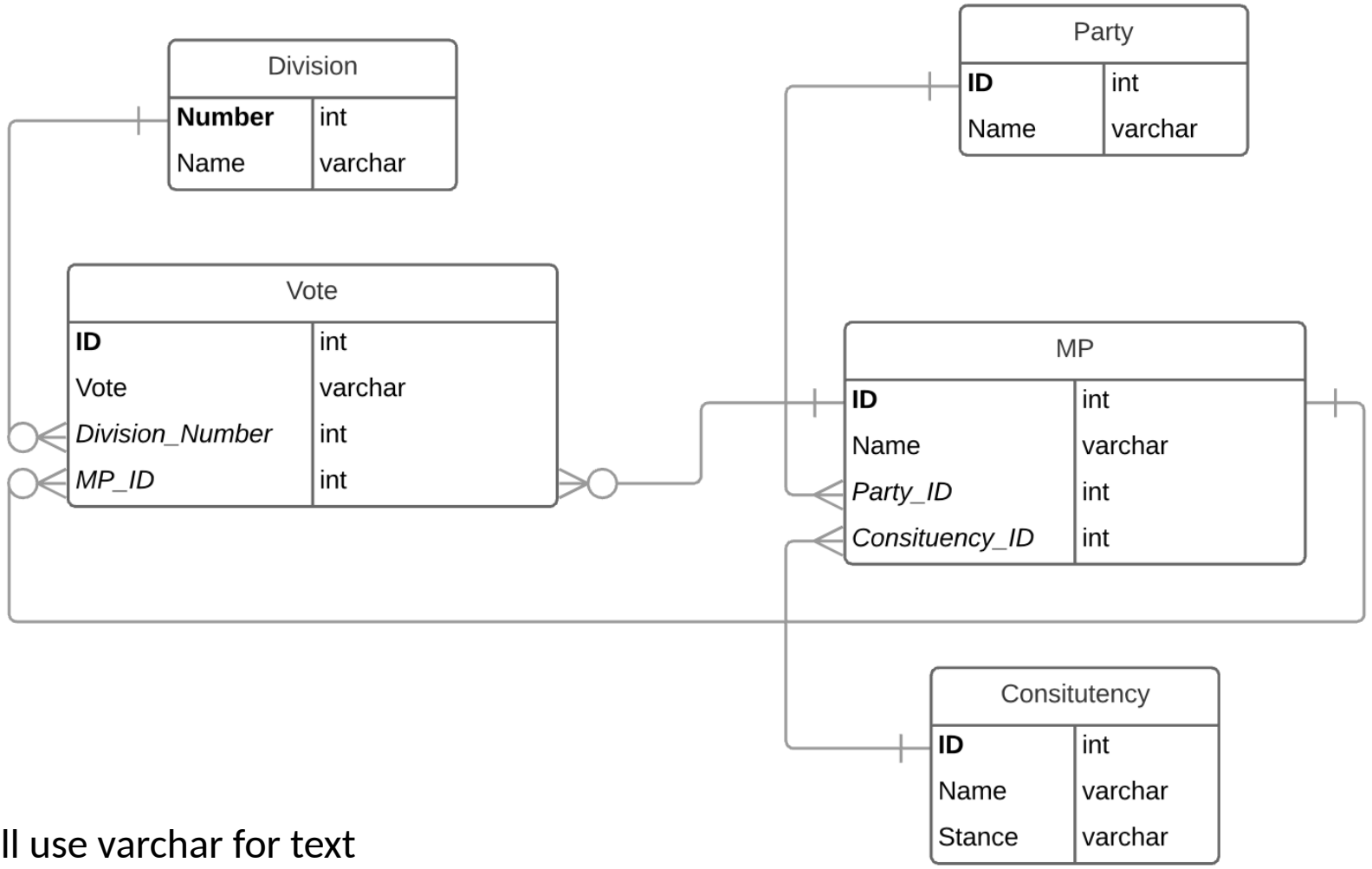


Foreign keys and surrogate keys (IDs) added

A Note on Data Types

- Integer types: **INT** or **INTEGER**, **SMALLINT** and **BIGINT**.
- Floating point types: **FLOAT** and **DOUBLE**.
- String types: The two varities are **CHAR(n)** and **VARCHAR(n)**;
  - CHAR: strings of length < n are padded.
  - VARCHAR: short strings have an end marker.
- Text types: **TEXT** Larger text data type (not indexable)
- Date types: **DATE**, **TIME** and **DATETIME**.
  - 'YYYY-MM-DD' ('2012-11-05').
  - 'HH:MM:SS'.
- None type: **BLOB** does not specify a format; may be an image

Physical Model



We will use varchar for text
We will represent vote as text for now (aye, no, abstain)

Now we have the model, we want to build it

- Put it into a database management system
  - MySQL
  - SQLite
  - Oracle
  - Etc.
- Turn our model into tables
- Populate with data

SQLite

- All of the database contained inside a single file
- Perfect for when you need a simple database on the go, without needing to run a fully fledged database server (such as SQL server, MySQL etc.)
  - Small
  - No configuration
  - Serverless - no background process/server
  - Lightweight
  - Efficient
  - Supports most SQL and some extensions
  - Cross-platform
  - Open source

- But it's more basic than alternatives
  - It's just a file
  - Not good for large operations
  - Not multi-user
  - No concurrency
  - Not client/server
  - Lacks some SQL features

- And you might not be keen on some of the design decisions
  - It uses dynamic typing – you can put a string in an integer field etc.

Getting Started

- Creating a database is simple

```
oliver@rubicon /tmp % sqlite3 database.db
SQLite version 3.19.3 2017-06-27 16:48:08
Enter ".help" for usage hints.
sqlite>
```

- You can then run and execute SQL directly

```
sqlite> create table friends (name varchar(255));
sqlite> insert into friends (name) values ('Rob');
sqlite> select * from friends;
Rob
```

A reminder: SQL

- **Data definition** : define tables and views.
- **Data query** : extract data, add data and delete data.
- **Administration** : grant permissions to users to perform operations on our database.

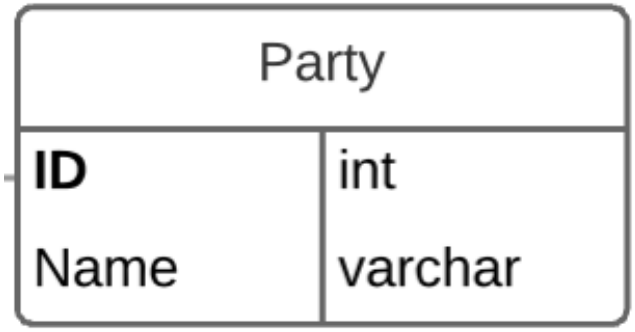
Data Definition

- Create Database
- Create Table
- Define Primary Keys
- Define Foreign Keys
  - action the DBMS should take if we update or delete a key value in the referenced table.
  - how will we enforce referential integrity.

Create a Table

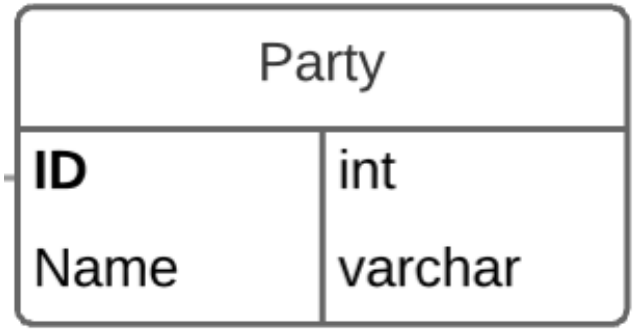
```
CREATE TABLE Table
(
 Field field_type [Options],
 Field field_type [Options],
 Field field_type [Options],
 …
);
```

Create a Table



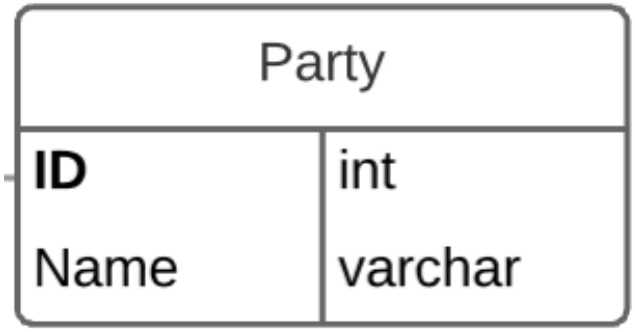

```
CREATE TABLE Party
(
 ID integer,
 Name varchar(255)
);
```

Primary Key




```
CREATE TABLE Party
(
 ID integer
   primary key
autoincrement,
 Name varchar(255)
);
```

Constraints




```
CREATE TABLE Party
(
 ID integer
  constraint Party_pk
   primary key
autoincrement,
 Name varchar(255)
);
```

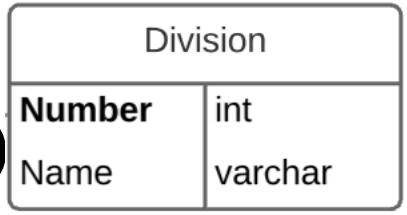
The constraint keyword allows us to label our constraints
By naming our constraints, we can easily modify and reference them later

Extra Attributes

Consitutency	
ID	int
Name	varchar
Stance	varchar

```
CREATE TABLE Constituency
(
 ID integer
   constraint Constituency_pk
    primary key autoincrement,
 Name varchar(255) not null,
 Stance varchar(255)
);
```

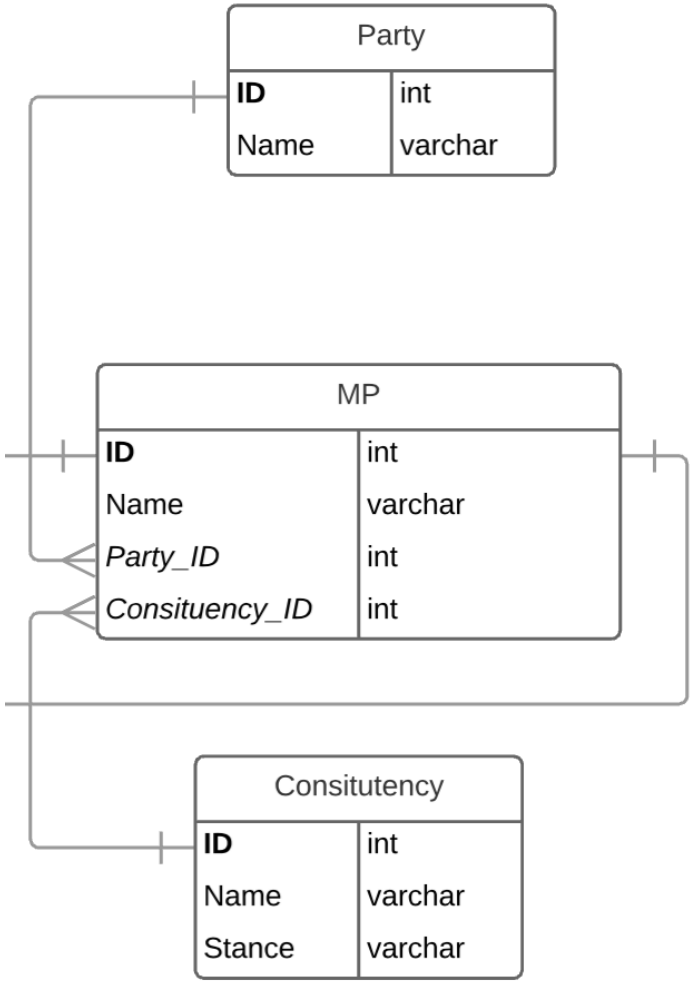
Create some more tab




```
CREATE TABLE Division
(
 Number integer not null
  constraint Division_pk
   primary key,
 Name varchar(255)
);
```

Create some more tables

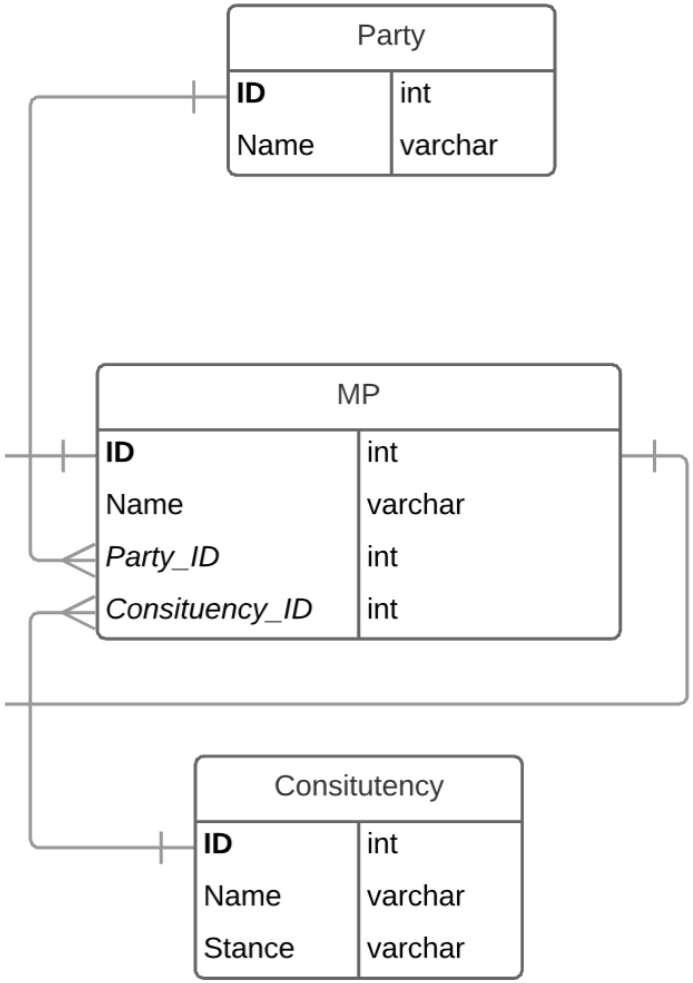
```
CREATE TABLE MP
(
 ID integer
  constraint MP_pk
   primary key,
 Name varchar(255),
 Party_ID integer,
Constituency_ID integer
);
```



We can define our foreign keys here for the MP (their party and constituency)

Foreign Keys

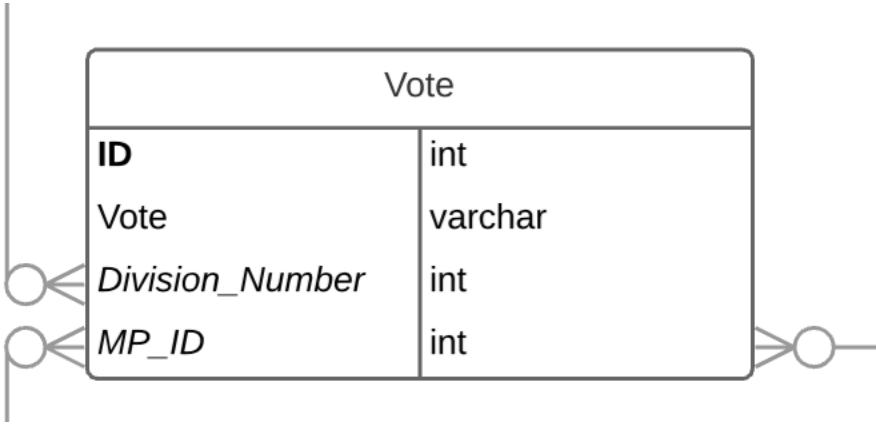
```
CREATE TABLE MP
(
 ID integer
  constraint MP_pk
   primary key,
 Name varchar(255),
 Party_ID integer
  constraint MP_Party_ID_fk
   references Party,
 Constituency_ID integer
  constraint MP_Constituency_ID_fk
   references Constituency
);
```



We can define our foreign keys here for the MP (their party and constituency)

Referential Integrity

```
CREATE TABLE Vote
(
 ID integer
  constraint Vote_pk
   primary key autoincrement,
 Vote varchar(10),
 Division_Number integer
  constraint Vote_Division_Number_fk
   references Division
    on update cascade on delete cascade,
 MP_ID integer
  constraint Vote_MP_ID_fk
   references MP
    on update cascade on delete restrict
);
```



Deleting a Division will remove all associated Votes (cascade)
It is not possible to remove an MP who has votes (restrict)

Maintaining Referential Integrity

- ON DELETE
  - When the parent record is deleted
- ON UPDATE
  - When the parent key is updated
  - Not overly useful when it's an automatically generated key

- Potential actions:
  - **CASCADE** the deletion/updates to the referring tables
  - May not be appropriate
    - Delete a booking, you don't want to delete the member!
    - Delete a member when they've left, you don't want to delete they had a booking
  - **RESTRICT**: Prevent the parent being updated/deleted
  - **SET DEFAULT**: Set the key value to the default
  - **SET NULL**: Set the key value to NULL

Summary

- **PRIMARY KEY**: Define the primary key
- **AUTOINCREMENT:** Automatically incrementing integer
- **CONSTRAINT**: Name a constraint
- **NOT NULL**: Prevents NULL values
- **REFERENCES**: Defines foreign keys and referential integrity

Modifying Tables

- **ALTER TABLE** table
  ADD column definition;

- **ALTER TABLE** table
  RENAME TO newtable;

- **DROP TABLE** table

Alter table syntax varies in different SQL implementations

Populating a table from another table

- INSERT with a SELECT

```
INSERT INTO Constituency_new
(ID, Name)
SELECT ID, Name FROM Constituency;
```

Will get all ID and Name values from Consitutency table and insert into the Consituency_new table

Modifying Tables

- In **SQLite**, to further change the table, you need to create a new table, copy the data, and then rename
  - https://www.sqlite.org/lang_altertable.html
- For example, to remove the ‘Stance’ column in the ‘Party’ table:

```
create table Constituency_new
(
 ID integer
  constraint Constituency_pk
   primary key autoincrement,
 Name varchar(255) not null
 Stance varchar(255)
);

insert into Constituency_new(ID, Name) select ID, Name from
Constituency;

drop table Constituency;

alter table Constituency_new rename to Constituency;
```

Populating our tables

- Now we need to populate our tables

- First, we need to get our data
  - Open data for MPs:
    - http://explore.data.parliament.uk/index.html?endpoint=endpoint/commonsmembers
  - Division voting data:
    - http://www.data.parliament.uk/dataset/09

Populating our tables

Commons Divisions

Number of records: 4401

Advanced search

Download | Sort by **date** | Page size of **10** | Output to **HTML** | API Url

European Union Withdrawal Act Amendment (a) - Letwin

date	2019-03-25
title	European Union Withdrawal Act Amendment (a) - Letwin
uin	CD:2019-03-25:642

European Union Withdrawal Act Amendment (f) - Beckett

date	2019-03-25
title	European Union Withdrawal Act Amendment (f) - Beckett
uin	CD:2019-03-25:643

European Union Withdrawal Act main Motion as amended

date	2019-03-25
title	European Union Withdrawal Act main Motion as amended
uin	CD:2019-03-25:644

timgor inubashiri @thetimgor · Apr 6

7O3HLNKDEh/jgA89A4MaaLEUbLccPUIGA+zXX1iCN8ALfzHTcQCrivNX
1TzrA3TEaNrCNvEPNa4vfvbmAjlJ33G94in+zE8bDR3bgc9HQNeN3WX
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R3uzEDETfSIS/dDR/yYz9nAj+4NNMu7STbfd3+DGLzY7gXsdbGMBC/B4
fvzzgCDf/N7QYA31LRLSvLAUrjQ/27gjlNsfAhXTTzdyvryoTo4EOsVa

Structured data.

Data available in JSON


```
      ], "date" : {"_value" : "2019-03-25", "_datatype" : "dateTime"}
       , "divisionNumber" : "375", "isPrimaryTopicOf" : "http://eldaddp.azurewebsites.net/commonsdivisions/id/1104689.json", "legislature" : ["http://data.parliament.uk/terms/25259"], "session" : ["2017/19",
"http://data.parliament.uk/resources/730830"], "title" : "European Union Withdrawal Act main Motion as amended", "uin" : "CD:2019-03-25:644", "vote" : [{"_about" :
"http://data.parliament.uk/resources/1104689/vote/1", "member" : [{"_about" : "http://data.parliament.uk/members/4473", "label" : {"_value" : "Biography information for Louise Haigh"}
        }
        ], "memberParty" : "Labour", "memberPrinted" : {"_value" : "Louise Haigh"}
        , "type" : "http://data.parliament.uk/schema/parl#AyeVote"}
       , {"_about" : "http://data.parliament.uk/resources/1104689/vote/10", "member" : [{"_about" : "http://data.parliament.uk/members/400", "label" : {"_value" : "Biography information for John Healey"}
        }
        ], "memberParty" : "Labour", "memberPrinted" : {"_value" : "John Healey"}
        , "type" : "http://data.parliament.uk/schema/parl#AyeVote"}
       , {"_about" : "http://data.parliament.uk/resources/1104689/vote/100", "member" : [{"_about" : "http://data.parliament.uk/members/4071", "label" : {"_value" : "Biography information for Sarah Newton"}
        }
        ], "memberParty" : "Conservative", "memberPrinted" : {"_value" : "Sarah Newton"}
        , "type" : "http://data.parliament.uk/schema/parl#AyeVote"}
       , {"_about" : "http://data.parliament.uk/resources/1104689/vote/101", "member" : [{"_about" : "http://data.parliament.uk/members/4641", "label" : {"_value" : "Biography information for Alex Norris"}
        }
        ], "memberParty" : "Labour (Co-op)", "memberPrinted" : {"_value" : "Alex Norris"}
        , "type" : "http://data.parliament.uk/schema/parl#AyeVote"}
       , {"_about" : "http://data.parliament.uk/resources/1104689/vote/102", "member" : [{"_about" : "http://data.parliament.uk/members/4371", "label" : {"_value" : "Biography information for Brendan O'Hara"}
        }
        ], "memberParty" : "Scottish National Party", "memberPrinted" : {"_value" : "Brendan O'Hara"}
        , "type" : "http://data.parliament.uk/schema/parl#AyeVote"}
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        }
        ], "memberParty" : "Independent", "memberPrinted" : {"_value" : "Jared O'Mara"}
        , "type" : "http://data.parliament.uk/schema/parl#AyeVote"}
       , {"_about" : "http://data.parliament.uk/resources/1104689/vote/104", "member" : [{"_about" : "http://data.parliament.uk/members/4629", "label" : {"_value" : "Biography information for Fiona Onasanya"}
        }
        ], "memberParty" : "Independent", "memberPrinted" : {"_value" : "Fiona Onasanya"}
        , "type" : "http://data.parliament.uk/schema/parl#AyeVote"}
       , {"_about" : "http://data.parliament.uk/resources/1104689/vote/105", "member" : [{"_about" : "http://data.parliament.uk/members/4464", "label" : {"_value" : "Biography information for Melanie Onn"}
        }
        ], "memberParty" : "Labour", "memberPrinted" : {"_value" : "Melanie Onn"}
        , "type" : "http://data.parliament.uk/schema/parl#AyeVote"}
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        }
        ], "memberParty" : "Labour", "memberPrinted" : {"_value" : "Chi Onwurah"}
        , "type" : "http://data.parliament.uk/schema/parl#AyeVote"}
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        }
        ], "memberParty" : "Labour (Co-op)", "memberPrinted" : {"_value" : "Kate Osamor"}
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        }
        ], "memberParty" : "Labour", "memberPrinted" : {"_value" : "Albert Owen"}
        , "type" : "http://data.parliament.uk/schema/parl#AyeVote"}
       , {"_about" : "http://data.parliament.uk/resources/1104689/vote/109", "member" : [{"_about" : "http://data.parliament.uk/members/4052", "label" : {"_value" : "Biography information for Mark Pawsey"}
        }
```

Using the data

```php
<?php

$data = json_decode(file_get_contents("1104689.json"));

$title = $data->result->primaryTopic->title;

$votes = ($data->result->primaryTopic->vote);

$mps = [];
$results = [];

foreach($votes as $vote) {
  $type = $vote->type;
  $party = $vote->memberParty;
  $mp = $vote->memberPrinted->_value;
  $mps[$mp] = $party;
  if(preg_match('!Aye!',$type)) {
    $vote = 'Aye';
  } else if(preg_match('!No!',$type)) {
    $vote = 'No';
  } else {
    $vote = null;
  }
  $results[$mp] = $vote;
}

var_dump($results);
```

```
["Ian Mearns"]=>
string(3) "Aye"
["Edward Miliband"]=>
string(3) "Aye"
["Mr Andrew Mitchell"]=>
string(3) "Aye"
["Carol Monaghan"]=>
string(3) "Aye"
["Sue Hayman"]=>
string(3) "Aye"
["Mrs Madeleine Moon"]=>
string(3) "Aye"
["Layla Moran"]=>
string(3) "Aye"
["Jessica Morden"]=>
string(3) "Aye"
["Nicky Morgan"]=>
string(3) "Aye"
["Stephen Morgan"]=>
string(3) "Aye"
["Grahame Morris"]=>
string(3) "Aye"
["Ian Murray"]=>
string(3) "Aye"
["Lisa Nandy"]=>
string(3) "Aye"
["Robert Neill"]=>
string(3) "Aye"
["Gavin Newlands"]=>
string(3) "Aye"
```

Now we want to link it with our database…

Data Manipulation Language

- Query
  - Retrieve: SELECT
- Manipulate
  - Update: INSERT/UPDATE/DELETE

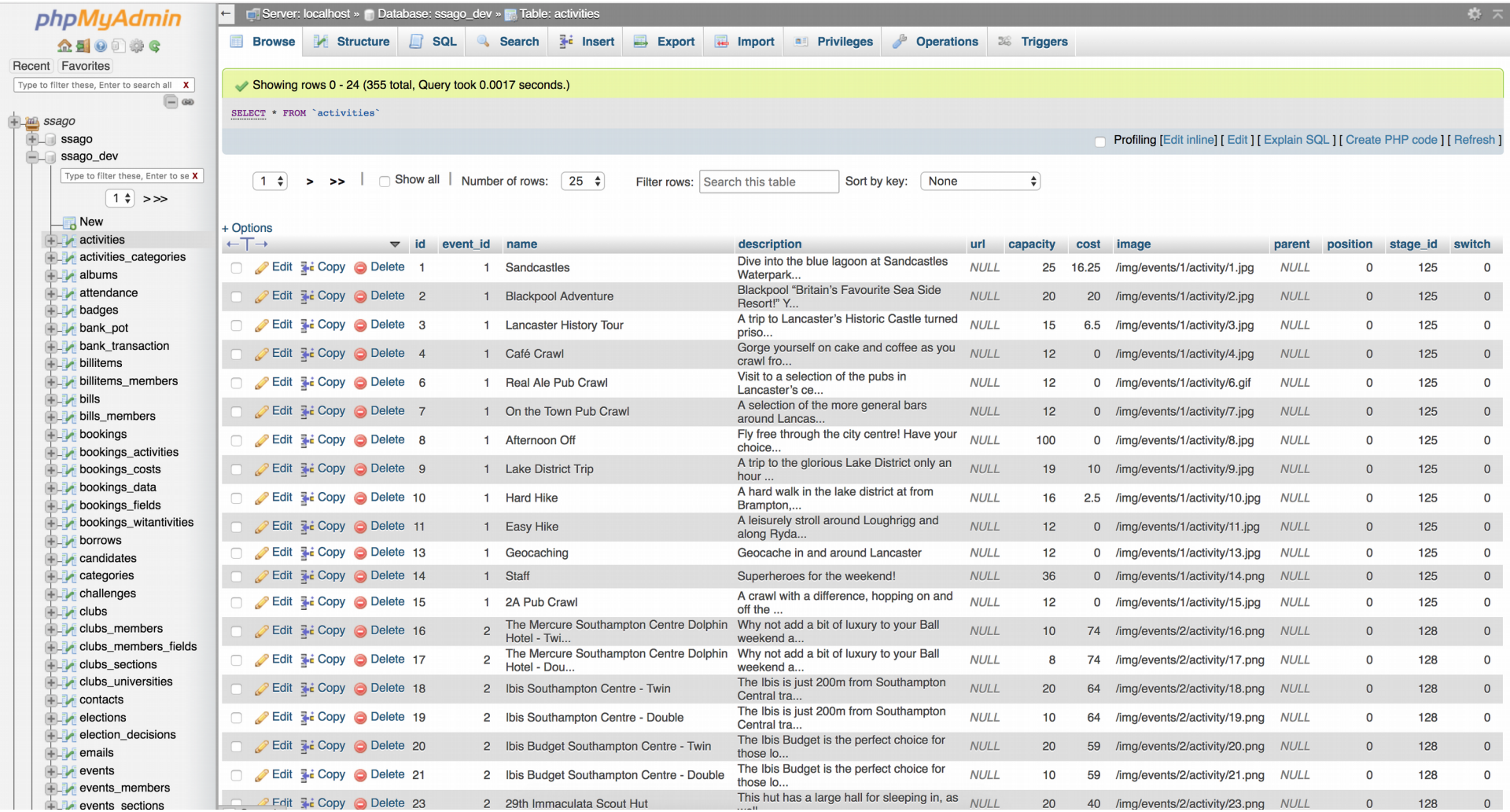
- Combine multiple tables
- Combine multiple records (aggregation)

Using UI Tools

- While it’s good to know your SQL, there are plenty of tools to help you
- Web-based tools
- Local tools

- Different user interfaces for different database systems

PHPMyAdmin


phpMyAdmin
Recent
Favorites
Type to filter these, Enter to search all
ssago
ssago
ssago_dev
Type to filter these, Enter to se
New
activities
activities_categories
albums
attendance
badges
bank_pot
bank_transaction
billitems
billitems_members
bills
bills_members
bookings
bookings_activities
bookings_costs
bookings_data
bookings_fields
bookings_witantivities
borrows
candidates
categories
challenges
clubs
clubs_members
clubs_members_fields
clubs_sections
clubs_universities
contacts
elections
election_decisions
emails
events
events_members
events_sections
Server: localhost » Database: ssago_dev » Table: activities
Browse
Structure
SQL
Search
Insert
Export
Import
Privileges
Operations
Triggers
Showing rows 0 - 24 (355 total, Query took 0.0017 seconds.)
SELECT * FROM `activities`
Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]
Show all
Number of rows: 25
Filter rows: Search this table
Sort by key: None
+ Options
id
event_id
name
description
url
capacity
cost
image
parent
position
stage_id
switch
Edit Copy Delete 1 1 Sandcastles Dive into the blue lagoon at Sandcastles Waterpark... NULL 25 16.25 /img/events/1/activity/1.jpg NULL 0 125 0
Edit Copy Delete 2 1 Blackpool Adventure Blackpool "Britain's Favourite Sea Side Resort!" Y... NULL 20 20 /img/events/1/activity/2.jpg NULL 0 125 0
Edit Copy Delete 3 1 Lancaster History Tour A trip to Lancaster's Historic Castle turned priso... NULL 15 6.5 /img/events/1/activity/3.jpg NULL 0 125 0
Edit Copy Delete 4 1 Café Crawl Gorge yourself on cake and coffee as you crawl fro... NULL 12 0 /img/events/1/activity/4.jpg NULL 0 125 0
Edit Copy Delete 6 1 Real Ale Pub Crawl Visit to a selection of the pubs in Lancaster's ce... NULL 12 0 /img/events/1/activity/6.gif NULL 0 125 0
Edit Copy Delete 7 1 On the Town Pub Crawl A selection of the more general bars around Lancas... NULL 12 0 /img/events/1/activity/7.jpg NULL 0 125 0
Edit Copy Delete 8 1 Afternoon Off Fly free through the city centre! Have your choice... NULL 100 0 /img/events/1/activity/8.jpg NULL 0 125 0
Edit Copy Delete 9 1 Lake District Trip A trip to the glorious Lake District only an hour ... NULL 19 10 /img/events/1/activity/9.jpg NULL 0 125 0
Edit Copy Delete 10 1 Hard Hike A hard walk in the lake district at from Brampton,... NULL 16 2.5 /img/events/1/activity/10.jpg NULL 0 125 0
Edit Copy Delete 11 1 Easy Hike A leisurely stroll around Loughrigg and along Ryda... NULL 12 0 /img/events/1/activity/11.jpg NULL 0 125 0
Edit Copy Delete 13 1 Geocaching Geocache in and around Lancaster NULL 12 0 /img/events/1/activity/13.jpg NULL 0 125 0
Edit Copy Delete 14 1 Staff Superheroes for the weekend! NULL 36 0 /img/events/1/activity/14.png NULL 0 125 0
Edit Copy Delete 15 1 2A Pub Crawl A crawl with a difference, hopping on and off the ... NULL 12 0 /img/events/1/activity/15.jpg NULL 0 125 0
Edit Copy Delete 16 2 The Mercure Southampton Centre Dolphin Hotel - Twi... Why not add a bit of luxury to your Ball weekend a... NULL 10 74 /img/events/2/activity/16.png NULL 0 128 0
Edit Copy Delete 17 2 The Mercure Southampton Centre Dolphin Hotel - Dou... Why not add a bit of luxury to your Ball weekend a... NULL 8 74 /img/events/2/activity/17.png NULL 0 128 0
Edit Copy Delete 18 2 Ibis Southampton Centre - Twin The Ibis is just 200m from Southampton Central tra... NULL 20 64 /img/events/2/activity/18.png NULL 0 128 0
Edit Copy Delete 19 2 Ibis Southampton Centre - Double The Ibis is just 200m from Southampton Central tra... NULL 10 64 /img/events/2/activity/19.png NULL 0 128 0
Edit Copy Delete 20 2 Ibis Budget Southampton Centre - Twin The Ibis Budget is the perfect choice for those lo... NULL 20 59 /img/events/2/activity/20.png NULL 0 128 0
Edit Copy Delete 21 2 Ibis Budget Southampton Centre - Double The Ibis Budget is the perfect choice for those lo... NULL 10 59 /img/events/2/activity/21.png NULL 0 128 0
Edit Copy Delete 23 2 29th Immaculata Scout Hut This hut has a large hall for sleeping in, as NULL 20 40 /img/events/2/activity/23.png NULL 0 128 0

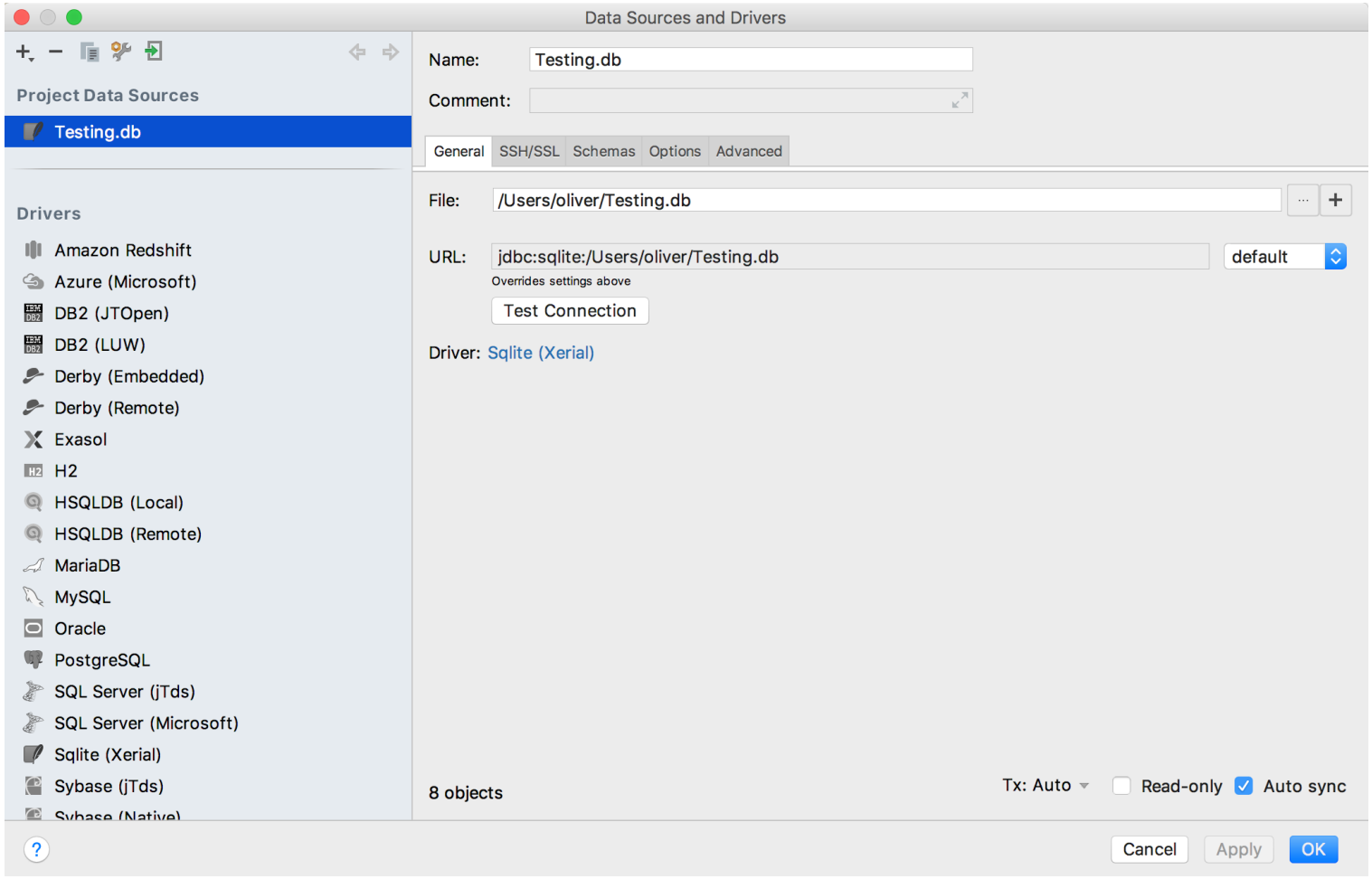
Datagrip

- Completely free for students
- https://www.jetbrains.com/student/

- Along with various of their other tools

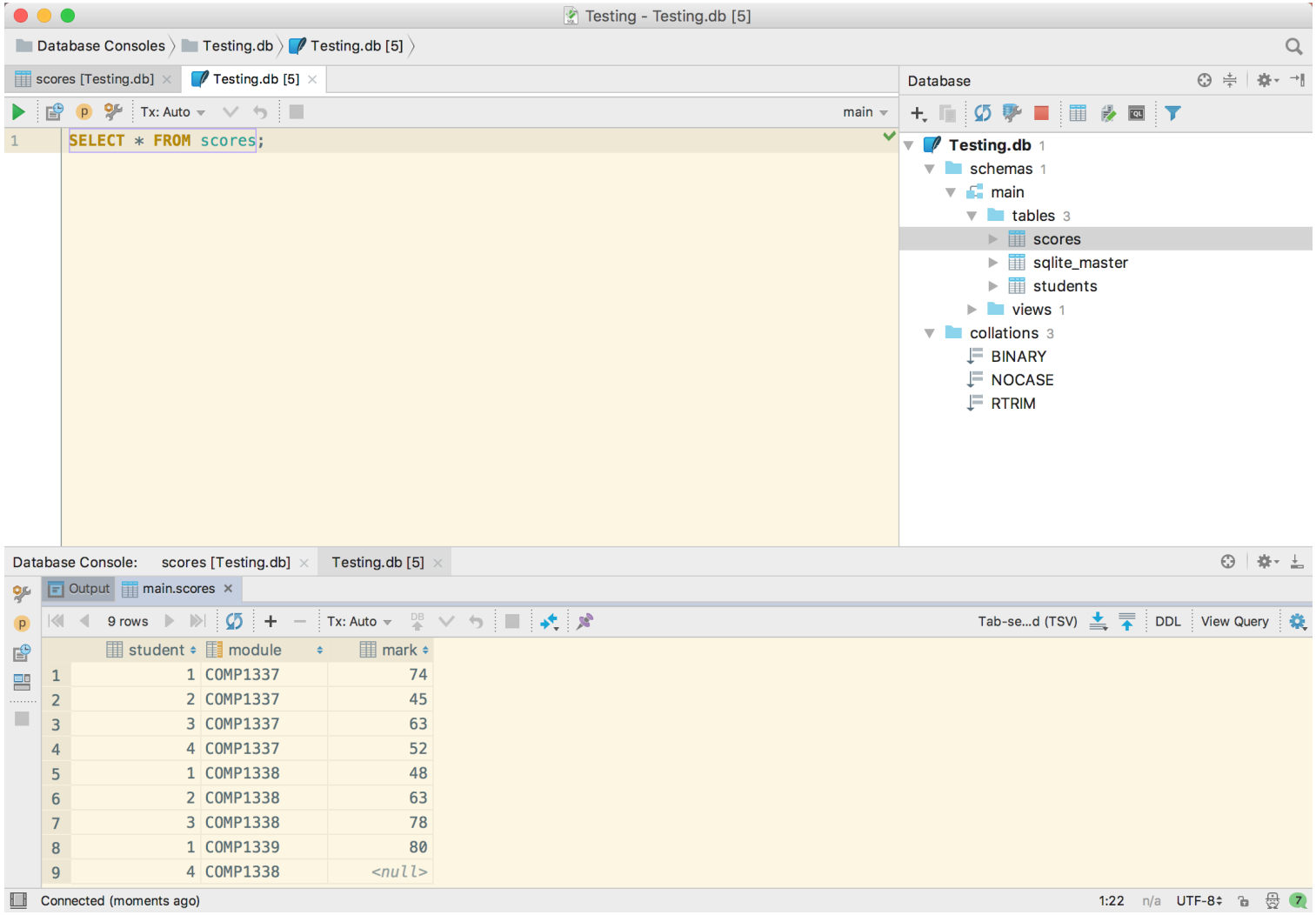
- Works with SQLite and most major database systems

Datagrip



You will need to set up and install the driver and then point it at your SQLite file

Datagrip


Testing - Testing.db [5]
Database Consoles
Testing.db
Testing.db [5]
scores [Testing.db]
Testing.db [5]
Tx: Auto
main
1
SELECT * FROM scores;
Database
Testing.db 1
schemas 1
main
tables 3
scores
sqlite_master
students
views 1
collations 3
BINARY
NOCASE
RTRIM
Database Console:
scores [Testing.db]
Testing.db [5]
Output
main.scores
9 rows
Tx: Auto
Tab-se...d (TSV)
DDL
View Query
student
module
mark
1 1 COMP1337 74
2 2 COMP1337 45
3 3 COMP1337 63
4 4 COMP1337 52
5 1 COMP1338 48
6 2 COMP1338 63
7 3 COMP1338 78
8 1 COMP1339 80
9 4 COMP1338 <null>
Connected (moments ago)
1:22
n/a
UTF-8

Inserting

- **INSERT INTO** Table(Column1,Colum2,Column3) **VALUES**(”Value1”,”Value2”,3)

- For example
- **INSERT INTO** Party (ID,Name) **VALUES** (1,'Labour');

```
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,467,'No');  NSERT INTO Division (Number,Name) VALUES (375,"European Union Withdrawal Act main Motion as amended");
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,66,'Aye');  NSERT INTO Division (Number,Name) VALUES (374,"European Union Withdrawal Act Amendment (f) - Beckett");
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,469,'No');  NSERT INTO Division (Number,Name) VALUES (373,"European Union Withdrawal Act Amendment (a) - Letwin");
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,470,'No');  NSERT INTO Party (ID,Name) VALUES (1,'Labour');
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,471,'No');  NSERT INTO MP (ID,Name,Party_ID) VALUES (1,"Louise Haigh",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,472,'No');  NSERT INTO MP (ID,Name,Party_ID) VALUES (2,"John Healey",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,473,'No');  NSERT INTO Party (ID,Name) VALUES (2,'Conservative');
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,474,'No');  NSERT INTO MP (ID,Name,Party_ID) VALUES (3,"Sarah Newton",2);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,475,'No');  NSERT INTO Party (ID,Name) VALUES (3,'Labour (Co-op)');
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,476,'No');  NSERT INTO MP (ID,Name,Party_ID) VALUES (4,"Alex Norris",3);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,477,'No');  NSERT INTO Party (ID,Name) VALUES (4,'Scottish National Party');
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,478,'No');  NSERT INTO MP (ID,Name,Party_ID) VALUES (5,"Brendan O\'Hara",4);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,67,'Aye');  NSERT INTO Party (ID,Name) VALUES (5,'Independent');
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,480,'No');  NSERT INTO MP (ID,Name,Party_ID) VALUES (6,"Jared O\'Mara",5);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,481,'No');  NSERT INTO MP (ID,Name,Party_ID) VALUES (7,"Fiona Onasanya",5);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,631,'Aye'); NSERT INTO MP (ID,Name,Party_ID) VALUES (8,"Melanie Onn",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,69,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (9,"Chi Onwurah",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,70,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (10,"Kate Osamor",3);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,71,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (11,"Albert Owen",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,72,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (12,"Mark Pawsey",2);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,73,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (13,"Sir Mark Hendrick",3);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,6,'Aye');   NSERT INTO MP (ID,Name,Party_ID) VALUES (14,"Stephanie Peacock",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,74,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (15,"Teresa Pearce",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,75,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (16,"Matthew Pennycook",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,76,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (17,"Toby Perkins",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,77,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (18,"Jess Phillips",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,78,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (19,"Bridget Phillipson",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,80,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (20,"Laura Pidcock",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,81,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (21,"Jo Platt",3);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,82,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (22,"Luke Pollard",3);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,83,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (23,"Stephen Pound",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,84,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (24,"Drew Hendry",4);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,7,'Aye');   NSERT INTO MP (ID,Name,Party_ID) VALUES (25,"Lucy Powell",3);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,85,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (26,"Yasmin Qureshi",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,86,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (27,"Faisal Rashid",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,87,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (28,"Angela Rayner",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,88,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (29,"Mr Steve Reed",3);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,89,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (30,"Christina Rees",3);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,91,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (31,"Ellie Reeves",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,93,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (32,"Rachel Reeves",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,94,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (33,"Emma Reynolds",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,95,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (34,"Jonathan Reynolds",3);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,8,'Aye');   NSERT INTO MP (ID,Name,Party_ID) VALUES (35,"Mike Hill",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,96,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (36,"Ms Marie Rimmer",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,97,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (37,"Mr Geoffrey Robinson",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,98,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (38,"Matt Rodda",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,99,'Aye');  NSERT INTO MP (ID,Name,Party_ID) VALUES (39,"Danielle Rowley",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,100,'Aye'); NSERT INTO MP (ID,Name,Party_ID) VALUES (40,"Chris Ruane",1);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,102,'Aye'); NSERT INTO MP (ID,Name,Party_ID) VALUES (41,"Lloyd Russell-Moyle",3);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,103,'Aye'); NSERT INTO MP (ID,Name,Party_ID) VALUES (42,"Joan Ryan",5);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,104,'Aye'); NSERT INTO MP (ID,Name,Party_ID) VALUES (43,"Antoinette Sandbach",2);
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,105,'Aye'); NSERT INTO Party (ID,Name) VALUES (6,'Plaid Cymru');
INSERT INTO Vote (Division_Number,MP_ID,Vote) VALUES (373,106,'Aye'); NSERT INTO MP (ID,Name,Party_ID) VALUES (44,"Liz Saville Roberts",6);
```

Updating and Deleting

- **UPDATE** Table
  - **SET** Field=Value
  - **WHERE** Field=Condition

```
UPDATE MP SET Name = ‘Sir John Bercow’
WHERE Name = ‘John Bercow’
```

- **DELETE FROM** Table
  - **WHERE** Field=Value

```
DELETE FROM Party WHERE Name = ‘Conservative’
```

Querying

- So now we've modelled our data and populated it, we can start querying

- This allows us to ask questions of the data
  - We could use this for analysis
  - We could be using it for further manipulation
  - We could be generating reports or exporting
  - We could be writing an application or website that uses the result

SELECT

```
SELECT
    [ALL | DISTINCT]
    expression
    FROM table_references
    WHERE where_condition]
    GROUP BY {col_name | expr | position}
    ORDER BY {col_name | expr | position} [ASC | DESC]
    LIMIT {[offset,] row_count | row_count OFFSET offset}]
```

SELECT

- Made up of a number of clauses
  - Retrieves tuples and attributes (rows and columns) from one or more tables or views
  - to apply conditions on (WHERE)
- Order of clauses is important:
  - **SELECT** columns
  - **[*INTO* *new table]***
  - **FROM** table **or** view
  - ***[WHERE** specific rows or a join is created]*
  - ***[GROUP BY** grouping conditions (columns) – **HAVING** group-property (specific rows)]*
  - ***[ORDER BY** ordering criterion **ASC | DESC]***

SELECT

- **SELECT** * **FROM** Table
  - * Means all columns
- **SELECT** Column,Column2… **FROM** Table
  - Specify specific columns
- **SELECT** Columns **FROM** Table **WHERE** Conditions
  - Specify conditions on results returned
- **SELECT** Columns **FROM** Table **LIMIT** Number
  - Limit the number of results
- **SELECT** * **FROM** Table **ORDER BY** Column **ASC/DESC**
  - Specify an ordering
- You can combine them but they must be in the right order

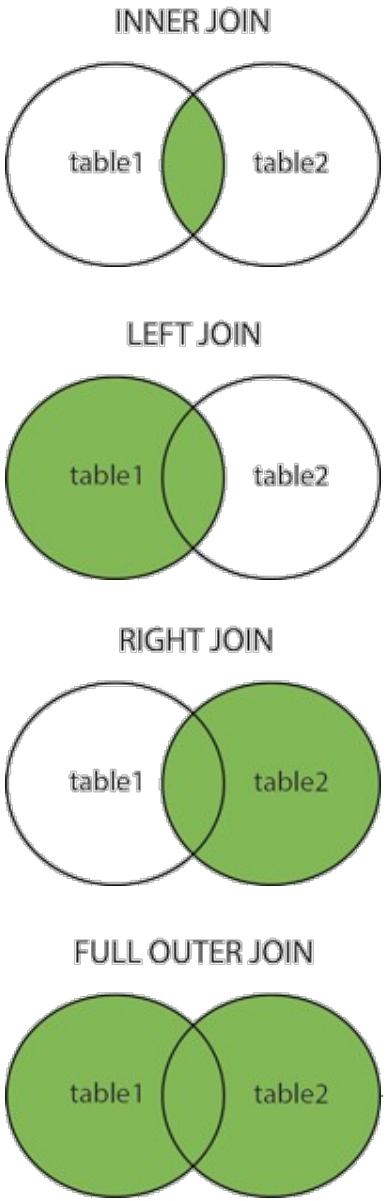
Joins

- When you want to select data from more than one table
- We do this using **JOINS**

- You split your relations to avoid redundant data, now you want to bring them back together…
- Join column is usually Key column
- Nulls will never join
- Need compatible data types

Join Types

- **INNER** join: returns just rows with matching keys (join column values)
- **RIGHT** join: returns all rows from right (second) table, whether they match a row in the first table or not
- **LEFT join**: returns all rows from left (first) table, whether they match a row in the second table or not
- **FULL OUTER join**: Returns all rows from both tables, whether they match or not



Joining in SQL

- **SELECT** Table1.*, Table2.*
  FROM Table1
  LEFT JOIN Table2
  ON Table1.Column=Table2.Column

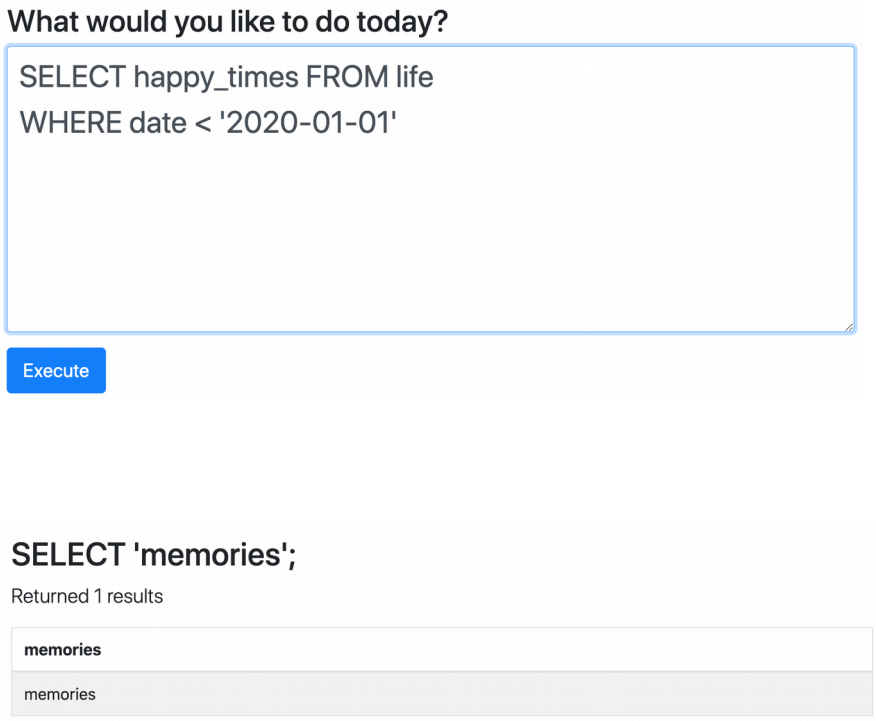
- Can have multiple tables and multiple joins
- You use ON to specify how the tables join to each other

So let’s give it a go...

SQL but it gets h a r d e r

- https://ecs.ninja/sql

- Play along and see if you can get the queries right
  - **PAUSE** when the question comes up and try and solve it using the site above
- **We will be going over this in more detail in the next lecture, don't worry!**
- We'll compete with… well yourself
  - I wanted to use Discord but they said no.



n00b

- Seriously, anyone can query this

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ACHAcgMURyK/QAXSzXTbffykXIILyA8DfXTz/dtI4jIcNo8HYrIsdogRizfEPLW8yoIuDO4TR/7GDfYDzgBfXNgBz7IuhUorXLXBHj/bPWsbuyyr7bmMdzIb27jabfTYs3RBY8Az9rMTA3HEPMrYnbncR3/TA+AdD4I8Qhze/3LcDY9rRJIYTMfe/TQP4NaIDzT9HfeDaE8nbBizdyPWSrbg8rYomI9sLBWIsQoQz+D4d3EvNALMXoSN+uUL3ln3rbQPfSLdHb9fzTDBvAYjASA4
bg2/AN/zBXfOJjTf47YPCFogMWdcEQ+vInCrb1EAbe/P4rzD4hDbca4BP9UsoLgLfT44hW4QzSzeM+LgKLQIbi73DcCE/DfbPKEYAcWMv2MN7TESvzSB9g/IHvQPonFDdYL8gbQDcIUu/AT3HBcOLV8jrIhYrIiuHfSLA+ALQX83fSMrWMrBSNKzEEuO7NNX/ANDzgfDXyrCN/OKmQQbMEjcnY1PW+TeRV3jbLEQbfXKD8r8hsX/7IXfCsfbcrIXzfTIrDDIT/6EfHbAoprUTg/A
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+LyP3V/MggBsbvUX6dbMBMIQj71DbTvzBuNUi+Y11Ia/fLDdDZ447QY/8PU3DzvWAomQgMTXzeNjYDyM/1FDIDoPh976z78/SNHA/qvA8FXLbfN78AQXgODTNP87vvHAXEvMPEQCCEffP7
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+i0QewjDBFtT/1yy/E+QSoerLz3wwmyw33zwHt0P4P9w06P/V388ogAggB9TUB0fhH8+x2Qw9i/0M3u4a/7zUr0FAIVw/gA7xUP3fwQz018/wDM+wYiazw/HZ07q4V/
+W/EKPXE/aDFzwjixf4C/L2/IxB8/S610++
+F9SG122G883V874KxS/7PAMw0A1CjyE23Et2L0q7uECAdyfQOvi3EAFDs4C+wvxHoKCEOz3xP6wzyAvdq/10H/wmihP2O3829QhQRDhgt3208+3rMw+mO

Simple Select

Get all the divisions in the system

DESCRIBE Division;

Field	Type
Number	int(11)
Name	varchar(255)

SELECT * FROM Division;

Returned 3 results

Number	Name
373	European Union Withdrawal Act Amendment (a) - Letwin
374	European Union Withdrawal Act Amendment (f) - Beckett
375	European Union Withdrawal Act main Motion as amended

Conditional Select

- Get all the votes for Division 375

```
SELECT * FROM Vote WHERE Division_Number=375;
```

Returned 627 results

ID	Vote	Division_Number	MP_ID
1	Aye	375	1
2	Aye	375	2
3	Aye	375	3
4	Aye	375	4
5	Aye	375	5
6	Aye	375	6
7	Aye	375	7
8	Aye	375	8
9	Aye	375	9
10	Aye	375	10

Easy 

- It’s a little bit harder but still only two clauses
- A little practice and you can learn this no problem

Additional Conditions

- Get the voting record for MP 1 for Division 375

```
SELECT * FROM Vote WHERE Division_Number=375 AND MP_ID=1;
```

Returned 1 results

ID	Vote	Division_Number	MP_ID
1	Aye	375	1

- Get the voting record for MP1 for Division 373 or 375

```
SELECT * FROM Vote WHERE (Division_Number=375 OR Division_Number=373) AND MP_ID=1;
```

Returned 2 results

ID	Vote	Division_Number	MP_ID
1	Aye	375	1
1403	Aye	373	1

Additional Conditions

- Remember, that AND binds tighter than OR
- This is probably not what you wanted
- SELECT * FROM Vote WHERE Division_Number=375 OR Division_Number=373 AND MP_ID=1;

SELECT * FROM Vote WHERE Division_Number=375 OR Division_Number=373 AND MP_ID=1;

Returned 628 results

ID	Vote	Division_Number	MP_ID
1	Aye	375	1
2	Aye	375	2
3	Aye	375	3
4	Aye	375	4
5	Aye	375	5
6	Aye	375	6
7	Aye	375	7
8	Aye	375	8
9	Aye	375	9

Fields and Ordering

- Get just the names of parties, in alphabetical order

DESCRIBE Party;

Field	Type
ID	int(11)
Name	varchar(255)

SELECT Name FROM Party ORDER BY Name

Returned 9 results

Name
Conservative
Democratic Unionist Party
Green Party
Independent
Labour
Labour (Co-op)
Liberal Democrat
Plaid Cymru
Scottish National Party

Medium

- Now it’s getting a bit more interesting
- Once you’ve practiced a few extra keywords, it’ll be easy

Aggregating

```
SELECT column_name,
aggregate_function(another_column)
FROM table_name
WHERE column_name=operator_value
GROUP BY column_name;
```

- Two most useful aggregation functions
  - COUNT
  - SUM

Aggregation: COUNT

- Get the total amount of MPs in each party who were involved last night

Describe MP

Field	Type
ID	int(11)
Name	varchar(255)
Party_ID	int(11)
Constituency_ID	int(11)

SELECT Party_ID,COUNT(ID) FROM MP GROUP BY Party_ID

Returned 9 results

Party_ID	COUNT(ID)
1	208
2	311
3	33
4	34
5	20
6	4
7	11
8	10
9	1

Hard

- More than one table? What is this madness!

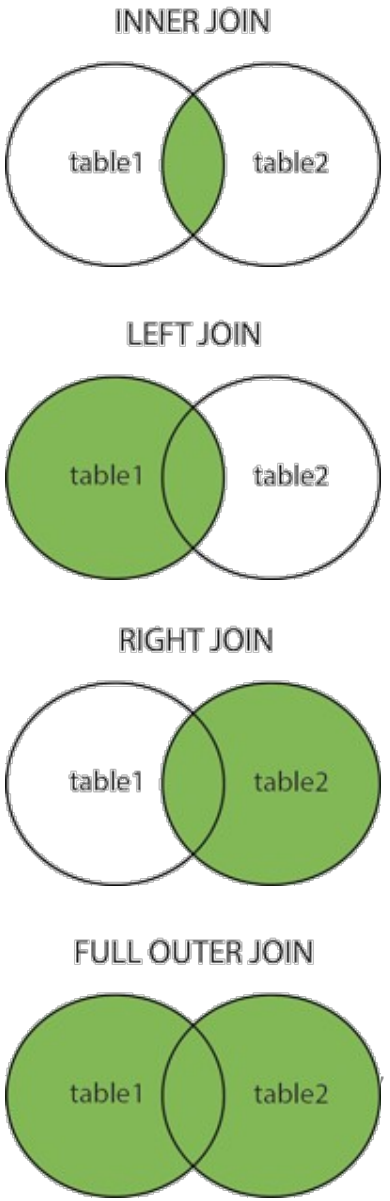
Joins

- Now we need a way to bring our data together in am more useful way
- We do this using **JOINS**

- You split your relations to avoid redundant data, now you want to bring them back together…
- Join column is usually Key column
- Nulls will never join
- Need compatible data types

Join Types

- **INNER** join: returns just rows with matching keys (join column values)
- **RIGHT** join: returns all rows from right (second) table, whether they match a row in the first table or not
- **LEFT join**: returns all rows from left (first) table, whether they match a row in the second table or not
- **FULL OUTER join**: Returns all rows from both tables, whether they match or not



Joining in SQL

- **SELECT** Table1.*, Table2.*
  FROM Table1
  LEFT JOIN Table2
  ON Table1.Column=Table2.Column

- Can have multiple tables and multiple joins
- You use ON to specify how the tables join to each other

Renaming Columns

- **SELECT** Table.Column **AS** Column1, Table2.Column2 **AS** Columns2

- Lets us specify which columns from which tables we want and what we want to call them

Join: Map MPs to Parties

- Get the name and party of MPs

```
SELECT MP.Name,Party.Name as PARTY FROM MP LEFT JOIN Party ON MP.Party_ID = Party.ID;
```

Returned 632 results

Name	PARTY
Louise Haigh	Labour
John Healey	Labour
Melanie Onn	Labour
Chi Onwurah	Labour
Albert Owen	Labour
Stephanie Peacock	Labour

Aggregation and Joins Combined

- Get the total amount of MPs in each party who were involved last night – with the party names

```
SELECT Party.Name,COUNT(MP.ID) FROM MP LEFT JOIN Party ON MP.Party_ID=Party.ID GROUP BY Party.ID
```

Returned 9 results

Name	COUNT(MP.ID)
Labour	208
Conservative	311
Labour (Co-op)	33
Scottish National Party	34
Independent	20
Plaid Cymru	4
Liberal Democrat	11
Democratic Unionist Party	10
Green Party	1

Adding Order

- Now do the same, but rename the column to Total and order by it descending, to give the parties in increasing order

```
SELECT Party.Name,COUNT(MP.ID) AS Total FROM MP LEFT JOIN Party ON MP.Party_ID=Party.ID GROUP BY Party.ID ORDER BY Total DESC
```

Returned 9 results

Name	Total
Conservative	311
Labour	208
Scottish National Party	34
Labour (Co-op)	33
Independent	20
Liberal Democrat	11
Democratic Unionist Party	10
Plaid Cymru	4
Green Party	1

Impossible

- I mean, if you had two people querying together…

Bringing it all together

- Get the names of the divisions and the totals of each type of vote

```
SELECT Division.Name,Vote.Vote,COUNT(Vote.ID) FROM Vote LEFT JOIN Division ON
Vote.Division_Number=Division.Number GROUP BY Vote.Division_Number,Vote.Vote;
```

Returned 6 results

Name	Vote	COUNT(Vote.ID)
European Union Withdrawal Act Amendment (a) - Letwin	Aye	329
European Union Withdrawal Act Amendment (a) - Letwin	No	301
European Union Withdrawal Act Amendment (f) - Beckett	Aye	311
European Union Withdrawal Act Amendment (f) - Beckett	No	314
European Union Withdrawal Act main Motion as amended	Aye	327
European Union Withdrawal Act main Motion as amended	No	300

Bringing it all together

- Now break it down by party as well

```
SELECT Division.Name AS Division,Party.Name AS Party,Vote.Vote,COUNT(Vote.ID) FROM Vote LEFT JOIN Division ON Vote.Division_Number=Division.Number LEFT JOIN MP ON Vote.MP_ID=MP.ID LEFT JOIN Party ON MP.Party_ID=Party.ID GROUP BY Vote.Division_Number,Party.Name,Vote.Vote;
```

Returned 38 results

Division	Party	Vote	COUNT(Vote.ID)
European Union Withdrawal Act Amendment (a) - Letwin	Conservative	Aye	30
European Union Withdrawal Act Amendment (a) - Letwin	Conservative	No	280
European Union Withdrawal Act Amendment (a) - Letwin	Democratic Unionist Party	No	10
European Union Withdrawal Act Amendment (a) - Letwin	Green Party	Aye	1
European Union Withdrawal Act Amendment (a) - Letwin	Independent	Aye	17
European Union Withdrawal Act Amendment (a) - Letwin	Independent	No	3
European Union Withdrawal Act Amendment (a) - Letwin	Labour	Aye	200
European Union Withdrawal Act Amendment (a) - Letwin	Labour	No	8
European Union Withdrawal Act Amendment (a) - Letwin	Labour (Co-op)	Aye	32
European Union Withdrawal Act Amendment (a) - Letwin	Liberal Democrat	Aye	11
European Union Withdrawal Act Amendment (a) - Letwin	Plaid Cymru	Aye	4
European Union Withdrawal Act Amendment (a) - Letwin	Scottish National Party	Aye	34

Finally

- Work out who in Labour voted against Division 375

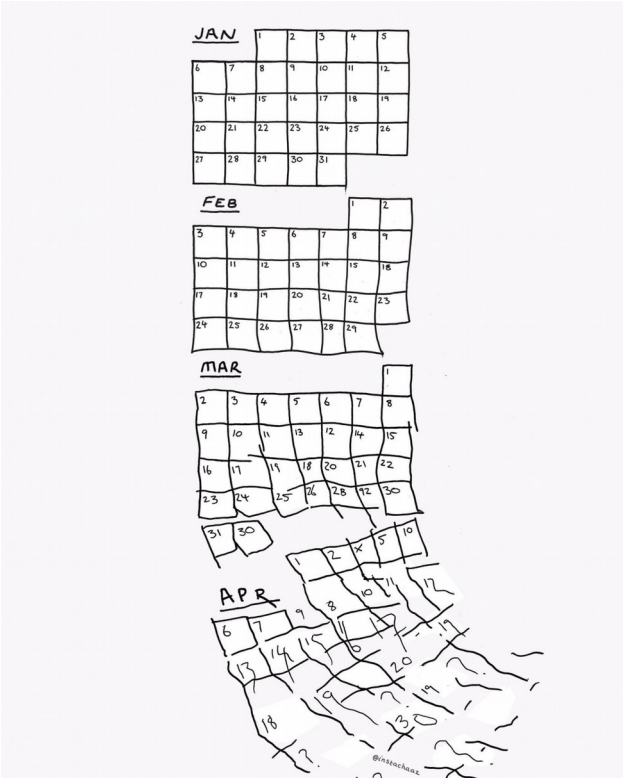
```
SELECT MP.Name FROM Vote LEFT JOIN MP ON Vote.MP_ID=MP.ID LEFT JOIN Party ON MP.Party_ID=Party.ID
LEFT JOIN Division ON Vote.Division_Number=Division.Number WHERE Party.Name='Labour' AND Vote.Vote='No'
AND Division.Number=373;
```

Returned 8 results

Name
Sir Kevin Barron
Mr Ronnie Campbell
Rosie Cooper
Caroline Flint
Mr Stephen Hepburn
Kate Hoey
John Mann
Graham Stringer

Ok, this is hard as it gets

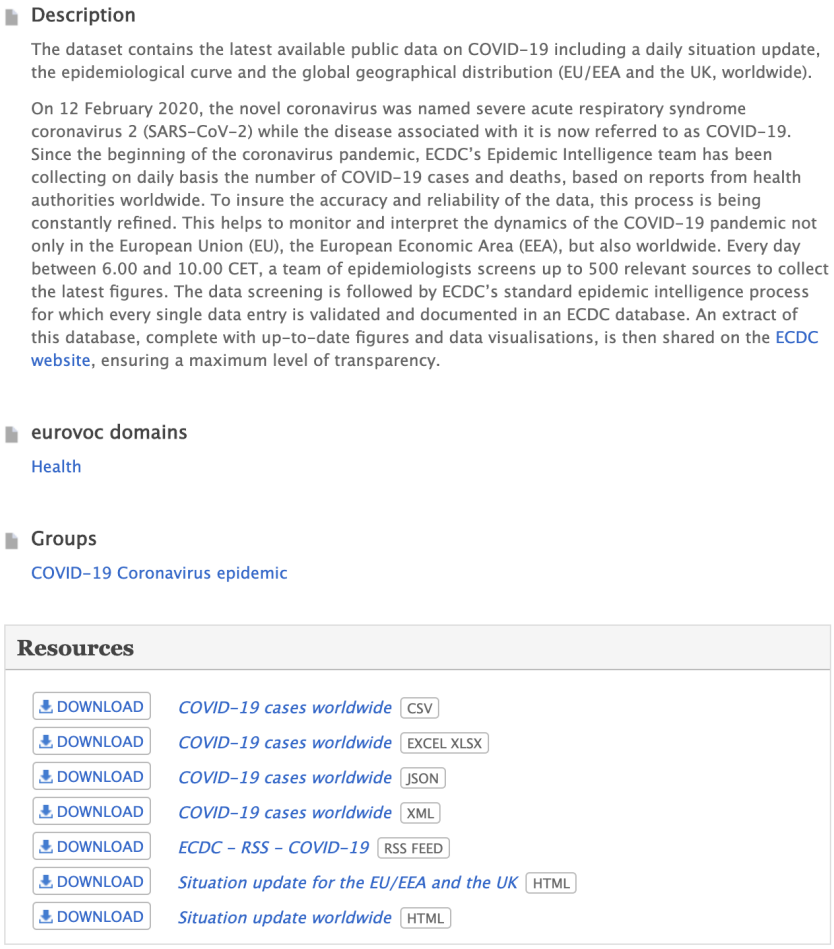
Your coursework



- 15% (I think!?) of your marks
- 15 exercises split into
  - The Relational Model (20%)
    - IT GCSE
  - Normalisation (25%)
    - Did you watch last weeks lecture?
  - Modelling (20%)
    - CREATE TABLE
  - Querying (30%)
    - INSERT INTO answers SELECT * FROM friends
  - Extension (5%)
    - Because you've got plenty of spare time
- Deadline:
  - As late as we can make it
  - Monday 25th of May (should this even be term time? I don't think so)
- https://secure.ecs.soton.ac.uk/noteswiki/w/COMP1204/Coursework2

Your coursework: Corona Special

- Topical (and realistic)
- Working with the COVID-19 cases dataset
- Turning this into a relational model that we can query
  - From CSV to SQLite
- Then we can answer questions about the current situation



Description

The dataset contains the latest available public data on COVID-19 including a daily situation update, the epidemiological curve and the global geographical distribution (EU/EEA and the UK, worldwide).

On 12 February 2020, the novel coronavirus was named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) while the disease associated with it is now referred to as COVID-19. Since the beginning of the coronavirus pandemic, ECDC's Epidemic Intelligence team has been collecting on daily basis the number of COVID-19 cases and deaths, based on reports from health authorities worldwide. To insure the accuracy and reliability of the data, this process is being constantly refined. This helps to monitor and interpret the dynamics of the COVID-19 pandemic not only in the European Union (EU), the European Economic Area (EEA), but also worldwide. Every day between 6.00 and 10.00 CET, a team of epidemiologists screens up to 500 relevant sources to collect the latest figures. The data screening is followed by ECDC's standard epidemic intelligence process for which every single data entry is validated and documented in an ECDC database. An extract of this database, complete with up-to-date figures and data visualisations, is then shared on the ECDC website, ensuring a maximum level of transparency.

eurovoc domains

Health

Groups

COVID-19 Coronavirus epidemic

Resources

DOWNLOAD	*COVID-19 cases worldwide*	CSV
DOWNLOAD	*COVID-19 cases worldwide*	EXCEL XLSX
DOWNLOAD	*COVID-19 cases worldwide*	JSON
DOWNLOAD	*COVID-19 cases worldwide*	XML
DOWNLOAD	*ECDC - RSS - COVID-19*	RSS FEED
DOWNLOAD	*Situation update for the EU/EEA and the UK*	HTML
DOWNLOAD	*Situation update worldwide*	HTML

The questions

- **EX14**: The worldwide total number of cases and deaths
- **EX15**: The number of cases and the date, by increasing date order, for the United Kingdom
- **EX16**: The number of cases, deaths and the date, by increasing data order, for each continent
- **EX17**: The number of cases and deaths as a percentage of the population, for each country
- **EX18**: A descending list of the the top 10 countries, by percentage deaths out of cases
- **EX19**: The date against a cumulative running total of the number of deaths by day and cases by day for the united kingdom

What is this madness?

An extension

- **EX20**: Using GnuPlot, write a small script (plot.sh) which will, using the data in the SQLite database (called coronavirus.db), produce a graph with the date on the horizontal axis and the cumulative number of deaths by country on the vertical axis.
- Include the full script in the report and the resulting graph produced

- Bring together your Unix and SQL skills
- This is actually pretty simple if you understand what you're doing ;-)

Your submission

You must write your report in LaTeX and produce a report PDF. The name of the generated file should be report.pdf. Your report should not be more than 5 pages long excluding the cover (first) page. Your report should contain:

- A title, your name, your username and your student ID.
- A section for each part of the coursework:
- The Relational Model
- Normalisation
- Modelling
- Querying
- Extension (if applicable)

Your submission should be a single *cw2.tar.gz* tar.gz file

Getting Help

- Email ob1a12@soton.ac.uk
  - I'll do my best to help
  - You can send me a video of your question if you'd like to make it more personal and feel like we're real people and I'll reply in kind
- Please put **COMP1204** in the **subject**
  - Then I know it's important and worth replying to
  - You're much more exciting than all the academics that email me
- I'll be putting up an FAQ on the Coursework page when the questions come in
  - So take a look 1 hour before the deadline if you get stuck, as that's when they'll probably all come in…

Academic References

- https://www.youtube.com/watch?v=valoPJlKbs4

- Also did you know this presentation contained the full genome of the Coronavirus?