

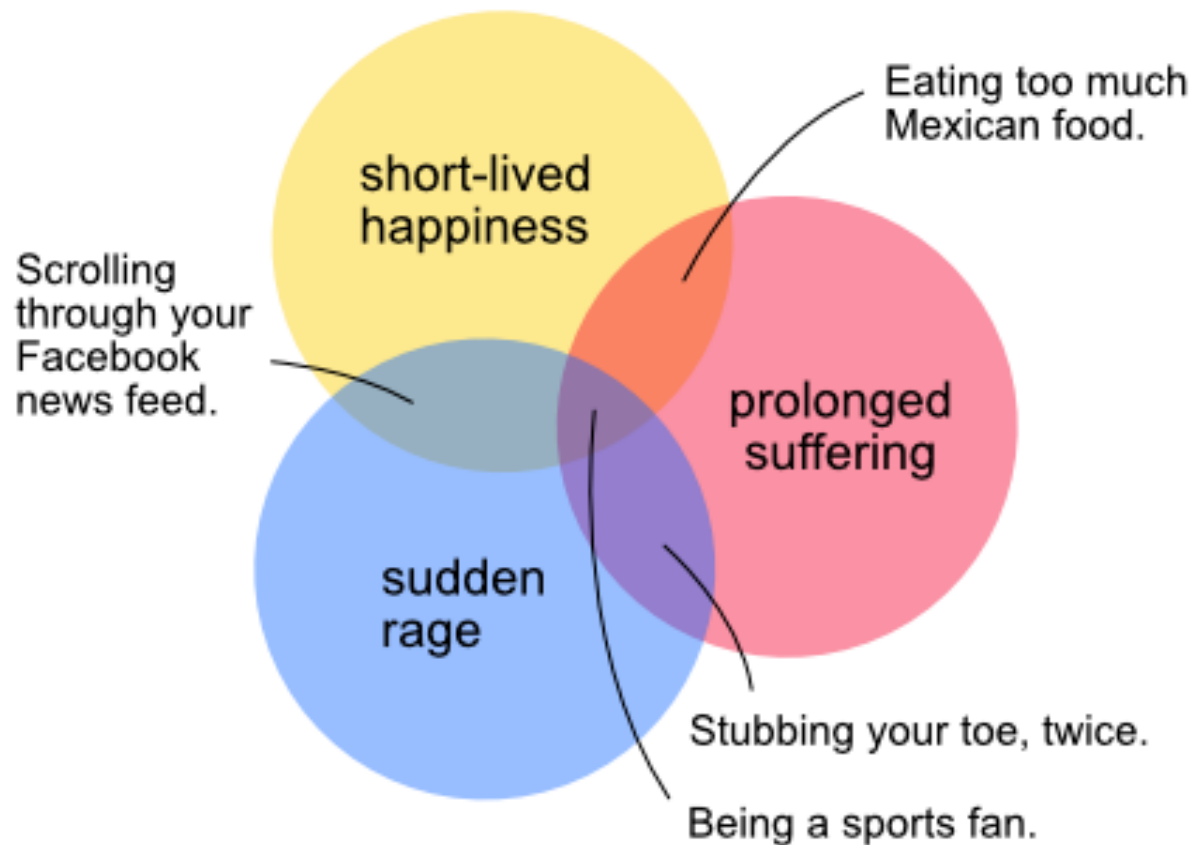
# Set theory

How data can be related

# Set theory

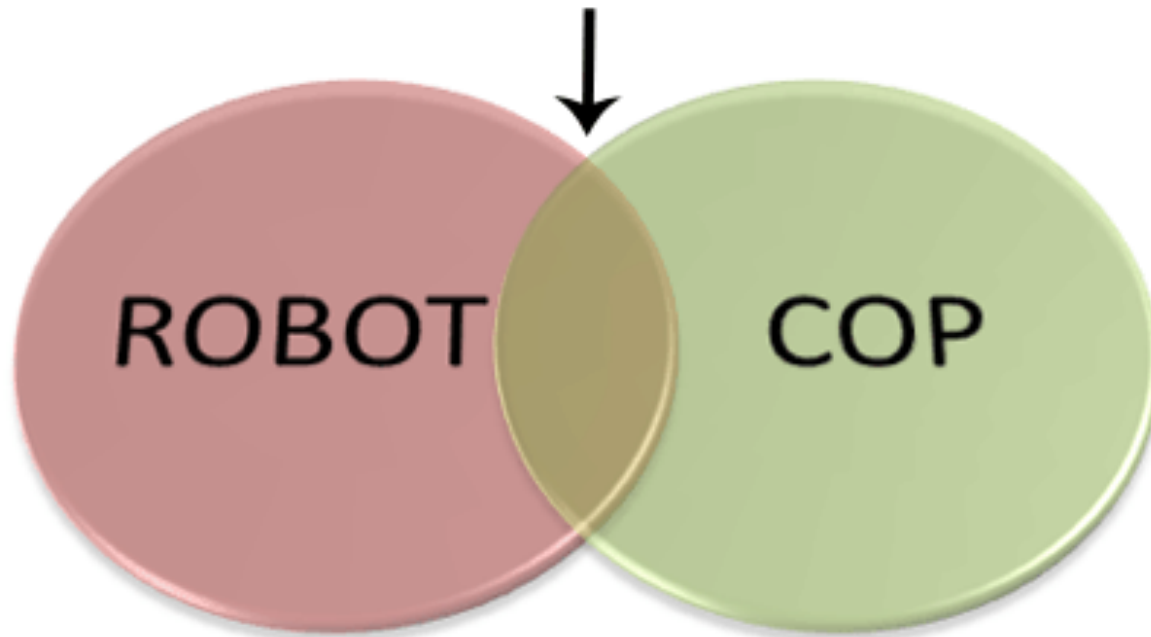
- A set is represented by a circle
- Each set represents a group of entities that have a particular attribute.
- Intersecting sets overlap when they have attributes in common.
- Sets that have no commonality do not overlap.

# Venn Diagram of Emotions



# Intersection

Futuristic Trends in Law Enforcement

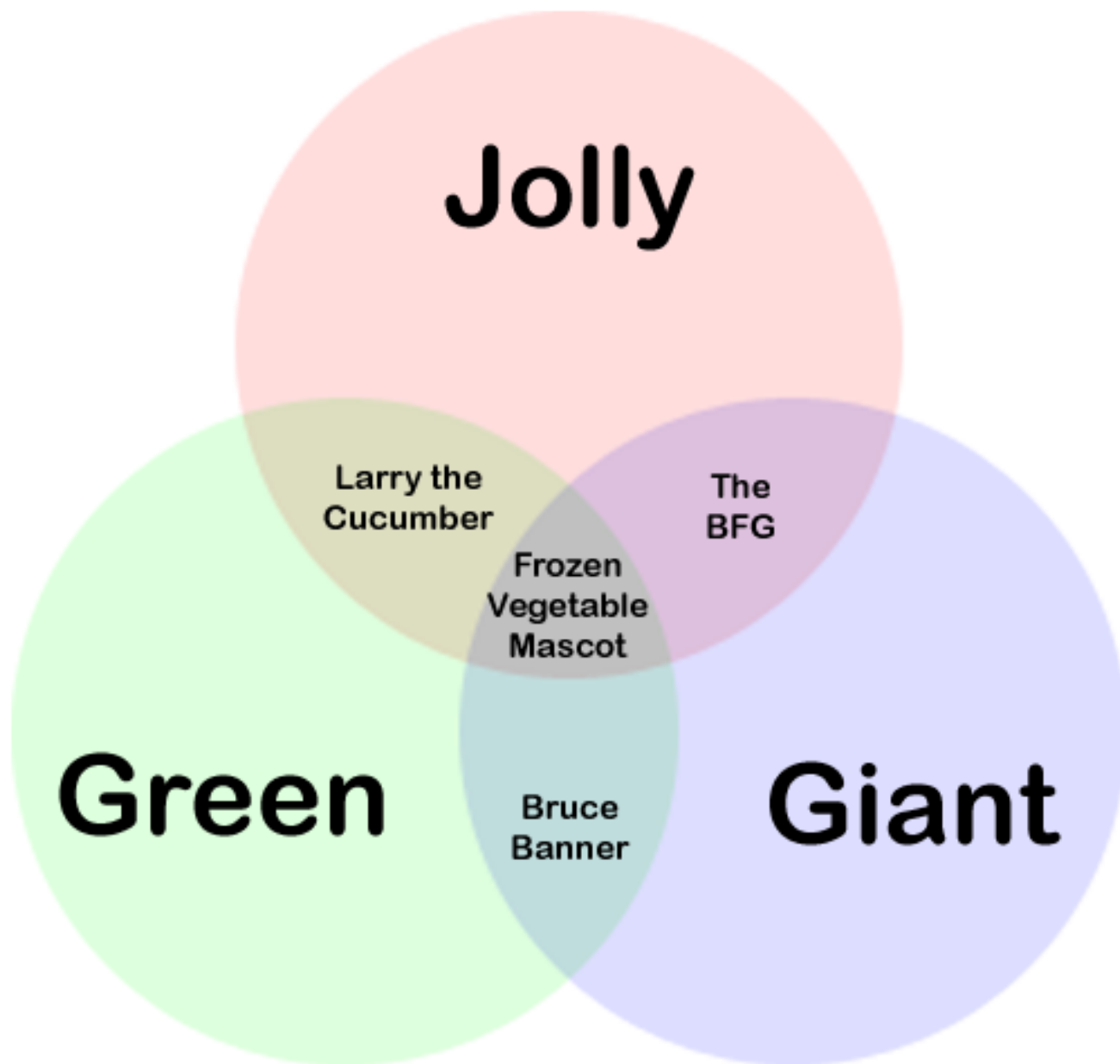


GraphJam

<http://graphjam.files.wordpress.com/2008/03/robo-cop-venn-diagram-2.gif>

# What are the attributes of these sets?

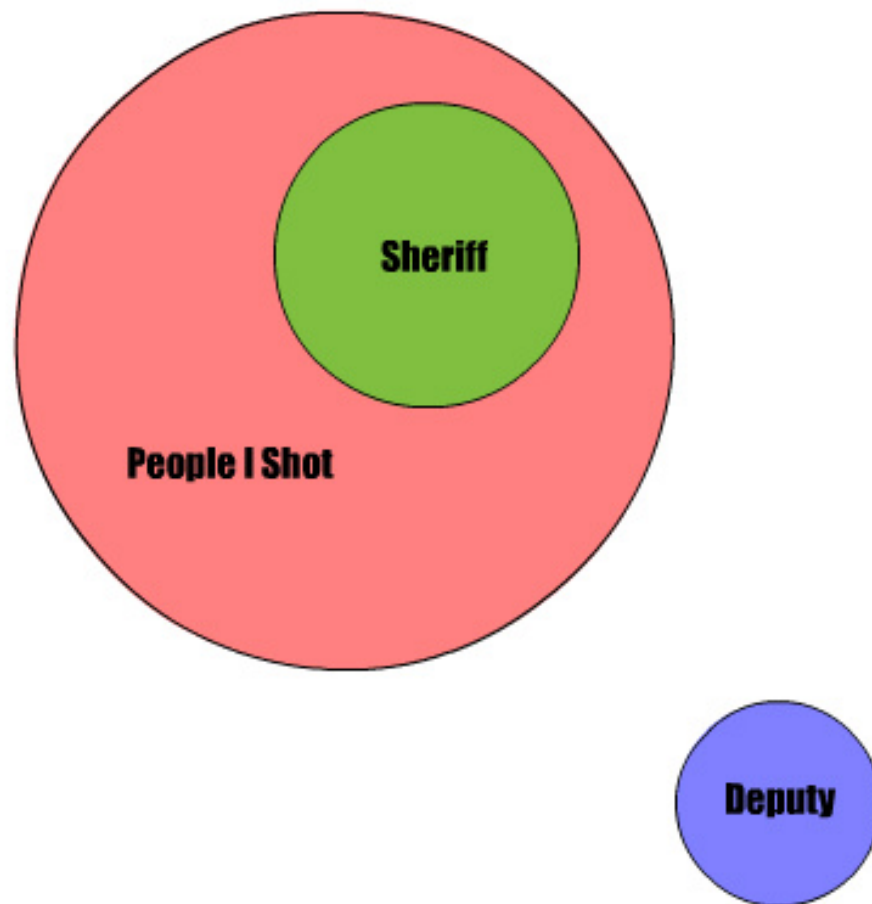




# Non-intersecting sets

- Have no attributes in common.
- Do not overlap.

# Summary of Contentions by Bob Marley





# Handling sets

- In general, where there are sets of data, some will overlap and some will not.
- It is useful to find:
  - The intersection of the sets
  - The union of sets
  - Differences between sets
  - Subsets
- SQL allows us to manipulate these relationships.

# Questions we might ask

- Return the list of cops that aren't robots.
- Return the list of animals that have beaks and play six-stringed instruments.
- Return the list of things that are Jolly and Green, but not Giant.
- Return the list of law enforcement officers that Bob shot.

# Assumptions we might make

- There are no sheriffs that Bob didn't shoot.
  - There is nothing in the set of sheriffs that is not in the set of people Bob shot.
  - Sheriffs are a subset of the people that Bob shot.

# Sets

Although there are a lot of divisions between these groups, there is also a lot they have in common.

They are perfect groups to use for set relations.



# Related domains

Hill 16 - The Official Dublin County Board Website - Mozilla Firefox

File Edit View History Bookmarks Tools Help

DIT Web Timetables Blackboard Learning System GAA Club Results | Fixtures & Results | ... Hill 16 - The Official Dublin County ...

http://www.hill16.ie/index.php?/home/fixtures-and-results/

Most Visited Webcourses DIT Secure Access 55... RTÉ News IrishTimes.com - RSS F... DIT BSc in Computing DIT Web Timetables

**Hill 16.ie**  
THE OFFICIAL DUBLIN COUNTY BOARD WEBSITE / ÁIT OIFIGIÚIL COISTE ÁTHA CLIATH

HOME WORD ON THE HILL FIXTURES & RESULTS THE DUB HUB INTER COUNTY EXTRAS SHOP

Home > Fixtures & Results

**Fixtures & Results**  
Match results by email  
Inter County  
Club Fixtures  
Club Results  
Club - Adult - Tables  
Club - U13 - U16 Tables  
Club - U8 - U12 Tables  
2010  
Club Services (New)

Upcoming Fixtures : 23/09/2011 - 07/10/2011

23/09/2011 07/10/2011 Set dates Sort By Date Sort By Co

**Senior Hurling Championship A**

Team 1	Team 2	Venue	Date	Time	Referee	No
St Brigid's	Craobh Chiarain	Parnell Park	24/09/2011	16:00	Gearoid McGrath	No

**Senior Hurling Championship B**

Team 1	Team 2	Venue	Date	Time	Referee	No
St Marks	St Oliver Plunketts ER	O Toole Park	24/09/2011	16:00	Donal Ryan	No
Thomas Davis	Naomh Olaf	O Toole Park	24/09/2011	17:30	Fergus McGreevy	No

**Senior Hurling Championship A**

Team 1	Team 2	Venue	Date	Time	Referee	No
Cuala	Lucan Sarsfields	Parnell Park	24/09/2011	17:45	Michael Butler	No

**Senior Hurling Championship B**

Team 1	Team 2	Venue	Date	Time	Referee	No
Kevin's	Naomh Fionnbarra O Toole Park	O Toole Park	25/09/2011	14:15	Pat Denieffe	No

**Senior Hurling Championship A**



**GAA HURLING**  
**ALL IRELAND SENIOR CHAMPIONSHIP**



# When do we use SET theory?

- SET theory
  - When the tables have similar columns and constraints.
- JOINS
  - When the tables are related, but NOT necessarily with the same columns and constraints.
  - The tables must have one or more columns with attributes in common.

# Converting to SQL

- Using SET theory to formulate queries
- Set theory
- Intersection, Union, Difference

# Relational algebra terms

- Projection
- Selection
- Union
- Intersect
- Minus
- Divide



## Projection

- This is where we return just some ***columns*** from a table
- i.e., instead of
  - SELECT \* FROM STOCK,

we select just some of the fields:

- SELECT stock\_code, stock\_description FROM STOCK;

# Selection

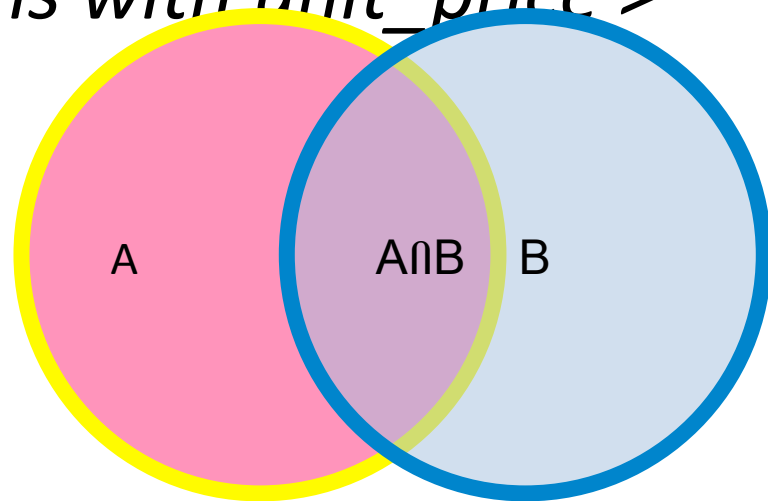
- This is where we select just some ***rows*** from a table, by filtering out the ones we don't want:
  - `SELECT * FROM STOCK WHERE stock_code like 'A101';`

# Sets from the Stock Table

- Consider set A as all stock items supplied by supplierid 501.
  - `select * from stock where supplier_id = 501;`
- Consider set B as all stock items that have a unit\_price of more than €200.
  - `select * from stock where unit_price > 200;`

# Intersection in a Venn diagram

- Intersection is where the two sets overlap.
- *If A is the set of stock items supplied by SupplierId 501 and*
- *B is the set of stock items with unit\_price > €200,*
- *What's  $A \cap B$ ?*



# Using INTERSECT in SQL

- Determine the sets in separate SQL statements.
- Use the word INTERSECT between the two SQL statements.

– Omit the ; from the first select statement.

```
select * from stock where supplier_id = 501;
```

```
select * from stock where unit_price > 200;
```

# Using INTERSECT in SQL

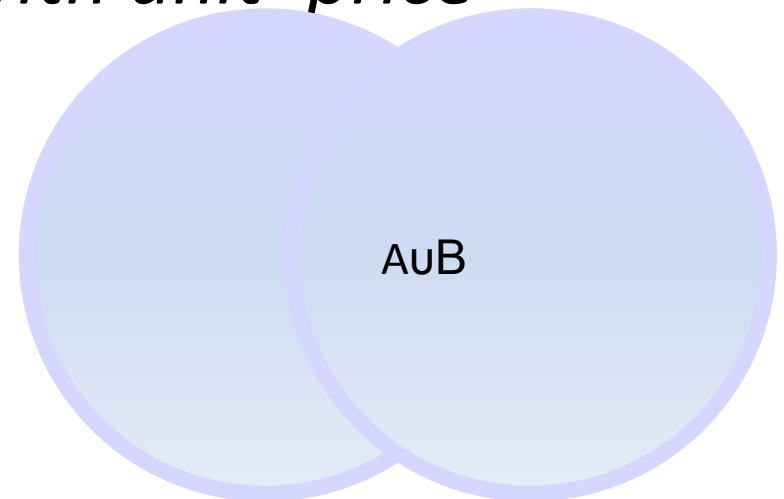
- Determine the sets in separate SQL statements.
- Use the word INTERSECT between the two SQL statements.

– Omit the ; from the first select statement.

```
select * from stock where supplier_id = 501  
INTERSECT  
select * from stock where unit_price > 200;
```

# Union in a Venn diagram

- This is what it looked like in a VENN diagram
- *If  $A$  is the set of stock items supplied by SupplierId 501 and*
- *$B$  is the set of stock items with unit price  $> €200$ ,*
- *What's  $A \cup B$ ?*



# Using UNION in SQL

- Determine the sets in separate SQL statements.
- Use the word UNION between the two SQL statements.

– Omit the ; from the first select statement.

```
select * from stock where supplier_id = 501
```

```
UNION
```

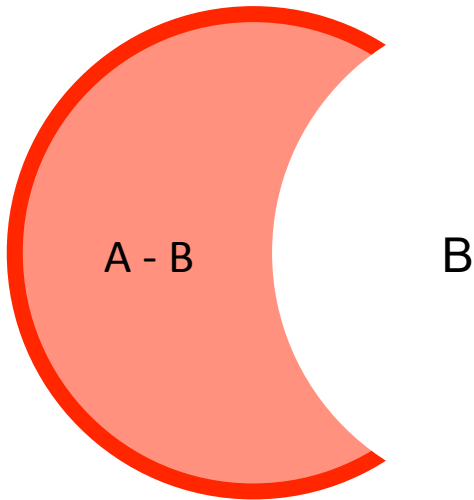
```
select * from stock where unit_price > 200;
```



# Difference Venn diagram

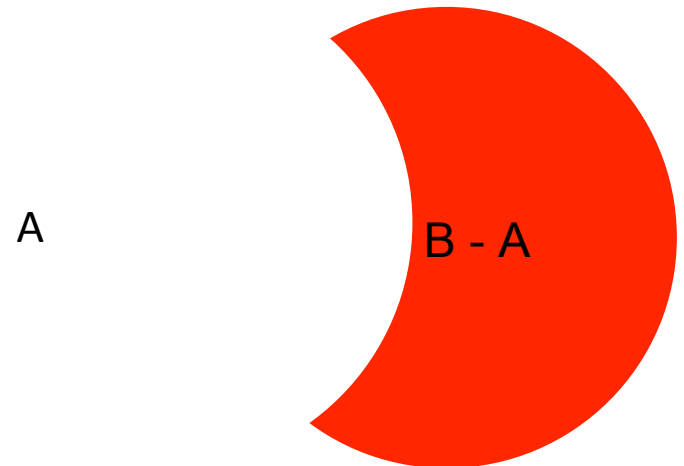
- $A - B$

- *What is  $A - B$  in our example?*



- $B - A$

- *What is  $B - A$  in our example?*



# A – B in SQL

- Determine the sets in separate SQL statements.
- Use the word MINUS between the two SQL statements.

– Omit the ; from the first select statement.

```
select * from stock where supplier_id = 501
```

```
minus
```

```
select * from stock where unit_price > 200;
```

# B - A in SQL

- Determine the sets in separate SQL statements.
- Use the word MINUS between the two SQL statements.

– Omit the ; from the first select statement.

```
select * from stock where unit_price > 200
```

```
minus
```

```
select * from stock where supplier_id = 501;
```

- Socrative quiz on sets.
- Before question 5 do views.

# Divide

- $A \div B$  = rows in A that are related to every row in B.
  - This always requires a third table.
- Example:
  - Student that passed all modules.
  - Supplier who supplies all parts.
  - Consumer who eats all types of crisps.
- See later!