

Pragmatic Teaching of Database Concepts

Arjen Lentz & Shaun Nykvist

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Databases in Today's Society

- * Databases are in use everywhere
- * Most people use databases... generally without knowing!
- * Internet - web sites
- * Company records / accounting

Relational Databases

- * Based on concepts developed by E.F. Codd
- * Everything is a table (set)

<i>Column name:</i>	<i>Firstname</i>	<i>Lastname</i>	<i>City</i>
<i>Row 1:</i>	David	Johnson	Brisbane
<i>Row 2:</i>	Mark	Andrews	Sydney
...
<i>Row N</i>			

Structured Query Language

* SQL - the most common language for interacting with relational databases:

- > `INSERT INTO contacts (firstname, lastname, city)
VALUES ('David', 'Johnson', 'Brisbane');`
- > `SELECT firstname, lastname
FROM contacts WHERE city = 'Brisbane';`
- > `UPDATE contacts SET city = 'Cairns'
WHERE firstname = 'David' AND lastname = 'Johnson';`
- > `DELETE FROM contacts
WHERE firstname = 'David' AND lastname = 'Johnson';`

Codd vs Practice

- * Codd = Theory
- * Implementations: compromises
- * SQL: does not map perfectly on theory

But it's Really Just Maths!

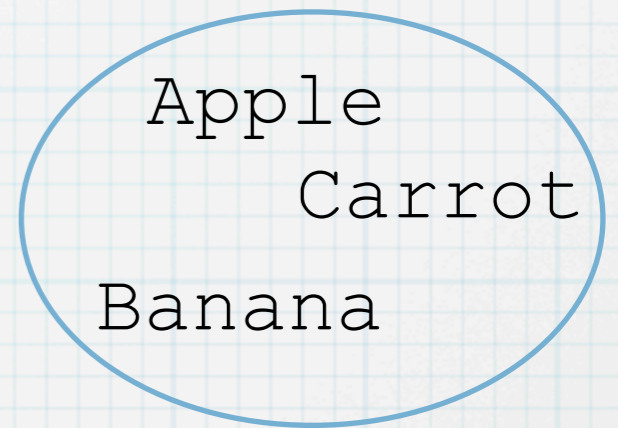
- * Level: junior high school
- * No IT background required
- * Sets, Set Operations, Venn Diagrams
- * Binary & Ternary Logic

Sets

\in \notin \subset $\not\subset$ \cup \cap \emptyset

* Set = Relation = Table

* Fruit = { Apple, Carrot, Banana }
Nuts = { Macademia, Walnut }



* Apple \in Fruit

Healthy Food = Fruit \cup Nuts

Empty Bowl = \emptyset

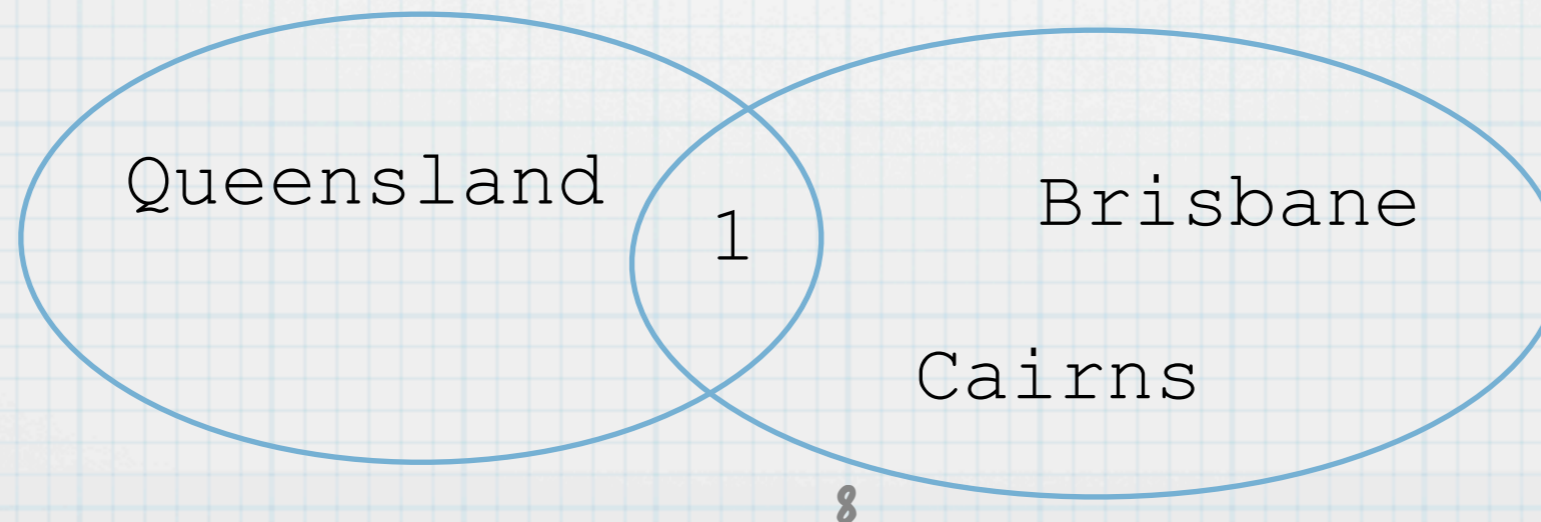
Set Operations

<i>StateID</i>	<i>StateName</i>
1	Queensland
2	New South Wales
3	Victoria
4	Tasmania
...	...

<i>CityName</i>	<i>StateID</i>
Brisbane	1
Cairns	1
Sydney	2
Melbourne	3
...	...

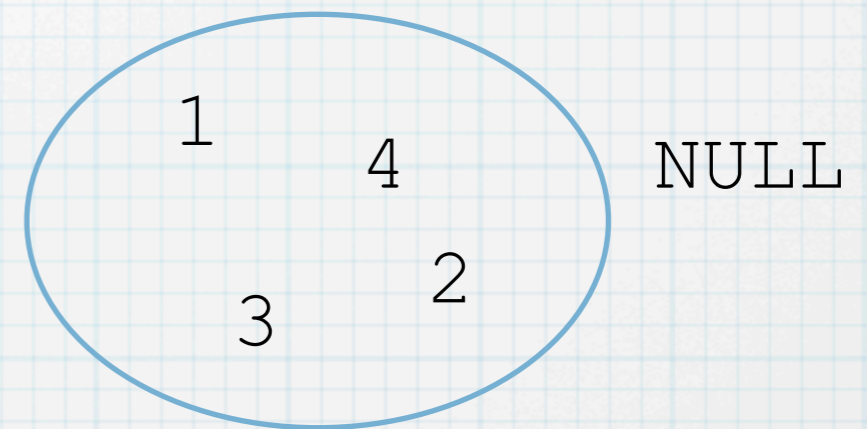
```
SELECT StateName, CityName
FROM States s JOIN Cities c ON s.StateID = c.StateID
WHERE StateName = 'Queensland'
```

States \cap Cities



Binary (boolean) & Ternary Logic

AND	False	True	Null
False	False	False	False
True	False	True	Null
Null	False	Null	Null



```
UPDATE contacts SET city = 'Cairns'  
WHERE firstname = 'David' AND lastname = 'Johnson';
```

Software Tools

- * Method is vendor neutral
- * Open Source tools: gratis freedom
- * Be wary of crippled “free” products

Concept Book Layout

I. Relational Basics

1. Sets
2. Binary & Ternary Logic
3. Relational Databases and SQL

II. Simple SQL Queries

4. Data Definition and Data Types
5. Data Manipulation
6. Joins
7. Basic Functions

III. Advanced SQL Queries

IV. Concurrency Control

V. Applying Your Skills

14. Database Design and Normalisation

1. Sets

- 1.1 Objectives
- 1.2 Concept 1
- 1.3 Exercises
- 1.4 Concept 2
- 1.5 Exercises
- 1.6 ...
- 1.x Summary
- 1.y Revision

Thank You!

Questions / Feedback?

Arjen Lentz (arjen@lentz.com.au)

Shaun Nykvist (s.nykvist@qut.edu.au)