Introduction to SQL

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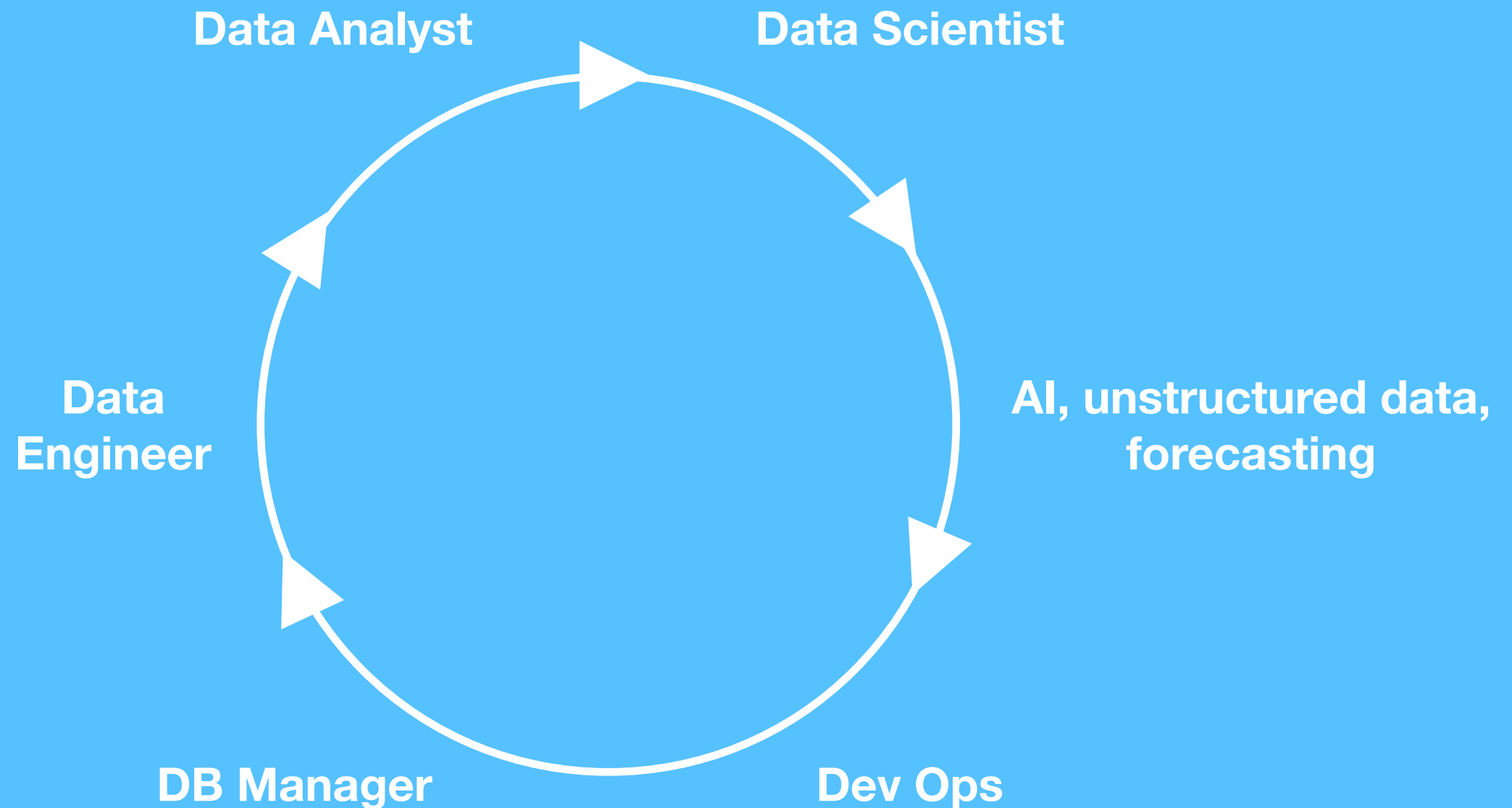https://github.com/learning-analytics-curriculum-teaching/sql-workshop

Learning SQL

1. Today = First pass at concepts + syntax

2. Rote practice (exercises, app, website)

3. Projects (post to Github)

Today

Background **AWS** **Syntax** **Activity** **Moving Forward**

History
Purpose

Create DB

DBI
Creating
Reading
Updating
Deleting
NULL
Constraints
ID Columns
Filtering
Duplicates
Conditionals
Relationships

Resources
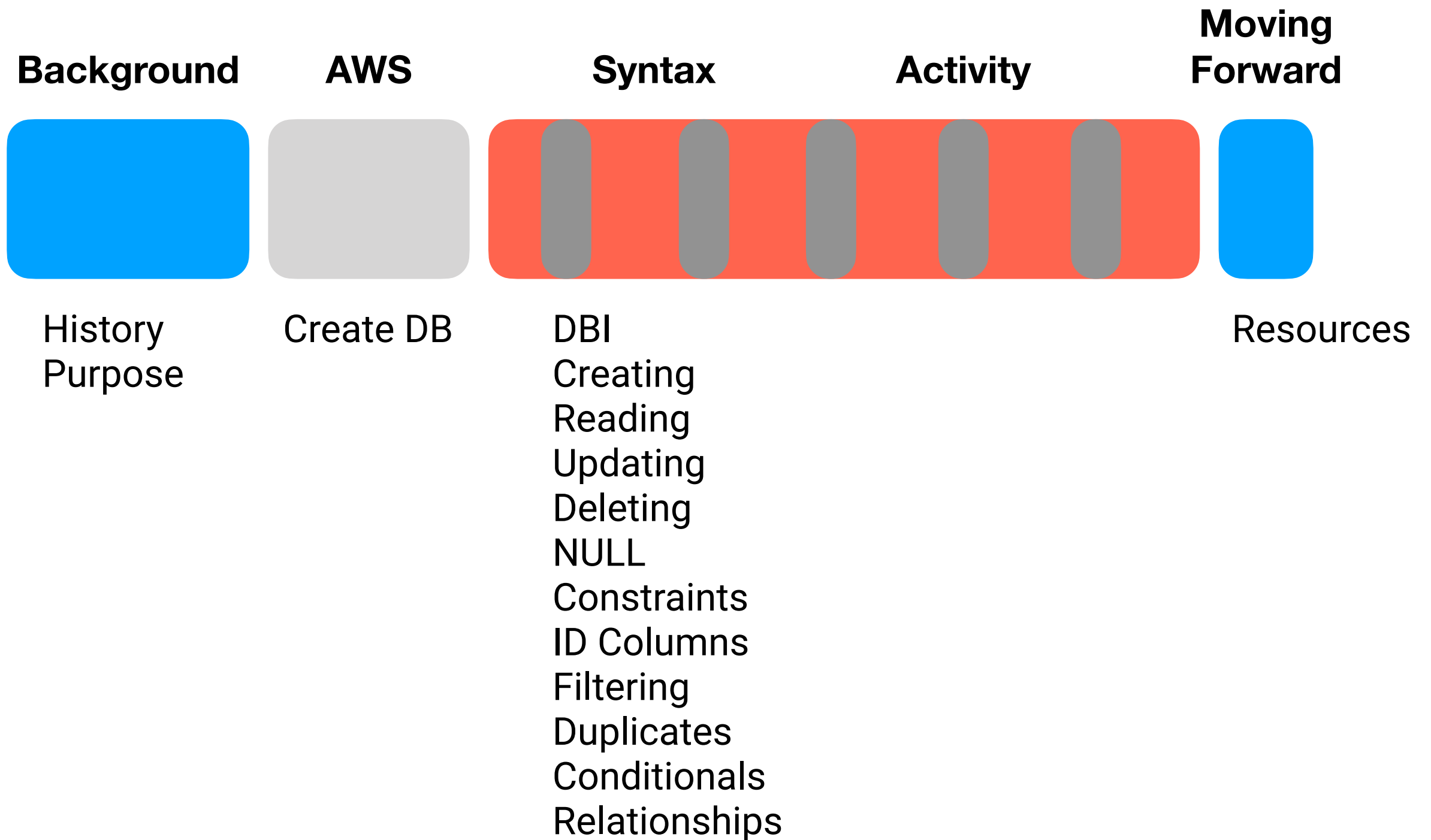
Data Science Workflow

DB Taxonomy

Relational (RDDBMS)

Old School

MySQL
Oracle
PostgreSQL

New School
Amazon Aurora
MySQL Cluster

Maria

Object-Oriented
Smalltalk

Non-Relational

NoSQL

Key-Value
Membrane
Document
MongoDB
Graph

InfiniteGraph

Distributed
Blockchain

Relational DBs

student   **Table**

student_id	username	email
1	AAA	emailA
2	BBB	emailB
3	CCC	emailC
4	DDD	emailD

Row/ Record

Unique Key/ Primary key*

Column/ Field

lesson

id	student_id
Z	1
Z	2
Z	3
Z	4

Foreign key

game

id	lesson_id	level
1A	Z	1
1A	Z	2
1A	Z	1
1B	Z	1

* Can be hidden

DB Popularity

383 systems in ranking, February 2022

	Rank		DBMS	Database Model	Score		
Feb 2022	Jan 2022	Feb 2021			Feb 2022	Jan 2022	Feb 2021
1.	1.	1.	Oracle ➕	Relational, Multi-model ℹ️	1256.83	-10.05	-59.84
2.	2.	2.	MySQL ➕	Relational, Multi-model ℹ️	1214.68	+8.63	-28.69
3.	3.	3.	Microsoft SQL Server ➕	Relational, Multi-model ℹ️	949.05	+4.24	-73.88
4.	4.	4.	PostgreSQL ➕ 💬	Relational, Multi-model ℹ️	609.38	+2.83	+58.42
5.	5.	5.	MongoDB ➕	Document, Multi-model ℹ️	488.64	+0.07	+29.69
6.	6.	⬆ 7.	Redis ➕	Key-value, Multi-model ℹ️	175.80	-2.18	+23.23
7.	7.	⬇ 6.	IBM Db2	Relational, Multi-model ℹ️	162.88	-1.32	+5.26
8.	8.	8.	Elasticsearch	Search engine, Multi-model ℹ️	162.29	+1.54	+11.29
9.	9.	⬆ 11.	Microsoft Access	Relational	131.26	+2.31	+17.09
10.	10.	⬇ 9.	SQLite ➕	Relational	128.37	+0.94	+5.20

https://db-engines.com/en/ranking

Create a MySQL DB

- Log into your [AWS Management Console](#)
- Locate `RDS` under the Services -> `Databases` heading
- Within Amazon RDS click `Create database`
- Under `Choose a database creation method` click `Standard Create`
- Under `Engine options` choose `MySQL`
- Under `Templates` choose `Free tier`
- Under `Settings` name your `DB instance identifier` as `sqltest`
- Under `Credential settings` create a username and password combination and write it down (you will need it later): username: `admin`, password: `sql030122`
- Under `Connectivity` make sure that `Publicly accessible` is checked `Yes`
- Expand `Additional connectivity configuration` to check port is 3306
- Database Authentication should be Password authentication
- Expand the `Additional configuration` menu
- Under `Initial database name` write `testdb`
- Uncheck `Automatic backups`
- Click `Create database`

Structured Query Language (SQL)

- Developed SEQUEL at IBM ~1970

- Domain-specific language for querying relational DBs

- Based on relational algebra

- Works with structured data

- <u>Main benefit</u>: don't need to specify how to reach a given record (no file path, index number)

- Is *loosely standardized* across products
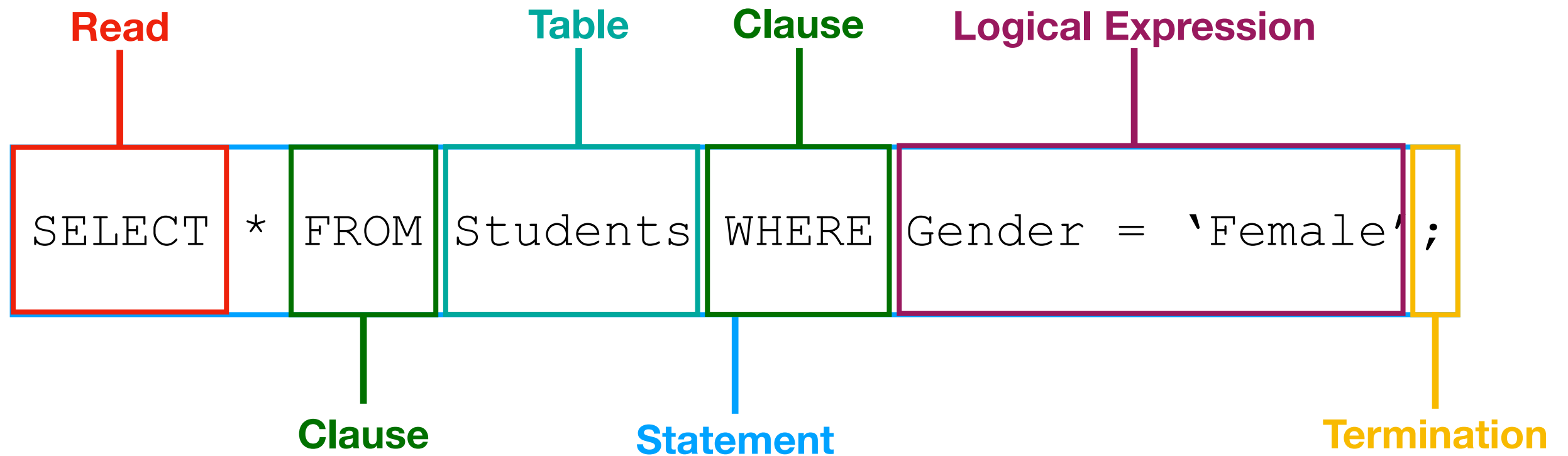
Todd Codd

Donald Chamberlin
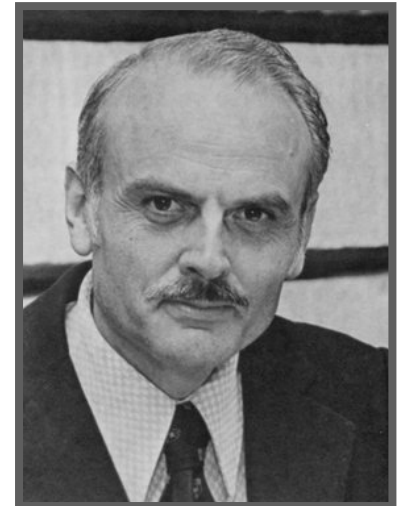
Ray Boyce

DB Fundamental Functions

- **C**reate

- **R**ead

- **U**pdate

- **D**elete

DB Fundamental Functions

- **Create:** `INSERT` - Add rows

- **Read:** `SELECT` - Get data

- **Update:** `UPDATE` - Change data

- **Delete:** `DELETE` - Remove rows

Basic Statement

Read — SELECT

Clause — FROM

Table — Students

Clause — WHERE

Statement

Logical Expression — Gender = 'Female'

Termination — ;

```
SELECT * FROM Students WHERE Gender = 'Female';
```

*Capitalization of SQL keywords is not required but is useful

Create a MySQL DB

- Once your DB has been created

- Under `Connectivity & security` and `Security group rules` click the hyperlink

  - something like: `default(sg-sgbfftf)`

- Click on `Security group ID` link

- Click `Edit inbound rules`

- Do not delete any rules!

- Add the rule MYSQL/Aurora on `Port 3306` with the `Connection` of `MyIP`
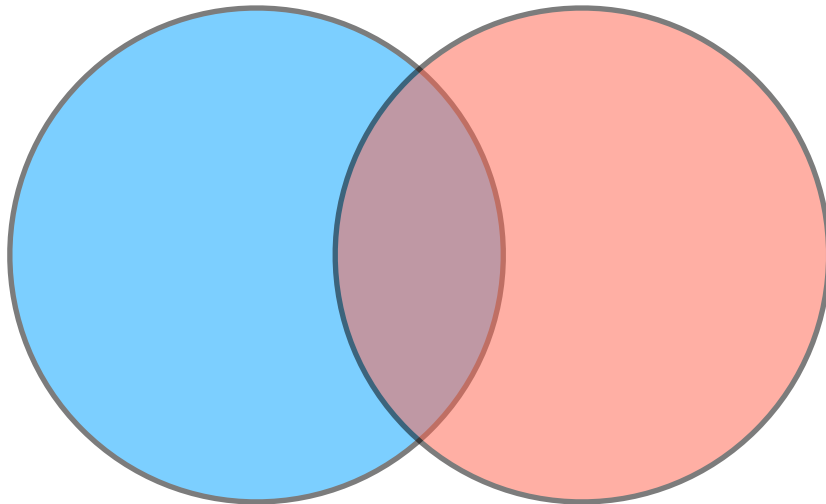
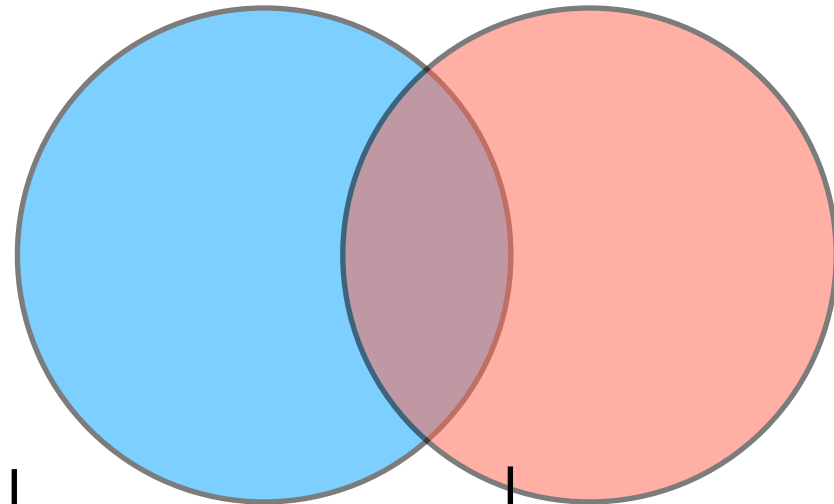# OU LA Data Set
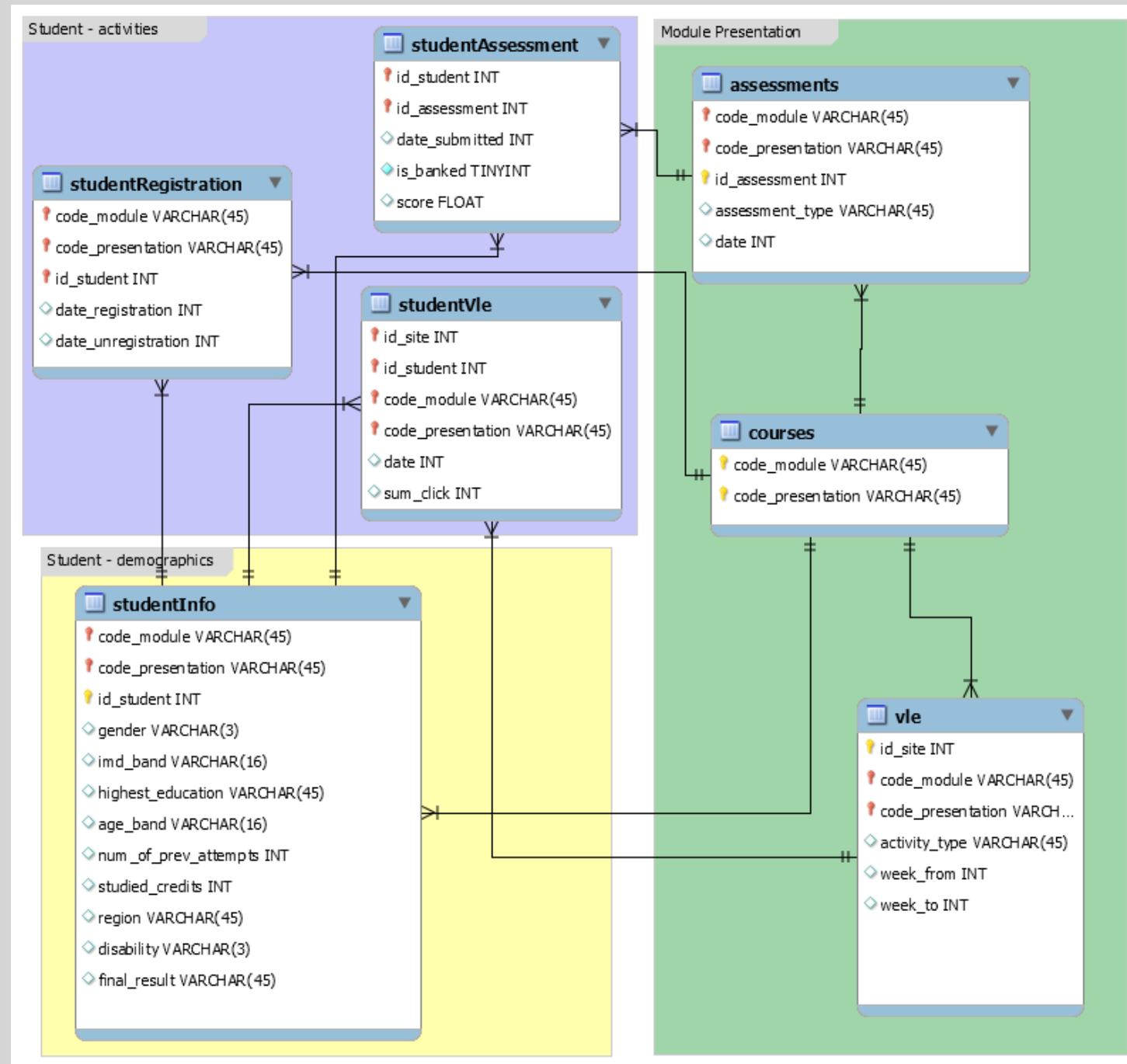
Union

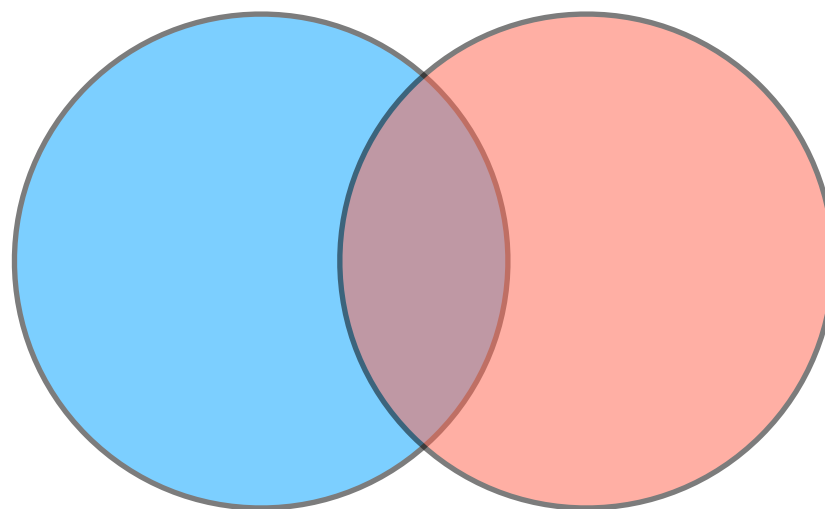***tidyvesre:: bind_rows**

Joins

Inner Join

Left Outer Join

Full Join

*tidyvesre:: join

Delete Your Amazon Instance

- Under `RDS` -> `Databases`

- Click radio button next to `sqltest`

- `Actions` -> `Stop` -> `Create snapshot` = no

- Actions -> Delete

  - Uncheck `Create final snapshot`

  - `Check` "I acknowledge that upon instance deletion, automated backups, including system snapshots and point-in-time recovery, will no longer be available."

  - Type "`delete me`" in text box

  - Delete

Moving Forward

- SoloLearn, DataCamp, W3Schools, etc

- LeetCode.com

- Test

- Projects