Lab 13

SQL

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Apologize for the sudden switch of slides format… but I have to admit that google slides are much more powerful at producing visualizations than raw html files

Logistics

- Lab 13 due tomorrow 04/26
- Homework 10 due next Tue 05/02
- Scheme 👾
  - Checkpoint 2 (part 2 & 3) due today 04/25
  - The entire project due Fri 04/28
  - Submit everything by Thu 04/27 for 1 extra credit!
  - Attempt the problems in order due to some dependency
  - Come to OH/project parties!
- (not an announcement but) this is our second to last section
  - I'll bring snacks for Thursday's section! Please come it counts toward your attendance :)

From last time ... 👀

"What would you do if everything was legal for 24 hours?"

- not go to cs lecture - ofc legal 😳
- I would rob a bank - sus
- delete scheme - even more sus
- I don't think I'd do anything bad lol - □
- Go shopping and buy everything I want and change my grades to As - we should all do this
- Go back in time - can this be legal tho
- steal
- would fly somewhere
- Speed - 🏎️
- Sneak in somewhere
- 0_o
- cc
- robbing bank[doge]
- Rob the bank
- That's soooooo crazy :0, I'm gonna find a place and hide - that's wise actually
- go to Dubai and ..... : P - and befriend the locals ofc
- I honestly don't think my day would change ngl ;-; I am lame... maybe like steal food from the bear marts actually - sounds like a plan
- steal a DragonBoat, kidnap a group of NASA&SpaceX scientists and go to the space - gotta push the experts hard
- Speed
- Probably steal a lot of expensive stuff.
- I would hide. - if you are not wanted by the police hiding on any day is lowkey valid
- vandalize random places with random and funny stuff - funny as in...?
- Rob a bank
- I'm not sure - it's ok. It probably won't happen during your lifetime

Now let’s welcome one of our amazing AIs, Jeremy, to mini-lecture on SQL 🥳

Slides are here (click here)

Week 15: SQL

Congrats on making it to the last week of lectures!
(two more lecture to go~)

Announcements

1.
Who am I

About MEE

- Jeremy Yoo
  - 1 of the 3 AIs in this section
  - CS Freshman, possibly DS or statistics
  - Hobbies: Volleyball, biking, eating good food
  - Why am I teaching? Idk sounds fun, and I think sql is cool 👍

Feel free to talk to me about anything :)

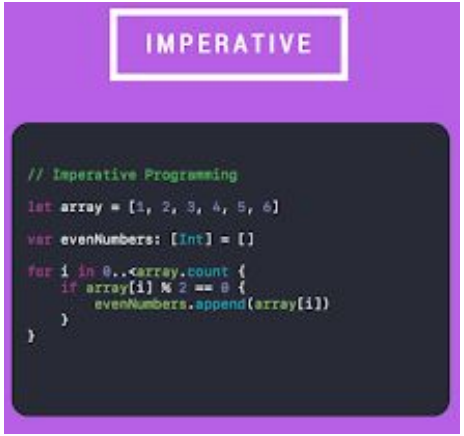
2.

SQL

Structured Query Language

From last week...

- SQL is a declarative programming language (like HTML, CSS)
  - You tell the program what you want and program does it for you
- Used to retrieve information from database by querying data (e.i. filtering, ordering)
- Each query needs to end with a semicolon
- If you have taken Data 8, SQL is pretty much the same thing



3.

Basic SQL Queries

SELECT, FROM, WHERE, ORDER BY

SELECT (You will use this every time)

- Think of it as “selecting” a column from the table

FROM (You will use this every time)

- Where you are selecting the data from

Example: say we have a table named “Customers”:

CustomerID	CustomerName	ContactName	Address	City	PostalCode	Country
1	Alfreds Futterkiste	Maria Anders	Obere Str. 57	Berlin	12209	Germany
2	Ana Trujillo Emparedados y helados	Ana Trujillo	Avda. de la Constitución 2222	México D.F.	05021	Mexico
3	Antonio Moreno Taquería	Antonio Moreno	Mataderos 2312	México D.F.	05023	Mexico
4	Around the Horn	Thomas Hardy	120 Hanover Sq.	London	WA1 1DP	UK
5	Berglunds snabbköp	Christina Berglund	Berguvsvägen 8	Luleå	S-958 22	Sweden

What happens if we do `SELECT CustomerName, City FROM Customers;` ?

CustomerName	City
Alfreds Futterkiste	Berlin
Ana Trujillo Emparedados y helados	México D.F.
Antonio Moreno Taquería	México D.F.
Around the Horn	London
Berglunds snabbköp	Luleå
Blauer See Delikatessen	Mannheim
Blondel père et fils	Strasbourg
Bólido Comidas preparadas	Madrid
Bon app'	Marseille
Bottom-Dollar Marketse	Tsawassen
B's Beverages	London
Cactus Comidas para llevar	Buenos Aires
Centro comercial Moctezuma	México D.F.
Chop-suey Chinese	Bern

WHERE = filtering data with condition

ORDER BY = literally just ordering the data

- Orders in ascending order (/ alphabetically) by default

Example: say we have a table named “Customers”:

CustomerID	CustomerName	ContactName	Address	City	PostalCode	Country
1	Alfreds Futterkiste	Maria Anders	Obere Str. 57	Berlin	12209	Germany
2	Ana Trujillo Emparedados y helados	Ana Trujillo	Avda. de la Constitución 2222	México D.F.	05021	Mexico
3	Antonio Moreno Taquería	Antonio Moreno	Mataderos 2312	México D.F.	05023	Mexico
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5	Berglunds snabbköp	Christina Berglund	Berguvsvägen 8	Luleå	S-958 22	Sweden

To obtain rows of data in Berlin or London:

```
SELECT * FROM Customers
WHERE City = 'Berlin'
OR City = 'London';
```

To obtain data in descending order of City name:

```
SELECT * FROM Customers
ORDER BY City DESC;
```

To obtain data in ascending order of Country, then City name:

```
SELECT * FROM Customers
ORDER BY Country, City;
```

To obtain rows of data in Berlin or London:

```
SELECT * FROM Customers
WHERE City = 'Berlin'
OR City = 'London';
```

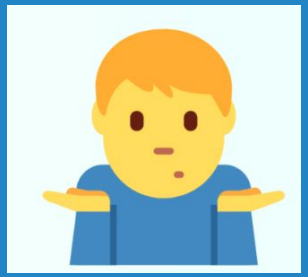
CustomerID	CustomerName	ContactName	Address	City	PostalCode	Country
1	Alfreds Futterkiste	Maria Anders	Obere Str. 57	Berlin	12209	Germany
4	Around the Horn	Thomas Hardy	120 Hanover Sq.	London	WA1 1DP	UK
11	B's Beverages	Victoria Ashworth	Fauntleroy Circus	London	EC2 5NT	UK
16	Consolidated Holdings	Elizabeth Brown	Berkeley Gardens 12 Brewery	London	WX1 6LT	UK
19	Eastern Connection	Ann Devon	35 King George	London	WX3 6FW	UK
53	North/South	Simon Crowther	South House 300 Queensbridge	London	SW7 1RZ	UK
72	Seven Seas Imports	Hari Kumar	90 Wadhurst Rd.	London	OX15 4NB	UK

To obtain data in ascending order of Country, then City name:

```
SELECT * FROM Customers
ORDER BY Country, City;
```

CustomerID	CustomerName	ContactName	Address	City	PostalCode	Country
12	Cactus Comidas para llevar	Patricio Simpson	Cerrito 333	Buenos Aires	1010	Argentina
54	Océano Atlántico Ltda.	Yvonne Moncada	Ing. Gustavo Moncada 8585 Piso 20-A	Buenos Aires	1010	Argentina
64	Rancho grande	Sergio Gutiérrez	Av. del Libertador 900	Buenos Aires	1010	Argentina
20	Ernst Handel	Roland Mendel	Kirchgasse 6	Graz	8010	Austria
59	Piccolo und mehr	Georg Pipps	Geislweg 14	Salzburg	5020	Austria

4.
Joining Tables



Joining Tables

- To join two tables into one, add a comma between the table names

Example: say we have two tables named “records” and “meeting”:

records

Name	Division	Title	Salary	Supervisor
Alyssa P Hacker	Computer	Programmer	40000	Ben Bitdiddle
...	...	...	...	...
Robert Cratchet	Accounting	Scrivener	18000	Eben Scrooge

meetings

Division	Day	Time
Accounting	Monday	9am
Computer	Wednesday	4pm
Administration	Monday	11am
Administration	Wednesday	4pm

```
sqlite> SELECT name, day FROM records, meetings;
Ben Bitdiddle | Monday
Ben Bitdiddle | Wednesday
...
Alyssa P Hacker | Monday
...
```

Alias

- If two tables have the same column name, you can also use alias by using AS after the FROM query

Example: say we have a table named “Customers”:

CustomerID	CustomerName	ContactName	Address	City	PostalCode	Country
1	Alfreds Futterkiste	Maria Anders	Obere Str. 57	Berlin	12209	Germany
2	Ana Trujillo Emparedados y helados	Ana Trujillo	Avda. de la Constitución 2222	México D.F.	05021	Mexico
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5	Berglunds snabbköp	Christina Berglund	Berguvsvägen 8	Luleå	S-958 22	Sweden

and “Orders”:

OrderID	CustomerID	EmployeeID	OrderDate	ShipperID
10354	58	8	1996-11-14	3
10355	4	6	1996-11-15	1
10356	86	6	1996-11-18	2

What happens if we do

```
SELECT o.OrderID, o.OrderDate, c.CustomerName
FROM Customers AS c, Orders AS o
WHERE c.CustomerName='Around the Horn' AND c.CustomerID=o.CustomerID;
```

?

Alias

- If two tables have the same column name, you can also use alias by using AS after the FROM query

Example: say we have a table named “Customers”:

CustomerID	CustomerName	ContactName	Address	City	PostalCode	Country
1	Alfreds Futterkiste	Maria Anders	Obere Str. 57	Berlin	12209	Germany
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and “Orders”:

OrderID	CustomerID	EmployeeID	OrderDate	ShipperID
10354	58	8	1996-11-14	3
10355	4	6	1996-11-15	1
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What happens if we do

```
SELECT o.OrderID, o.OrderDate, c.CustomerName
FROM Customers AS c, Orders AS o
WHERE c.CustomerName='Around the Horn' AND c.CustomerID=o.CustomerID;
```

?

Alias

- If two tables have the same column name, you can also use alias by using AS after the FROM query

Example: say we have a table named “Customers”:

CustomerID	CustomerName	ContactName	Address	City	PostalCode	Country
4	Around the Horn	Thomas Hardy	120 Hanover Sq.	London	WA1 1DP	UK

and “Orders”:

OrderID	CustomerID	EmployeeID	OrderDate	ShipperID
10355	4	6	1996-11-15	1

What happens if we do

```
SELECT o.OrderID, o.OrderDate, c.CustomerName
FROM Customers AS c, Orders AS o
WHERE c.CustomerName='Around the Horn' AND c.CustomerID=o.CustomerID;
```

?

OrderID	OrderDate	CustomerName
10355	1996-11-15	Around the Horn

Alias

- You could also rename the column name by using AS during the SELECT statement

```
SELECT CustomerID AS ID, CustomerName AS Customer
FROM Customers;
```

ID	Customer
1	Alfreds Futterkiste
2	Ana Trujillo Emparedados y helados
3	Antonio Moreno Taquería
4	Around the Horn
5	Berglunds snabbköp
6	Blauer See Delikatessen
7	Blondel père et fils
8	Bólido Comidas preparadas
9	Bon app'
10	Bottom-Dollar Marketse
11	B's Beverages

5.

Aggregation

Hardest part about SQL

Easier Aggregation Functions

- MIN(column_name) = get the data with the smallest value from column_name
- MAX(column_name) = get the data with the largest value from column_name
- COUNT(column_name) = get the # rows of the column
- AVG(column_name) = get the average value from column_name
- SUM(column_name) = get the sum of values from column_name

Easier Aggregation Functions Example

Example: say we have a table named “Products”:

ProductID	ProductName	SupplierID	CategoryID	Unit	Price
1	Chais	1	1	10 boxes x 20 bags	18
2	Chang	1	1	24 - 12 oz bottles	19
3	Aniseed Syrup	1	2	12 - 550 ml bottles	10
4	Chef Anton's Cajun Seasoning	2	2	48 - 6 oz jars	22
5	Chef Anton's Gumbo Mix	2	2	36 boxes	21.35

What happens if we do `SELECT MIN(Price) AS SmallestPrice FROM Products;` ?

SmallestPrice
10

Easier Aggregation Functions Example

ProductID	ProductName	SupplierID	CategoryID	Unit	Price
1	Chais	1	1	10 boxes x 20 bags	18
2	Chang	1	1	24 - 12 oz bottles	19
3	Aniseed Syrup	1	2	12 - 550 ml bottles	10
4	Chef Anton's Cajun Seasoning	2	2	48 - 6 oz jars	22
5	Chef Anton's Gumbo Mix	2	2	36 boxes	21.35

What happens if we do `SELECT SUM(ProductName) FROM Products;` ?

SUM(ProductName)
0

Harder Aggregation Statements

- GROUP BY <column_name> = groups the rows with the same “column_name”
- HAVING <condition> = filters the group based on the condition

ANIMATION

SQL Keywords -> Group By -> Visualize!

Slowed Down

```
SELECT stockExchange, AVG(stockPSRatio)
FROM StockProfiles
GROUP BY stockExchange
HAVING COUNT(stockID) > 2;
```

StockProfiles

stockID	stockTicker	stockPERatio	stockPSRatio	stockExchange	stockIndustry
1	SAP	23.63	4.31	NYSE	Software
2	NOW	493.35	19.99	NYSE	Software
3	MCD	23.59	8.08	NYSE	Restaurants
4	AAPL	26.43	7.28	NASDAQ	Electronics
5	PZA.TO	18.51	13.19	TSX	Restaurants
6	TD	12.86	4.52	NYSE	Banks
7	INFY.NS	35.53	6.14	NSE	IT
8	ORCL	30.03	5.34	NYSE	Software
9	BNS.TO	11.62	3.71	TSX	Banks
10	SBUX	23.53	3.61	NASDAQ	Restaurants
11	TCS.NS	36.11	7.05	NSE	IT
12	SBIN.NS	14.02	1.83	NSE	Banks

Grouping by the stockExchange

StockProfiles

stockID	stockTicker	stockPERatio	stockPSRatio	stockExchange	stockIndustry
1	SAP	23.63	4.31	NYSE	Software
2	NOW	493.35	19.99	NYSE	Software
3	MCD	23.59	8.08	NYSE	Restaurants
4	AAPL	26.43	7.28	NASDAQ	Electronics
5	PZA.TO	18.51	13.19	TSX	Restaurants
6	TD	12.86	4.52	NYSE	Banks
7	INFY.NS	35.53	6.14	NSE	IT
8	ORCL	30.03	5.34	NYSE	Software
9	BNS.TO	11.62	3.71	TSX	Banks
10	SBUX	23.53	3.61	NASDAQ	Restaurants
11	TCS.NS	36.11	7.05	NSE	IT
12	SBIN.NS	14.02	1.83	NSE	Banks

Filtering by groups that have more than 2 rows

stockExchange	AVG(stockPSRatio)
NYSE	8.45
NSE	5.01

result

6.

The End

That is all you need to know for SQL

Tips

- I think of each questions as you know it or you don't
  - I think cheat sheet is useful for writing things you have to memorize (like aggregation functions) but not necessarily concepts
- To prepare:
  - I recommend looking over the topics on cs61a.org
    - If I see something that I am unfamiliar / shaky with, I learn it until I can teach that concept to someone else
  - Take 3 - 4 practice exams
    - When grading your exam, write down all the mistakes on the top of the exam <- put it on your cheat sheet / look over before exam
  - Rest well, eat well :)
- If you want more SQL practice: W3School (do "SQL SELECT", "SQL WHERE", "SQL ORDER BY", "SQL ALIAS", "SQL GROUP BY")

What do you call the SQL talent show? Select a *!

Thank you for listening :)

If you are stressed, dw you'll do great

I saw a great movie about databases today.

I can't wait for the SQL