Introduction to Database Systems: CS312 Building Larger Database systems A discussion of code

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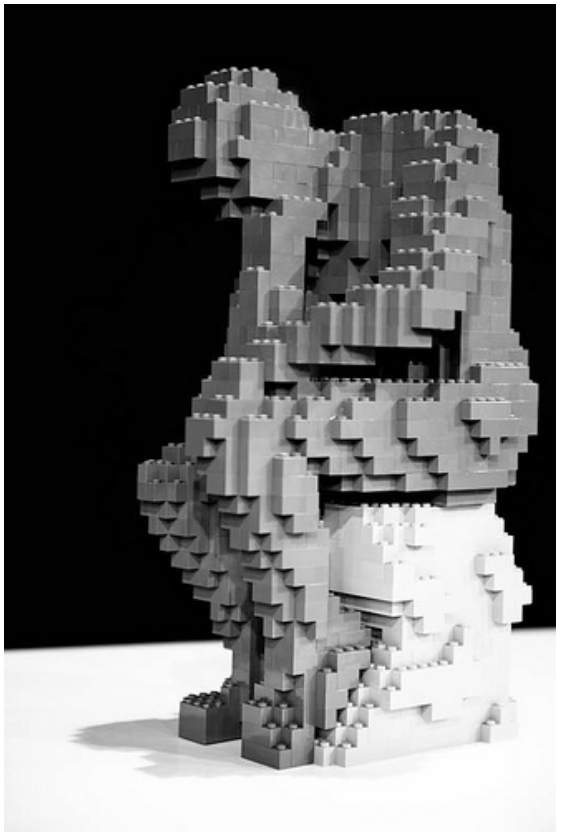
11 Sept 2020

Let's Consider This ...

From last time



(Rodin's *Thinker*)

- Can you design and populate a database? YES!!!
- Can you run queries to access particular attributes? YES!!!

Example Code Department Table

Create

```
DROP TABLE Department;
CREATE TABLE Department (
id VARCHAR NOT NULL PRIMARY KEY,
dept VARCHAR NOT NULL,
roomNum VARCHAR NOT NULL
);
```

Populate

```
INSERT INTO department VALUES ("OBC","CS","104" );
```

Data

```
ID, Dept, RoomNum
JJ,CS,105
OBC,CS,104
AM,CS,106
GK,CS,108
PL,CS,110
DW,CS,112
MC,GEO,209
RO,GEO,203
SR,GEO,001
SS,GEO,201
KT,GEO,204
```

Example Code Tea Table

Create

```
DROP TABLE Tea;
CREATE TABLE Tea (
id VARCHAR NOT NULL PRIMARY KEY,
tea VARCHAR NOT NULL,
sandwich VARCHAR NOT NULL
);
```

Populate

```
INSERT INTO Tea VALUES ("OBC", "1", "PBJ" );
```

Data

```
ID, Tea, Sandwich
JJ,1,Ruban
OBC,1,PBJ
AM,1,Chicken
GK,1,Chicken
PL,0,Ruban
DW,0,PBJ
MC,1,Ruban
RO,0,PBJ
SR,1,Ruban
SS,1,Ruban
KT,1,Ruban
```

Example Code Session Table

Create

```
DROP TABLE Session;
CREATE TABLE Session (
id VARCHAR NOT NULL PRIMARY KEY,
session VARCHAR NOT NULL,
material VARCHAR NOT NULL
);
```

Populate

```
INSERT INTO Session VALUES ("OBC", "112", "pres" );
```

Data

```
ID, Session, Material
JJ,101,pres
OBC,112,pres
AM,111,poster
GK,109,workshop
PL,109,poster
DW,101,pres
MC,112,pres
RO,111,poster
SR,111,poster
SS,109,workshop
KT,112,article
```

Importing Data: Two ideas

- **First idea**: `INSERT` line-by-line
  - Slow to code and to make the insertions

Populating tables line-by-line

```
INSERT INTO Table VALUES("1","ww","xx","yy","zz");
```

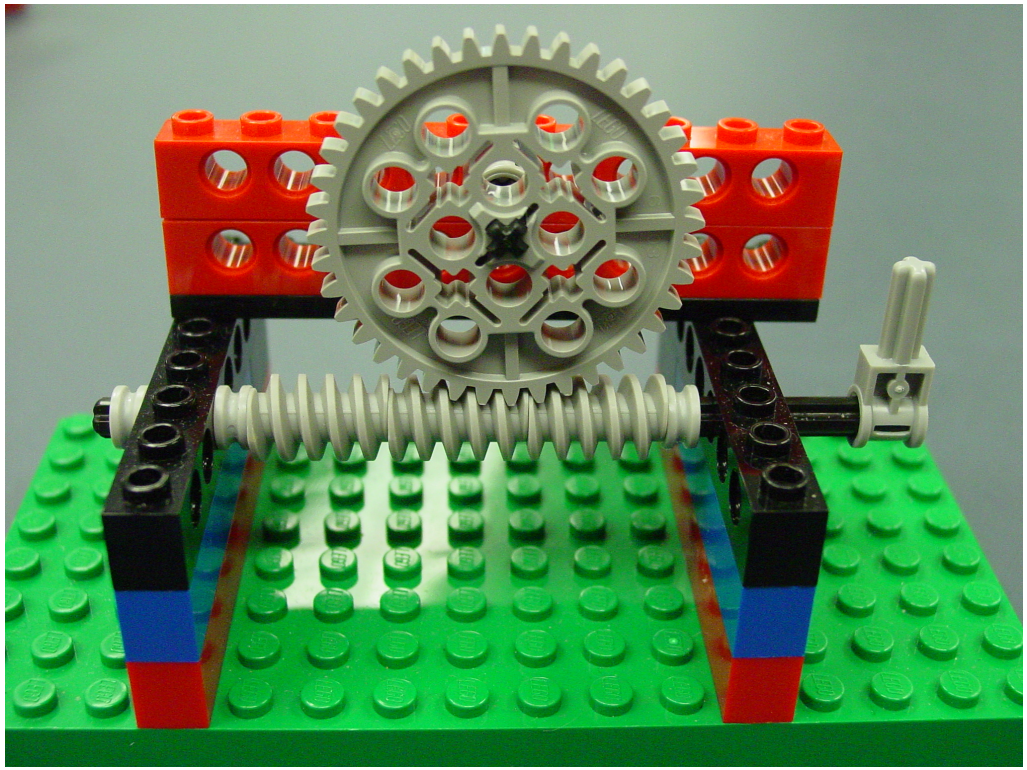
- **Second Idea**: `IMPORT` CSV data files via a "setup" file.
  - Fast and you can easily recreate your DB if it "breaks"

Populating table-by-table

```
/*data files */
.import data/department.csv Department
```

Automate Data Entry

How to get data into a base?



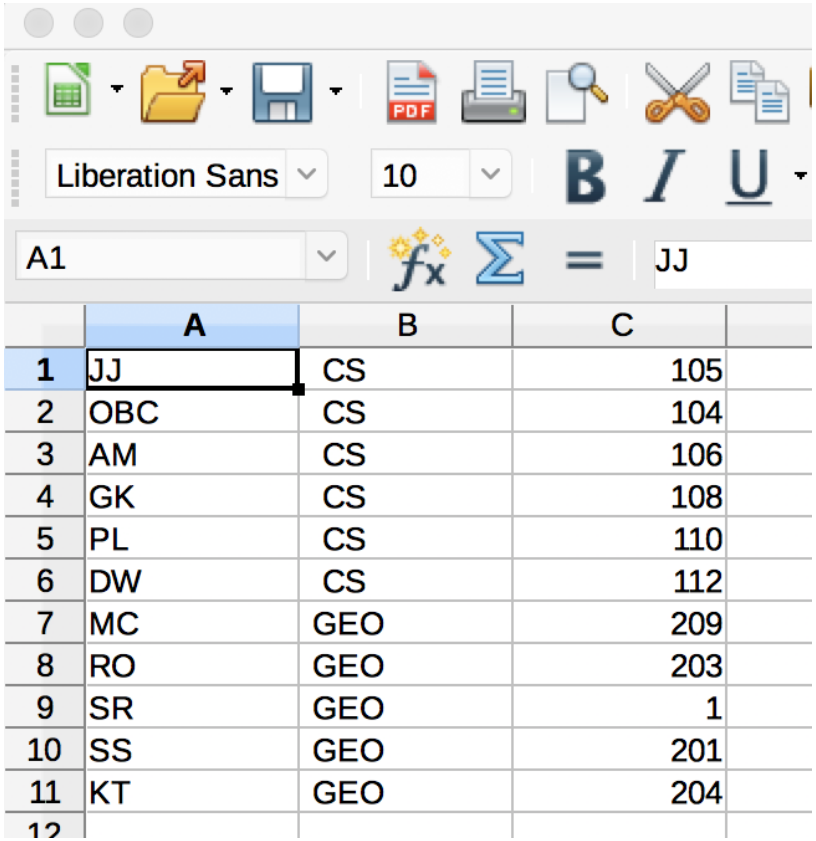
Why move data in files?

- Some data may arrive as a spreadsheet.
- Slow to enter data with `insert` statements.

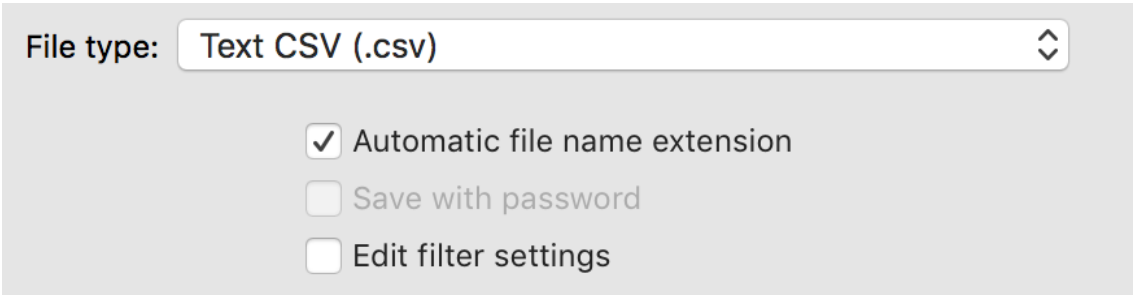
Making files of CSV's (Comma-separated values)...?

Data in Spreadsheet Form to Files

Use: "save a copy"



	A	B	C
1	JJ	CS	105
2	OBC	CS	104
3	AM	CS	106
4	GK	CS	108
5	PL	CS	110
6	DW	CS	112
7	MC	GEO	209
8	RO	GEO	203
9	SR	GEO	1
10	SS	GEO	201
11	KT	GEO	204
12			



CSV Files

```
JJ,CS,105
OBC,CS,104
AM,CS,106
GK,CS,108
PL,CS,110
DW,CS,112
MC,GEO,209
RO,GEO,203
SR,GEO,001
SS,GEO,201
KT,GEO,204
```

```
JJ,1,Ruban
OBC,1,PBJ
AM,1,Chicken
GK,1,Chicken
PL,0,Ruban
DW,0,PBJ
MC,1,Ruban
RO,0,PBJ
SR,1,Ruban
SS,1,Ruban
KT,1,Ruban
```

```
JJ,101,pres
OBC,112,pres
AM,111,poster
GK,109,workshop
PL,109,poster
DW,101,pres
MC,112,pres
RO,111,poster
SR,111,poster
SS,109,workshop
KT,112,article
```

- Tables: `Department`, `Tea`, `Session`
- Be sure to use an editor (i.e., Atom) to remove spaces!
- Once your file is in this CSV format, it can be easily loaded into the database

Bring the data!

- **CREATE Tables**: Build your create tables code before you load the data.
- **.separator**: tells SQlite3 how the entries in the files are separated.
- **.import file.csv tableName**: Each file must be placed into a specific table.

Check sandbox for builder file

```
/*Table Creation Above in This File*/
.separator ","

/*data files */
.import data/department.csv Department
.import data/tea.csv Tea
.import data/session.csv Session
```

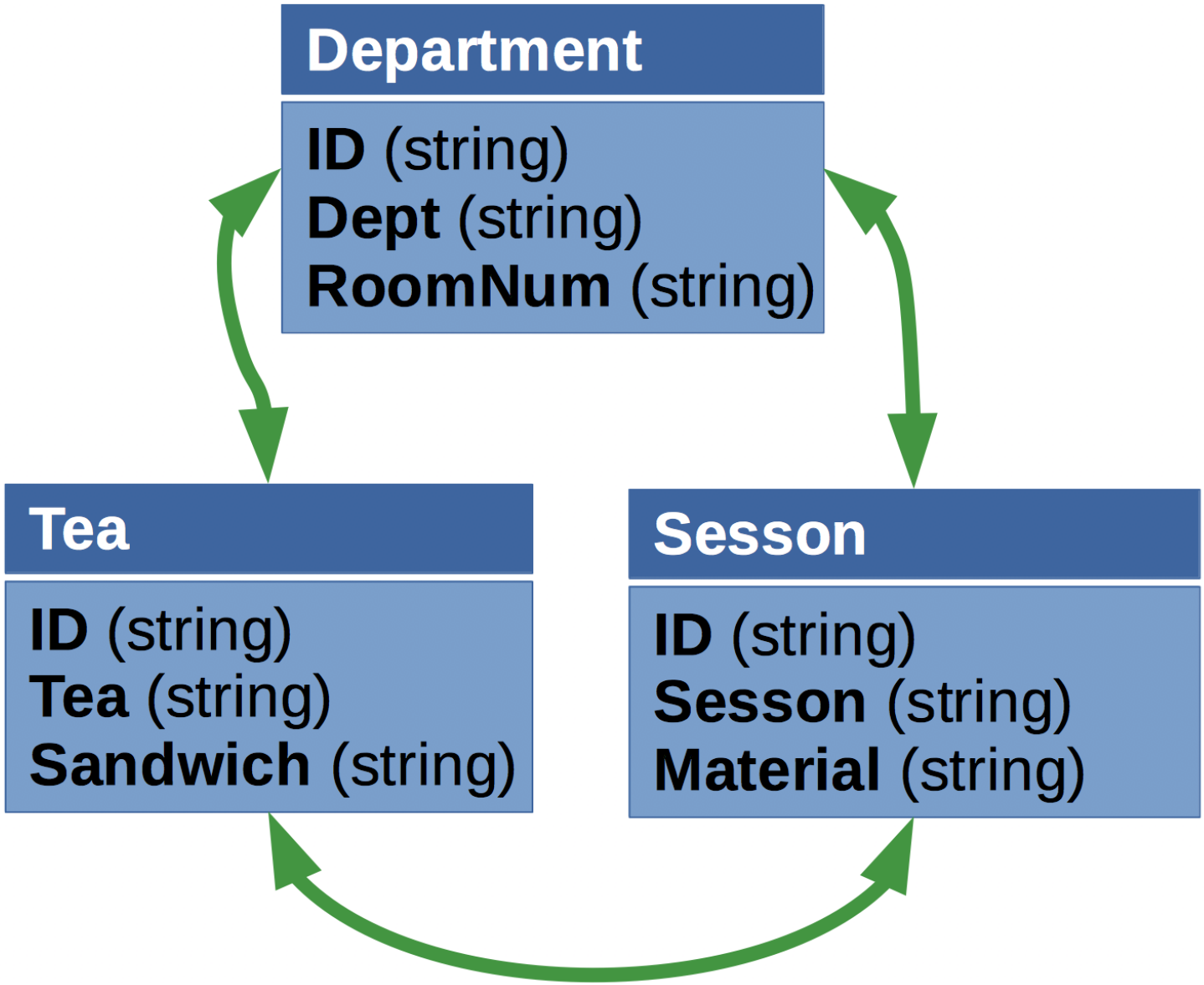
Bring the data!

Compile Your Persistent Database

```
cat buildFile.txt | sqlite3 mydb.sqlite3
```

- `catbuildFile.txt` : pull the contents of the text file
- Typically this command would send contents to the screen
- " | " means to *pipe* the contents to next function in bash command
- `sqlite3 mydb.sqlite` : Have `sqlite3` create a file to contain the database and data.

Connecting the Tables



Try This: Create and Link Tables

You have previous example code to guide you

Department

ID	Dept	RoomNum
JJ	CS	105
OBC	CS	104
AM	CS	106
GK	CS	108
PL	CS	110
DW	CS	112
MC	GEO	209
RO	GEO	203
SR	GEO	001
SS	GEO	201
KT	GEO	204

Tea

ID	Tea	Sandwich
JJ	1	Ruban
OBC	1	PBJ
AM	1	Chicken
GK	1	Chicken
PL	0	Ruban
DW	0	PBJ
MC	1	Ruban
RO	0	PBJ
SR	1	Ruban
SS	1	Ruban
KT	1	Ruban

Session

ID	Session	Material
JJ	101	pres
OBC	112	pres
AM	111	poster
GK	109	workshop
PL	109	poster
DW	101	pres
MC	112	pres
RO	111	poster
SR	111	poster
SS	109	workshop
KT	112	article

Example code
Two tables

Query for two tables

```
Select
   Department.roomNum, Tea.sandwich
From
   Department, Tea
WHERE
   Department.id == Tea.id;
```

- Two tables!
- All tables must be connected
- Modify it for your own query!

Queries, Part 1

Types of queries

Single table

Show me all rows from each of the tables, individually.

Two tables

Show me the name, dept and whether the person will have tea.

Show me the name and dept of each person who will have a Ruban.

Three tables

Show me the sandwich type and the session room number of each person.

Queries, Part 2

Show the ID, sandwich type, session material and department room number.

Hint

```
SELECT
   tea.id, tea.sandwich,
   session.material,
   department.roomNum
FROM
   tea, session, department
WHERE
   tea.ID == Session.id
AND
   tea.ID == department.ID
AND
   Session.ID == Department.ID;
```

Queries, Part 2

Three tables

Show the ID, sandwich type, session material and department room number.

Three tables

Show me all the ID, Material, Tea and Sandwich and department room number.

Three tables

Show me the ID, Material, Tea and Sandwich and department room number for each person who will have a Ruban

Three tables

Show me the ID, Material, Tea and Sandwich and department room number for each person who will be presenting a “pres”

Consider this ...

- Can you design and populate a database of three tables?
- Can you run queries to access particular attributes in three tables?