Today:

- HW3 Setup
- SQL Server Basics
- Using nested query semantics
/* Get list of tables */
SELECT * FROM INFORMATION_SCHEMA.TABLES WHERE TABLE_TYPE='BASE TABLE';

/* Get the columns of a table */
SELECT * FROM INFORMATION_SCHEMA.COLUMNS WHERE TABLE_NAME='tableName';

/* Do a SQLite LIMIT */
SELECT TOP 10 * FROM ...;
Nested queries

Subqueries in SELECT – Must be single valued

```
SELECT R.name, (…subquery like count(*)…) 
FROM SomeRelation R
```

Subqueries in WHERE using =/</>/ – Single valued

```
SELECT R.name 
FROM SomeRelation R 
WHERE R.<attribute> = (…subquery…>)
```

Subqueries in FROM

```
SELECT * 
FROM SomeRelation R, 
(…subquery…) SomeAlias
```
Nested queries in WHERE

- SELECT ............ WHERE EXISTS (sub);
- SELECT ............ WHERE NOT EXISTS (sub);
- SELECT ............ WHERE attribute IN (sub);
- SELECT ............ WHERE attribute NOT IN (sub);
- SELECT ............ WHERE attribute > ANY (sub);
- SELECT ............ WHERE attribute > ALL (sub);
Likes(drinker, beer)
Frequents(drinker, bar)
Servers(bar, beer)

Find drinkers that frequent some bar that serves only beer they like.

\( \exists y. \text{Frequents}(x,y) \land \forall z. (\text{Serves}(y,z) \Rightarrow \text{Likes}(x,z)) \)

Find drinkers that frequent only bars that serve only beer they like.

\( \forall y. \text{Frequents}(x,y) \Rightarrow \forall z. (\text{Serves}(y,z) \Rightarrow \text{Likes}(x,z)) \\
\exists u. \text{Frequents}(x,u) \land \neg (\exists y \exists z. \text{Frequents}(x,y) \land \text{Serves}(y,z) \land \neg \text{Likes}(x,z)) \)
Likes(drinker, beer)
Frequents(drinker, bar)
Servers(bar, beer)

Find drinkers that frequent some bar that serves only beer they like.

\[ \exists y.\text{Frequents}(x,y) \land \forall z. (\text{Serves}(y,z) \Rightarrow \text{Likes}(x,z)) \]

\[
\text{SELECT F.drinker}
\text{FROM Frequents F}
\text{WHERE NOT EXISTS (SELECT * FROM Serves S}
\text{WHERE S.bar = F.bar AND}
\text{NOT EXISTS (SELECT * FROM Likes L}
\text{WHERE L.beer = S.beer AND L.drinker = F.drinker));}
\]

Find drinkers that frequent only bars that serve only beer they like.

\[ \forall y.\text{Frequents}(x,y) \Rightarrow \forall z. (\text{Serves}(y,z) \Rightarrow \text{Likes}(x,z)) \]
\[ \exists u \text{Frequents}(x,u) \land \text{not (} \exists y \exists z \text{Frequents}(x,y) \land \text{Serves}(y,z) \land \text{not Likes}(x,z) \text{)} \]

\[
\text{SELECT F2.drinker}
\text{FROM Frequents F2}
\text{WHERE NOT EXISTS (SELECT * FROM Serves S, Frequents F}
\text{WHERE S.bar = F.bar AND F.drinker = F2.drinker AND}
\text{NOT EXISTS (SELECT * FROM Likes L}
\text{WHERE L.beer = S.beer AND L.drinker = F.drinker));}
\]