

Colleen Minor
 CS 340: Introduction to Databases
 HW 3
 July 31, 2016

1. Select the **CommonName** and **FoodType Name** of all pairs of **Fish** and **FoodTypes** that are compatible. This means a single **Fish** may appear several times (once for each kind of food it can eat).

$$\pi_{\text{Fish.CommonName, FoodTypes.Name}} (\text{Fish} \bowtie (\text{FishDiet.Fish} = \text{Fish.FishId}) \text{FishDiet} \bowtie \text{FoodTypes.FoodId} = \text{FishDiet.Food} \text{FoodTypes})$$

2. Select the *CommonName* and *ScientificName* of all **Fish** in **TankInstances** of *TankSize* 60.

$$\pi_{\text{CommonName, ScientificName}} (\sigma_{\text{TankInstance.TankSize} = 60} (\text{Fish} \bowtie (\text{FishInstance.FishType} = \text{Fish.FishId}) \text{FishInstance} \bowtie \text{TankInstanceId} = \text{FishInstance.TankInstance} \text{TankInstance}))$$

3. Select all of the **FoodType Names** that can be used to feed at least one **FishInstance** in the **TankInstance** with *TankInstanceId* of 44.

$$\pi_{\text{FoodTypes.Name}} (\sigma_{\text{FishInstance.TankInstance} = 44} (\text{FoodTypes} \bowtie (\text{FishDiet.Food} = \text{FoodTypes.FoodId}) \text{FishDiet} \bowtie \text{FishInstance.FishType} = \text{FishDiet.Fish} \text{FishInstance}))$$

4. Select all **FishInstance** *FishInstanceId* which are in a tank that is not compatible for them. In other words, if the **Fish** *TankType* is not the same as the *TankType* of the **TankInstance** a **FishInstance** is in, it is in an incompatible tank.

$$\pi_{\text{FishInstance.FishInstanceId}} (\sigma_{\text{TankInstance.TankType} \neq \text{Fish.TankType}} (\text{FishInstance} \bowtie (\text{Fish.FishId} = \text{FishInstance.FishType}) \text{Fish} \bowtie \text{FishInstance.TankInstance} = \text{TankInstance.TankInstanceId} \text{TankInstance}))$$

5. Convert the following into relational algebra:

```
SELECT Player.id, Team.name, City.name FROM Player
INNER JOIN Team ON Player.team_id = Team.id
INNER JOIN City ON Team.city_id = City.id
WHERE Player.score = 200;
```

$$\pi_{\text{Player.id, Team.name, City.name}} (\sigma_{\text{Player.score} = 200} (\text{Player} \bowtie (\text{Player.team_id} = \text{Team.id}) \text{Team} \bowtie \text{Team.city_id} = \text{City.id} \text{City}))$$