

COMS 4111 Intro to DB HW2

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1 Relational Algebra

- Q1:
 $\pi_{name}(\sigma_{month='November'}(\sigma_{county='Clarke' \vee county='Marshall'}(liquors \bowtie_{liquors.lid=sales.liquors \ sales} sales))).$
- Q2:
 $p(tmp1, (\sigma_{county='Marshall' \wedge month='January'}(liquors \bowtie_{liquors.lid=sales.liquors \ sales} sales))),$
 $p(tmp2, (\sigma_{county='Marshall' \wedge month='January'}(liquors \bowtie_{liquors.lid=sales.liquors \ sales} sales))),$
 $p(tmp3, (\sigma_{county='Marshall' \wedge month='January'}(liquors \bowtie_{liquors.lid=sales.liquors \ sales} sales))),$
 $p(tmp, (\sigma_{tmp1.lid \neq tmp2.lid \wedge tmp2.lid \neq tmp3.lid \wedge tmp1.lid \neq tmp3.lid}(tmp1 \bowtie_{manufacturer} tmp2 \bowtie_{manufacturer} tmp3))),$
 $\pi_{manufacturer}(tmp).$

2 More Relational Algebra

1. $\pi_{A,B}(T1)$:

A	B
1	x
2	y
2	z

2. $T1 \times \pi_A(T1)$:

(A)	B	C	(A)
1	x	a	1
1	x	a	2
2	y	b	1
2	y	b	2
2	z	c	1
2	z	c	2

3. $T1 \bowtie_{T1.B=T2.C} T2$:

A	(B)	(C)	(B)	(C)	D
1	x	a	1	x	c
1	x	a	3	x	a
2	y	b	2	y	c

4. $T1 - (T1 \wedge T2)$:

A	B	C
1	x	a
2	y	b
2	z	c

5. $T1 \bowtie_{T1.A < T2.B} (\sigma_{B \leq 2}(T2))$:

A	(B)	(C)	(B)	(C)	D
1	x	a	2	y	c

6. $T1 \bowtie (\sigma_{B=C}(T2))$: NULL.

3 SQL

1. $\pi_{name,age}(Student)$

```
SELECT name, age
FROM Student
```

2. $Student \times \pi_{age}(Student)$

```
WITH SA(age) AS
  (SELECT S1.age
   FROM Student as S1)
```

```
SELECT *
FROM Student
CROSS JOIN SA
```

3. $Student \bowtie_{Student.name=Teacher.name} Teacher$

```
SELECT *
FROM Student as S, Teacher as T
WHERE S.name = T.name
```

4. $Student - (Student \wedge Teacher)$

```
SELECT *
FROM Student
```

```
EXCEPT
```

```
SELECT *
FROM Teacher
```

5. $(\sigma_{year=2018}(Student)) \bowtie_{Student.age < Teacher.age} (\sigma_{name=engine}(Teacher))$

```
SELECT *
FROM Student as S, Teacher as T
WHERE S.year = 2018 AND
      S.age < T.age AND
      T.name = 'engine'
```

6. $Student \bowtie_{(\sigma_{age \leq 50}(Teacher))}$

```
SELECT *
FROM Student as S, Teacher as T
WHERE T.age <= 50
```