Relational Algebra Examples

Example Schema

- Consider the following schema:

Suppliers(*sid:* `integer`, *sname:* `string`, *address:* `string`)
Parts(*pid:* `integer`, *pname:* `string`, *color:* `string`)
Catalog(*sid:* `integer`, *pid:* `integer`, *cost:* `real`)

Example1

- Find the *name*s of suppliers who supply some red part.

$$\pi_{sname}(\pi_{sid}((\pi_{pid}\sigma_{color='red'}Parts) \bowtie Catalog) \bowtie Suppliers)$$

```
SELECT  S.sname
FROM    Suppliers S, Parts P, Catalog C
WHERE   P.color='red' AND C.pid=P.pid AND C.sid=S.sid
```

Example 2

- Find the *sid*s of suppliers who supply some red or green part.

$$\pi_{sid}(\pi_{pid}(\sigma_{color='red' \vee color='green'} Parts) \bowtie catalog)$$

```
SELECT  C.sid
FROM    Catalog C, Parts P
WHERE   (P.color = 'red' OR P.color = 'green')
        AND P.pid = C.pid
```

Example 3

- Find the *sid*s of suppliers who supply some red part or are at 221 Packer Street.

$$\rho(R1, \pi_{sid}((\pi_{pid}\sigma_{color='red'} Parts) \bowtie Catalog))$$
$$\rho(R2, \pi_{sid}\sigma_{address='221PackerStreet'} Suppliers)$$
$$R1 \cup R2$$

```
SELECT S.sid
FROM   Suppliers S
WHERE  S.address = '221 Packer street'
       OR S.sid IN ( SELECT C.sid
                     FROM   Parts P, Catalog C
                     WHERE  P.color='red' AND P.pid = C.pid )
```

Example 4

- Find the *sid*s of suppliers who supply some red part and some green part.

$$\rho(R1, \pi_{sid}((\pi_{pid}\sigma_{color='red'} Parts) \bowtie Catalog))$$
$$\rho(R2, \pi_{sid}((\pi_{pid}\sigma_{color='green'} Parts) \bowtie Catalog))$$
$$R1 \cap R2$$

```
SELECT C.sid
FROM   Parts P, Catalog C
WHERE  P.color = 'red' AND P.pid = C.pid
       AND EXISTS ( SELECT P2.pid
                    FROM   Parts P2, Catalog C2
                    WHERE  P2.color = 'green' AND C2.sid = C.sid
                           AND P2.pid = C2.pid )
```