RECAP

```
select *
from tablename as T
where ()
```

ORDER

```
select *
from tablename as T
order by job,name;
```

use the desc for the reverse order

KEY

DEF: Key is one or more attributes that **uniquely identify a row**

a set of attributes {Name, Job, Salary} can be a key

Foreign Keys

DEF:A Foreign Key is one or more attributes that uniquely identify a row in another table.

```
CREATE TABLE Payroll (
UserID INT PRIMARY KEY,
Name TEXT,
Job TEXT,
Salary INT);
'''Payroll(UserId, Name, Job, Salary)'''

CREATE TABLE Regist (
UserID INT REFERENCES Payroll,
Car TEXT);

'''Regist(UserId, Car)'''
```

Nested-loop

Payroll

UserID	Name	Job	Salary
123	Jack	TA	50000
345	Allison	TA	60000
567	Magda	Prof	90000
789	Dan	Prof	100000

Regist

UserID	Car
123	Charger
567	Civic
567	Pinto

```
SELECT P.Name, R.Car
FROM Payroll AS P JOIN Regist AS R
ON P.UserID = R.UserID;
```

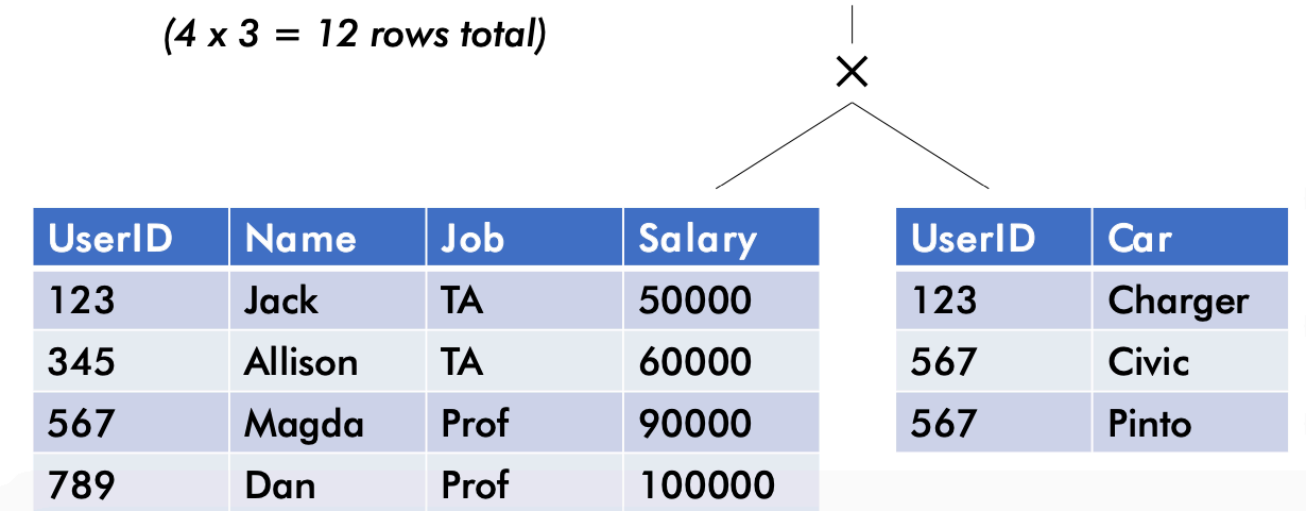
Name	Car
Jack	Charger
Magda	Civic
Magda	Pinto

Inner Joins

DEF:2-arg Cartesian product op (Symbol “x”) Take all pairs of tuples

UserID	Name	Job	Salary	UserID	Car
123	Jack	TA	50000	123	Charger
123	Jack	TA	50000	567	Civic
123	Jack	TA	50000	567	Pinto
345	Allison	TA	60000	123	Charger
345	Allison	TA	60000	567	Civic
…	…	…	…	…	…

(4 x 3 = 12 rows total)



UserID	Name	Job	Salary
123	Jack	TA	50000
345	Allison	TA	60000
567	Magda	Prof	90000
789	Dan	Prof	100000

UserID	Car
123	Charger
567	Civic
567	Pinto

Outer Joins

DEF: 2-arg Left Outer Join op (Symbol "bowtie with left edge") Take Join + pair non-matching entries on left with NULLs on right

```
SELECT P.Name, R.Car
FROM Payroll AS P LEFT OUTER JOIN Regist AS R
ON P.UserID = R.UserID;
```

UserID	Name	Job	Salary
123	Jack	TA	50000
345	Allison	TA	60000
567	Magda	Prof	90000
789	Dan	Prof	100000

UserID	Car
123	Charger
567	Civic
567	Pinto

NULL is a value placeholder. Depending on context, it may mean unknown, not applicable, etc.

Name	Car
Jack	Charger
Allison	NULL
Magda	Civic
Magda	Pinto
Dan	NULL

symbol:

- **LEFT OUTER JOIN** ⟕
  - All rows in left table are preserved
- **RIGHT OUTER JOIN** ⟖
  - All rows in right table are preserved
- **FULL OUTER JOIN** ⟗
  - All rows are preserved

Self Joins:

```
SELECT P.Name, R1.Car
FROM Payroll AS P, Regist AS R1, Regist AS R2
WHERE P.UserID = R1.UserID AND
P.UserID = R2.UserID AND
R1.Car = 'Civic' AND
R2.Car = 'Pinto';
```

we can serverl diffferent way to sovle the problem:

to do the optimation to decrase the joins's size ;

so the best case for this situation is filter/ select before the joins

UserID	Name	Job	Salary
123	Jack	TA	50000
345	Allison	TA	60000
567	Magda	Prof	90000
789	Dan	Prof	100000

UserID	Car
123	Charger
567	Civic
567	Pinto

```
SELECT P.Name, R1.Car
  FROM Payroll AS P, Regist AS R1,
       Regist AS R2
 WHERE P.UserID = R1.UserID AND
       P.UserID = R2.UserID AND
       R1.Car = 'Civic' AND
       R2.Car = 'Pinto';
```