CSCI4333 Database Design & Implement

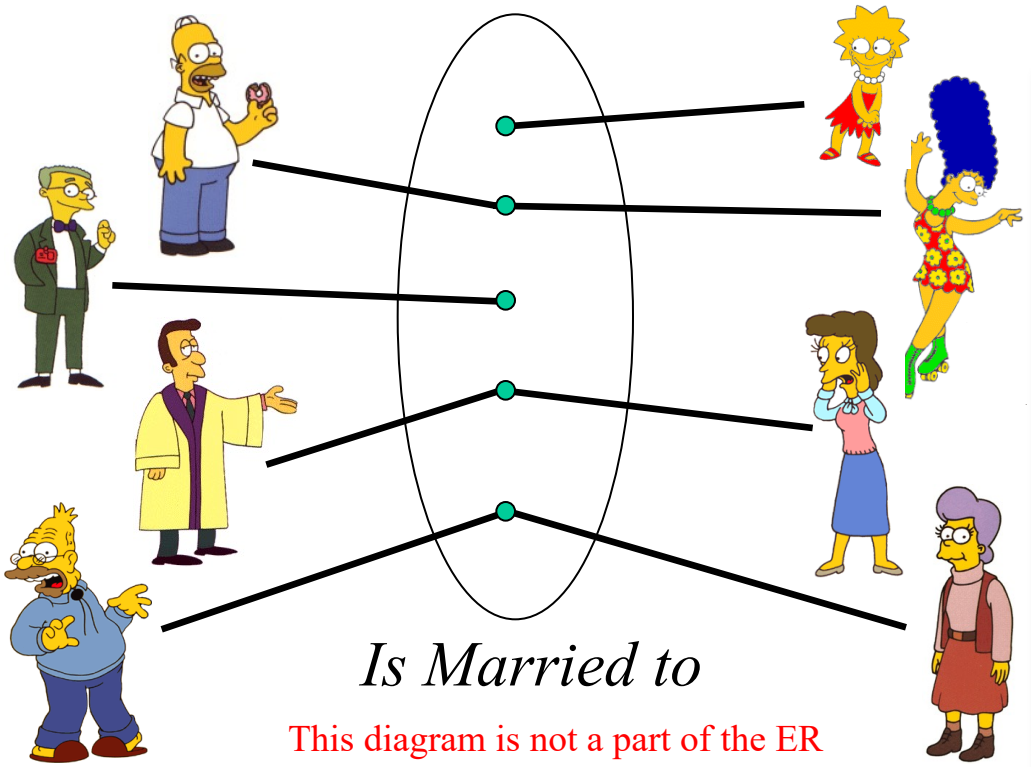
Lecture Four – E-R Model 2

Instructor: Dr. Yifeng Gao

Review: Key Constraints

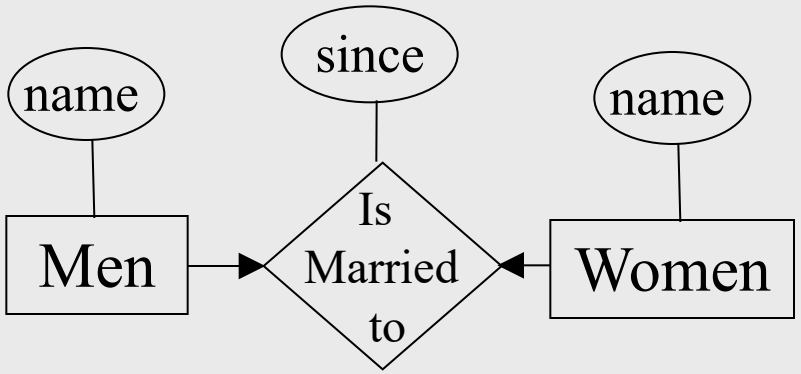
• **one-to-one**: An entity in A is associated with at most one entity in B, and an entity in B is associated with at most one entity in A.

A man may be married to at most one woman, and a woman may be married to at most one man (both men and women can be unmarried)



Is Married to

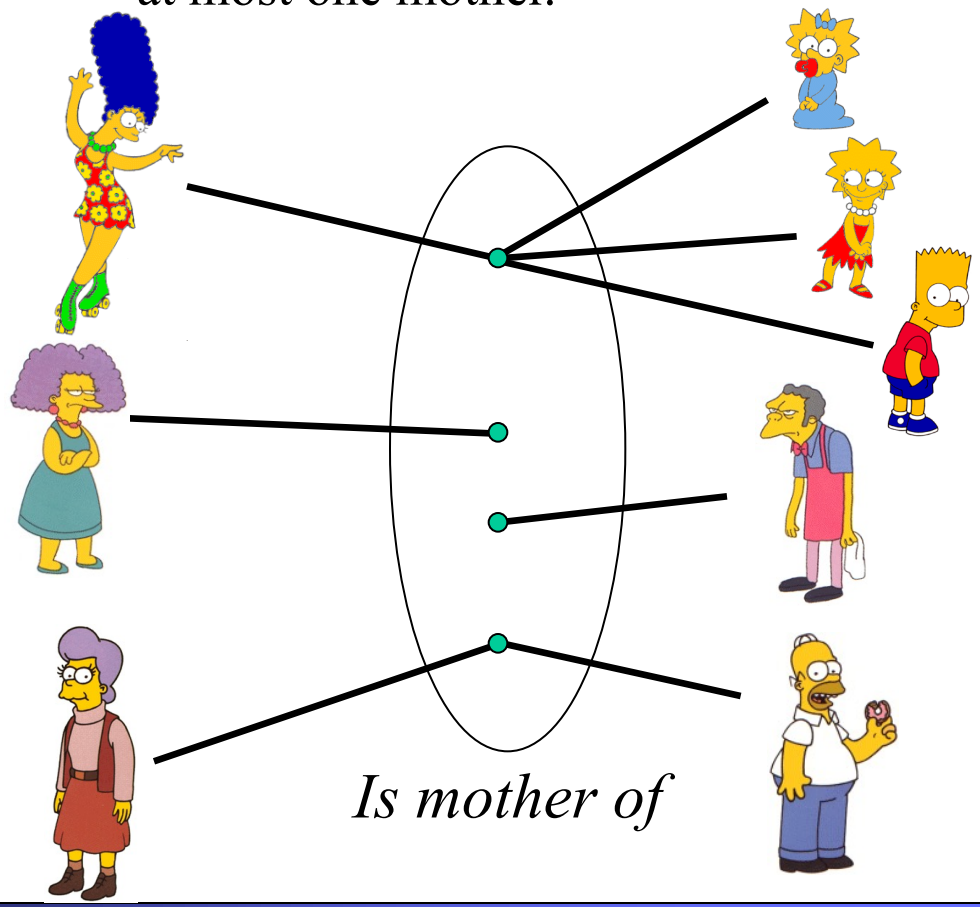
This diagram is not a part of the ER model! It is just an intuitive picture to explain a concept

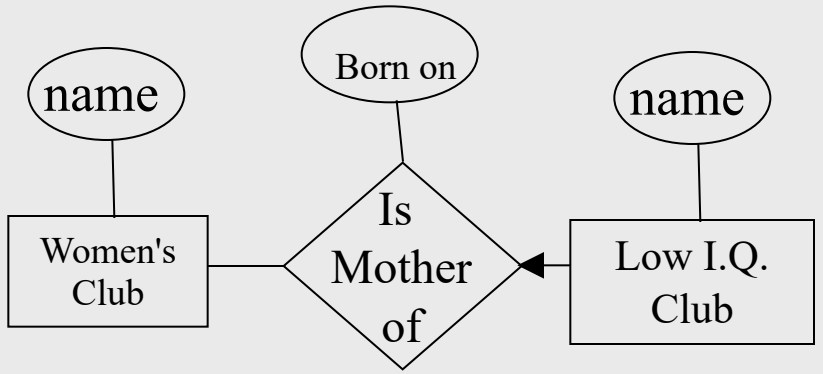


Review: Key Constraints

• **one-to-many**: An entity in A is associated with any number in B. An entity in B is associated with at most one entity in A.

A woman may be the mother of many (or no) children. A person may have at most one mother.

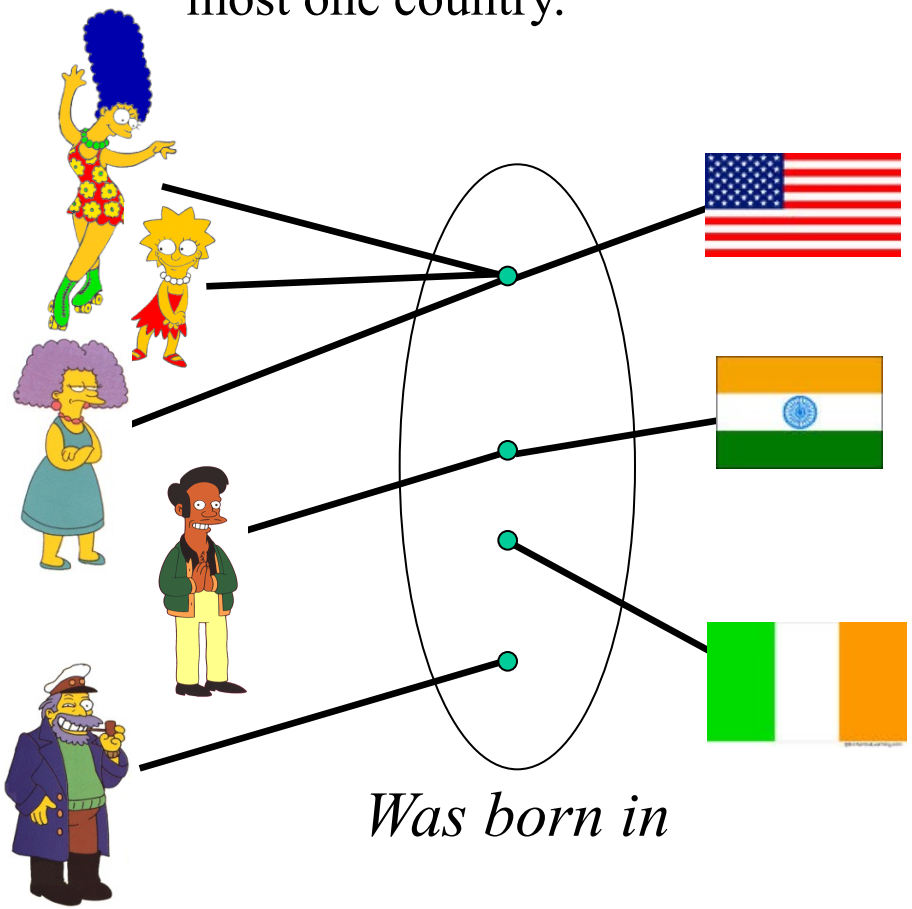


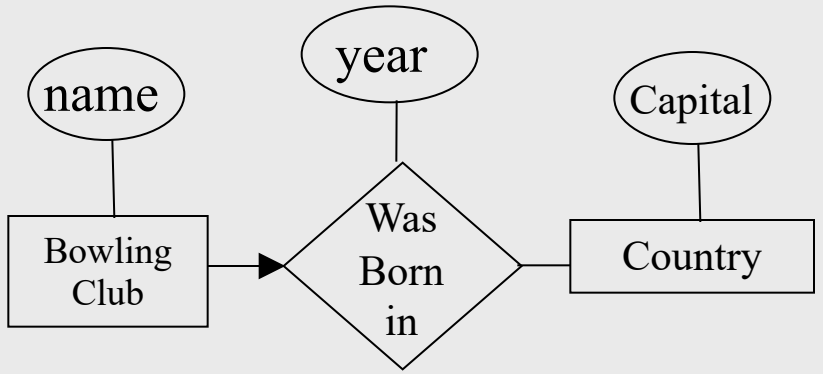


Review: Key Constraints

•**many-to-one**: An entity in A is associated with at most one entity in B. An entity in B is associated with any number in A.

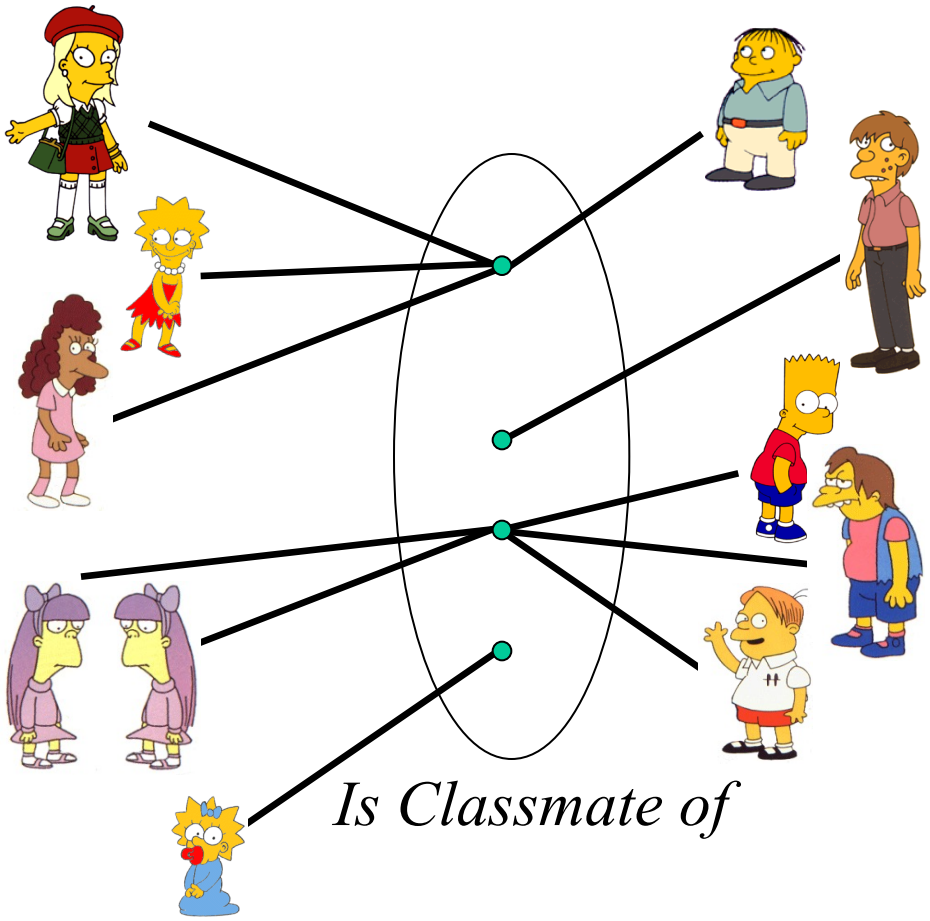
Many people can be born in any county, but any individual is born in at most one country.

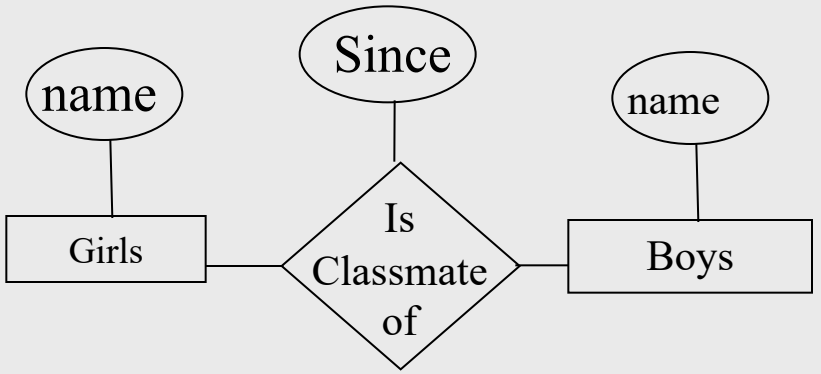




Review: Key Constraints

•**many-to-many**: Entities in A and B are associated with any number from each other.





Summary of Key Constraint

- Four different constraints:
  - one-to-one
  - one-to-many
  - many-to-one
  - many-to-many

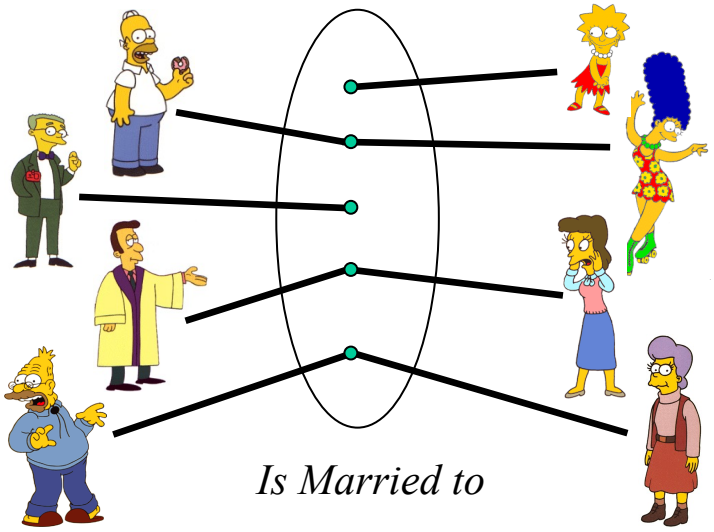
- Keyword: at most one

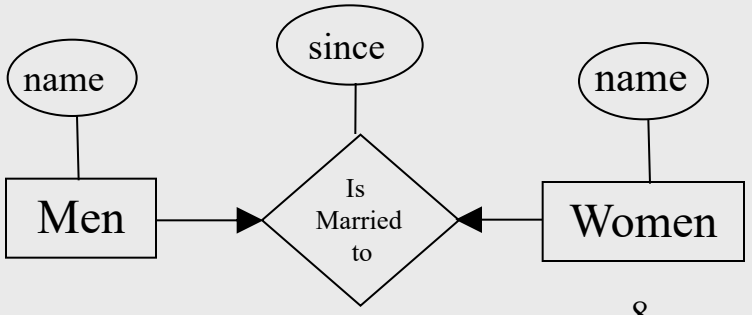
Questions

- Current President vs. Country
- Bank Account vs. Person

Participation Constraints

Earlier, we saw an example of a one-to-one key constraint, noting that a man may be married to at most one woman, and a woman may be married to at most one man (both men and women can be unmarried).

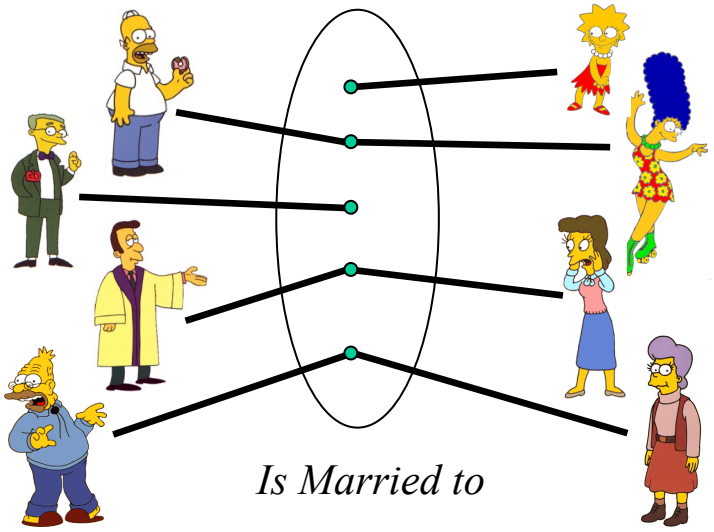


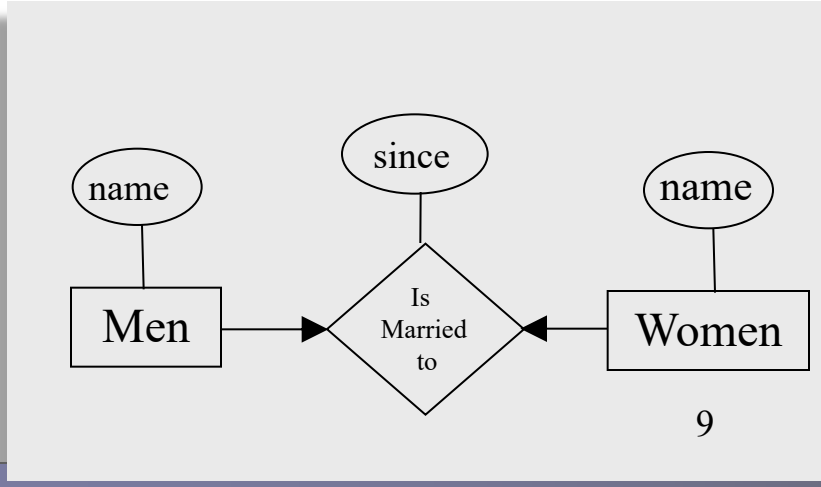


Participation Constraints

Earlier, we saw an example of a one-to-one key constraint, noting that a man may be married to at most one woman, and a woman may be married to at most one man (both men and women can be unmarried).

Suppose we want to build a database for the "Springfield Married Persons Association".



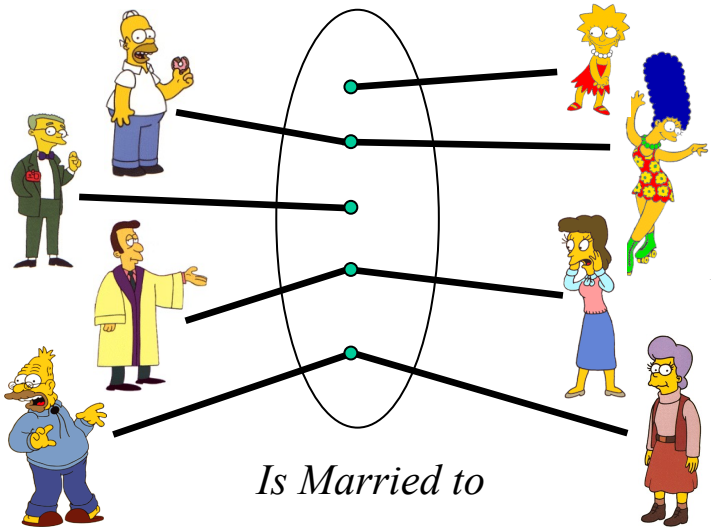


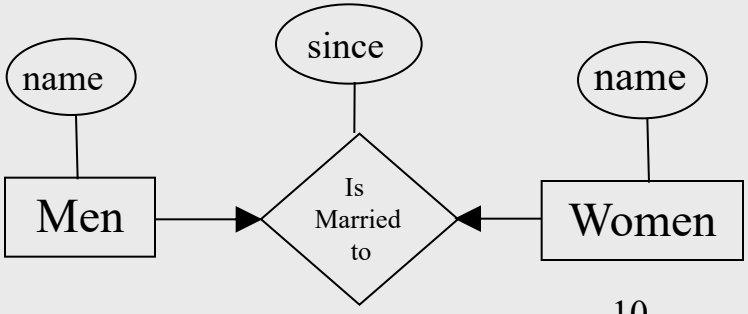
Participation Constraints

Earlier, we saw an example of a one-to-one key constraint, noting that a man may be married to at most one woman, and a woman may be married to at most one man (both men and women can be unmarried).

Suppose we want to build a database for the "Springfield Married Persons Association".

•In this case, *everyone* must be married!



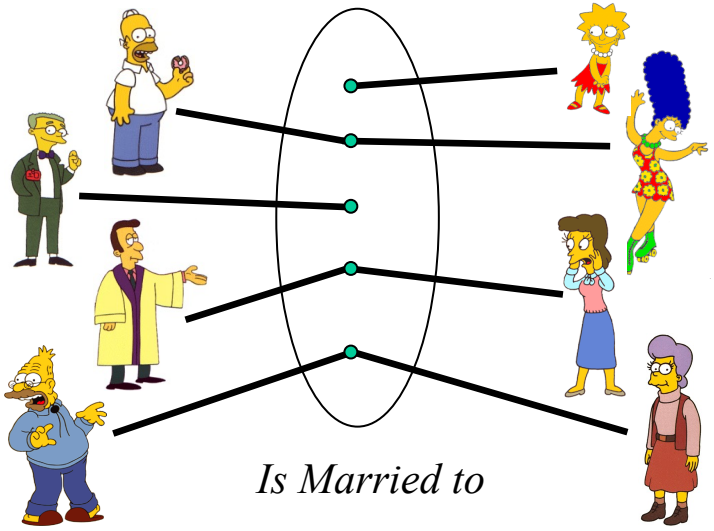


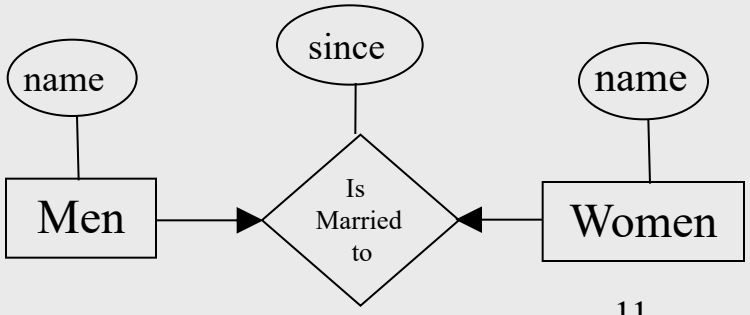
Participation Constraints

Earlier, we saw an example of a one-to-one key constraint, noting that a man may be married to at most one woman, and a woman may be married to at most one man (both men and women can be unmarried).

Suppose we want to build a database for the "Springfield Married Persons Association".

- In this case, *everyone* must be married!
- This condition cannot be described by Key Constraint



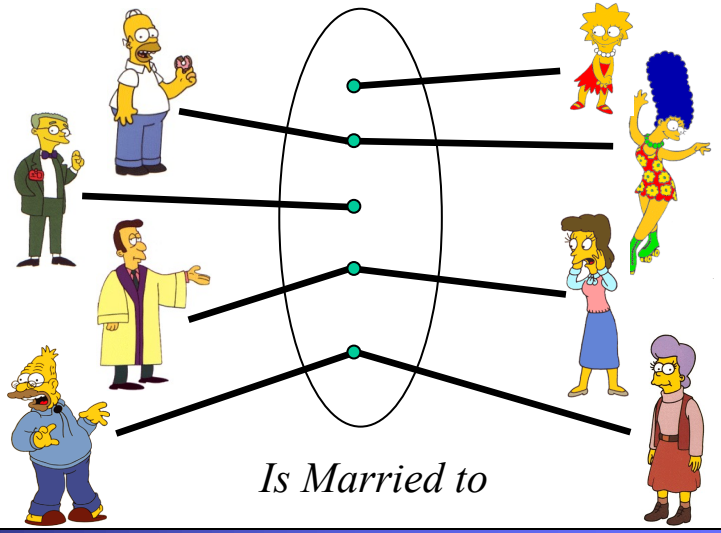


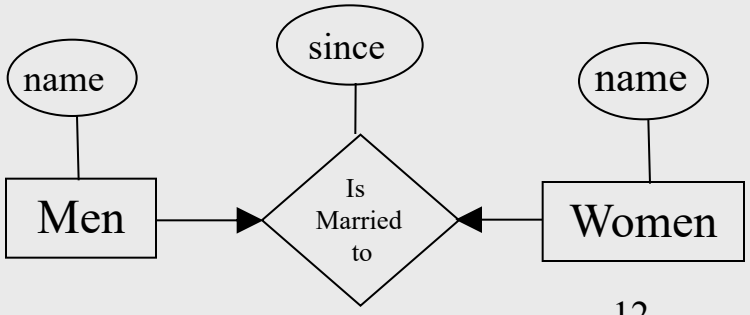
Participation Constraints

Earlier, we saw an example of a one-to-one key constraint, noting that a man may be married to at most one woman, and a woman may be married to at most one man (both men and women can be unmarried).

Suppose we want to build a database for the "Springfield Married Persons Association".

- In this case, *everyone* must be married!
- **Participation Constraint (at least one)**



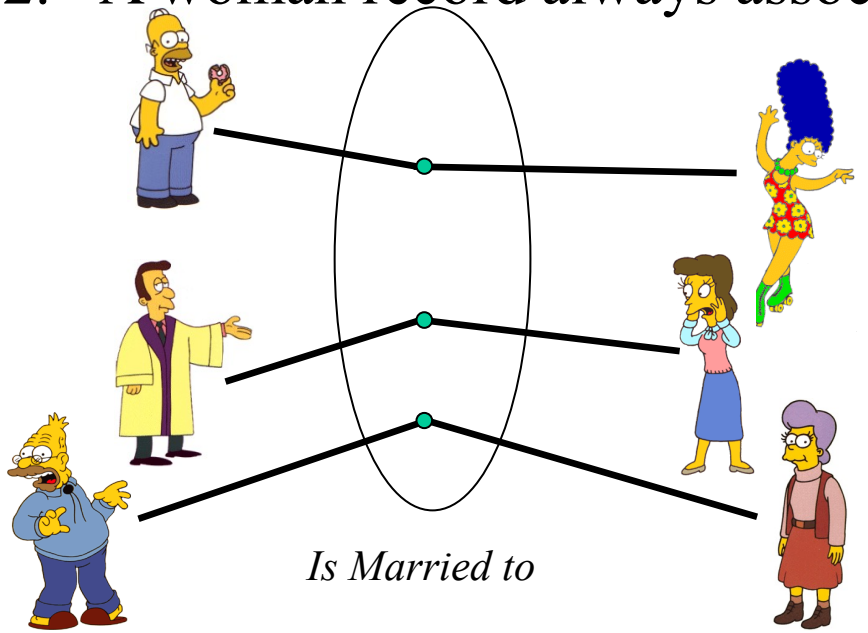


Participation Constraints Cont.

Participation Constraints are indicated by bold lines in ER diagrams.

In Springfield Married Persons Association, **in addition** to Key Constraint, we need:

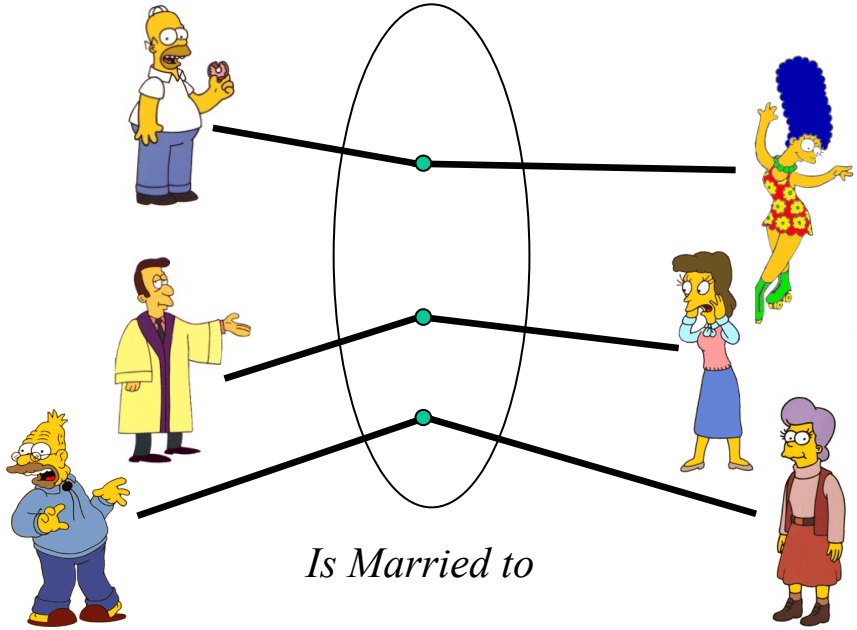
1. A man record always associate with a woman record.
2. A woman record always associate with a man record.

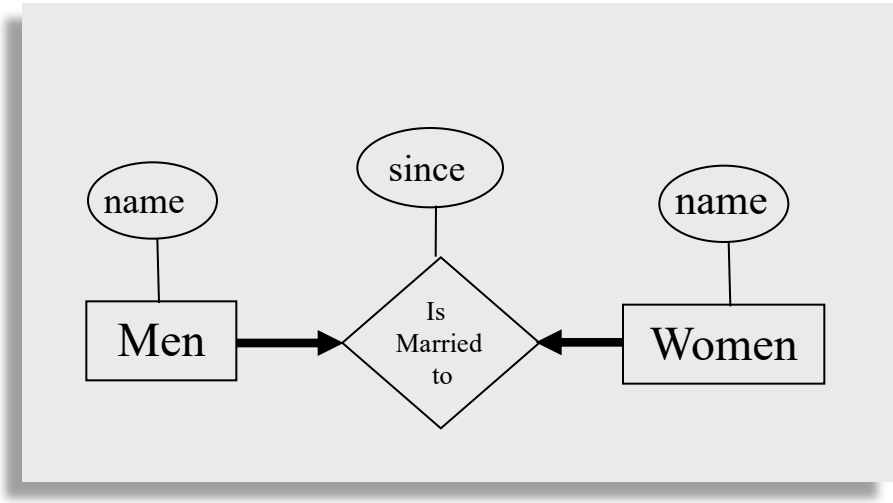


Participation Constraints Cont.

Participation Constraints are indicated by bold lines in ER diagrams.

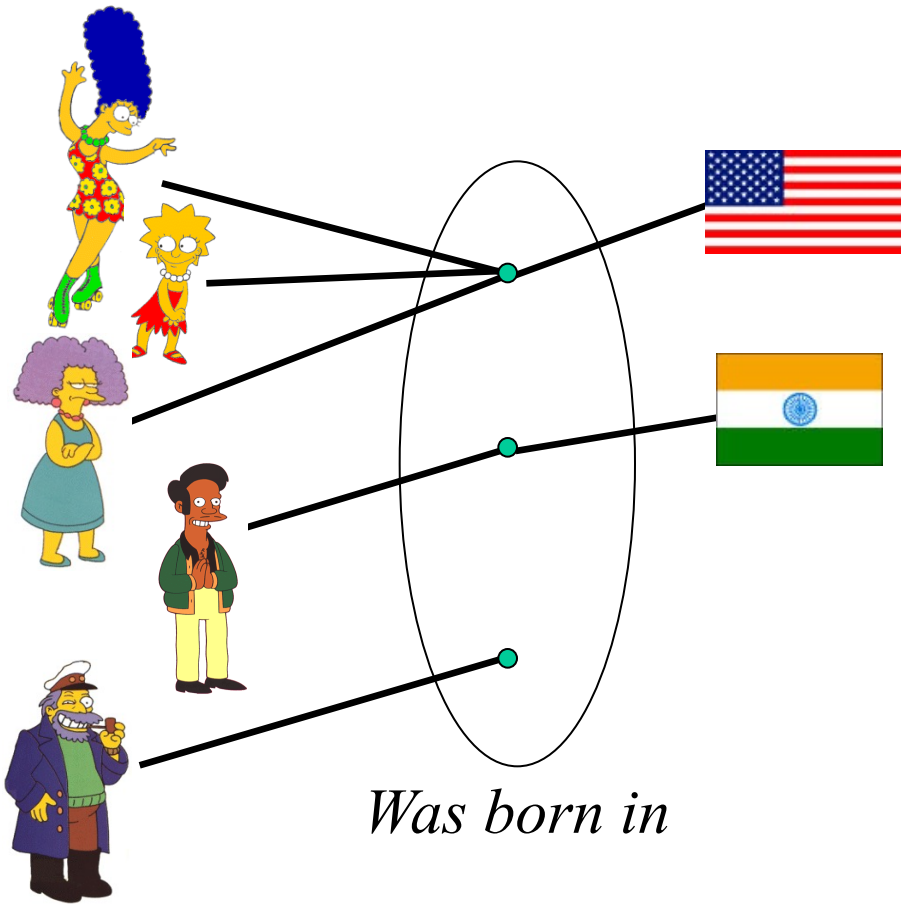
If we want to enforce 1 and 2…

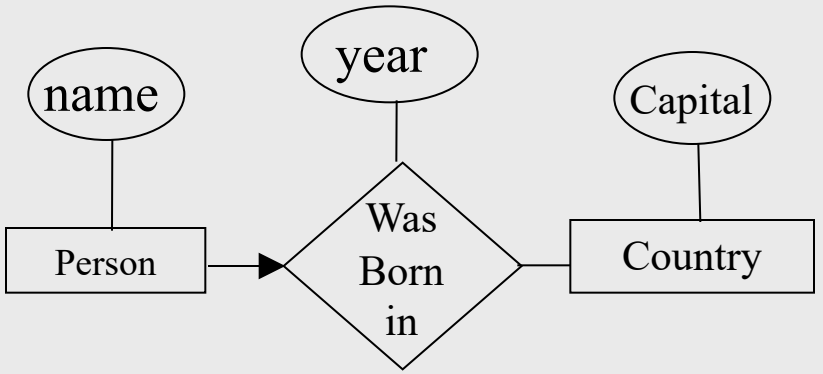




Participation Constraints Cont.

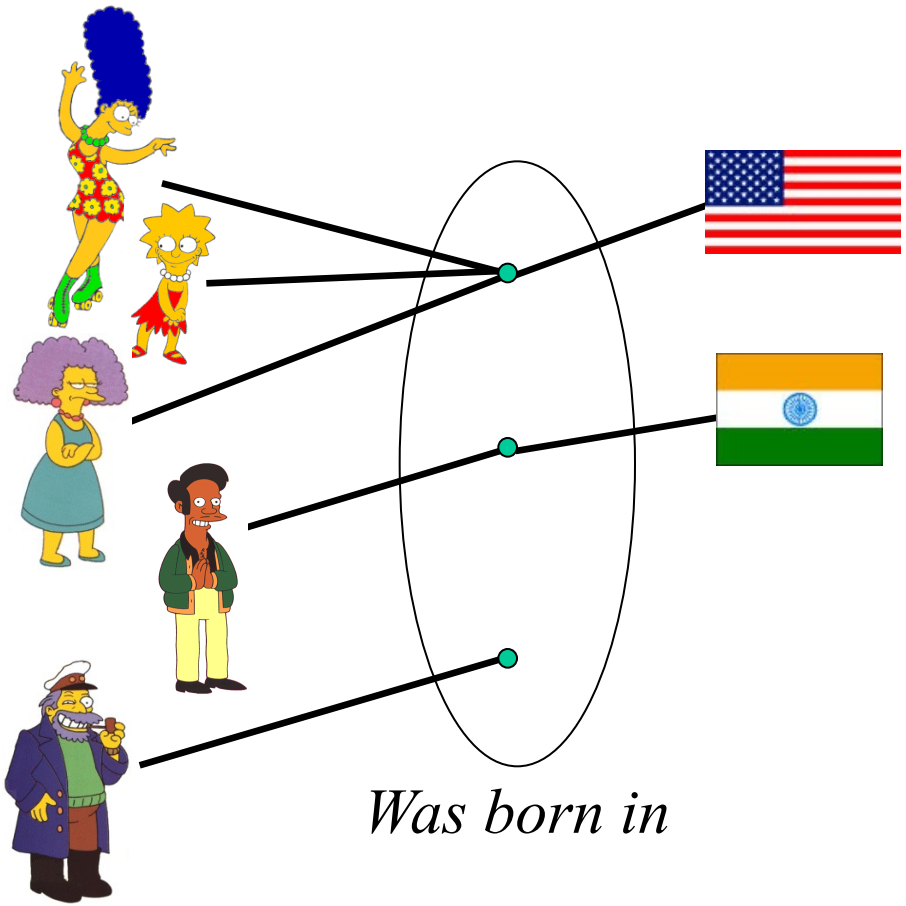
Many people can be born in any county, but any individual is born in at most one country.

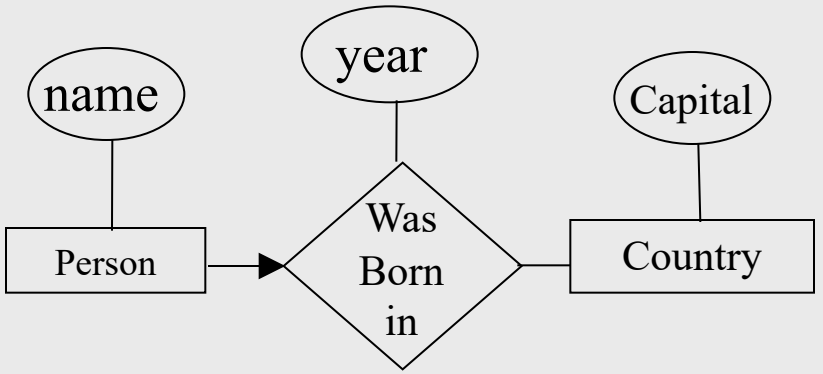




Participation Constraints Cont.

Many people can be born in any county, but any individual is born in at most one country.
In addition, a country should have at least one person.



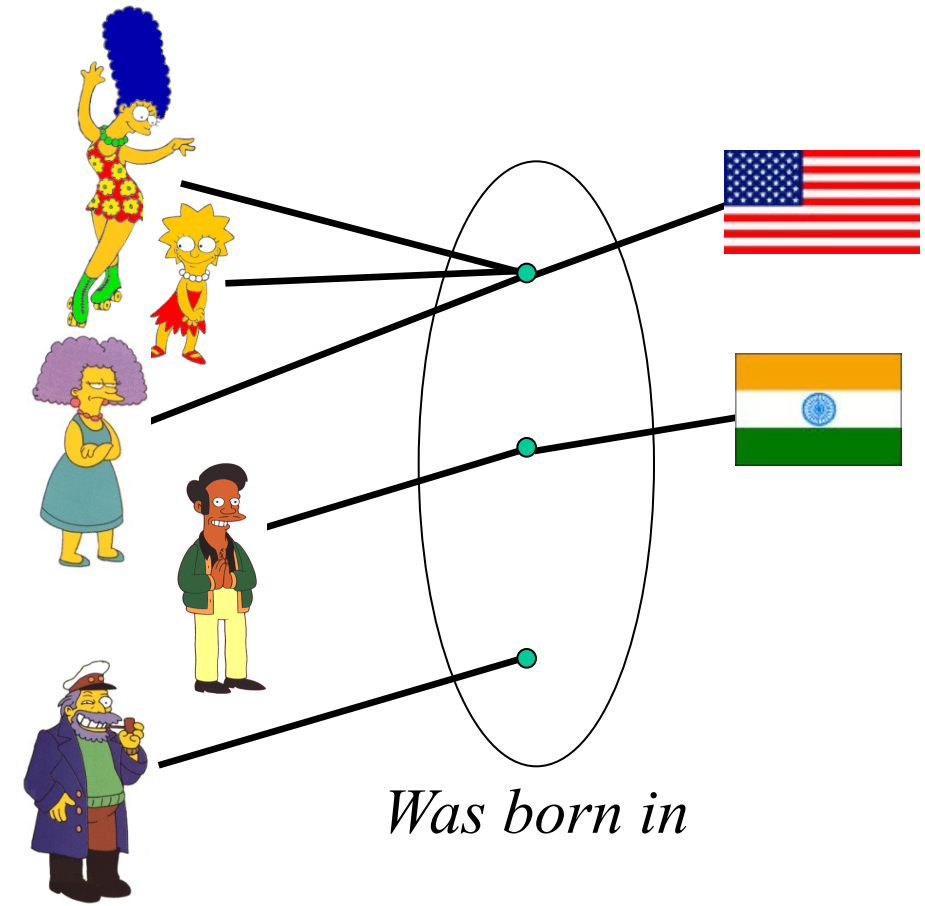


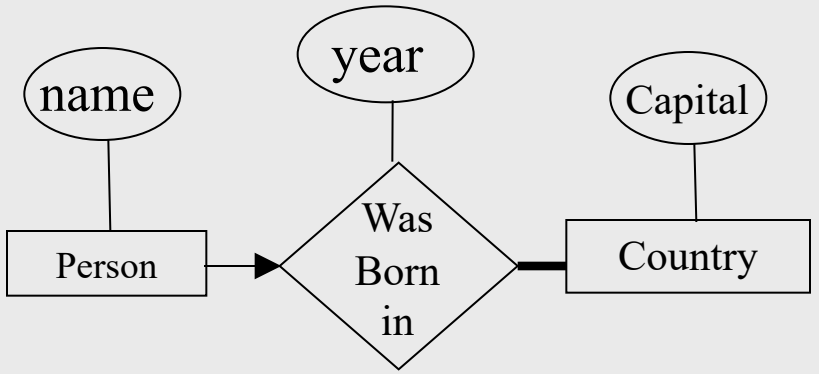
Participation Constraints Cont.

Many people can be born in any county, but any individual is born in at most one country.

In addition, a country should have at least one person.

1. Should a **person record** always associate with at least one **country record**?
2. Should a **country record** always associate with at least one **person record**?





Domain Constraint

Name	State	Established
Yellow Stone	WY	1872
Great Smoky Mountain	TN	1934
Acadia	ME	1916
Mount Rainer	WA	-9999

Not all input value is valid

Domain Constraint

Name	State	Established
Yellow Stone	WY	1872
Great Smoky Mountain	TN	1934
Acadia	ME	1916
Mount Rainer	WA	-9999

Not all input value is valid
We need to have something to constraint it

Domain Constraint

Name	State	Established
Yellow Stone	WY	1872
Great Smoky Mountain	TN	1934
Acadia	ME	1916
Mount Rainer	WA	-9999

The **domain** of the attribute is the set of permitted values

Domain Constraint

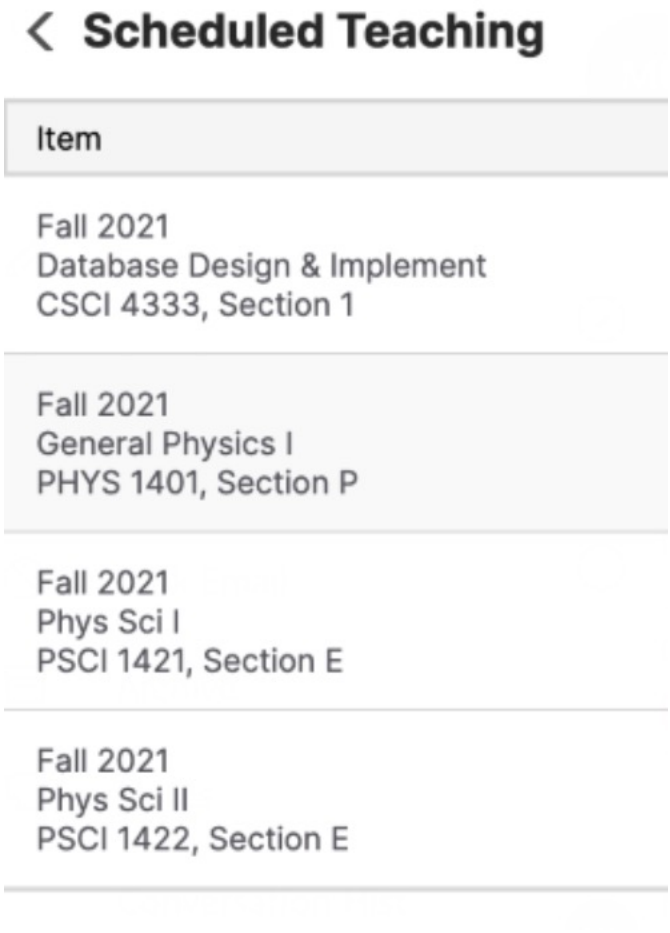
Name	State	Established
Yellow Stone	WY	1872
Great Smoky Mountain	TN	1934
Acadia	ME	1916
Mount Rainer	WA	**1899**

The **domain** of the attribute is the set of permitted values

Established must be a date

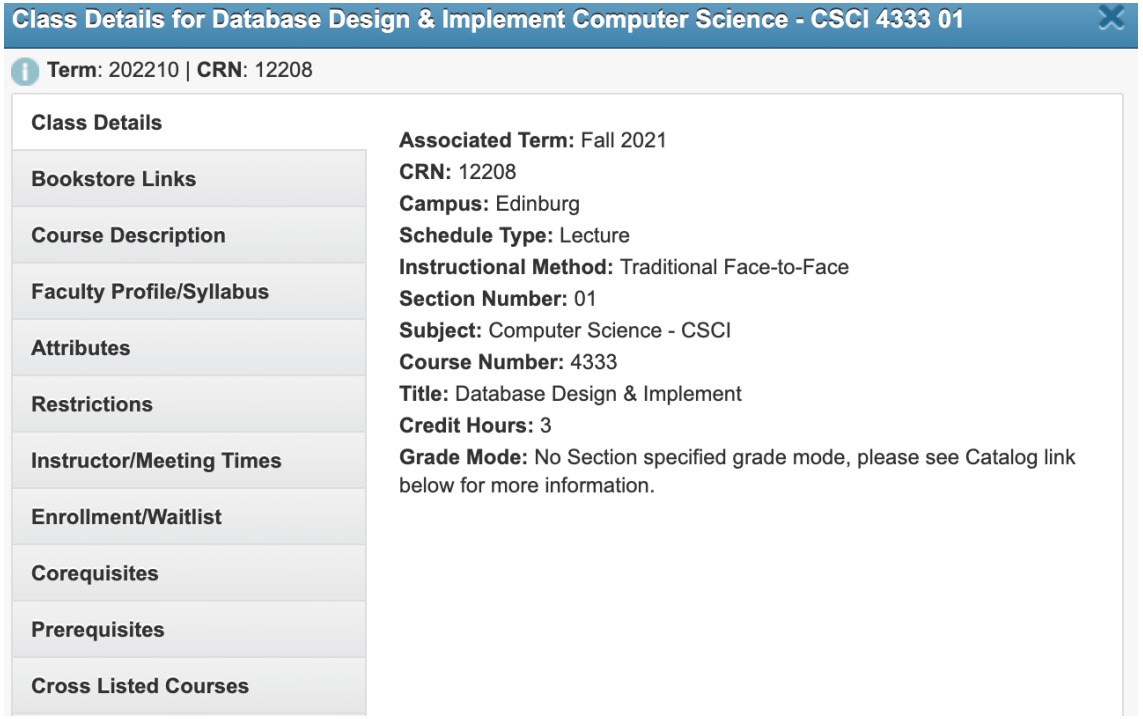
Not So Funny Example

My Scheduled Teaching Classes!



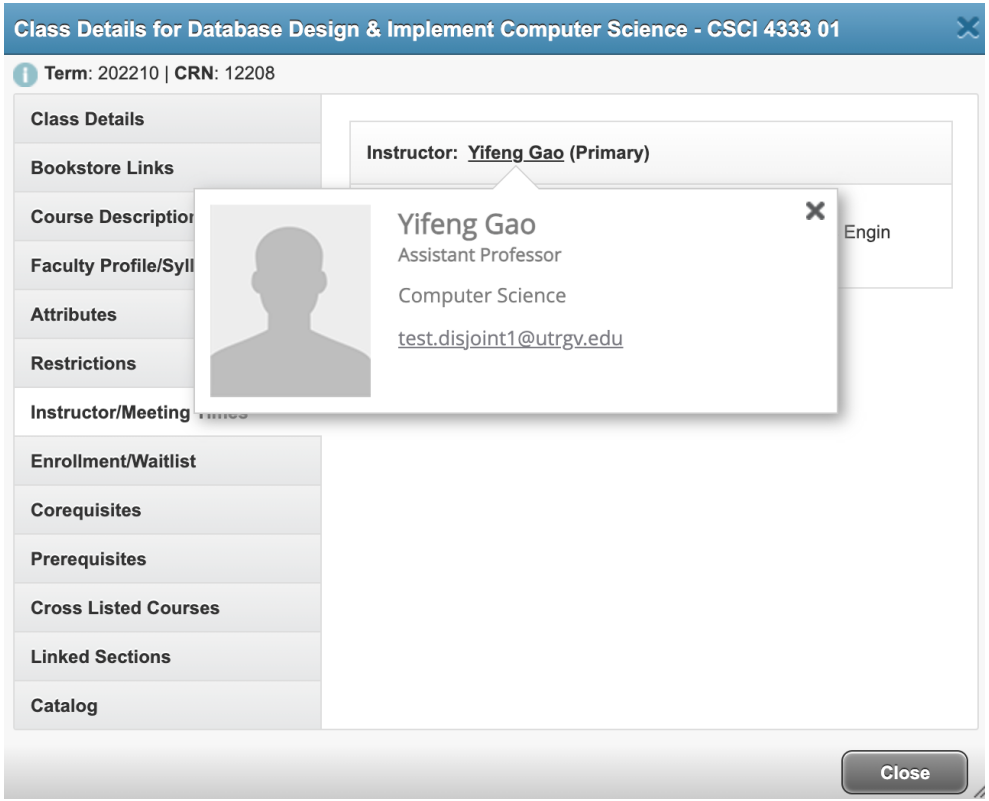
Not So Funny Example 2

Last Years' Public Course Schedule



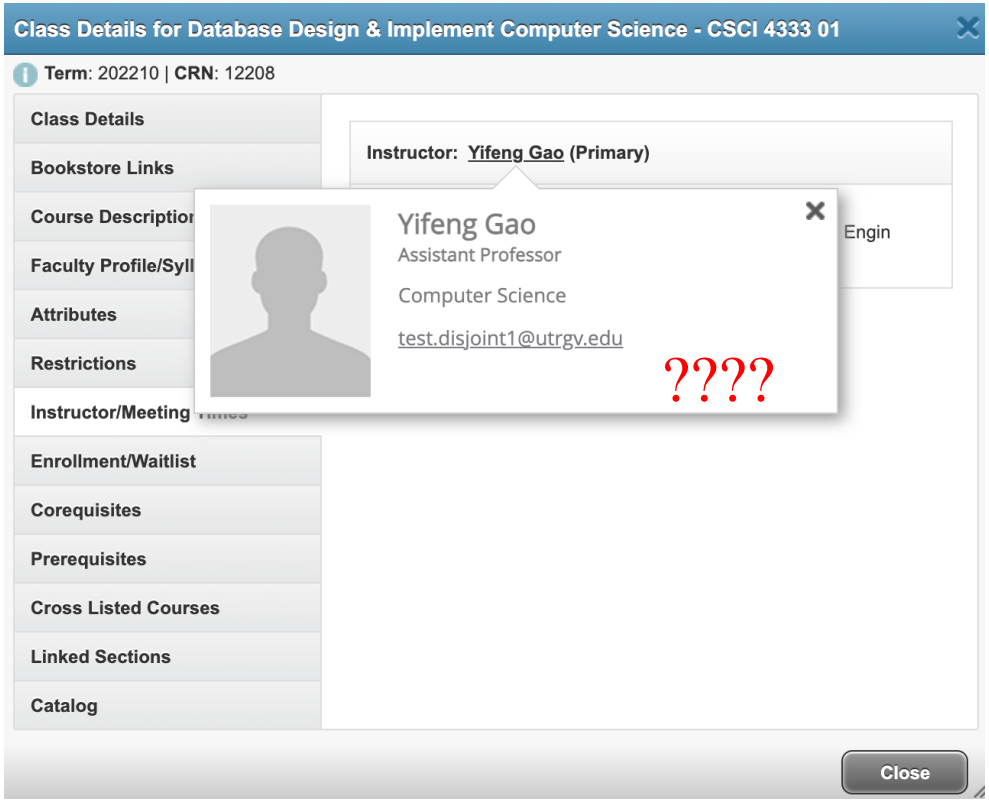
Not So Funny Example 2

Last Years' Public Course Schedule



Not So Funny Example 2

Last Years' Public Course Schedule



Summary

- So far, we discussed:
  - Entity & Entity Set
  - Relationship
  - Key Constraint
  - Participation Constraint
  - Domain Constraint