

# CSCI4333 Database Design & Implement

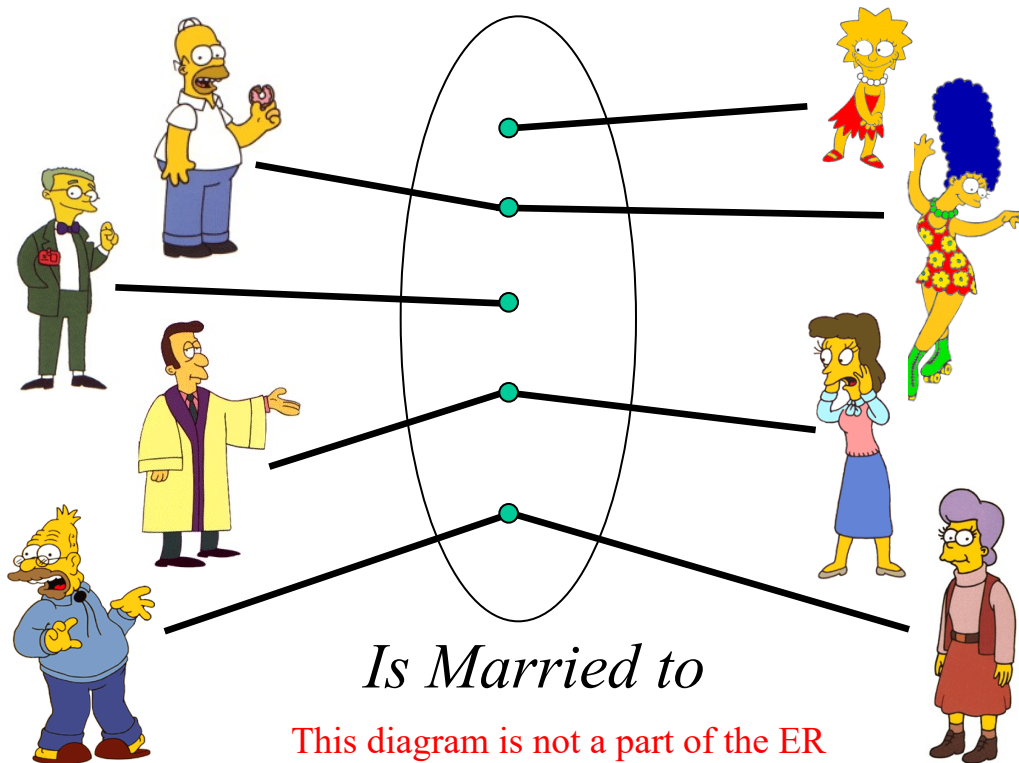
## **Lecture Four – E-R Model 2**

Instructor: Dr. Yifeng Gao

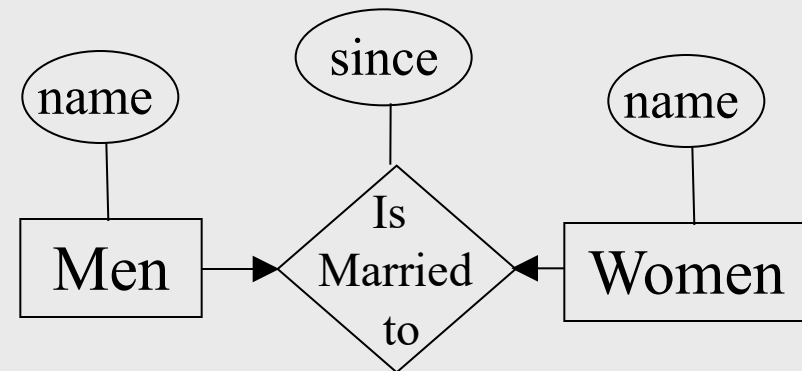
# Review: Key Constraints

- **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)



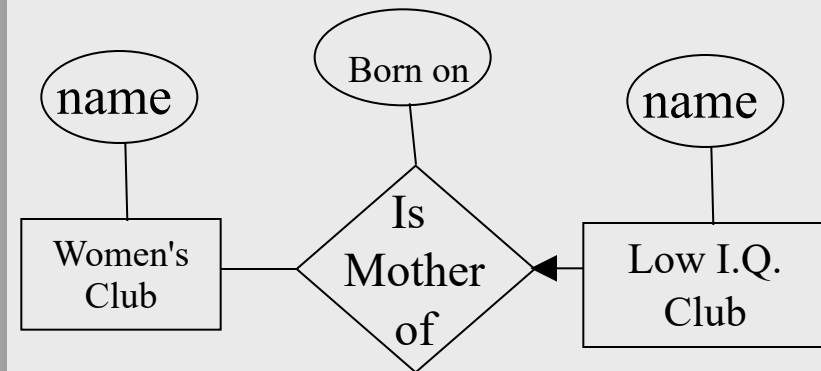
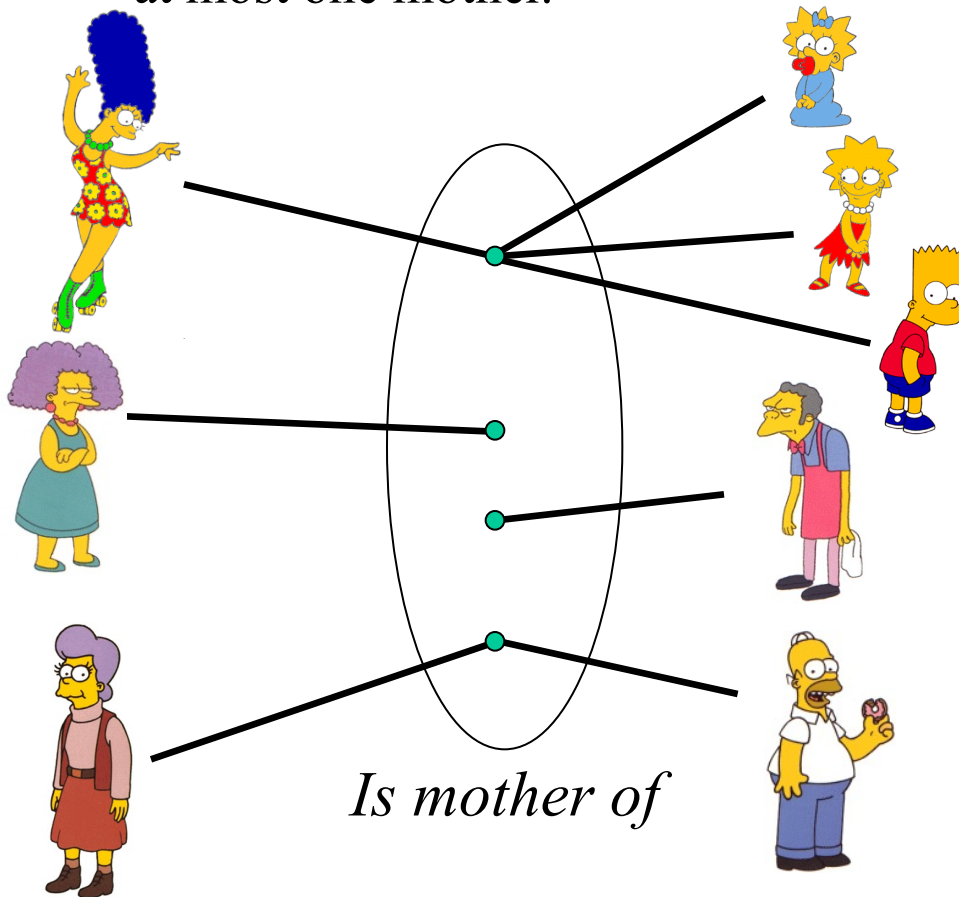
This diagram is not a part of the ER model! It is just an intuitive picture to explain a concept



# 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.

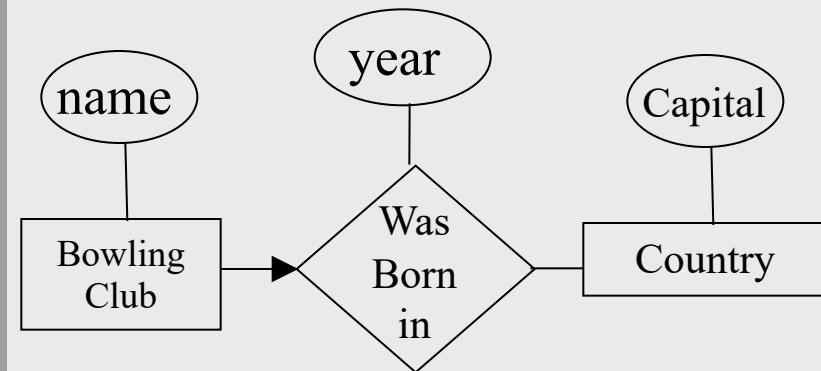
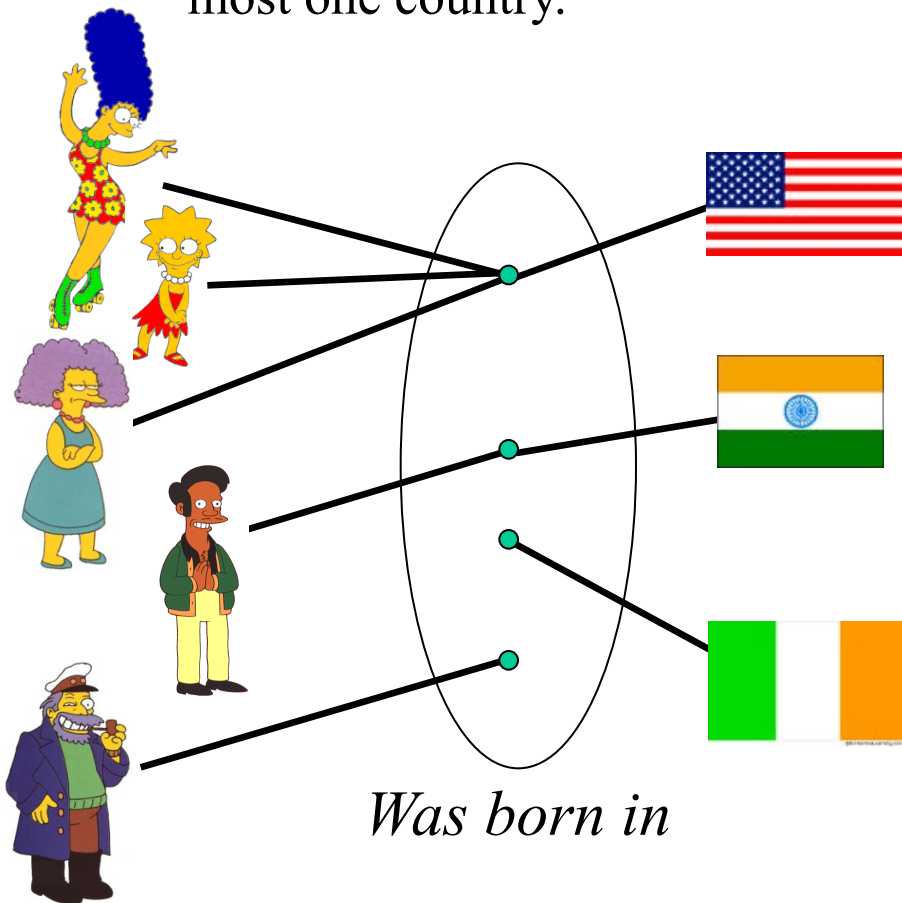
A woman may be the mother of many (or no) children. A person may have at most one mother.



# Review: Key Constraints

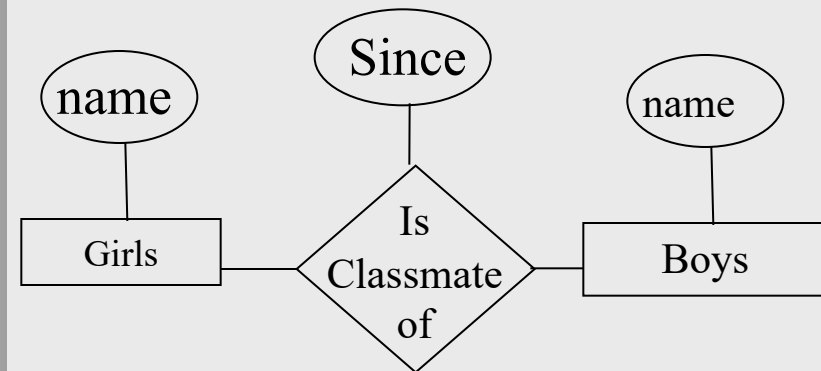
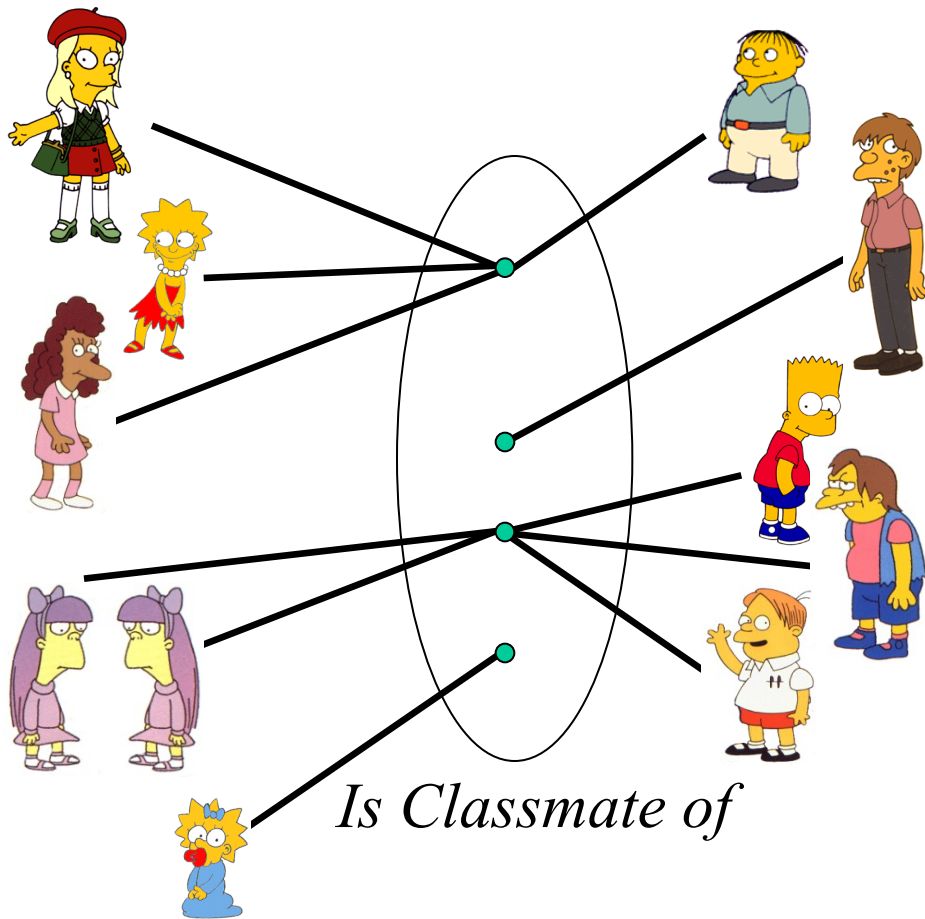
- **many-to-one:** An entity in A is associated with **at most one** entity in B. An entity in B is associated with any number in A.

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

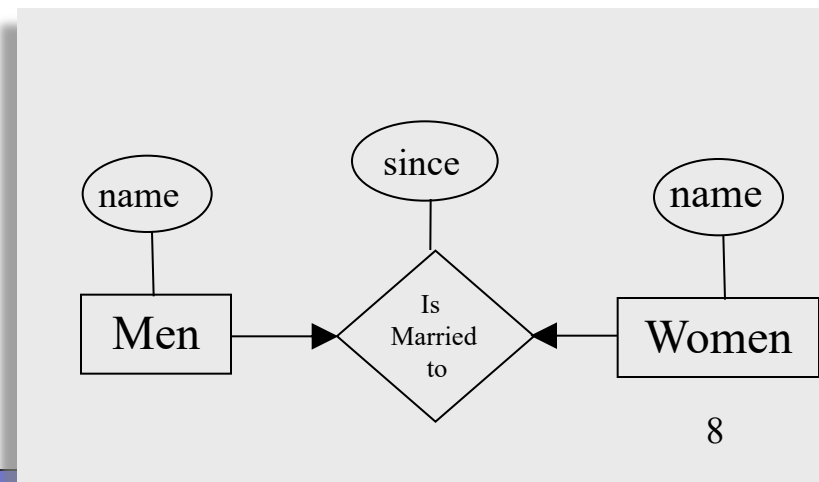
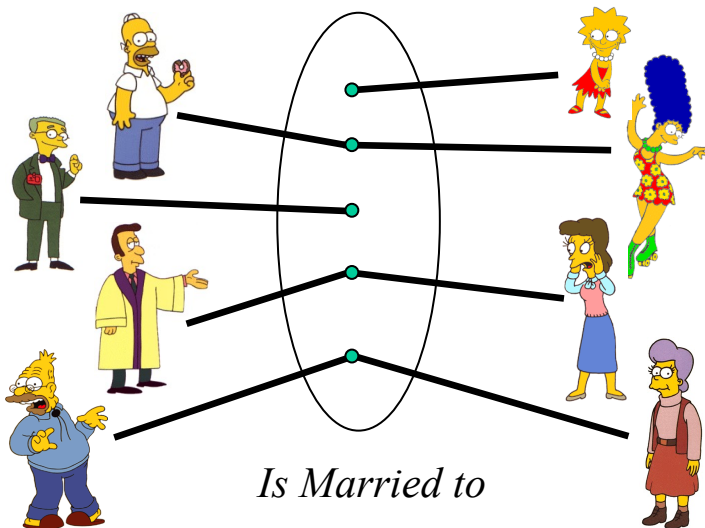
- Keyword: **at most one**

# 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).

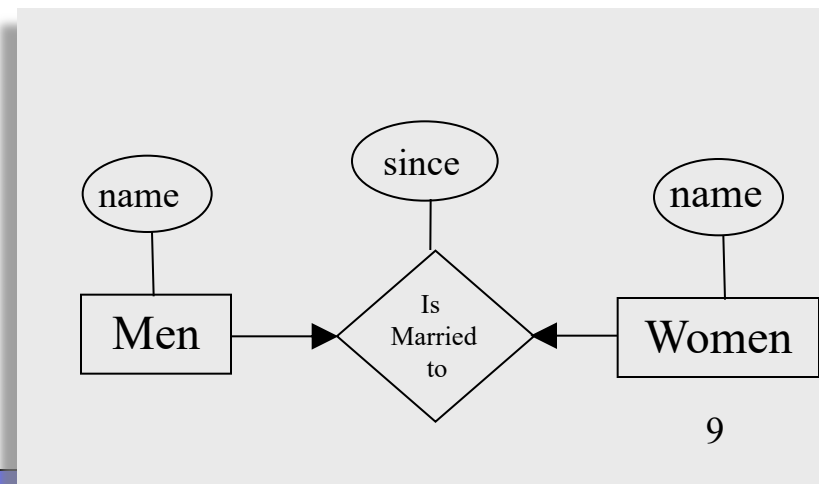
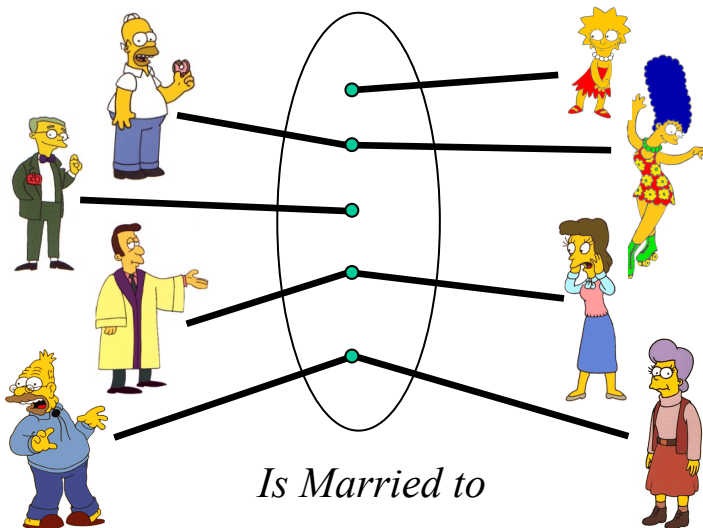




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Suppose we want to build a database for the “Springfield Married Persons Association”.

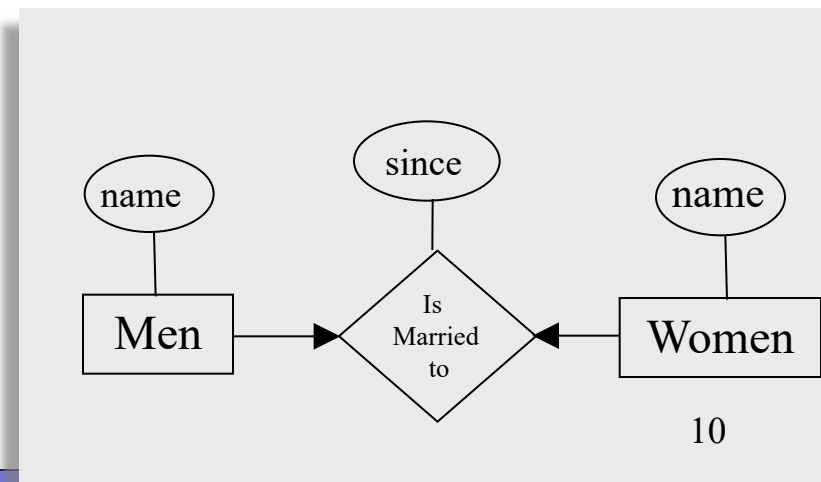
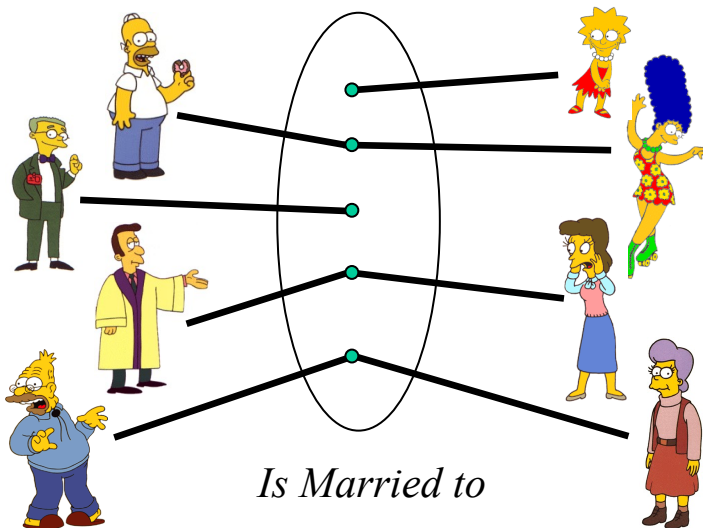


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- In this case, *everyone* must be married!

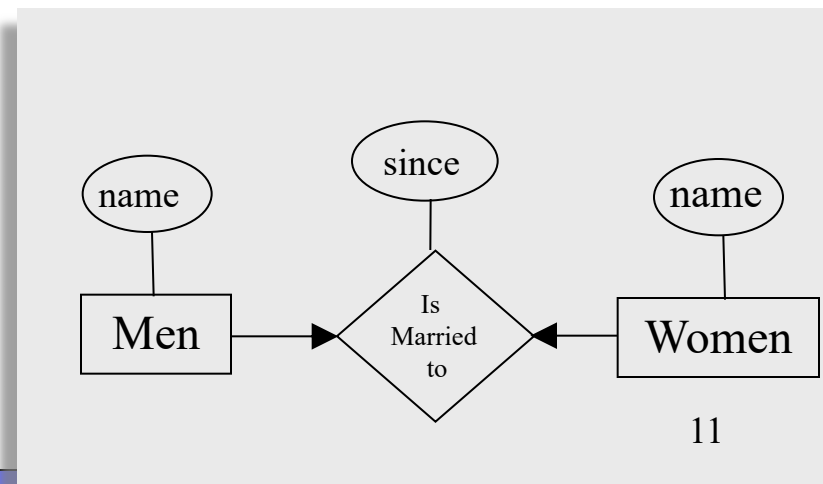
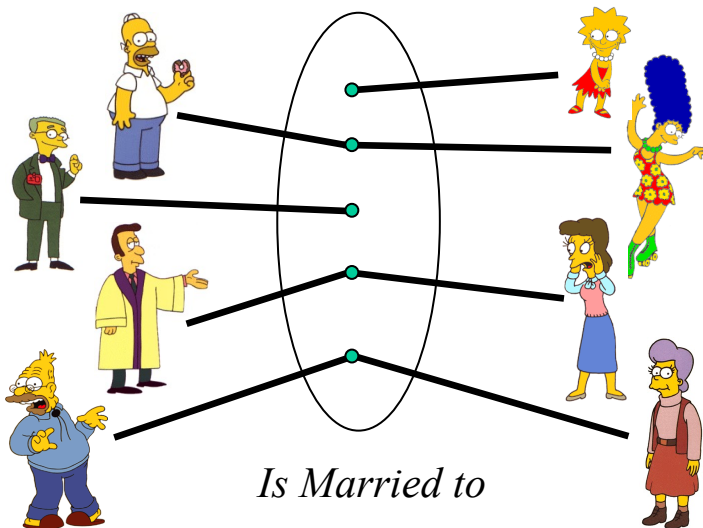


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- In this case, *everyone* must be married!
- This condition cannot be described by Key Constraint

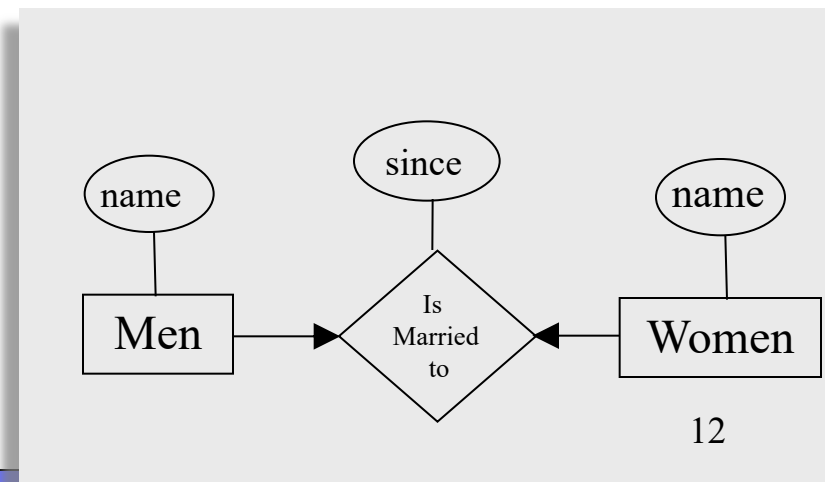
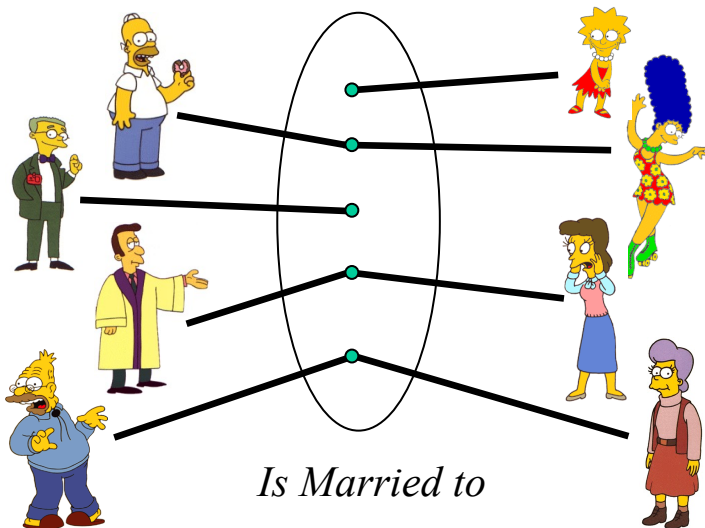


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Suppose we want to build a database for the “Springfield Married Persons Association”.

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

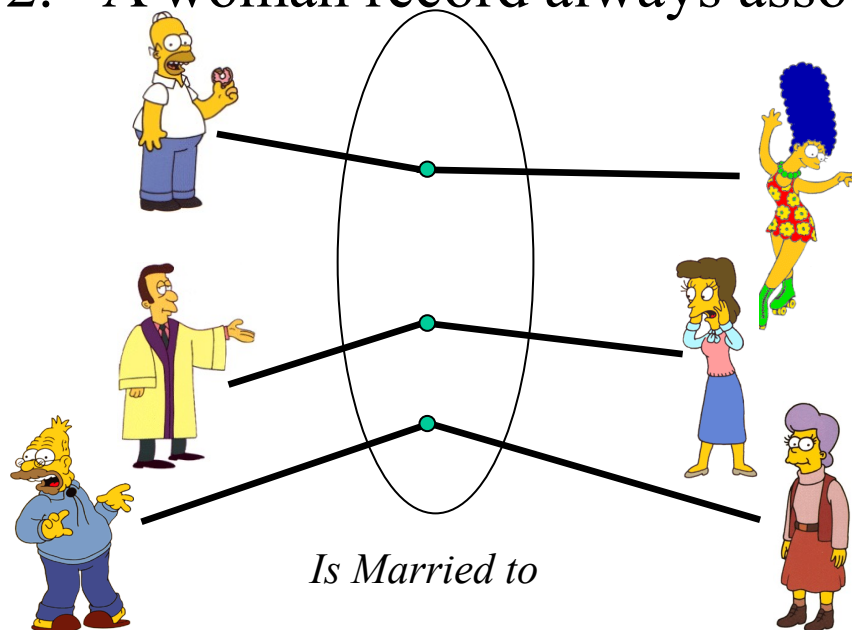


# Participation Constraints Cont.

Participation Constraints are indicated by bold lines in ER diagrams.

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

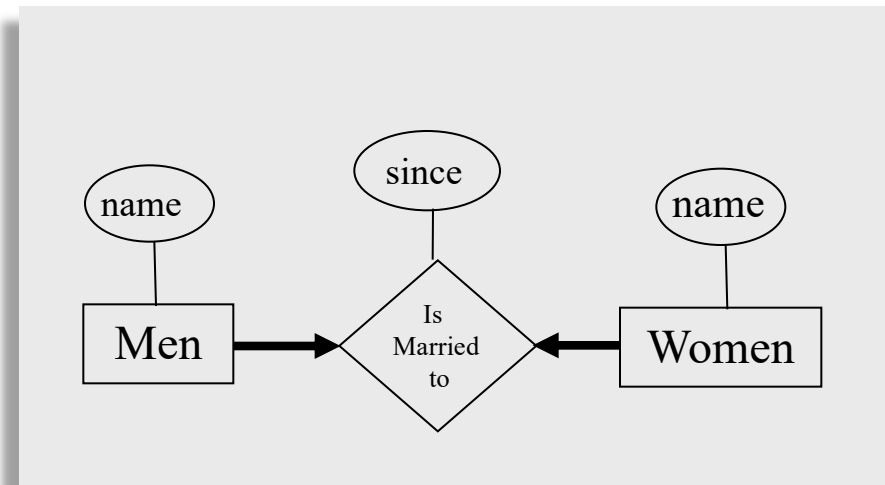
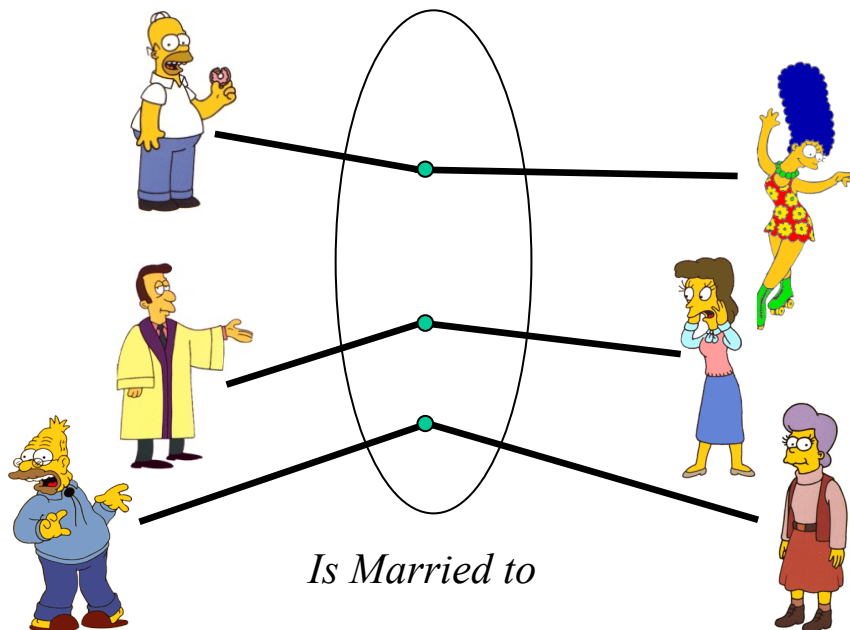
1. A man record always associate with a woman record.
2. A woman record always associate with a man record.



# Participation Constraints Cont.

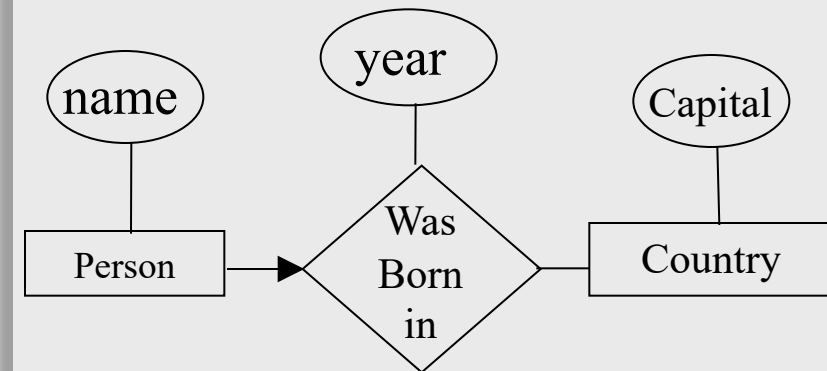
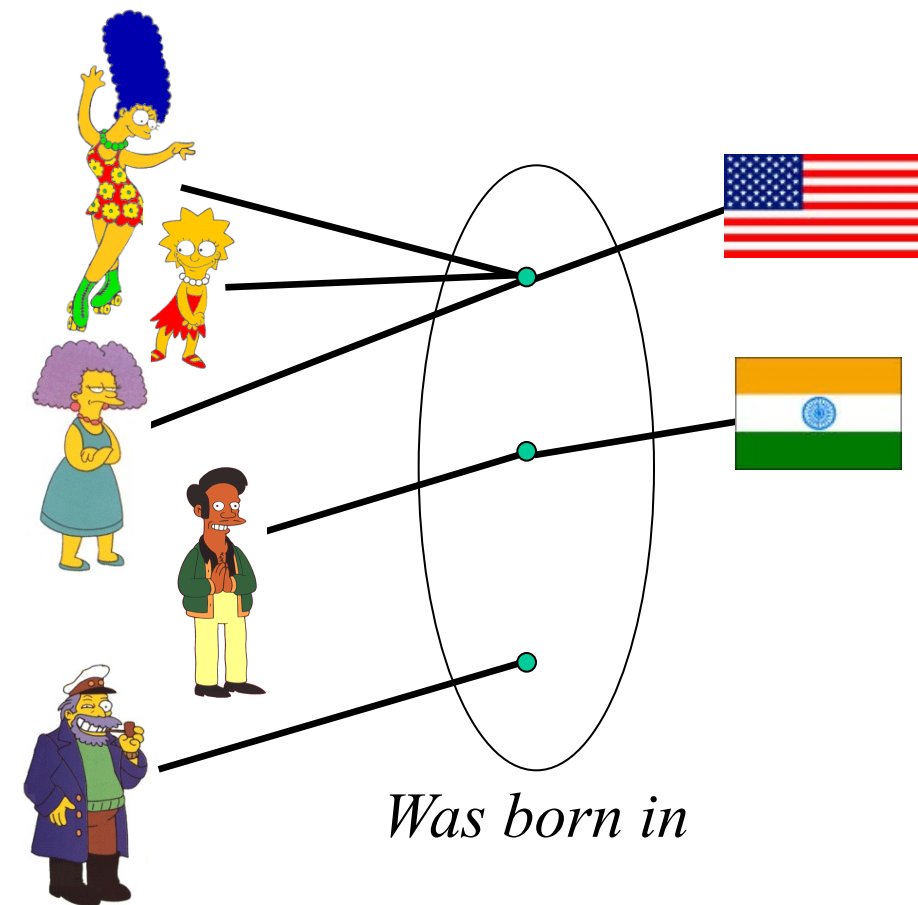
Participation Constraints are indicated by bold lines in ER diagrams.

If we want to enforce 1 and 2...



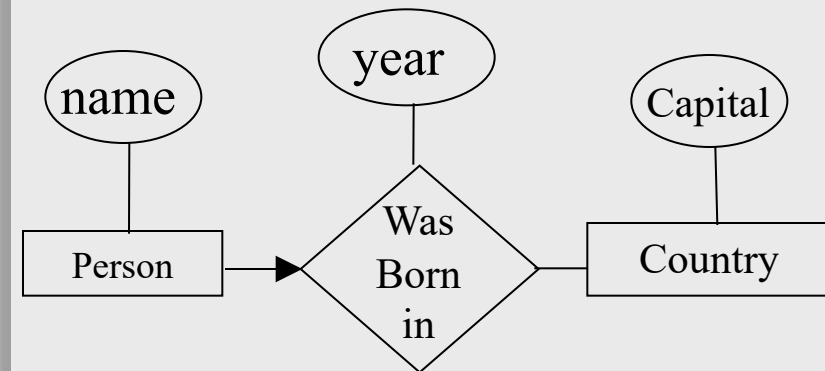
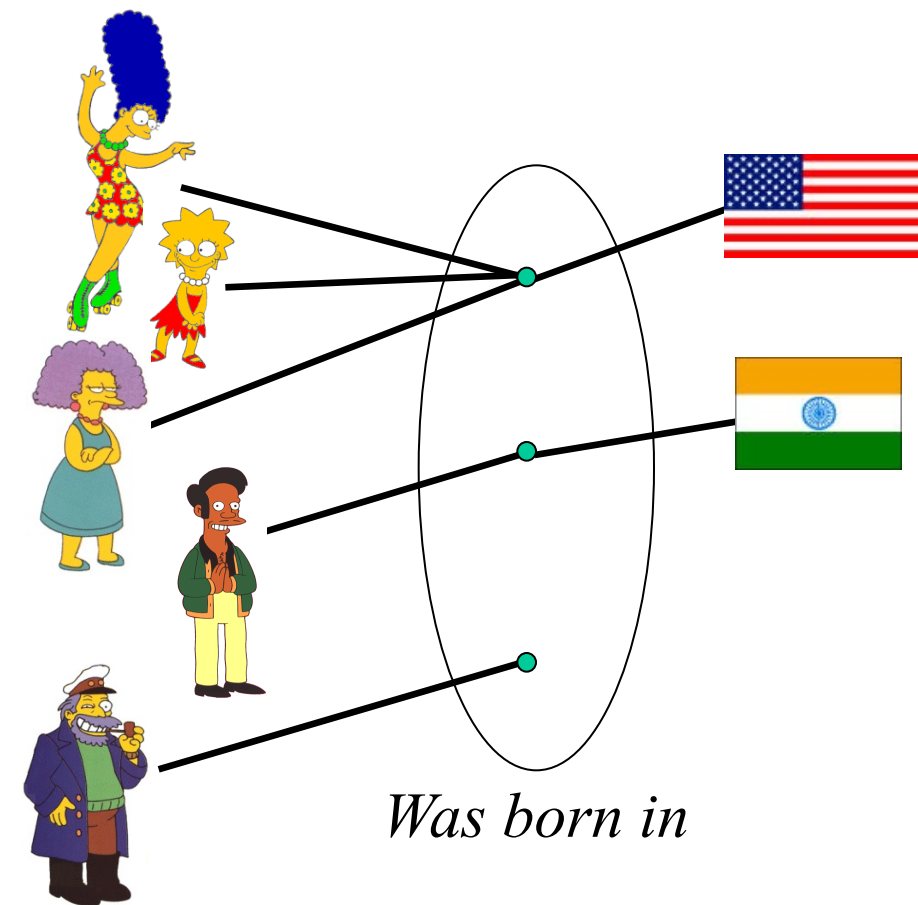
# Participation Constraints Cont.

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 country, but any individual is born in at most one country.  
*In addition, a country should have at least one person.*



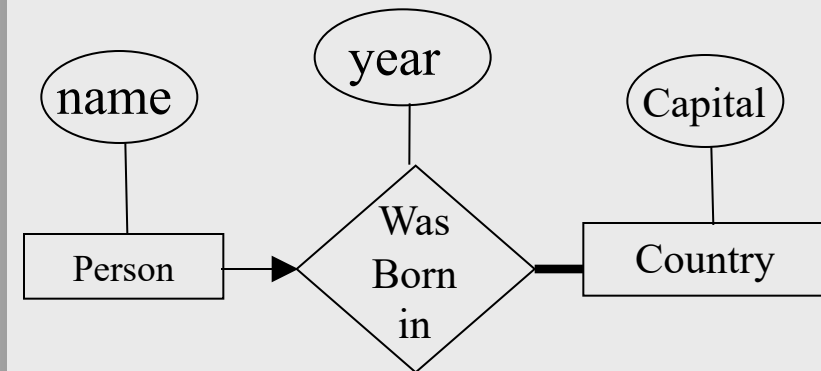
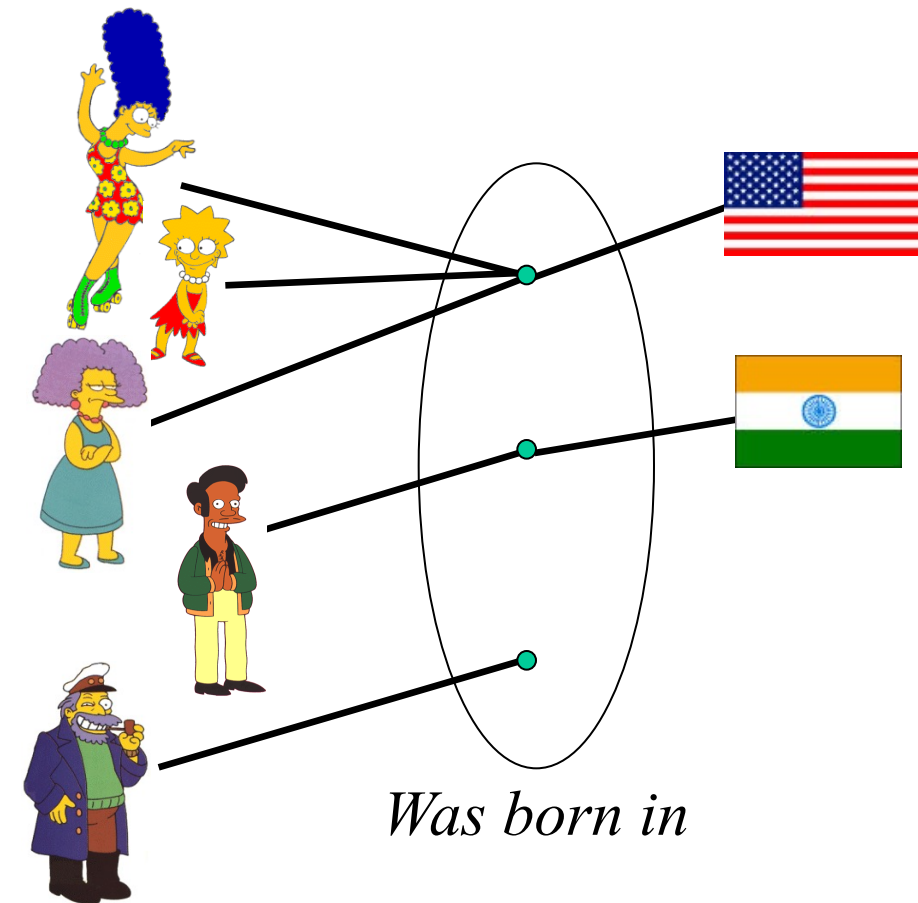


# Participation Constraints Cont.

Many people can be born in any country, 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

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

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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!

## < Scheduled Teaching

Item

Fall 2021  
Database Design & Implement  
CSCI 4333, Section 1

Fall 2021  
General Physics I  
PHYS 1401, Section P

Fall 2021  
Phys Sci I  
PSCI 1421, Section E

Fall 2021  
Phys Sci II  
PSCI 1422, Section E

# Not So Funny Example 2

## Last Years' Public Course Schedule

**Class Details for Database Design & Implement Computer Science - CSCI 4333 01**

**Term:** 202210 | **CRN:** 12208

**Class Details**

**Bookstore Links**

**Course Description**

**Faculty Profile/Syllabus**

**Attributes**

**Restrictions**

**Instructor/Meeting Times**

**Enrollment/Waitlist**

**Corequisites**

**Prerequisites**

**Cross Listed Courses**

**Associated Term:** Fall 2021

**CRN:** 12208

**Campus:** Edinburg

**Schedule Type:** Lecture

**Instructional Method:** Traditional Face-to-Face

**Section Number:** 01

**Subject:** Computer Science - CSCI

**Course Number:** 4333

**Title:** Database Design & Implement

**Credit Hours:** 3

**Grade Mode:** No Section specified grade mode, please see Catalog link below for more information.

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Cross Listed Courses

Linked Sections

Catalog

Instructor: Yifeng Gao (Primary)



Yifeng Gao

Assistant Professor

Computer Science

[test.disjoint1@utrgv.edu](mailto:test.disjoint1@utrgv.edu)

Engin

Close



# Not So Funny Example 2

## Last Years' Public Course Schedule

Class Details for Database Design & Implement Computer Science - CSCI 4333 01

Term: 202210 | CRN: 12208

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Linked Sections

Catalog

Instructor: Yifeng Gao (Primary)

 **Yifeng Gao**  
Assistant Professor  
Computer Science  
[test.disjoint1@utrgv.edu](mailto:test.disjoint1@utrgv.edu)

Engin

????

Close

# Summary

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