15CSE302 Database Management Systems

Lecture 9 Entity Relationship Diagram session 3

B.Tech /III Year CSE/V Semester   **L T P C 2 0 2 3**

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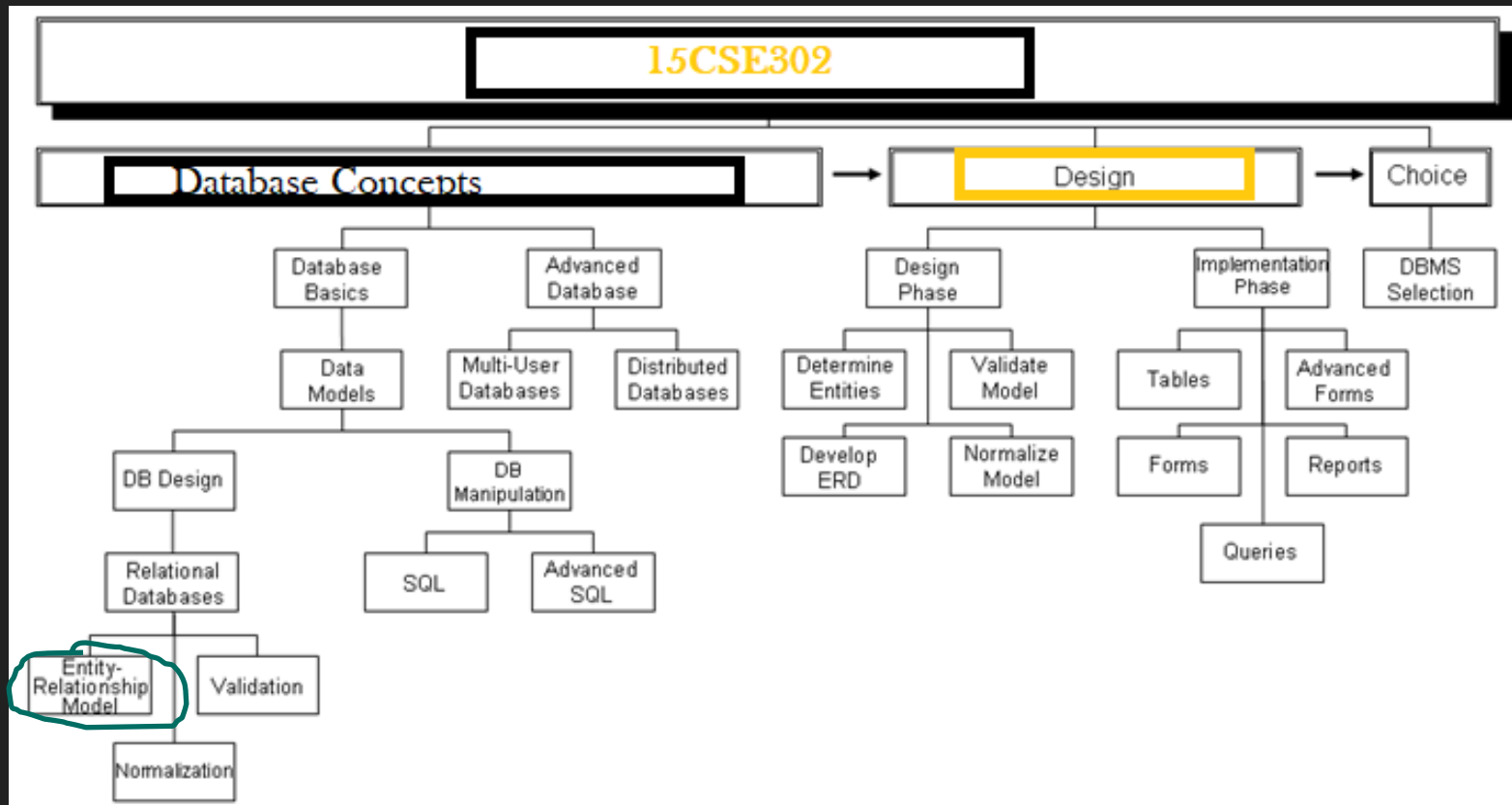**R. Manjusha**
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Slides Courtesy :CMSC424, Spring 2005

Syllabus
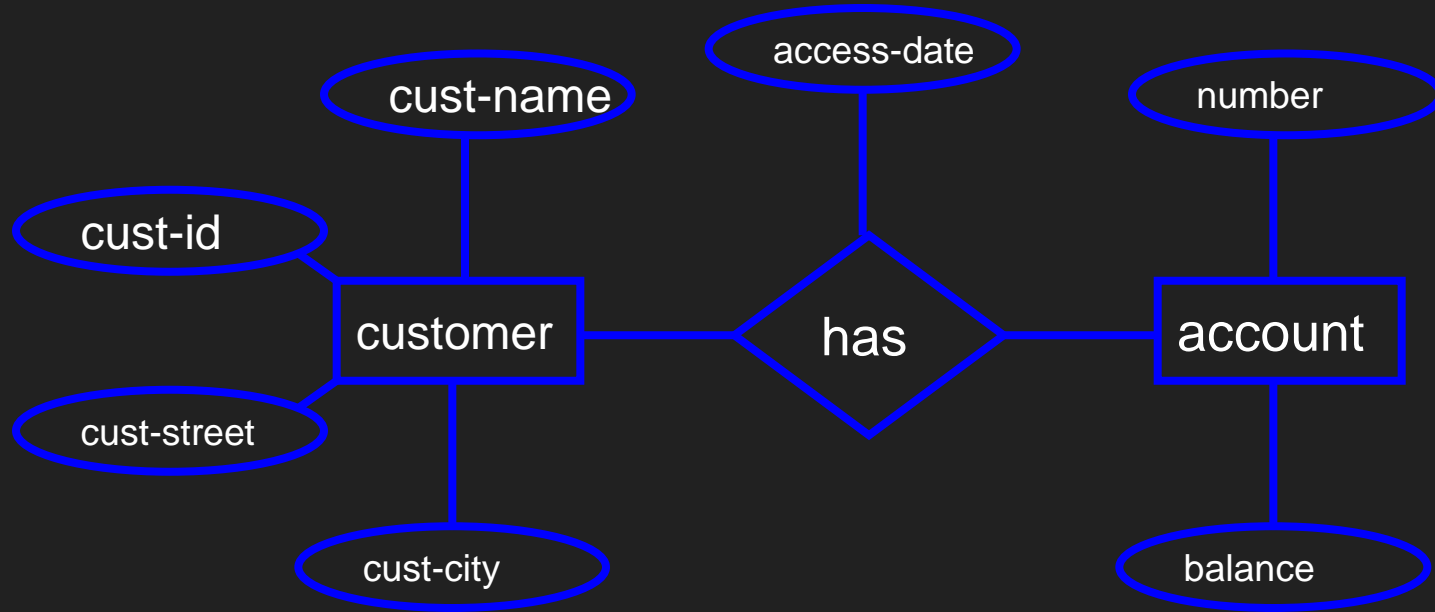
Brief Recap of Previous Lecture

- **E R Model examples**
  - ➤ **Entity**
  - ➤ **Attributes -Types of attributes and representation**
  - ➤ **Relationship**

https://quizizz.com/join?gc=44118046&from=challengeFriends

Today's Lecture

- ER Diagram –key attributes
- Participation Constraints
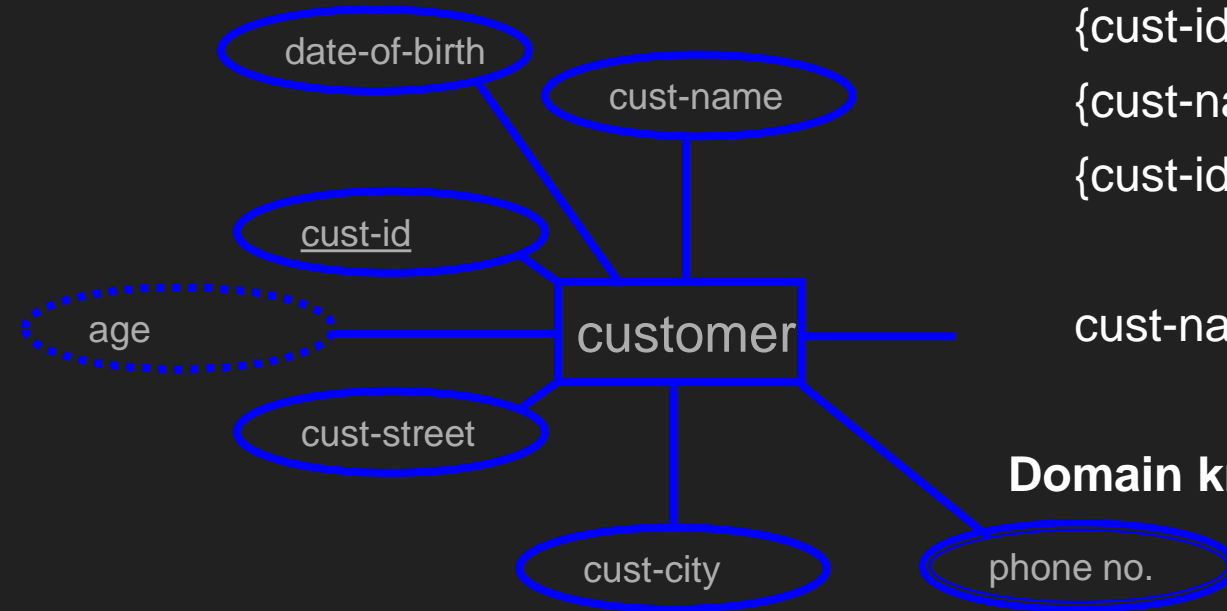- Weak Entity

ER Diagram: Example

Rectangles: entity sets   **Diamonds: relationship sets**   **Ellipses: attributes**

Entity Keys

Possible Keys:

{cust-id}

{cust-name, cust-city, cust-street}

{cust-id, age}

cust-name ?? Probably not.

Domain knowledge dependent !!

Entity Keys

- **Super key**   any attribute set that can distinguish entities
- **Candidate key**   a minimal superkey
  - Can't remove any attribute and preserve key-ness
    - {cust-id, age} not a superkey
    - {cust-name, cust-city, cust-street} is assuming cust-name is not unique

- **Primary key**
  - Candidate key chosen as the key by DBA
 - **Underlined in the ER Diagram**

Entity Keys
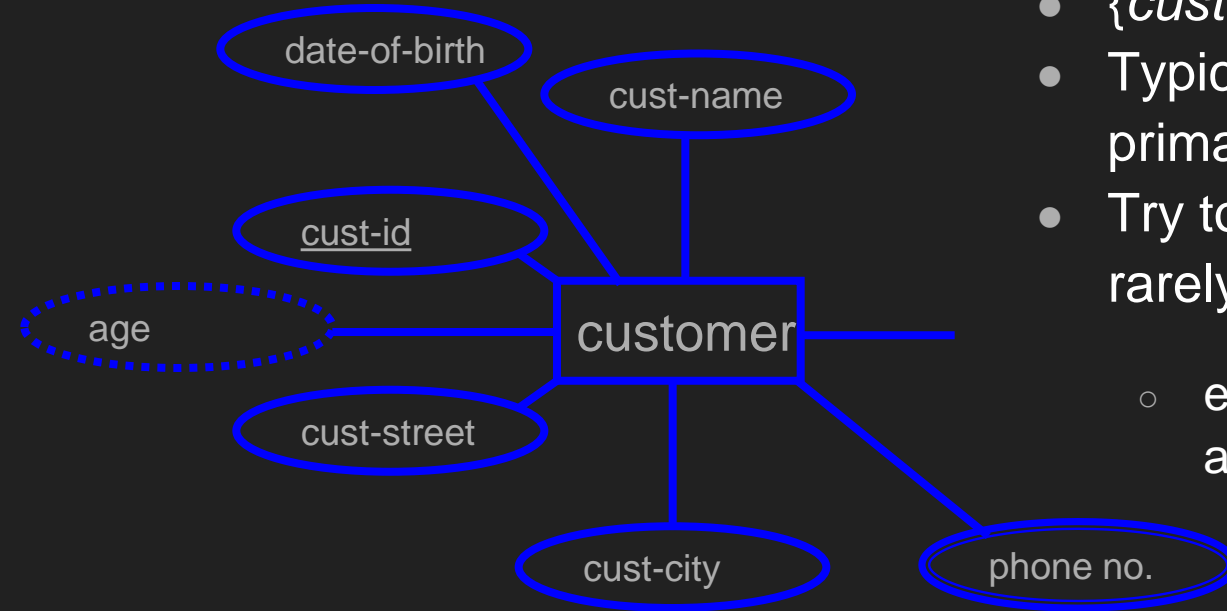
- {*cust-id*} is a natural primary key
- Typically, SSN forms a good primary key
- Try to use a candidate key that rarely changes
 - e.g. something involving address not a great idea

Relationship Set Keys

- What attributes are needed to represent a relationship completely and uniquely ?
  - Union of primary keys of the entities involved, and relationship attributes
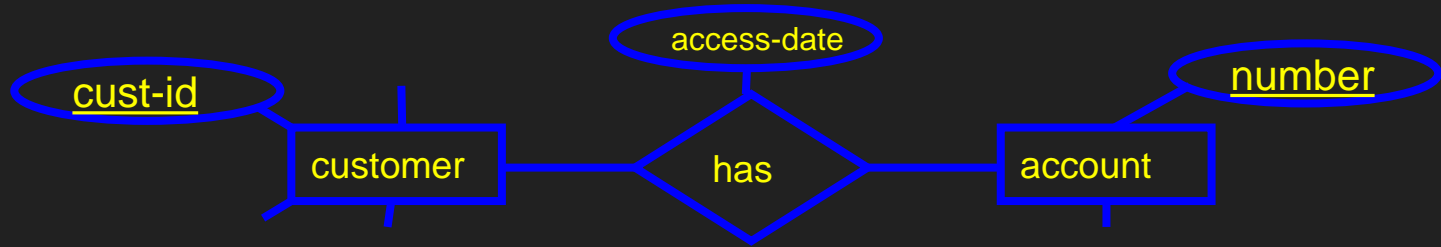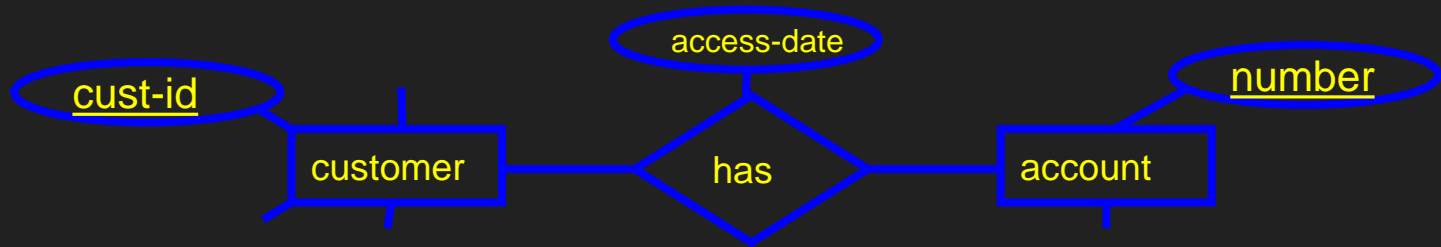
Relationship Set Keys

- Is *{cust-id, access-date, account number}* a candidate key ?

  - No. Attribute access-date can be removed from this set without losing key-ness

  - In fact, union of primary keys of associated entities is always a superkey
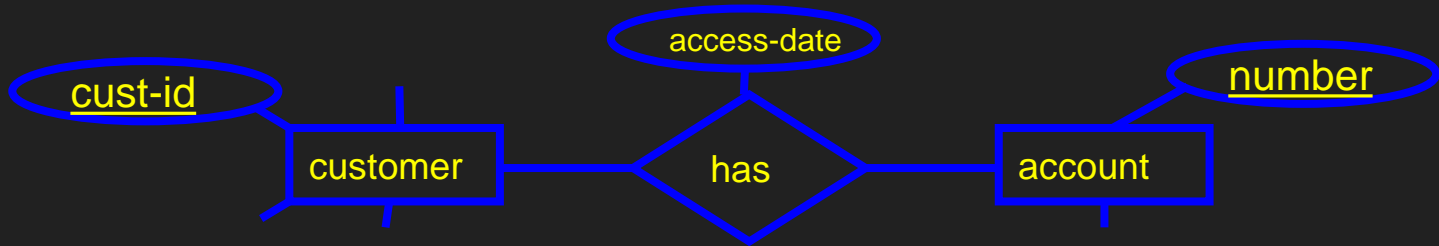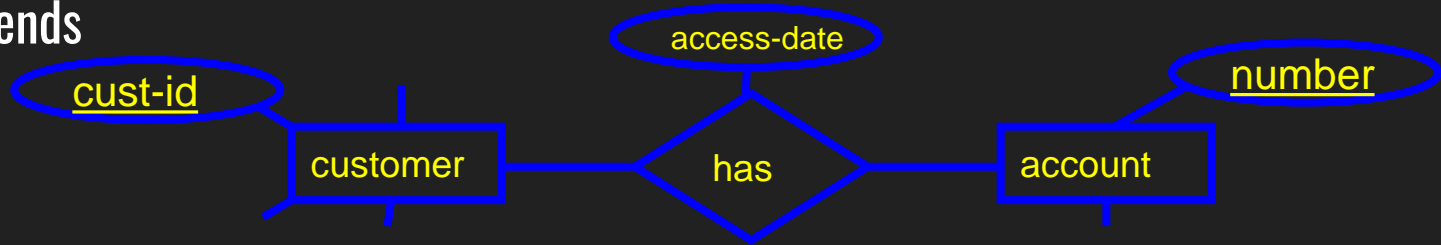
Relationship Set Keys

- ## Is {cust-id, account-number} a candidate key ?

  - ### Depends

Relationship Set Keys

- ## Is {cust-id, account-number} a candidate key ?
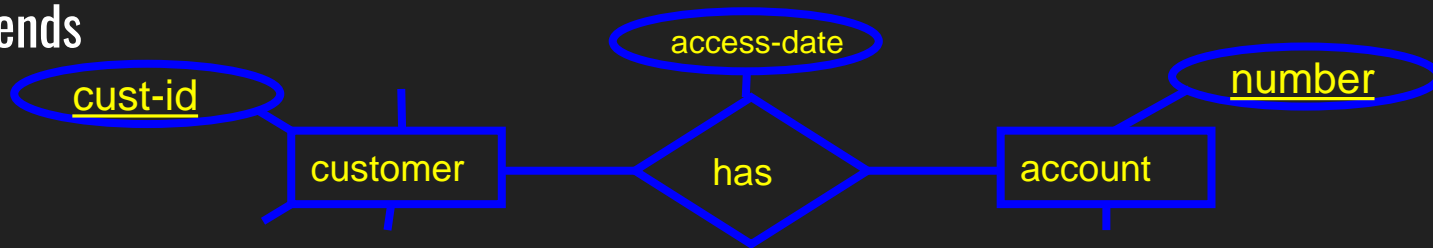
  - ### Depends

- If one-to-one relationship, either **{cust-id}** or **{account-number}** sufficient
  - Since a given customer can only have one account, she can only participate in one relationship
  - Ditto account

Relationship Set Keys

- ## Is {cust-id, account-number} a candidate key ?

  - ### Depends

- ## If one-to-many relationship (as shown), *{account-number}* is a candidate key

  - ### A given customer can have many accounts, but at most one account holder per account allowed

Relationship Set Keys

- General rule for binary relationships

  - one-to-one: primary key of either entity set

  - one-to-many: primary key of the entity set on the many side

  - many-to-many: union of primary keys of the associate entity sets
- n-ary relationships

  - More complicated rules

Data Constraints

- Representing semantic data constraints

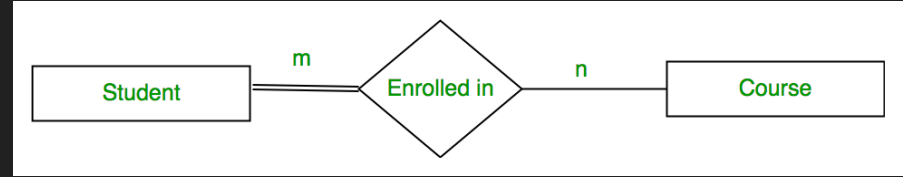 - We already saw constraints on relationship cardinalities

Participation Constraint

- Given an entity set E, and a relationship R it participates in:

  - If every entity in E participates in at least one relationship in R, it is total participation

  - partial otherwise
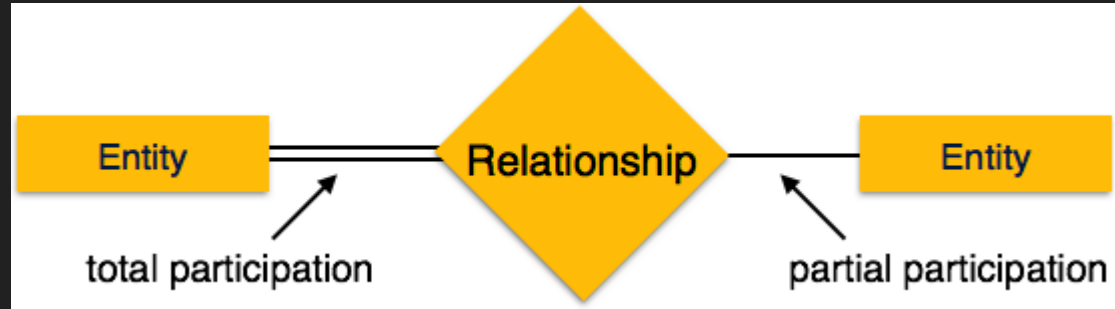
Participation Constraint

- **Total Participation** – Each entity in the entity set **must participate** in the relationship. If each student must enroll in a course, the participation of student will be total.
  Total participation is shown by double line in ER diagram.
- **Partial Participation** – The entity in the entity set **may or may NOT participat**e in the relationship.
- If some courses are not enrolled by any of the student, the participation of course will be partial.
- The diagram depicts the 'Enrolled in' relationship set with Student Entity set having total participation and Course Entity set having partial participation.
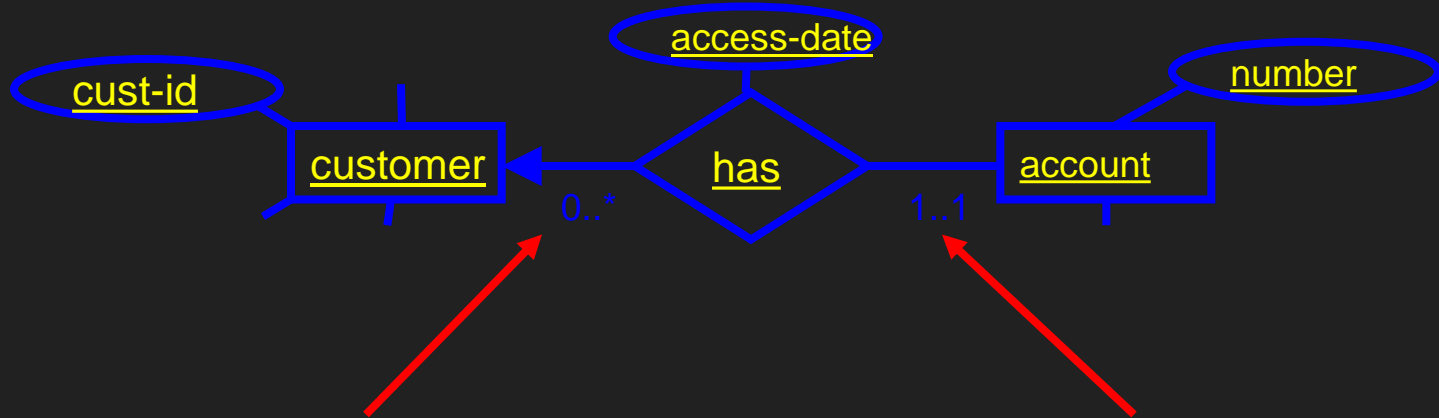
Participation Constraint
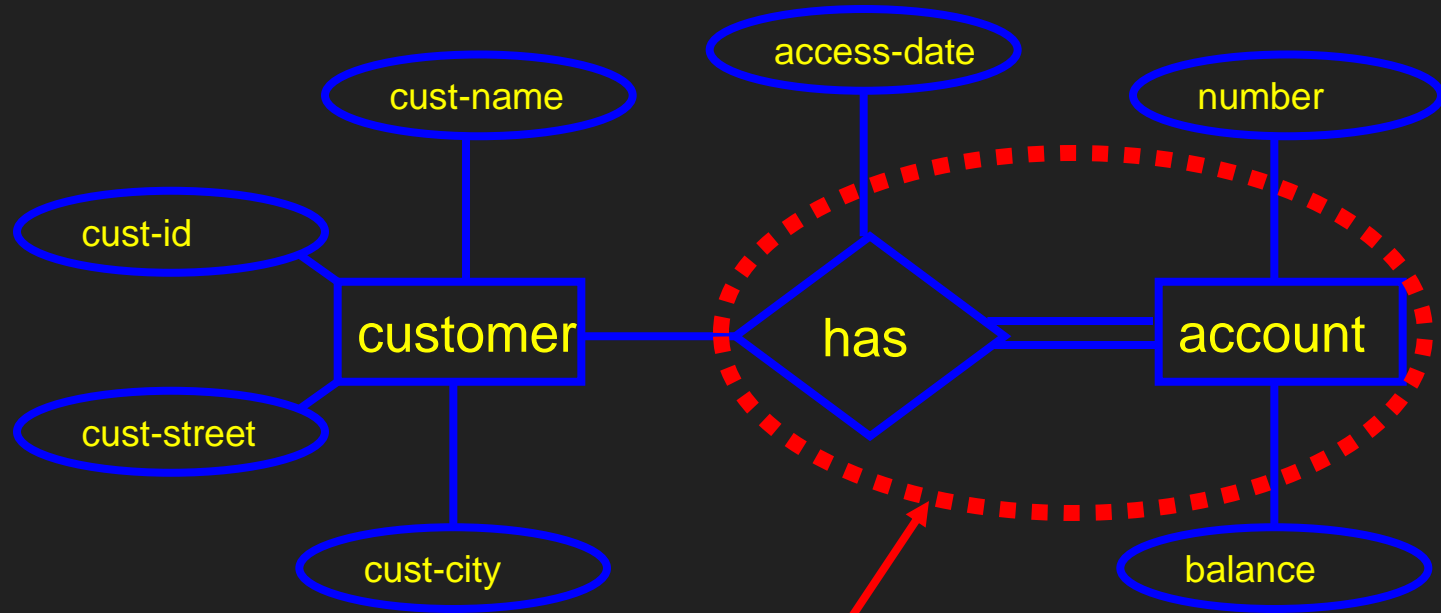
Cardinality Constraints

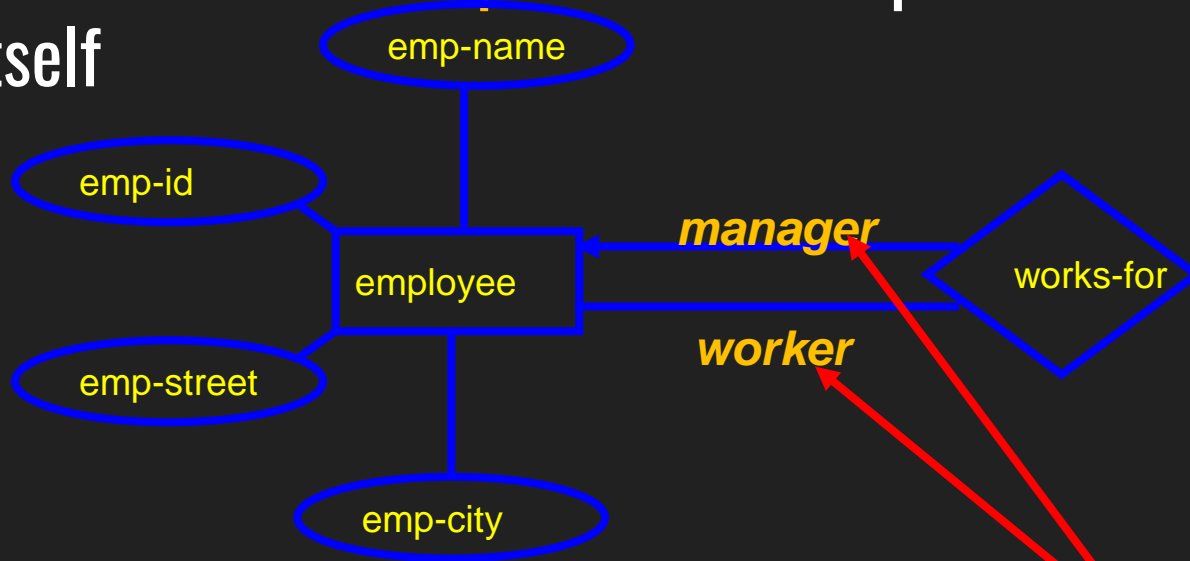How many relationships can an entity participate in ?

Minimum - 0
Maximum – no limit

Minimum - 1
Maximum - 1

Recursive Relationships a relationship associates an entity set to itself


Must be declared with roles

Weak Entity Sets

- An entity set without enough attributes to have a primary key
- E.g. Transaction Entity
  - Attributes:
    - transaction-number, transaction-date, transaction-amount, transaction-type
    - transaction-number: may not be unique across accounts

Weak Entity Sets

- A weak entity set must be associated with an identifying or owner entity set
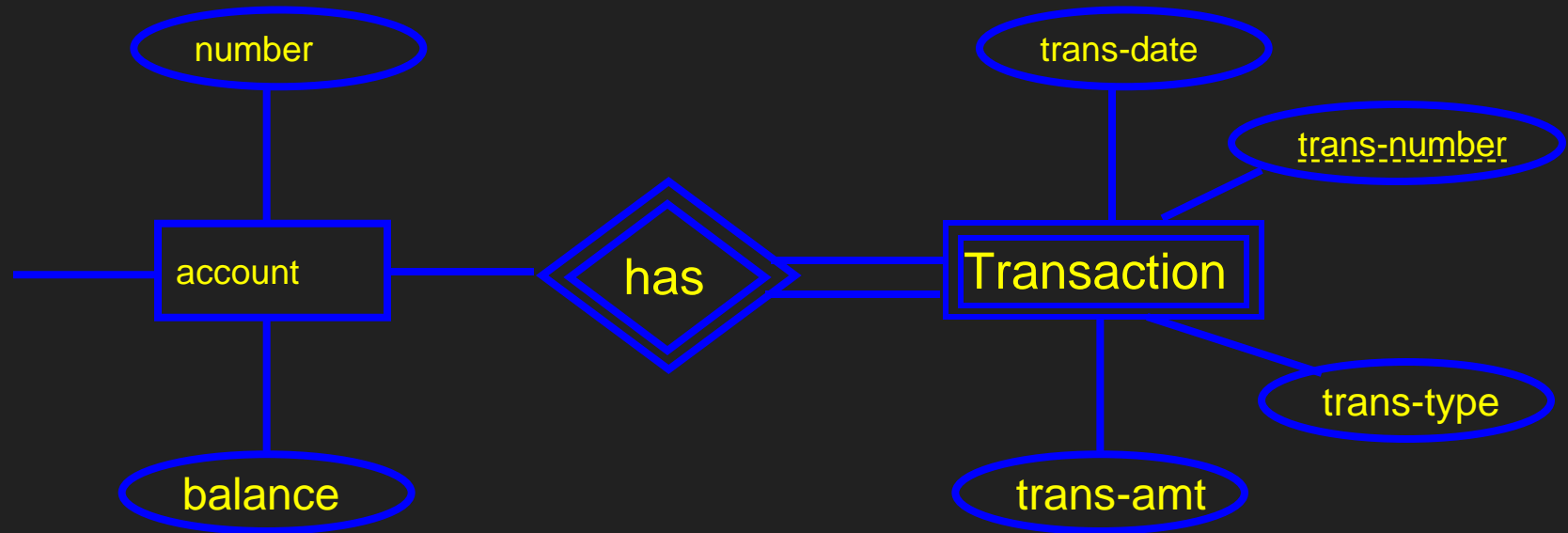- Account is the owner entity set for Transaction

Weak Entity Sets

Still need to be able to distinguish between different weak entities associated with the same strong entity
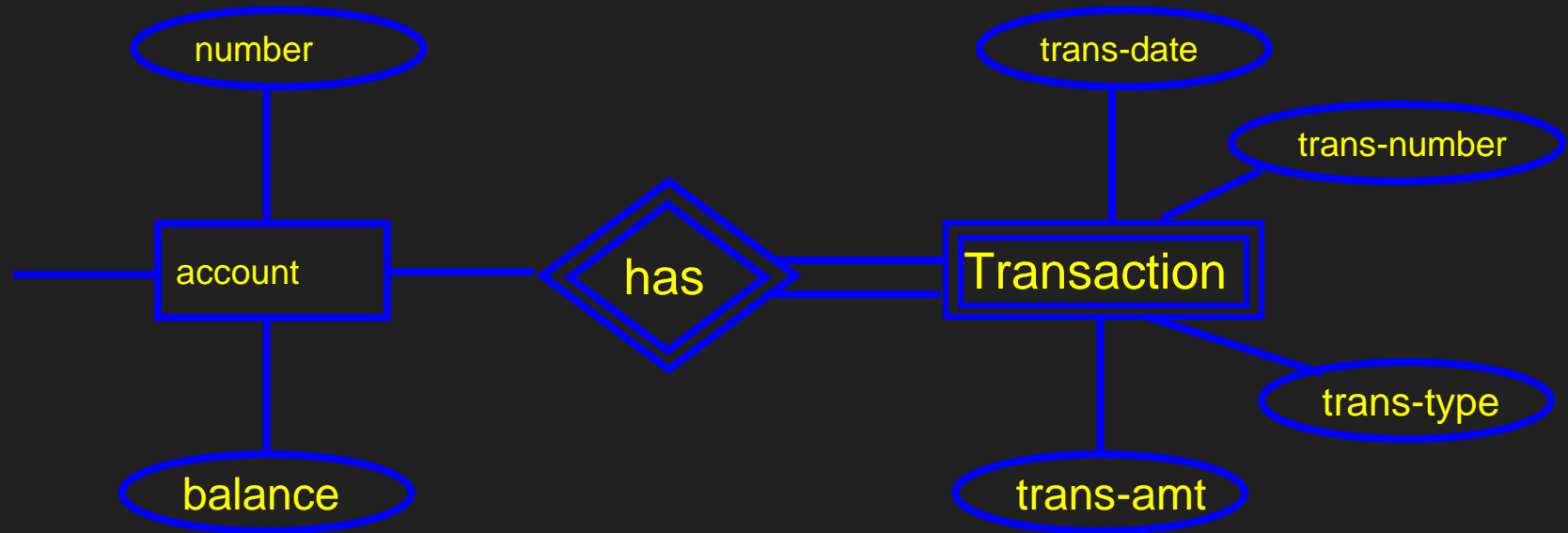
Weak Entity Sets

Discriminator: A set of attributes that can be used for that

Weak Entity Sets

- Primary key:

  - Primary key of the associated strong entity + discriminator attribute set

  - For Transaction:

    - {account-number, transaction-number}

Summary

- **E R Model examples**
  - **Entity**
  - **Attributes -Types of attributes and representation**
  - **Relationship**

Next Lecture

- **E R Model –**Key attributes
- **examples**

References

https://www.db-book.com/db6/index.html

Thank You

Happy to answer any questions ! ! !