

Database Management System 6

ER Modeling...

Keys

Keys for Relationship sets

Relationship Types

Participation

Constraints

1..h Representation

Alternate Mapping

Cardinality Representation

Strong Entity sets and

Weak Entity sets

Chittaranjan Pradhan
School of Computer Engineering,
KIIT University

Keys

A **key** allows us to identify a set of attributes that suffice to distinguish entities from each other

- A key is a property of the entity set, rather than of the individual entities
- A **super** key is a set of one or more attributes that allow us to identify uniquely an entity in an entity set
- The minimal super keys are called **candidate** keys
- **Primary** key is a candidate key that is chosen by the database designer as the principal means of identifying entities within an entity set. The primary key can be represented by **underlying** the attribute name. *The primary key should be chosen such that its attributes are never or very rarely changed*
- The remaining candidate keys except the primary key are called as **alternate** keys

Keys

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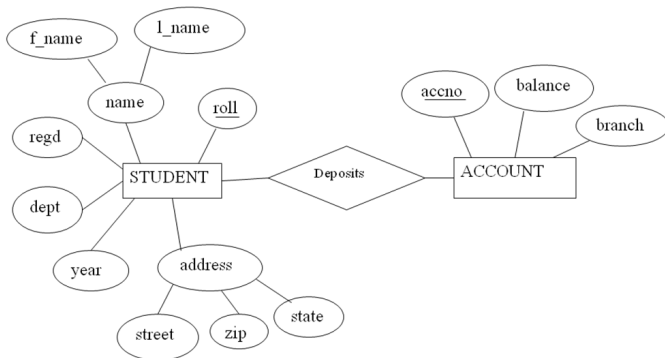
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Strong Entity sets and Weak Entity sets

Keys...

- If none of the columns is a candidate for the primary key in a table, sometimes database designers use an extra column as a primary key instead of using a composite key. Such key is known as the **surrogate** key
- Foreign** key is the set of attributes which is used for referring to another entity set having the primary key. *In ER diagram, foreign key can not be represented*



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Keys for Relationship sets

Let R be a relationship set involving entity sets E_1, E_2, \dots, E_n .

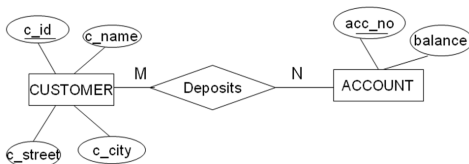
Let $PK(E_i)$ denotes the set of attributes that forms the primary key for entity set E_i

- If the relationship set R has no descriptive attributes associated with it, then the set of attributes $PK(E_1) \cup PK(E_2) \cup \dots \cup PK(E_n)$ describes an individual relationship in set R
- If the relationship set R has attributes a_1, a_2, \dots, a_m associated with it, then the set of attributes $PK(E_1) \cup PK(E_2) \cup \dots \cup PK(E_n) \cup \{a_1, a_2, \dots, a_m\}$ describes an individual relationship in set R

Keys for Relationship sets...

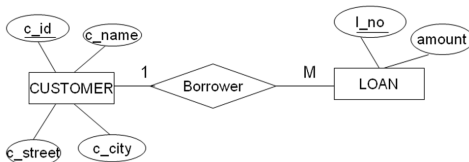
M:N relationship

The primary key of the relationship set consists of the union of the primary keys of the entity sets



1:M relationship

The primary key of the relationship set is the primary key of the many side entity set



Keys for Relationship sets...

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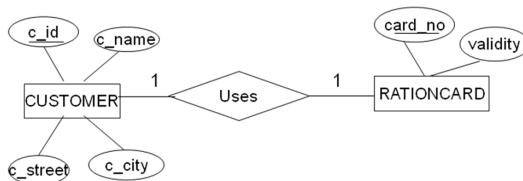
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Strong Entity sets and

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1:1 relationship

The primary key of the relationship set is either the primary key of any entity set



Relationship Types

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A **relationship type** is a meaningful association among entity types. The **degree** of a relationship type is defined as the number of entity sets participating in that relationship type

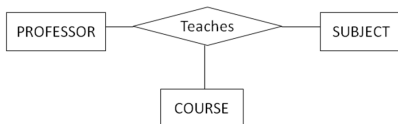
Binary relationship

A relationship type is said to be binary when two entity sets are involved



Ternary relationship

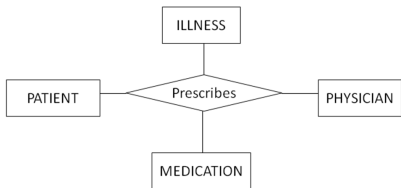
Relationship types that involve three entity sets are defined as ternary relationships



Relationship Types...

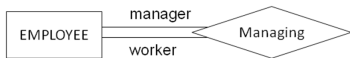
Quaternary relationship

A relationship of degree four can be referred to as a quaternary relationship



Recursive relationship

The participation of an entity set in a relationship type can be indicated by its role name. When used in recursive relationship types, role names describe the functionality of the participation

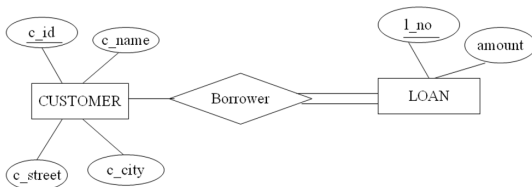


Participation Constraints

Participation Constraints

The participation constraint for an entity set in a binary relationship type is based on whether an entity of that entity set needs to be related to an entity of the other entity set through this relationship type

- **Total participation:** If, in order to exist, every entity must participate in the relationship, then participation of the entity set in that relationship type is **total** or **mandatory**. The total participation is represented by **double lines**
- **Partial participation:** If an entity can exist without participating in the relationship, then participation of the entity type in that relationship type is **partial** or **optional**



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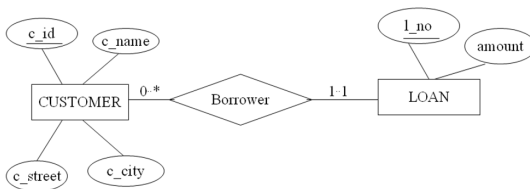
Strong Entity sets and Weak Entity sets

I..h Representation

I..h Representation

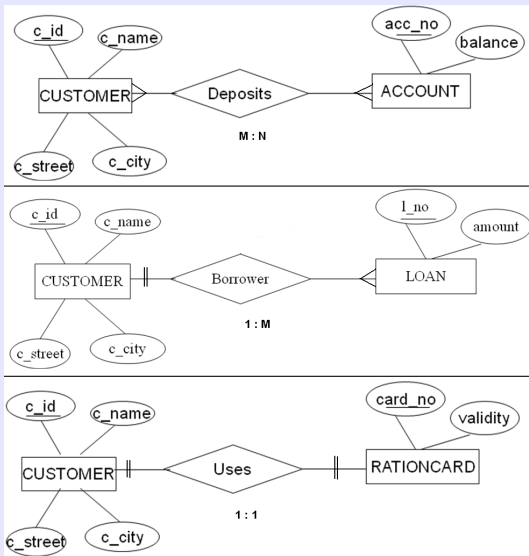
An edge between an entity set and a binary relationship set can have an associated minimum and maximum cardinality; shown as *I..h*, where *I* is the minimum and *h* is the maximum cardinality

- A minimum value of 1 indicates total participation of the entity set in the relationship set
- A maximum value of 1 indicates that the entity participates in at most one relationship, while a maximum value * indicates no limit
- 1..* indicates total participation or double line



Alternate Mapping Cardinality Representation

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Strong Entity sets and Weak Entity sets

An entity set where the entities have independent existence (that is, each entity is unique) is referred to as a **strong** or **base** entity set. On the other hand, the entity set that does not have independent existence, that is, an entity set that does not have its own unique identifier is known as **weak** entity set

- For a weak entity set to be meaningful, it must be associated with another strong entity set called **identifying or owner entity set**
- The relationship associating the weak entity set with the identifying entity set is called the **identifying relationship**
- The identifying relationship is usually many-to-one from the weak entity set to the identifying entity set and the participation of the weak entity set in the relationship is total participation

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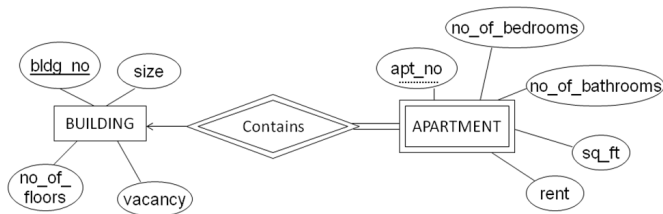
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Strong Entity sets and Weak Entity sets...

- An attribute in a weak entity set, which in conjunction with a unique identifier of the parent entity set in the identifying relationship type uniquely identifies weak entities, is called the **partial key** of the weak entity set and is denoted by a **dotted underline**. The partial key of a weak entity set is sometimes referred to as a **discriminator**
- The primary key of a weak entity set is formed by the primary key of the identifying entity set, plus the weak entity set's discriminator



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