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Database

Design 2 / 2

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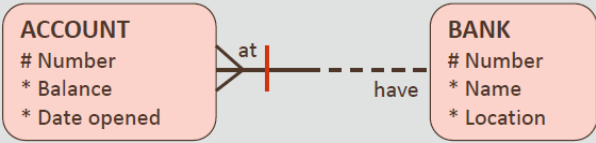
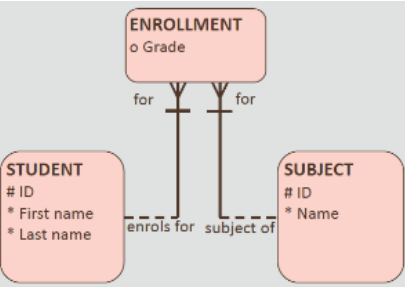
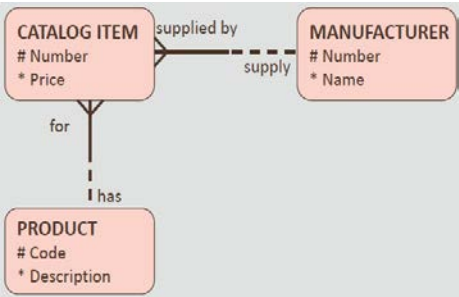
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Section 6 – UUIDs and Normalization

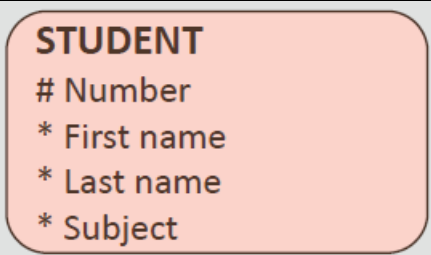
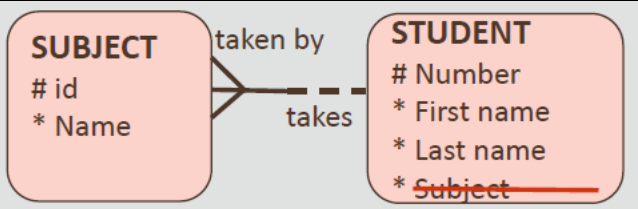
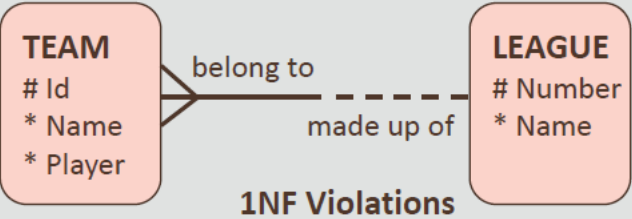
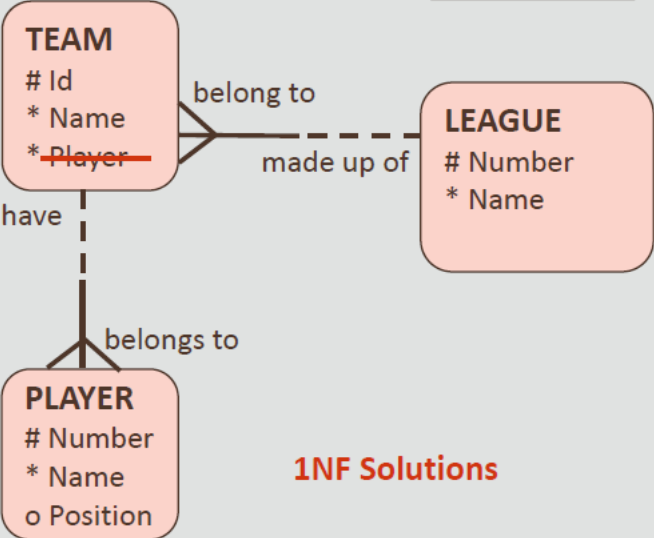
6-1 Artificial, Composite, and Secondary UUIDs

UID	Unique identifier
Simple UID	A UID that is a single attribute
Composite UID	A UID that is a combination of attributes
Artificial UID	A UID that does not occur in the natural world but is created for identification purposes in a system
Candidate UID	One of several UUIDs that could identify something
Primary UID	A candidate UID that is the primary identifier of something
Secondary UID	A candidate UID that also identifies something, but is not the primary UID

<p>UIDs from Barred Relationships</p> 	<p>ACCOUNT</p> <p><u>Key</u> Bank.Number Account.Number</p>
<p>UID from Barred Relationship Intersection Entity</p>  <p><u>Enrollment</u> key IdStudent IdSubject</p>	<p>Artificial UID Intersection Entity</p>  <p><u>CatalogItem</u> key Number</p>

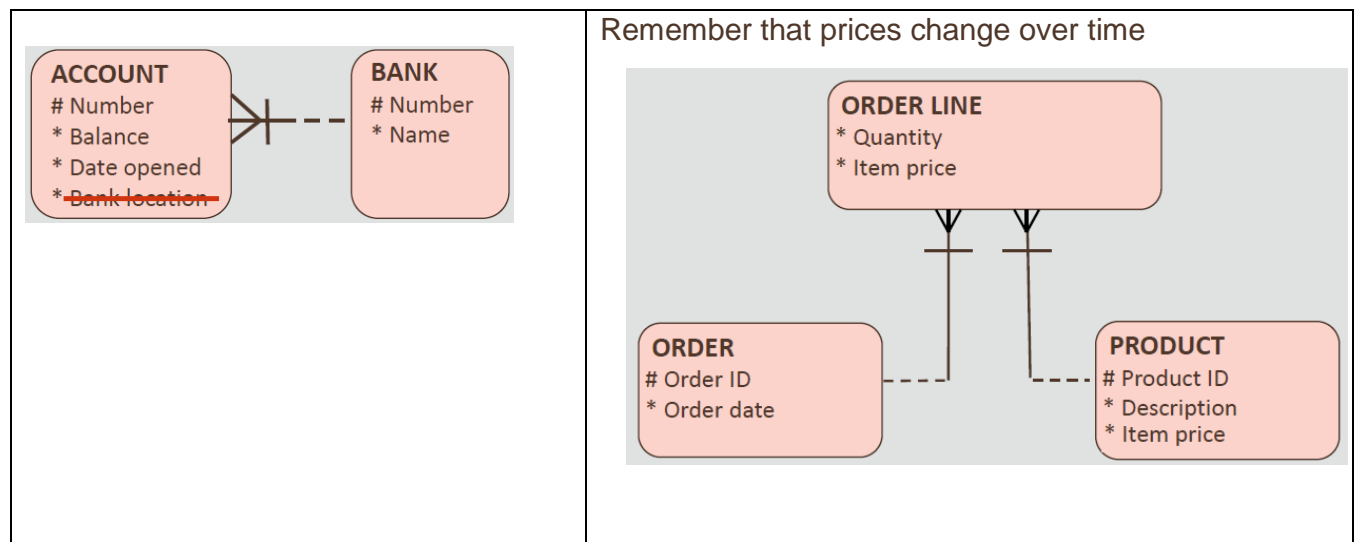
6-2 Normalization and First Normal Form

Normalization	A series of steps followed to obtain a database design that allows for efficient access and storage of data in a relational database. These steps reduce data redundancy and the chances of data becoming inconsistent
First Normal Form (1NF)	<p>The outcome of the first step of database normalization. 1NF eliminates repeating groups by putting each into a separate table and connecting them with a 1:M relationship.</p> <p>First Normal Form requires that no multi-valued attributes exist.</p> <p>The attributes must be atomic, that is, it is forbidden to have attributes that can take more than one value.</p>

Wrong	Right
	
	

6-3 Second Normal Form

Partial Dependency	Where an attribute of a table depends only on a part of the primary key and not on the entire key.
2NF	<p>The outcome of the second step of database normalization</p> <ul style="list-style-type: none">• 2NF requires that any non-UID attribute be dependent on the entire UID.• Every attribute that is not part of the key has full dependency on the primary key.• All fields depend directly on the key.• Remove transitive dependencies



6-4 Third Normal Form

Transitive dependency	<ul style="list-style-type: none"> A condition that exists when any attribute in an entity is dependent upon any other non-UID attribute in that entity. A transitive dependency is one in which there are non-key columns that depend on other non-key columns. A transitive dependency exists when any attribute in an entity is dependent on any other non-UID attribute in that entity.
Third Normal Form or 3NF	<ul style="list-style-type: none"> All non-key fields are dependent on the key, the whole key, and nothing but the key. It states that all non-key columns are functionally completely dependent on the primary key and there are no transitive dependencies.

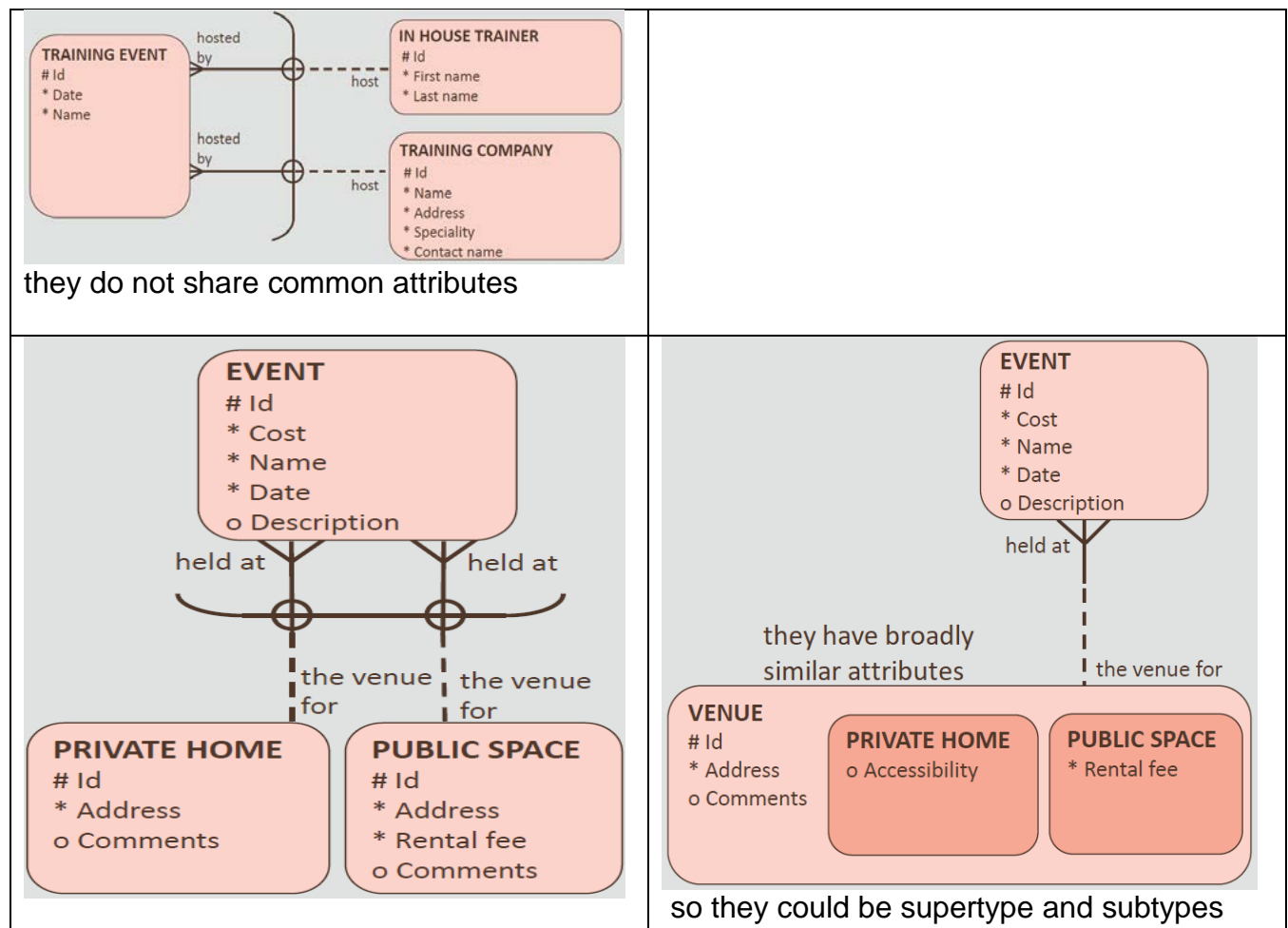
Wrong	Right
<p>The diagram shows two entities: EMPLOYEE and DEPARTMENT. EMPLOYEE has attributes: # Id, * Name, * Address, * Birth place, o Partner name, o Partner birth date. DEPARTMENT has attributes: # Number, * Name, * Budget. A solid arrow points from EMPLOYEE to DEPARTMENT with the label "part of". A dashed arrow points from DEPARTMENT back to EMPLOYEE with the label "composed of". This represents a transitive dependency where non-key attributes of EMPLOYEE depend on non-key attributes of DEPARTMENT.</p>	<p>The diagram shows three entities: EMPLOYEE, DEPARTMENT, and PARTNER. EMPLOYEE has attributes: # Id, * Name, * Address, * Birth place. DEPARTMENT has attributes: # Number, * Name, * Budget. PARTNER has attributes: # Number, * Name, * Birth date. A solid arrow points from EMPLOYEE to DEPARTMENT with the label "part of". A dashed arrow points from DEPARTMENT back to EMPLOYEE with the label "composed of". A dashed arrow points from EMPLOYEE to PARTNER with the label "have". A dashed arrow points from PARTNER to DEPARTMENT with the label "the dependent of". This structure correctly represents the dependencies without transitive dependencies.</p>

Section 7 – Arcs, Hierarchies, and Recursive Modeling

7-1 Arcs

Arc	A curved line used to represent an exclusive relationship in an entity-relationship diagram
Exclusive OR	A logical operator that returns a true value if one, but not both, of its operands is true
Mutually Exclusive relationship / Exclusive Or relationship	A relationship between one entity and two (or more) other entities when only one of the relationships can exist at a time
Constraint	A restriction that applies to data, which is often dictated by the business rules

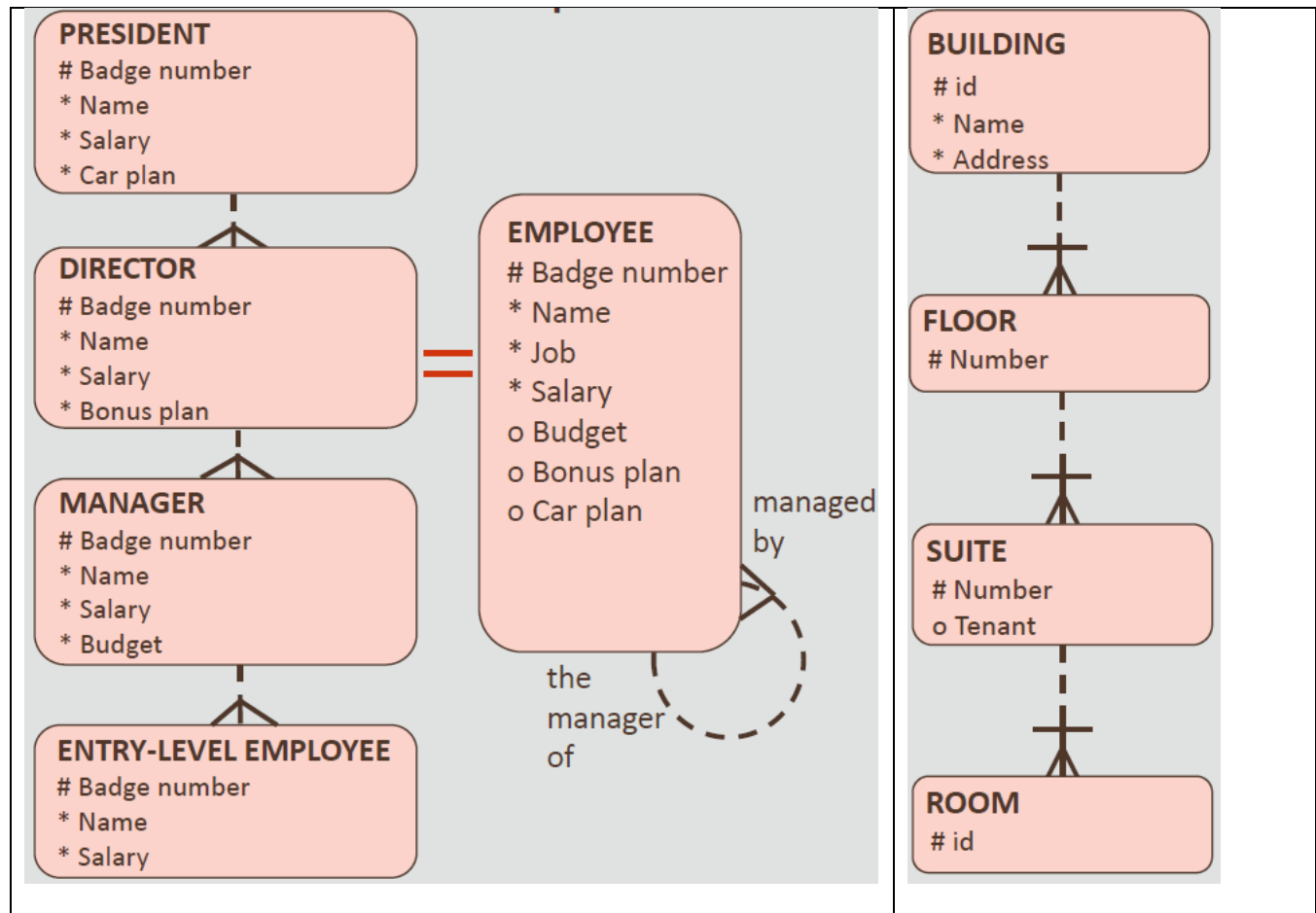
Arcs and Super/subtypes both model mutual exclusiveness



7-2 Hierarchies and Recursive Relationships

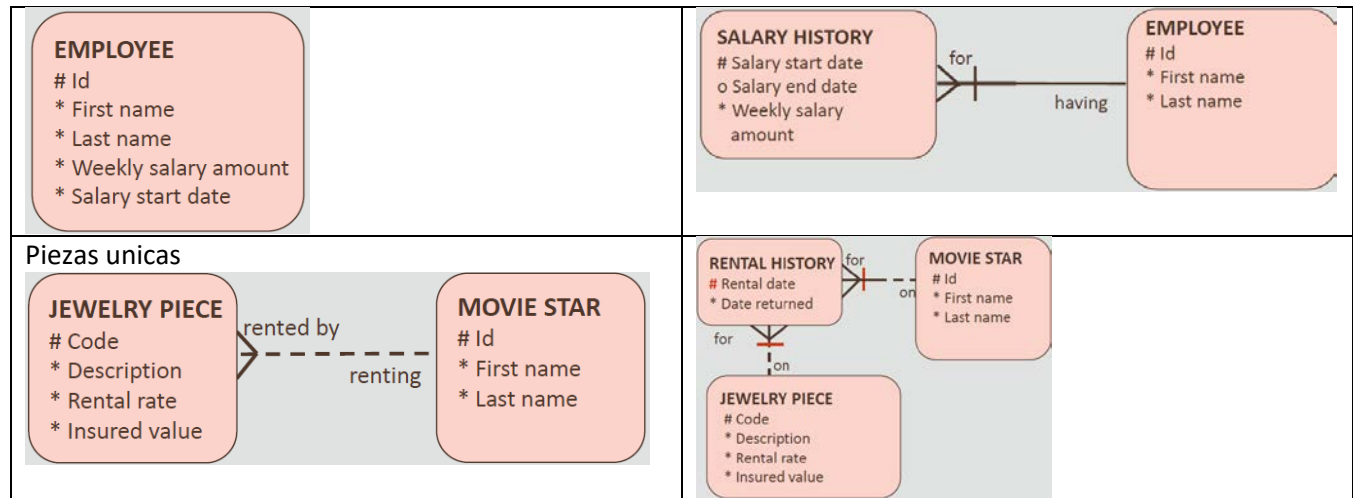
Recursive relationship	A relationship between an entity and itself
Hierarchical relationship	A series of relationships that reflect entities organized into successive levels

Hierarchy Versus Recursive Relationship



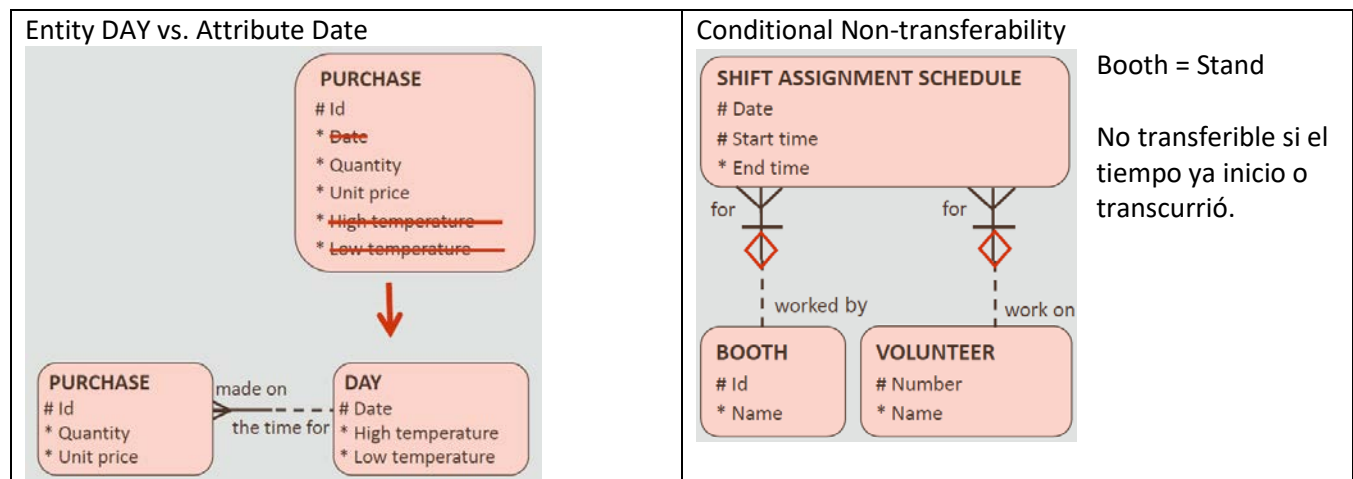
Section 8 – Changes and Historical Modeling

8-1 Modeling Historical Data



8-2 Modeling Change: Time

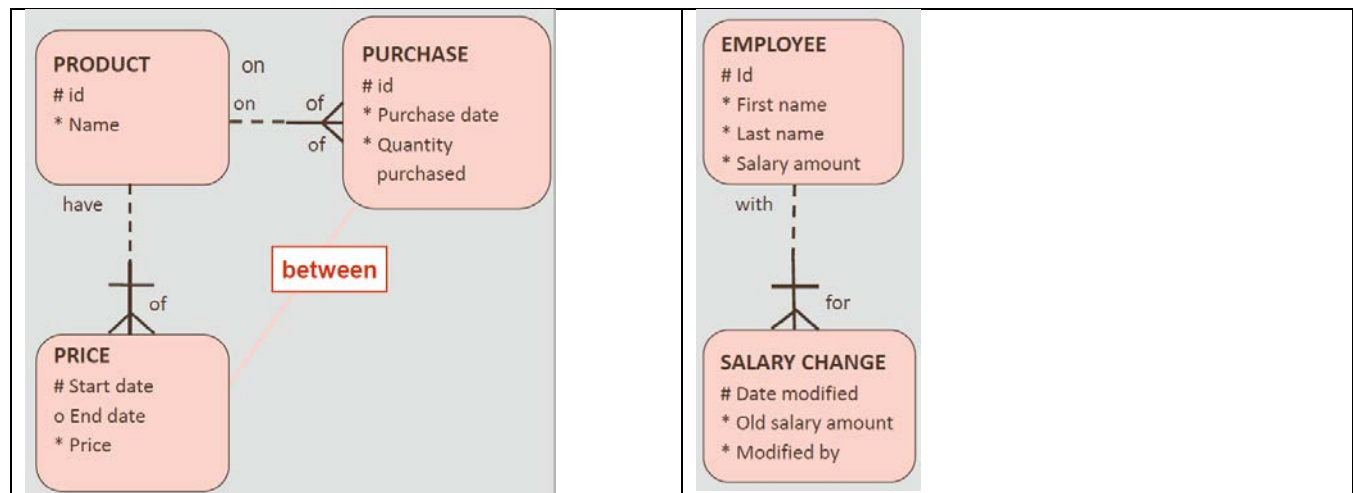
Time-related constraint	A constraint or data restriction that results from the time dimension.
Conditional nontransferability	Refers to a relationship that may or may not be transferable, depending on time. (Si ya pasó o estar por pasar)
Nontransferability (Intransferibilidad)	Property of a relationship where an instance of A is related to an instance of B, and the association cannot be moved to another instance of B



8-3 Modeling Change: Price

Journaling and/or logging (Diario y/o registro)	Keeping an on-going record of transactions On-going = continuo
Appreciation (Valorizacion)	A rise in value or price, especially over time
Depreciation (Amortizacion)	A decrease or loss in value, because of age, wear, or market conditions

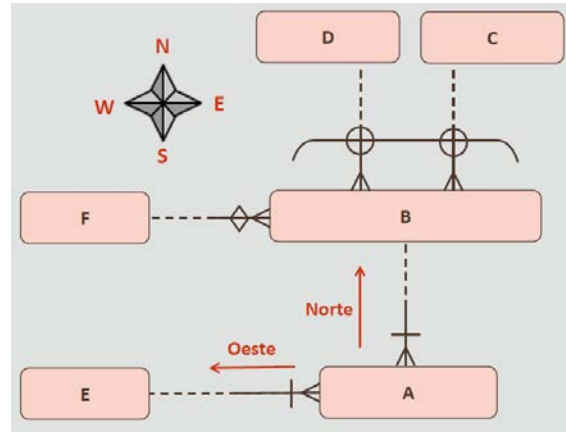
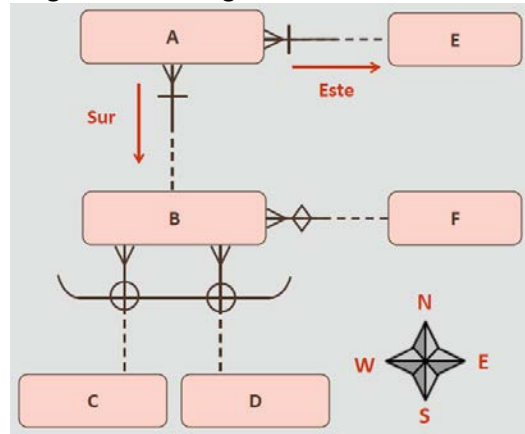
Refund = reembolso o devolución



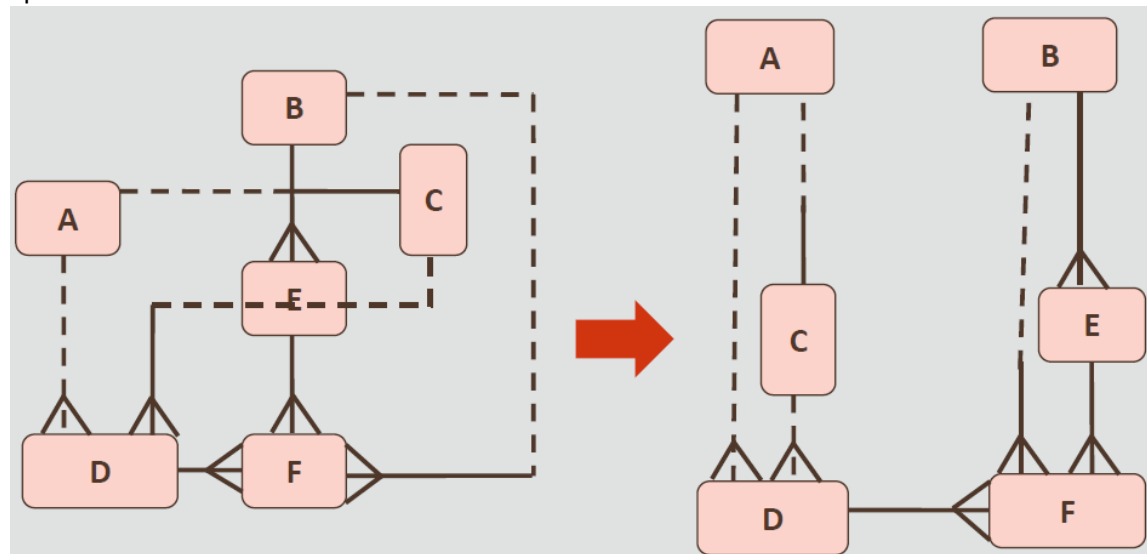
8-4 Drawing Conventions for Readability

White space	Space on a page or poster not covered by print or graphic matter.
High-volume entity	An entity that will have a large number of instances.

Large ERD Drawing Conventions



Space is Needed



Section 9 – Mapping

9-1 Introduction to Relational Database Concepts

Primary key	A constraint which ensures that the column contains no null values and uniquely identifies each row of the table
Foreign key	A column or set of columns that refers to a primary key in the same table or another table
Row	An entry in a table, consisting of values for each appropriate column
Column	An implementation of an attribute or relationship in a table
Unique key	An integrity constraint that requires every value in a column or set of columns be unique.
Relational database	Collections of objects or relations set of operators to act on those relations, and data integrity for accuracy and consistency.
Candidate key	More than one column or combination of columns that could serve as the table's primary key

Constraint Type	Explanation	Example
Data-integrity rule (Constraints)	Define the relationally correct state for a database; they ensure that users can perform only those operations that leave the database in a correct, consistent state	
Entity Integrity	A primary key must be unique, and no part of the primary key can be null	The column emp_no in the EMPLOYEES table cannot be null
Referential Integrity	A foreign key must match an existing primary key value (or else be null if nulls are allowed)	The value in the dept_no column of the EMPLOYEES table must match a value in the dept_no column in the DEPARTMENTS table
Column Integrity	A column must contain only values consistent with the defined data format of the column	The value in the balance column of the ACCOUNTS table must be numeric
User-Defined Integrity	The data stored in a database must comply with the rules of the business	If the value in the balance column of the ACCOUNTS table is below 1.00, we must send a letter to the account owner (this will need additional programming to enforce)

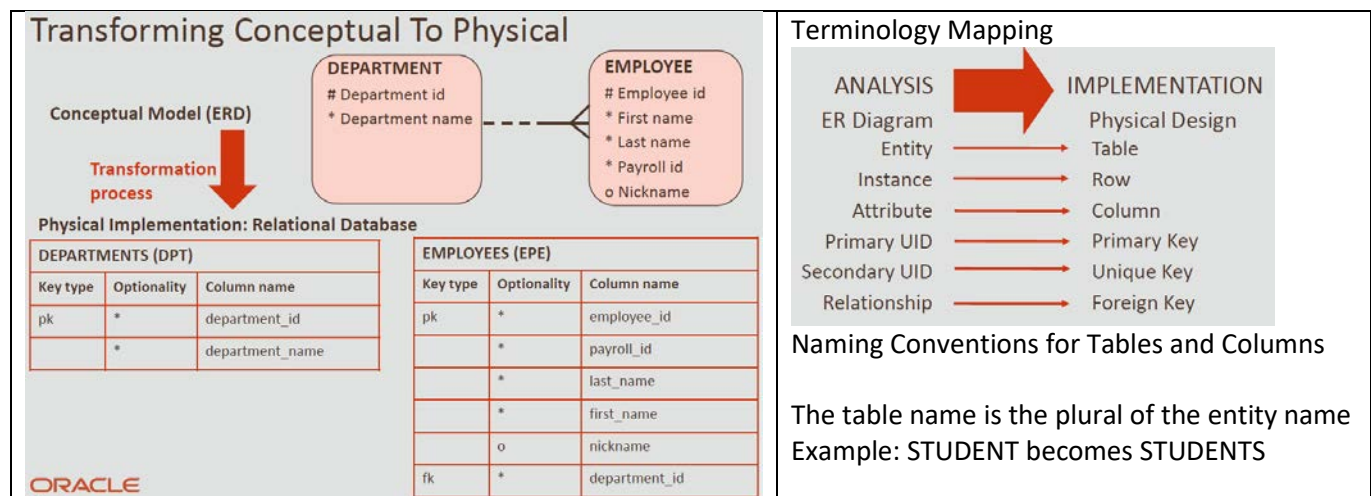
Structured query language (SQL) allows us to access data in relational databases in an efficient way

9-2 Basic Mapping: The Transformation Process

Transform	To change the elements of an ERD into database elements
Map	To associate the elements of an ERD with database elements

The conceptual model (ER diagram) is transformed into a physical model

The physical implementation will be a relational database

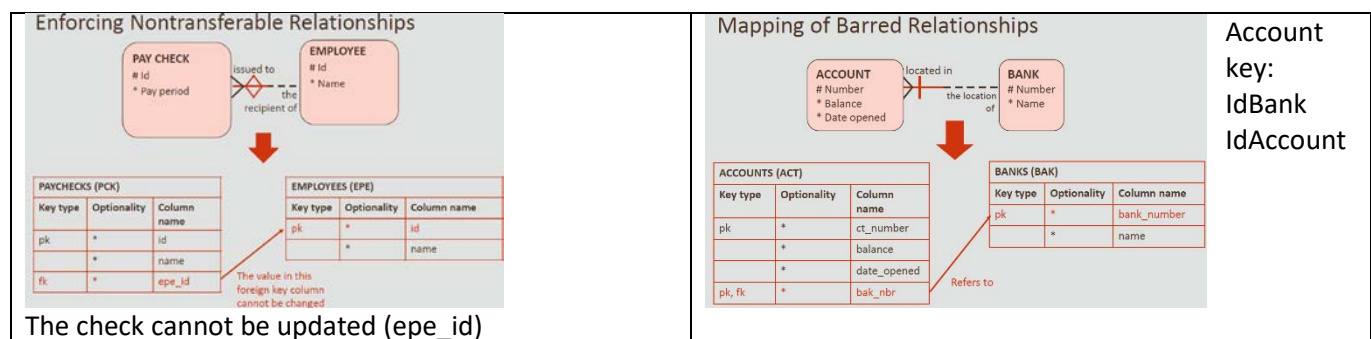


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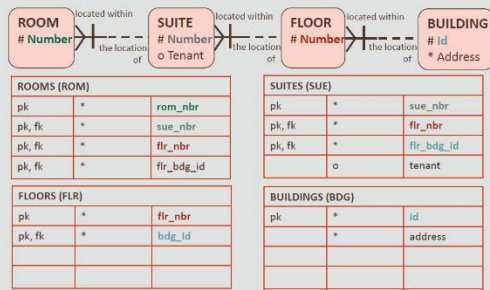
9-3 Relationship Mapping

Nontransferable relationship	A relationship in a database where the foreign key column in the database table cannot be updated
Cascade barred relationship (Relaciones Excluidas en Cascada)	A series of relationships implying that the unique identifier of each entity in the chain is carried down (descended) to the entity on the next level
Intersection entity (n:m)	The product of the resolution of a many to many relationship.

Apply: 1:1, 1:n, n:m, arc

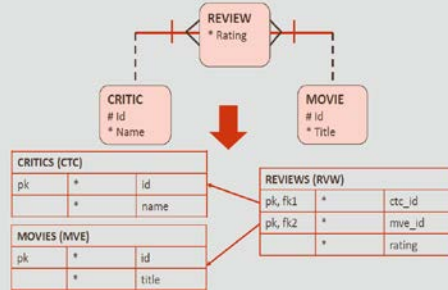


Cascade Barred Relationships

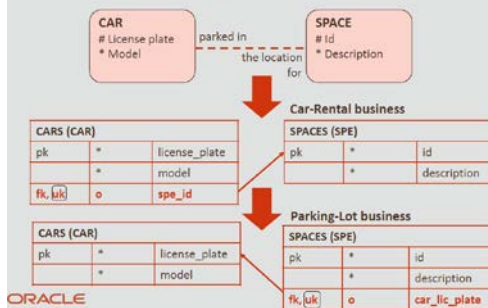


ROOM:
IdBdg
IdFlr
IdSue
IdRom

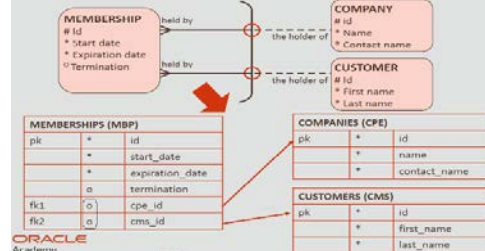
Mapping Many-to-Many Relationships



Business Rules for Optional One-to-One



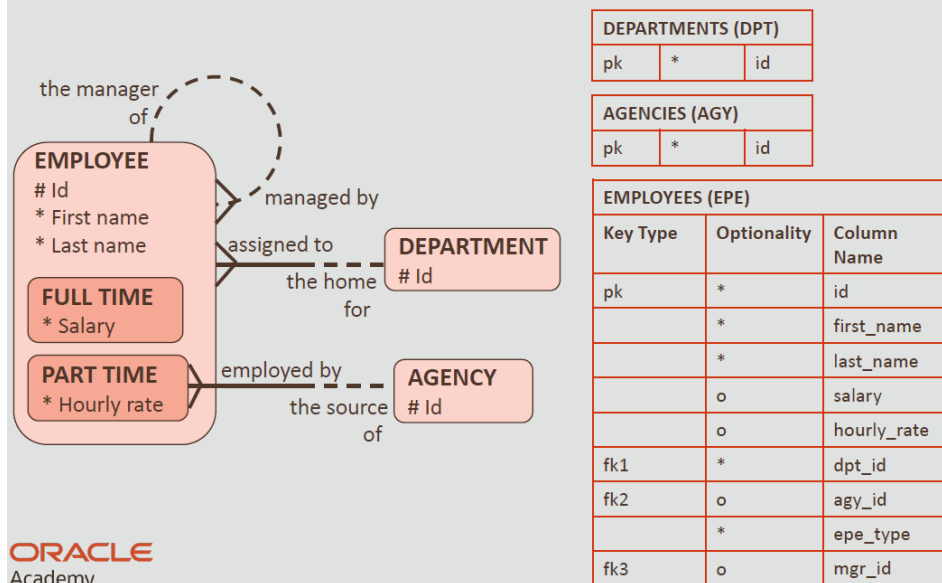
Mapping Arcs



programming or Create Table
CHECK (pse_idis not null AND phe_idis null)
OR (pse_idis null AND phe_idis not null)

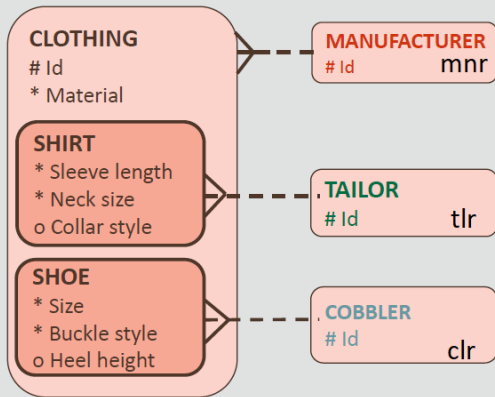
9-4 Subtype Mapping

Supertype Implementation: Single Table



CHECK (epe_type = 'FTE' and salary is not null and hourly_rate is null and agy_id is null)
OR (epe_type = 'PTE' and salary is null and hourly_rate is not null and agy_id is not null)

Subtype Implementation: Two Table

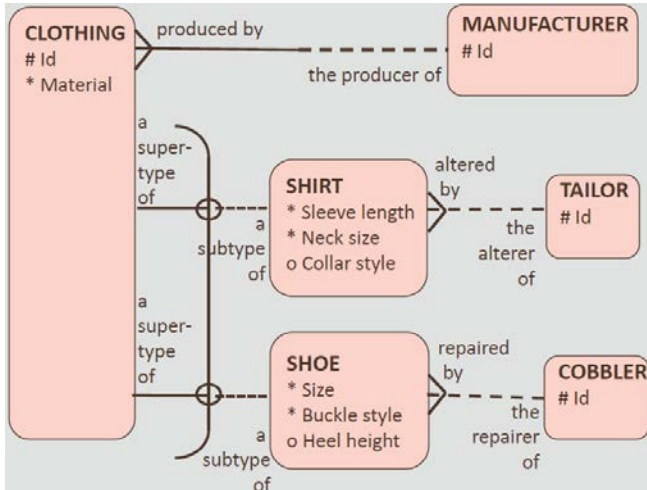


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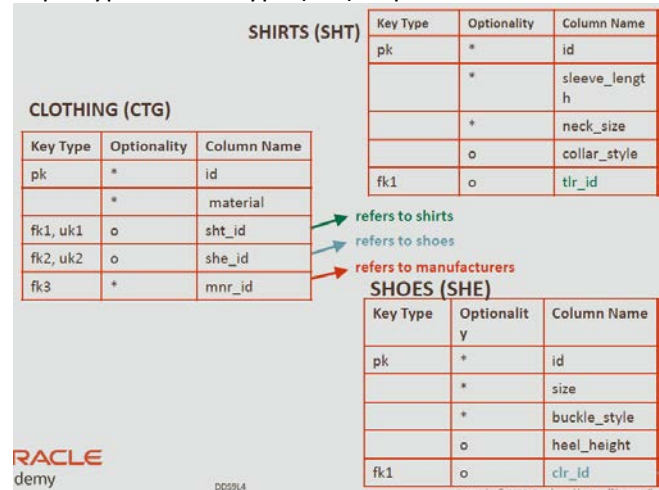
SHIRTS (SHT)		
pk	*	id
	*	material
	*	sleeve_length
	*	neck_size
	o	collar_style
fk1	o	tlr_id
fk2	*	mnr_id

SHOES (SHE)		
pk	*	id
	*	material
	*	size
	*	buckle_style
	o	heel_height
fk1	o	clr_id
fk2	*	mnr_id

Model an Arc Illustrated



Supertype and Subtype (Arc) Implementation



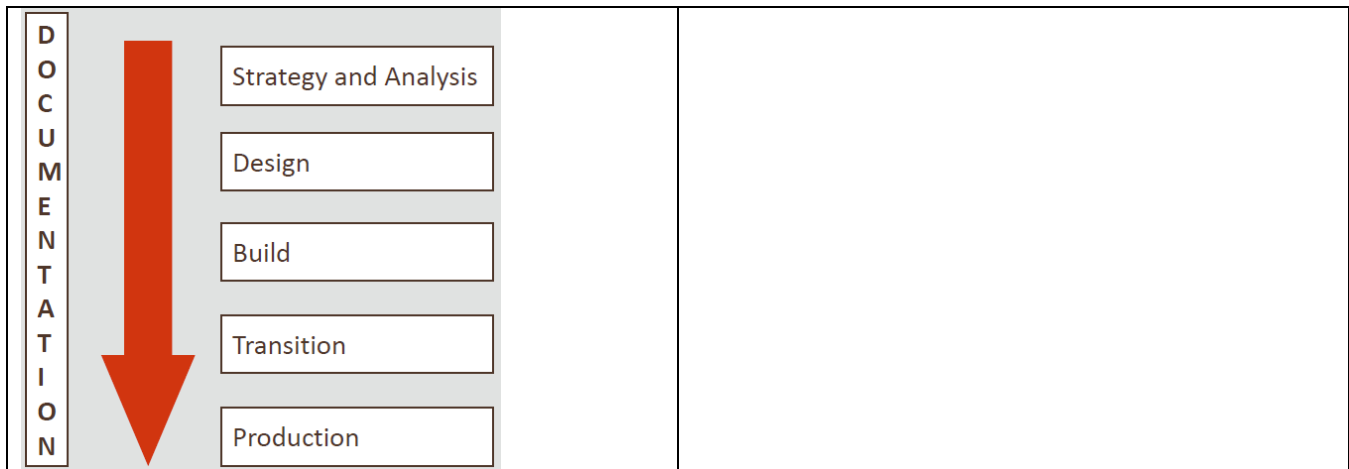
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Section 10 – Creating Database Projects

10-1 System Development Life Cycle

Populate	To enter data into a table
System development life cycle	The process of developing information systems through a multi-step process
User-acceptance testing	The type of testing where monitored users determine whether a system meets all their requirements, and will support the business for which it was designed
Parallel operations	The simultaneous execution of two different operations
SDLC	System Development Life Cycle



10-2 Project Overview and Getting Started

10-3 Presentation Project Management

10-4 Final Presentation Components