

SENG 471

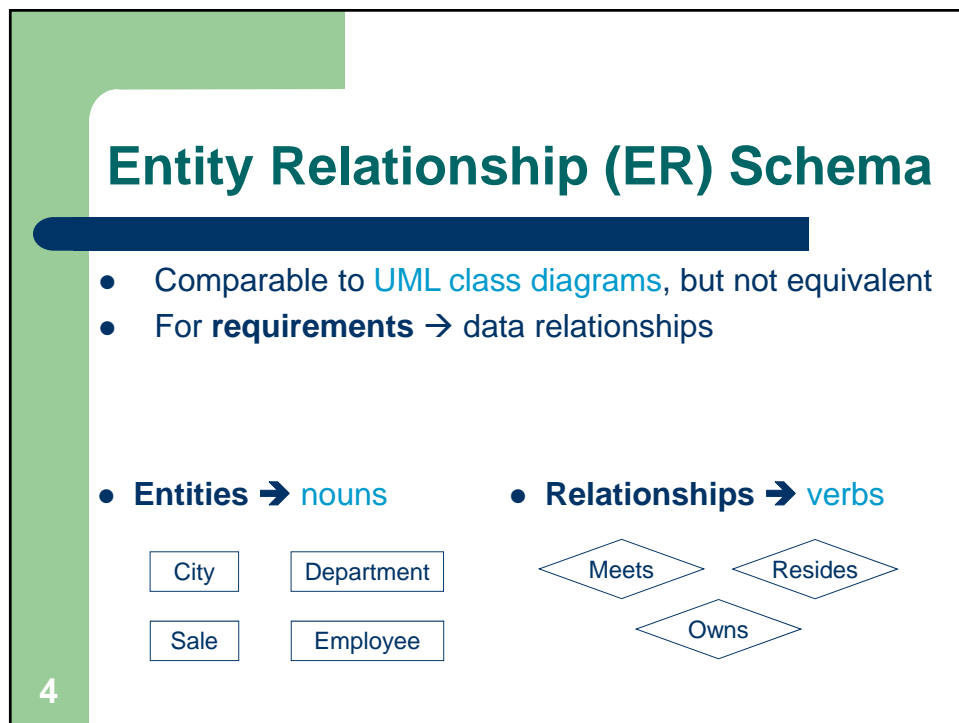
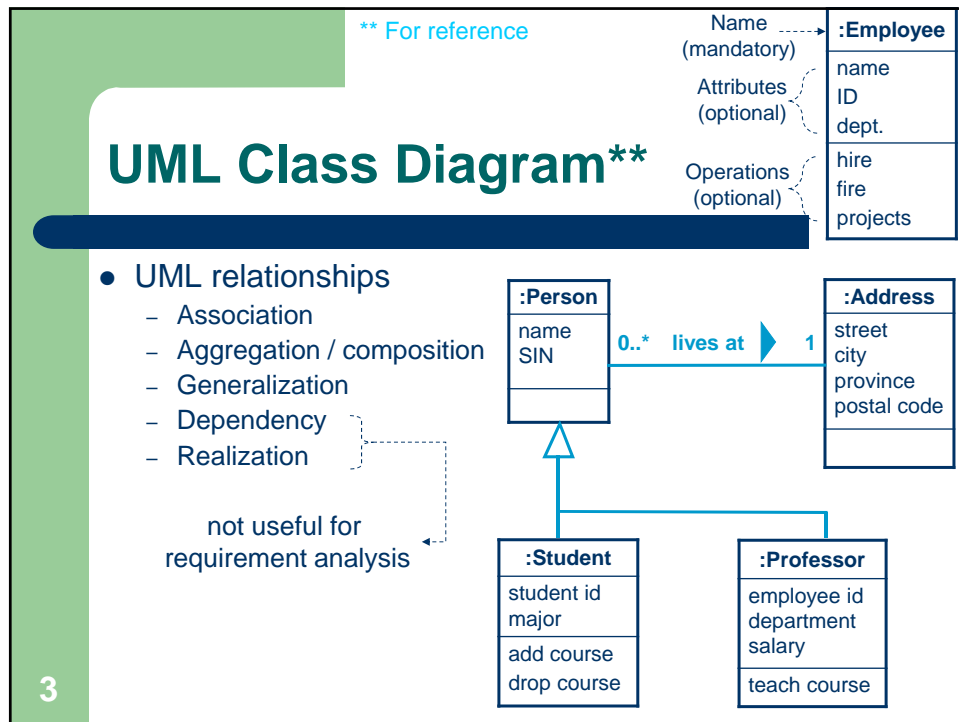
Software Requirements Engineering

Modelling Functions - Relationships

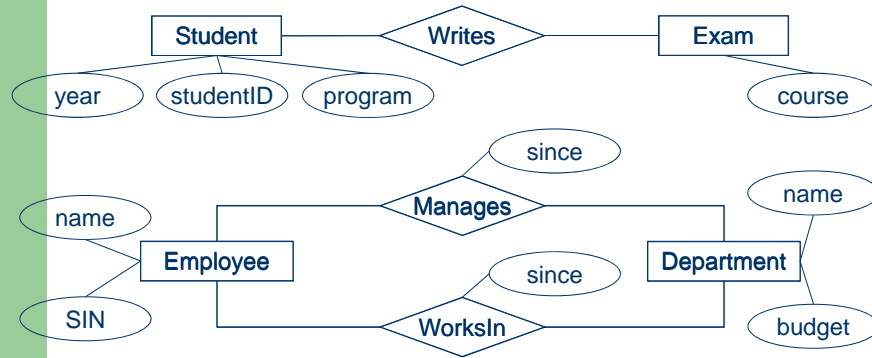
- Object Oriented Analysis:
- UML class diagrams
 - ER diagrams

Example - Online order system

A Customer places an Order on the web. The Customer has an address, and provides a form of payment. The Order includes the quantities of each Product that they want to have delivered. In order to plan deliveries and allocate delivery vans, Groceries-R-Us must determine the volume of orders being delivered, so in addition to the name, cost price and sale price of each Product, they also need to know the cubic volume required for a single item of that Product.



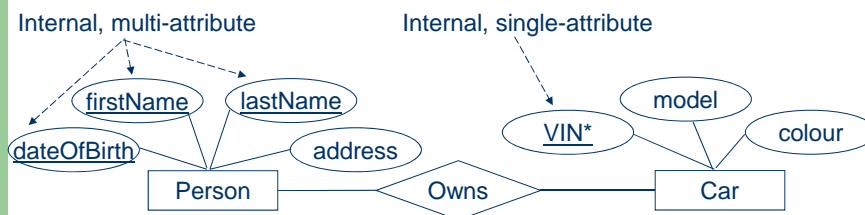
Examples and Attributes



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* VIN: Vehicle Identification Number

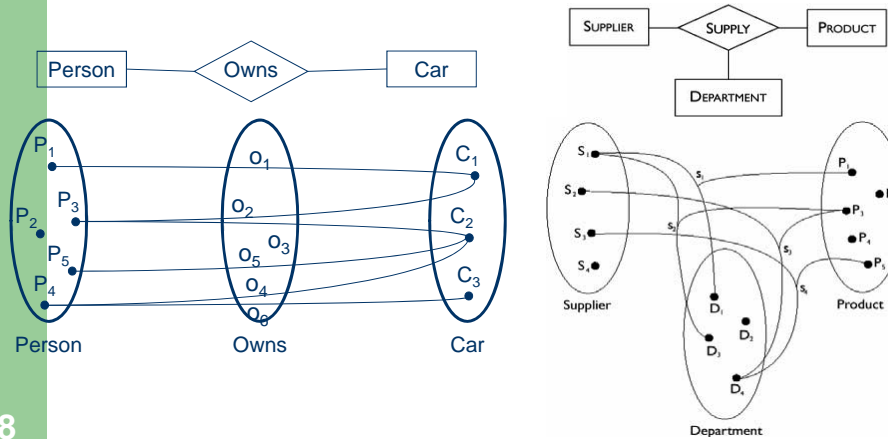
Internal Identifiers - Keys



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Instances, Ternary Relationship



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Cardinalities - Entities

- Cardinalities → participation in relationships



- Pairs of non-negative integers (min, max)
 - (1,1) - one-to-one (default)
 - (1,N) - one-to-many
 - (N,1) - many-to-one
 - (M,N) - many-to-many

- Illegal instances?

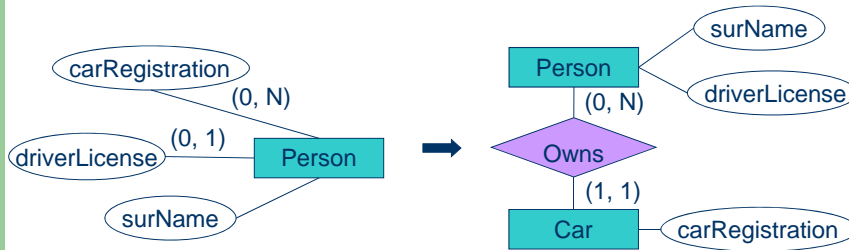


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Cardinalities - Attributes

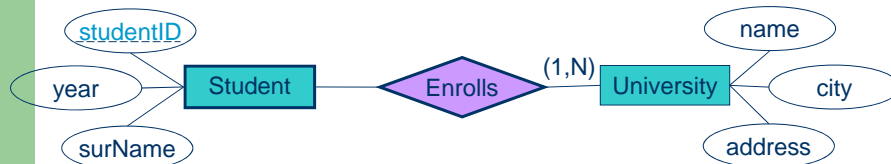
- Attributes can also have cardinalities, but problematic



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Weak Entities - External identifier



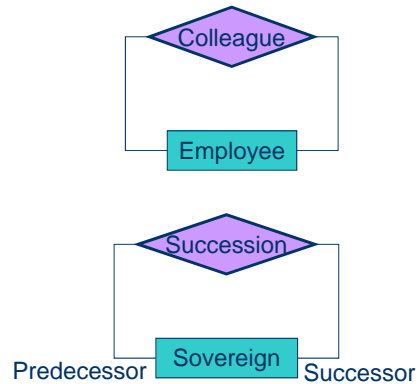
- Student is a weak entity, why??

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Recursive Relationships

- An entity has relationships with itself...
- If the relationship is not symmetric...

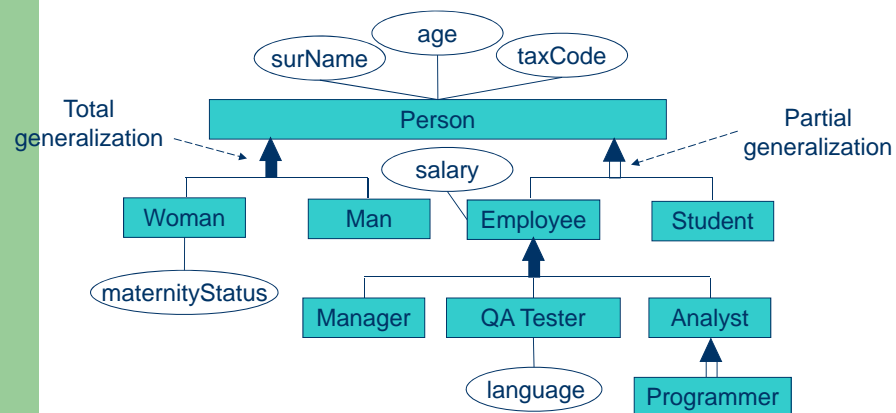


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- An "is-a" relationships between entities
- Usefulness to easily add new entities
- Look for generalizations in both top-down and bottom-up
- Don't generalize just for the sake of it

Generalizations



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Entities → Nouns (noun phrases) in stakeholders' descriptions of the problem.

Finding Entities

- External entities
- Things
- Occurrences/Events
- Roles
- Organizational units
- Places
- Structures

Invoice

HumanResources

Sensor

Payroll

LandTransfer

PrimeMinister

Warehouse

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For reading

Selecting Entities

- Discard entities
 - too vague/specific, duplication, off scope
- Include entities
 - ← info. essential to the system
- Coad & Yourdon's Criteria
 - Retained information: Will the system need to remember information about the entities?
 - Needed services: Do the entities have identifiable operations?
 - Common operations: Do the entities have operations that are shared?

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Exercise - Online order system

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Recap

- So far we've seen:
 - BPMN diagrams (UML activity diagrams)
 - The sequence of steps that make up a business process (workflow).
 - ER diagrams (UML class diagrams)
 - The relationship among entities that describe an application domain (static domain model).

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