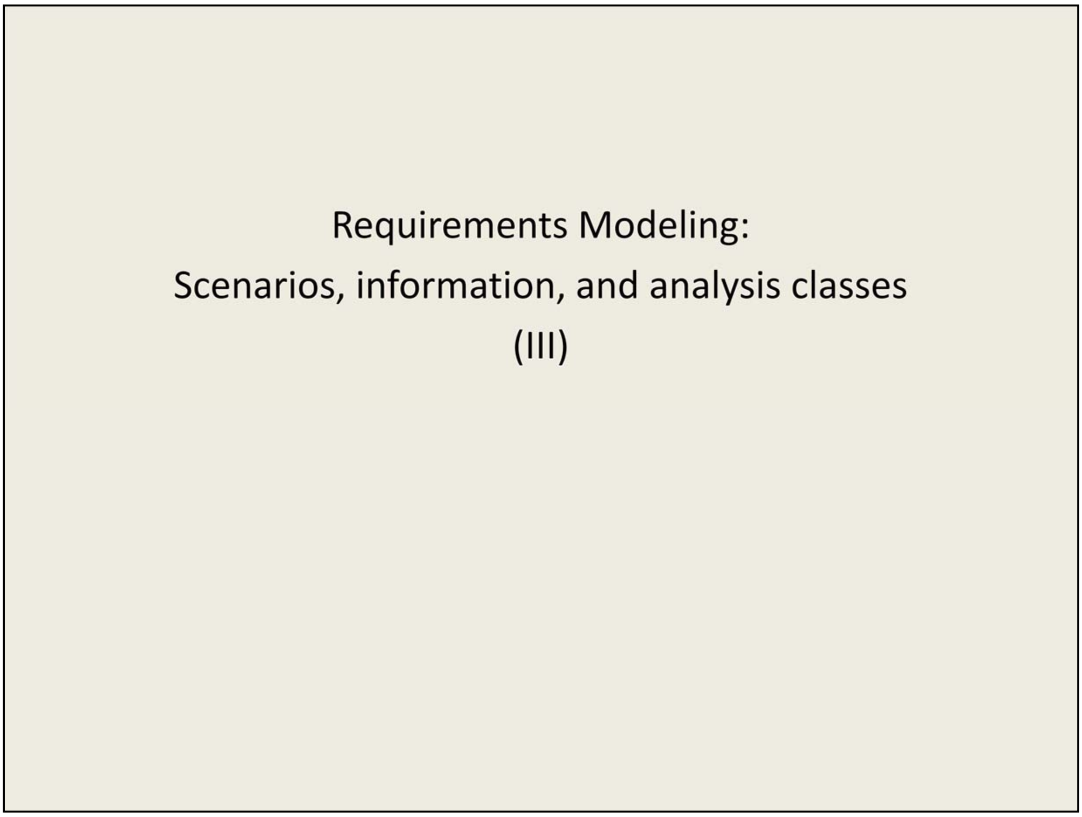
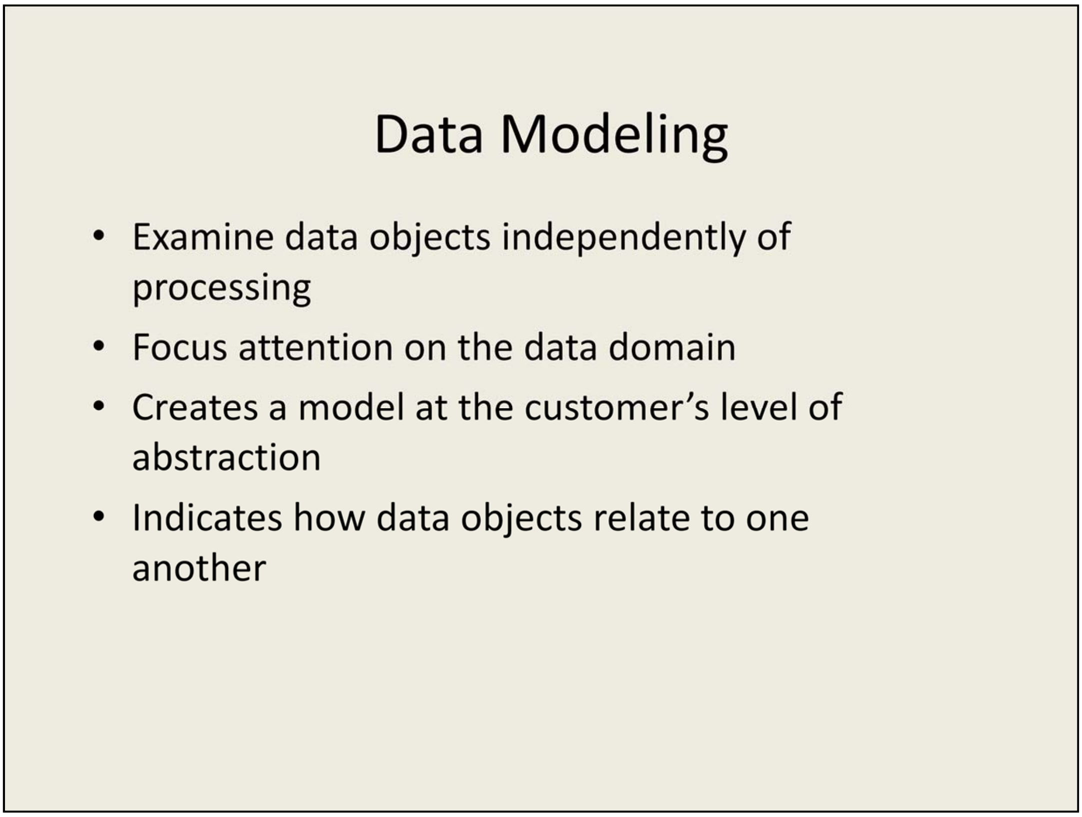


Requirements Modeling:
Scenarios, information, and analysis classes
(III)



Data Modeling

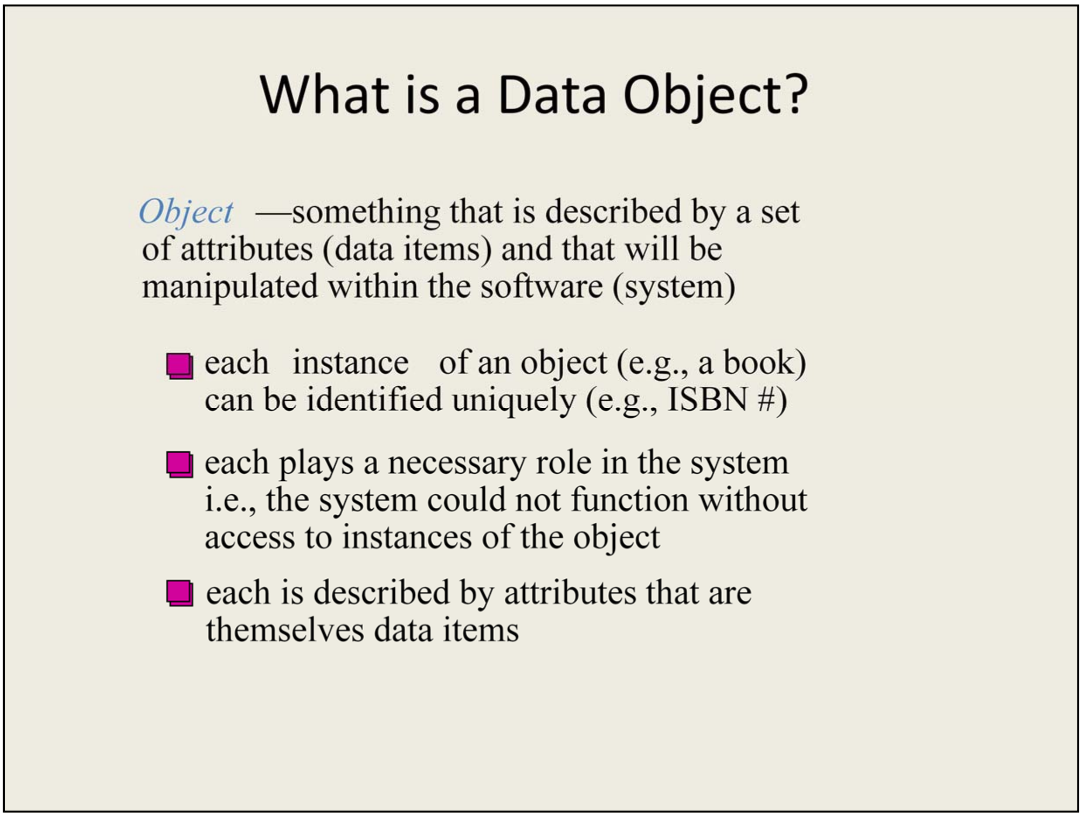
- Examine data objects independently of processing
- Focus attention on the data domain
- Creates a model at the customer’s level of abstraction
- Indicates how data objects relate to one another

If software requirements include the need to create, extend, or interface with a database

or if complex data structures must be constructed and manipulated, the software

team may choose to create a *data model* as part of overall requirements

modeling.

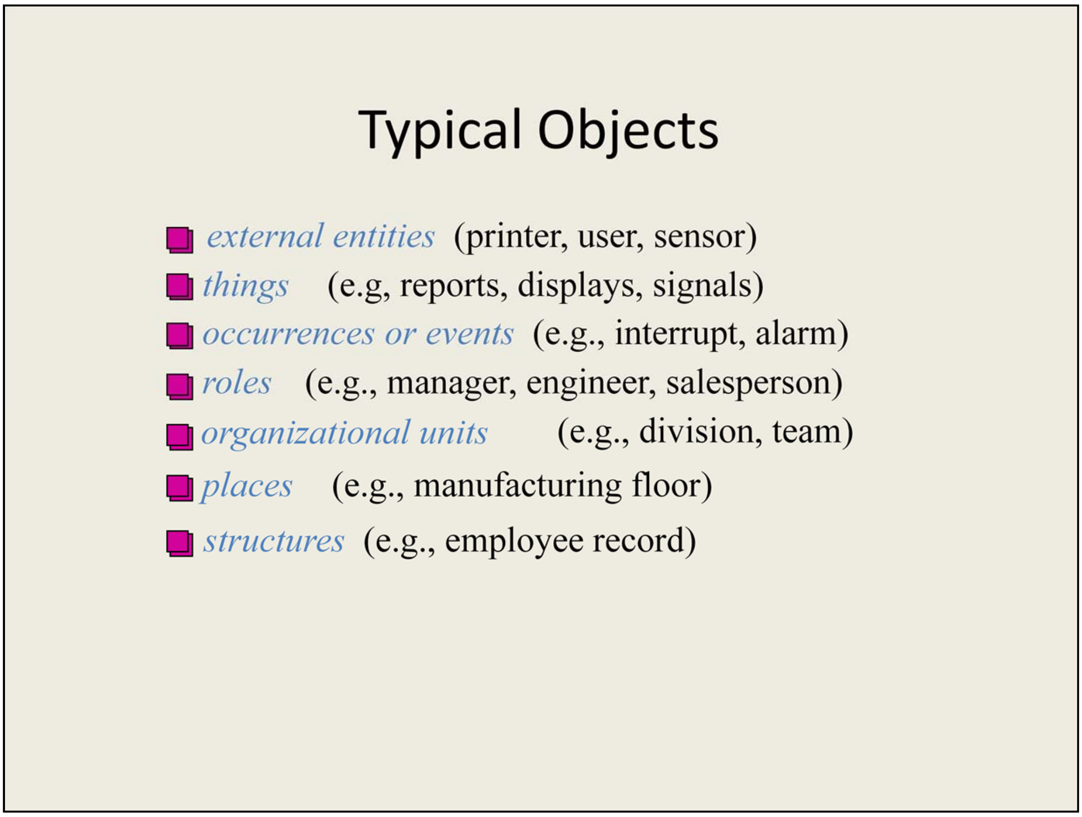


What is a Data Object?

Object —something that is described by a set of attributes (data items) and that will be manipulated within the software (system)

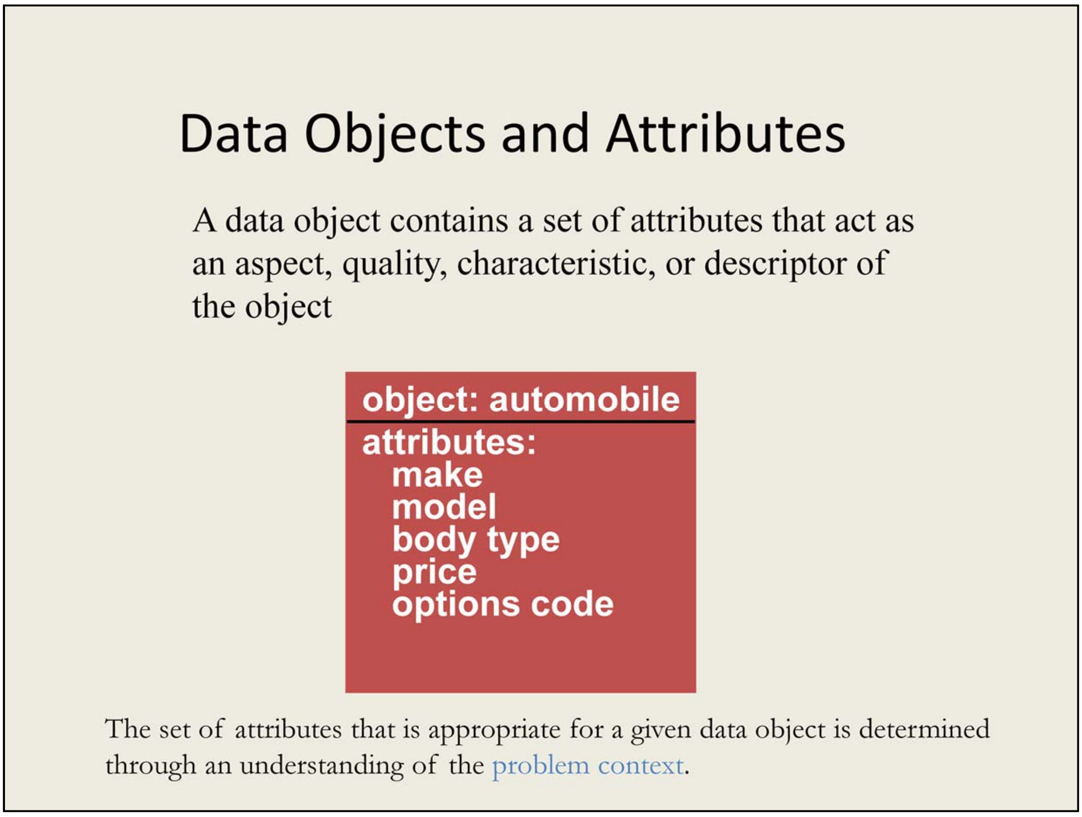
- each instance of an object (e.g., a book) can be identified uniquely (e.g., ISBN #)
- each plays a necessary role in the system i.e., the system could not function without access to instances of the object
- each is described by attributes that are themselves data items

A *data object* is a representation of composite information that must be understood by software. By *composite information,* I mean something that has a number of different properties or attributes.



Typical Objects

- *external entities* (printer, user, sensor)
- *things* (e.g, reports, displays, signals)
- *occurrences or events* (e.g., interrupt, alarm)
- *roles* (e.g., manager, engineer, salesperson)
- *organizational units* (e.g., division, team)
- *places* (e.g., manufacturing floor)
- *structures* (e.g., employee record)



Data Objects and Attributes

A data object contains a set of attributes that act as an aspect, quality, characteristic, or descriptor of the object

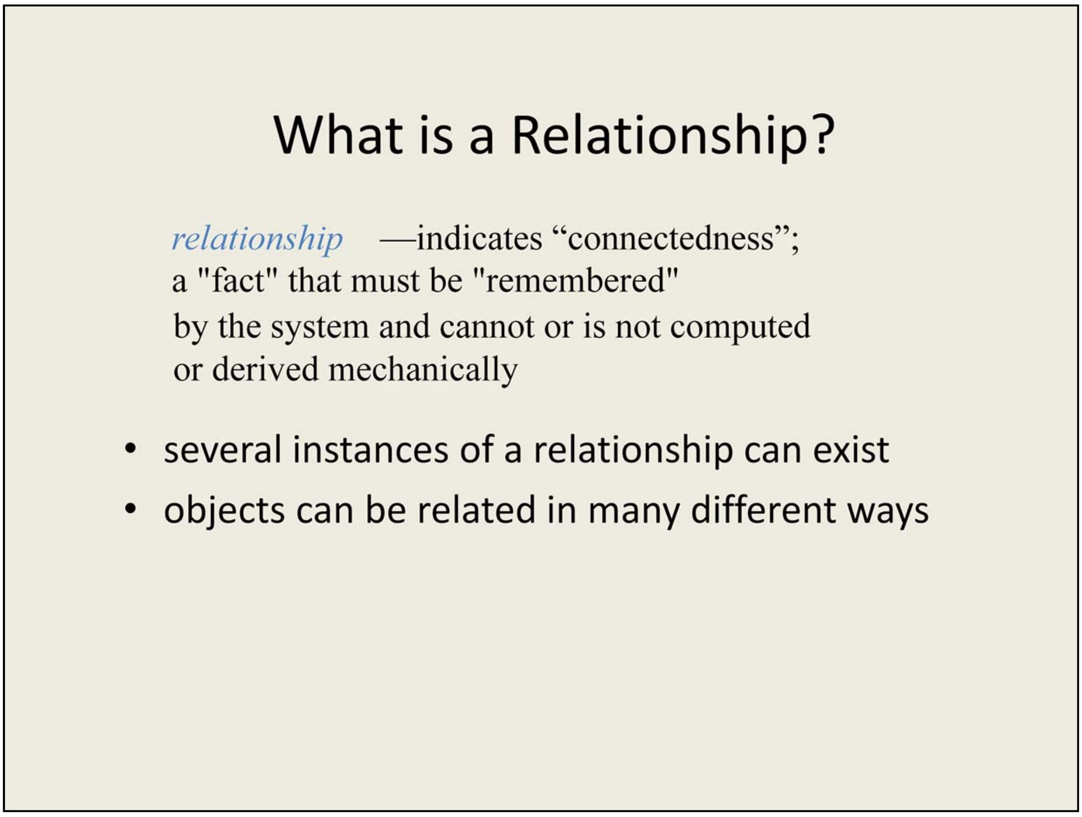
object: automobile

attributes:
- **make**
- **model**
- **body type**
- **price**
- **options code**

The set of attributes that is appropriate for a given data object is determined through an understanding of the problem context.

A data object encapsulates data only—there is no reference within a data object

to operations that act on the data



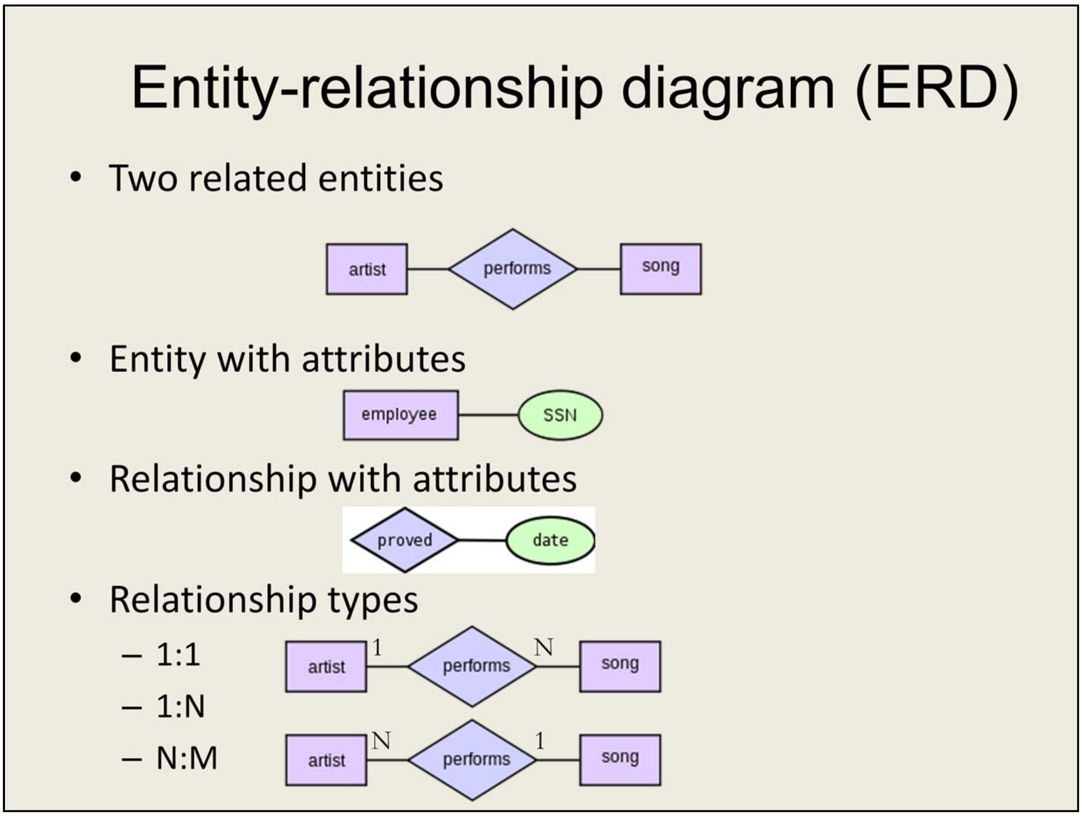
What is a Relationship?

relationship —indicates “connectedness”;
a "fact" that must be "remembered"
by the system and cannot or is not computed
or derived mechanically

- several instances of a relationship can exist
- objects can be related in many different ways

To determine the answer, you should understand the role of people (owners, in this case) and cars

within the context of the software to be built.



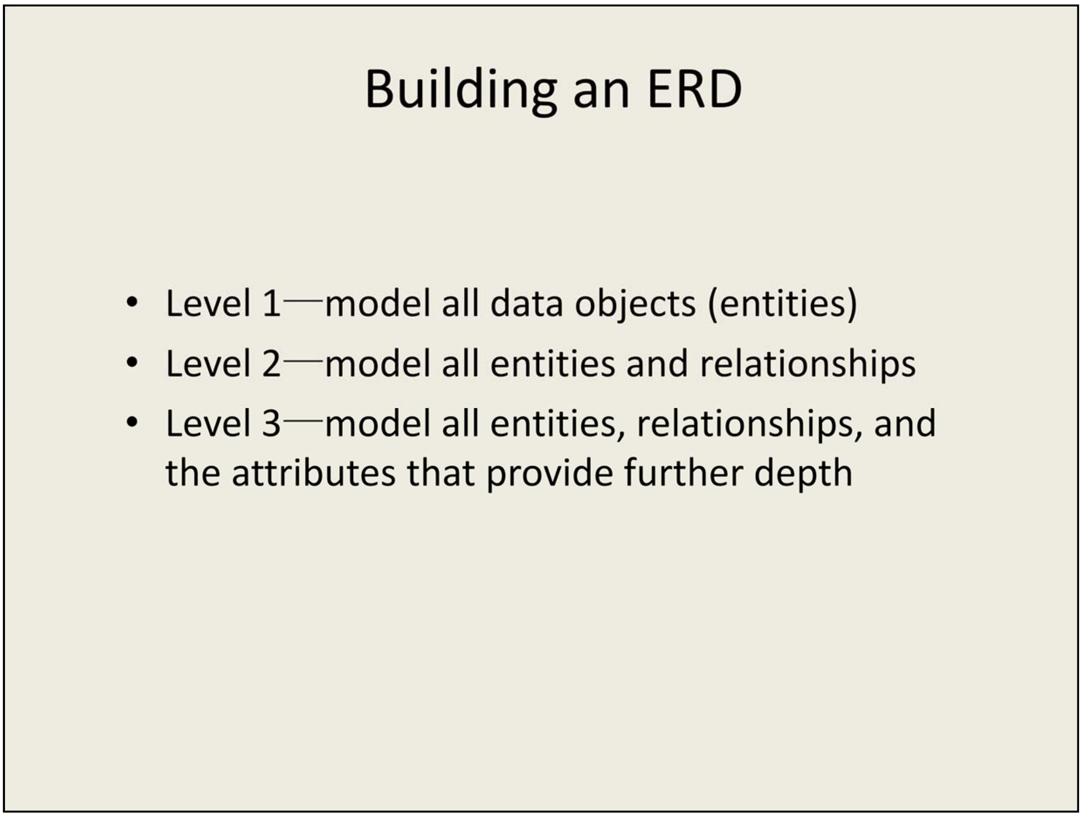
Entity-relationship diagram (ERD)

- Two related entities

- Entity with attributes

- Relationship with attributes

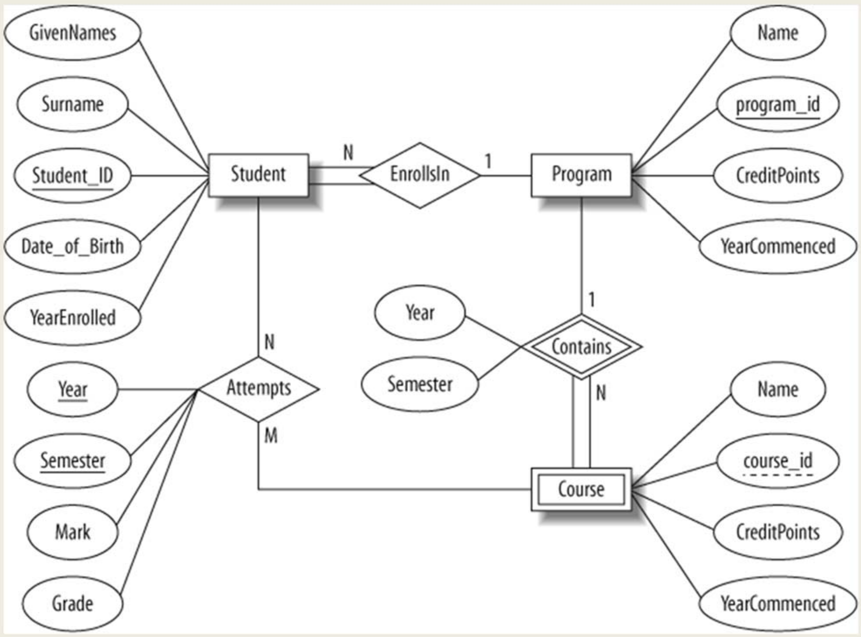
- Relationship types
  - 1:1
  - 1:N
  - N:M

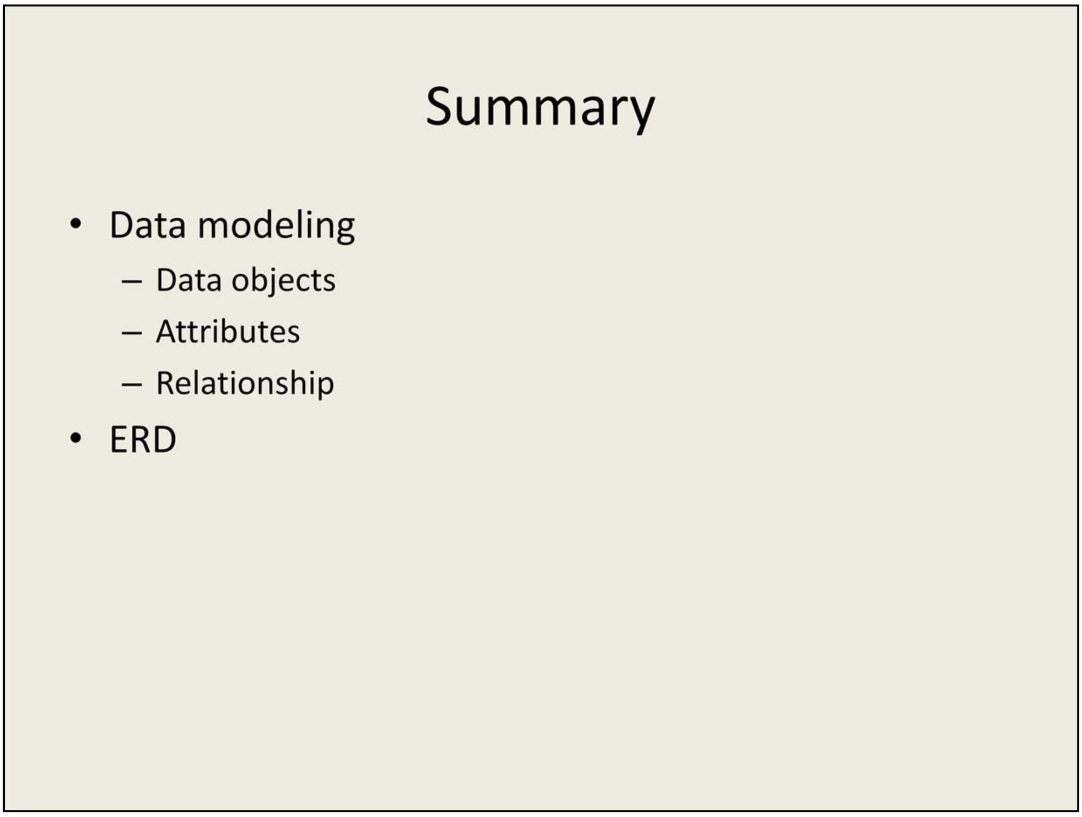


Building an ERD

- Level 1—model all data objects (entities)
- Level 2—model all entities and relationships
- Level 3—model all entities, relationships, and the attributes that provide further depth

The ERD: An Example





Summary

- Data modeling
  - Data objects
  - Attributes
  - Relationship
- ERD

UML has its own notations for data modeling – next lecture.