Analysis Modeling

OOSE

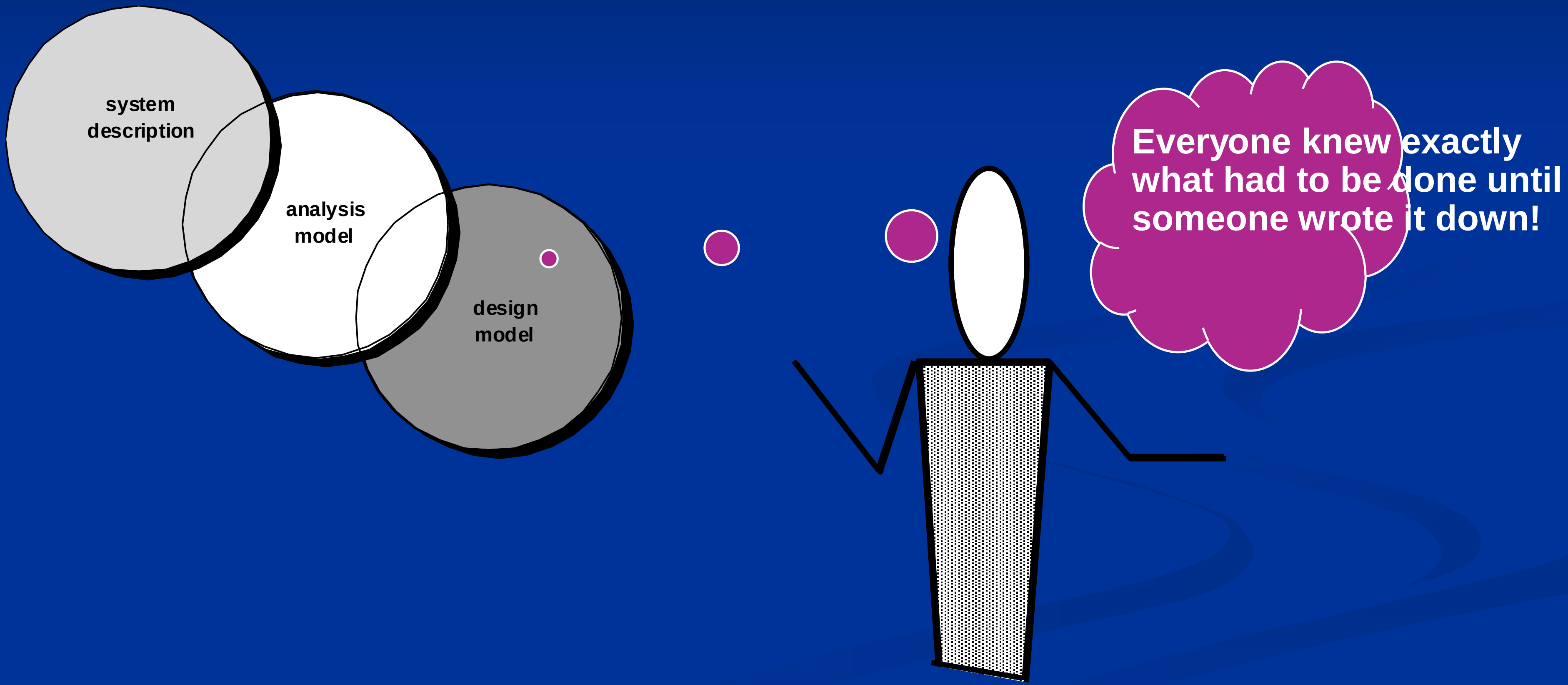
Chitkara University

Requirements Analysis

- Requirements analysis
  - specifies software’s ***operational*** characteristics
  - indicates software's ***interface*** with other system elements
  - establishes ***constraints*** that software must meet
- Requirements analysis allows the software engineer (called an *analyst* or *modeler* in this role) to:
  - ***elaborate*** on basic requirements established during earlier requirement engineering tasks
  - build ***models*** that depict user scenarios, functional activities, problem classes and their relationships, system and class behavior, and the flow of data as it is transformed.

A Bridge

Writing the Software Specification


system description
analysis model
design model
Everyone knew exactly what had to be done until someone wrote it down!

Specification Guidelines

- ❑ use a layered format that provides increasing detail as the "layers" deepen
- ❑ use consistent graphical notation and apply textual terms consistently (stay away from aliases)
- ❑ be sure to define all acronyms
- ❑ be sure to include a table of contents; ideally, include an index and/or a glossary
- ❑ write in a simple, unambiguous style (see "editing suggestions" on the following pages)
- ❑ always put yourself in the reader's position, "Would I be able to understand this if I wasn't intimately familiar with the system?"

Specification Guidelines

Be on the lookout for persuasive connectors, ask why?
keys: *certainly, therefore, clearly, obviously, it follows that ...*

Watch out for vague terms
keys: *some, sometimes, often, usually,ordinarily, most, mostly ...*

When lists are given, but not completed, be sure all items are understood
keys: *etc., and so forth, and so on, such as*

Be sure stated ranges don't contain unstated assumptions
e.g., *Valid codes range from 10 to 100.* Integer? Real? Hex?

Beware of vague verbs such as *handled, rejected, processed, ...*

Beware "passive voice" statements
e.g., *The parameters are initialized.* By what?

Beware "dangling" pronouns
e.g., *The I/O module communicated with the data validation module and its contol flag is set.* Whose control flag?

Specification Guidelines

When a term is explicitly defined in one place, try substituting the definition forother occurrences of the term

When a structure is described in words, draw a picture

When a structure is described with a picture, try to redraw the picture to emphasize different elements of the structure

When symbolic equations are used, try expressing their meaning in words

When a calculation is specified, work at least two examples

Look for statements that imply certainty, then ask for proof
keys; always, every, all, none, never

Search behind certainty statements—be sure restrictions or limitations are realistic

Domain Analysis

- Define the ***domain*** to be investigated.
- Collect a representative ***sample*** of applications in the domain.
- ***Analyze*** each application in the sample.
- Develop an analysis model for the ***objects***.
- In terms of data modeling, function/process modeling, behavioral modeling, etc.

Is this needed also for System Engineering, or for Requirements Analysis only?

Data Modeling

- examines ***data objects*** independently of processing
- focuses attention on the ***data domain***
- creates a model at the ***customer***'s level of abstraction
- indicates how data objects ***relate*** to one another

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

object: automobile

attributes:

make
model
body type
price
options code

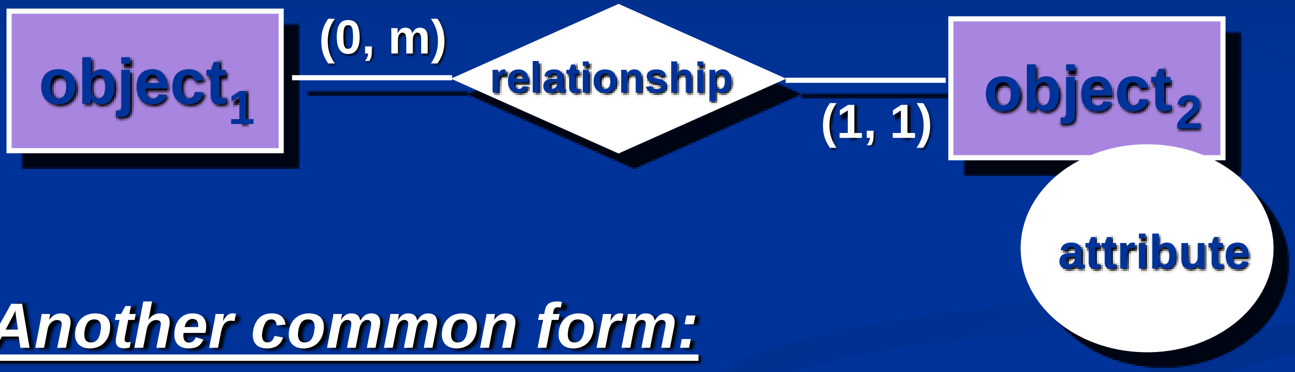
What is a Relationship?

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

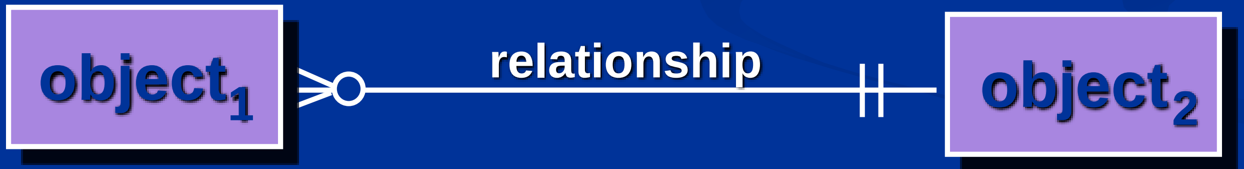
- several ***instances*** of a relationship can exist
- objects can be related in ***many different ways***

Entity Relation Diagram Notation

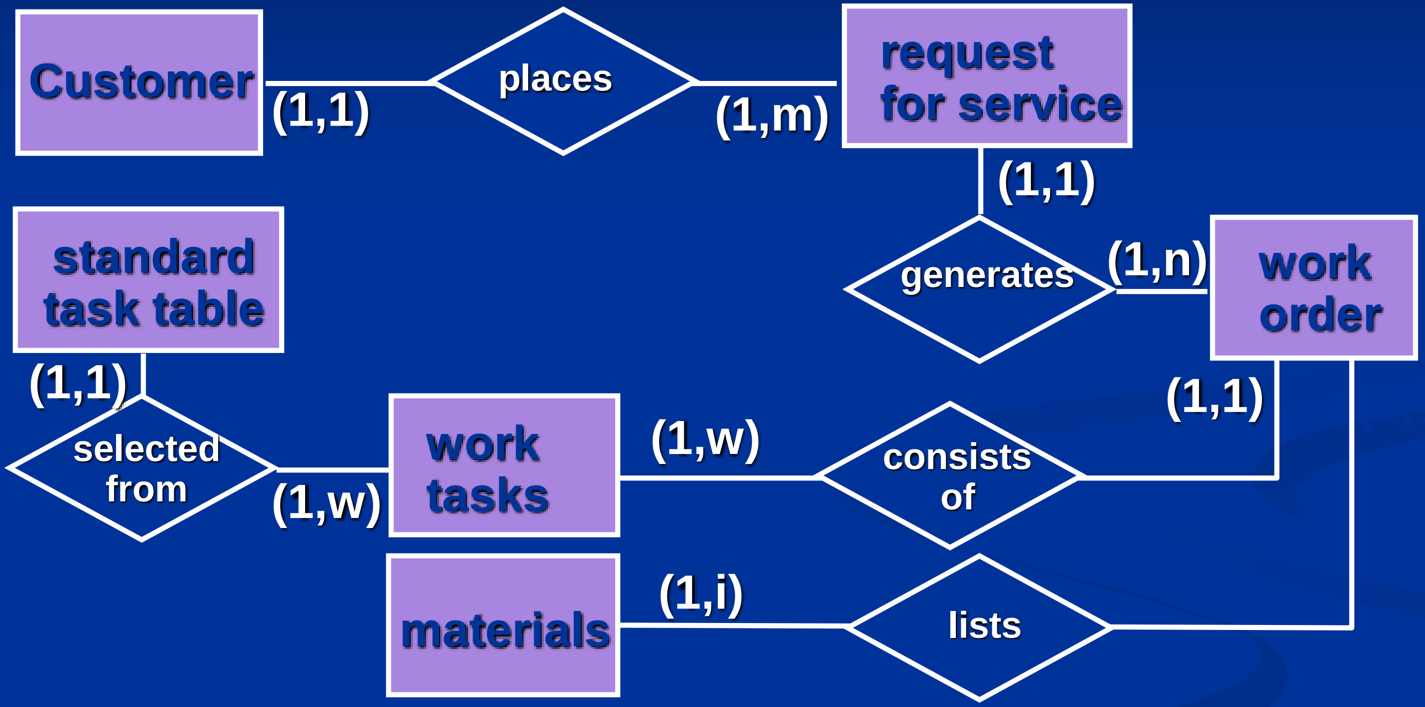
One common form:



Another common form:



The Entity Relation Diagram Notation (ERD): An Example



Object-Oriented Concepts

- Key concepts:
  - Classes and objects
  - Attributes and operations
  - Encapsulation and instantiation
  - Inheritance

How is this different from ERD?