1

ITSS SOFTWARE DEVELOPMENT
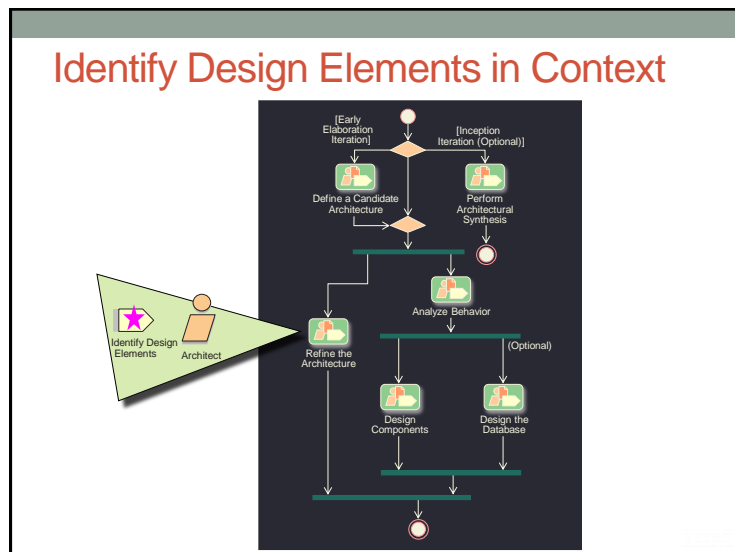
4. IDENTIFY DESIGN ELEMENTS

Some slides extracted from IBM coursewares

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Objectives: Identify Design Elements

- Define the purpose of Identify Design Elements and demonstrate where in the lifecycle it is performed
- Analyze interactions of analysis classes and identify Design Model elements => Design classes
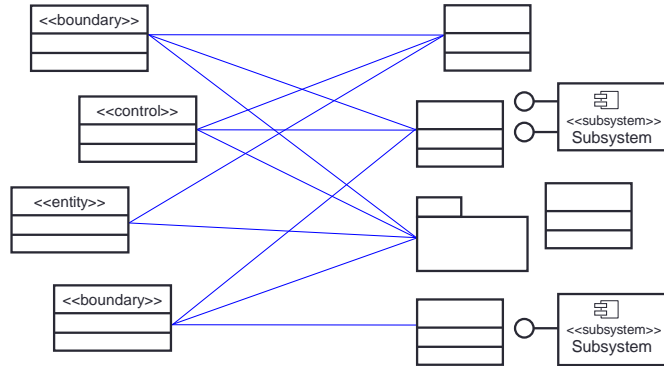
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Identify Design Elements in Context

3

Identify Design Elements Overview

4

Page 1
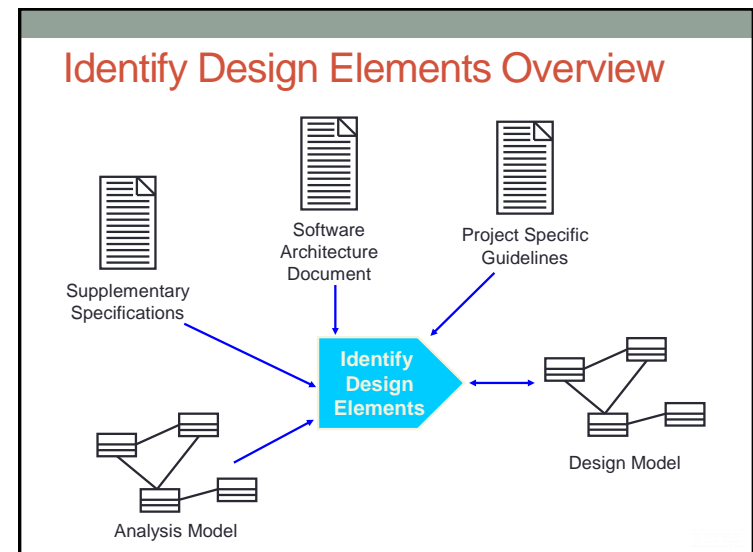
From Analysis Classes to Design Elements

Analysis Classes | Design Elements

Many-to-Many Mapping

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## Identifying Design Classes

- An analysis class maps directly to a design class if:
  - It is a simple class
  - It represents a single logical abstraction
- More complex analysis classes may
  - Split into multiple classes
  - Become a package
  - Become a subsystem (discussed later)
 - Any combination …

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Review: Class and Package

- What is a class?
  - A description of a set of objects that share the same responsibilities, relationships, operations, attributes, and semantics

  Class Name

- What is a package?
  - A general purpose mechanism for organizing elements into groups
  - A model element which can contain other model elements

  Package Name
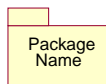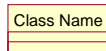
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## Group Design Classes in Packages

- You can base your packaging criteria on a number of different factors, including:
  - Configuration units
  - Allocation of resources among development teams
  - Reflect the user types
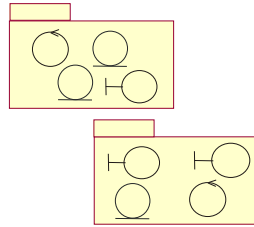 - Represent the existing products and services the system uses

  Package C

  Package B

  Package A

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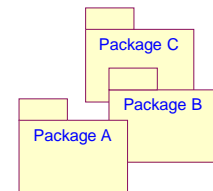
Packaging Tips: Boundary Classes

If it is **likely** the system interface will undergo considerable changes

If it is **unlikely** the system interface will undergo considerable changes
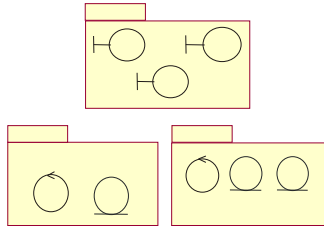
Boundary classes placed in separate packages

Boundary classes packaged with functionally related classes

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Packaging Tips:
Functionally Related Classes

- Criteria for determining if classes are functionally related:
  - Changes in one class' behavior and/or structure necessitate changes in another class
  - Removal of one class impacts the other class
  - Two objects interact with a large number of messages or have a complex intercommunication
  - A boundary class can be functionally related to a particular entity class if the function of the boundary class is to present the entity class
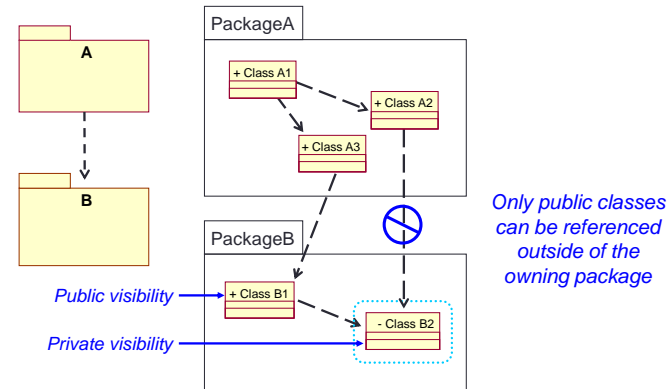 - Two classes interact with, or are affected by changes in the same actor

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Packaging Tips:
Functionally Related Classes (continued)

- Criteria for determining if classes are functionally related (continued):
  - Two classes have relationships between each other
  - One class creates instances of another class
- Criteria for determining when two classes should **NOT** be placed in the same package:
  - Two classes that are related to different actors should not be placed in the same package
  - An optional and a mandatory class should not be placed in the same package

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Package Dependencies: Package Element Visibility

PackageA

A

+ Class A1

+ Class A2

+ Class A3

B

PackageB

Public visibility → + Class B1

Private visibility → - Class B2

Only public classes can be referenced outside of the owning package
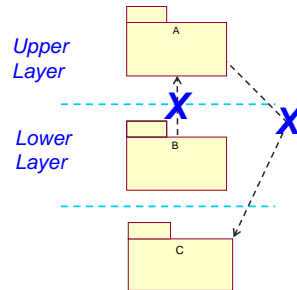
OO Principle: Encapsulation

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Package Coupling: Tips

- Packages should not be cross-coupled

- Packages in lower layers should not be dependent upon packages in upper layers

- In general, dependencies should not skip layers

Upper Layer

Lower Layer
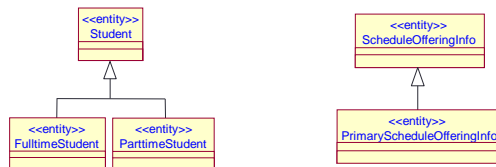
X = Coupling violation

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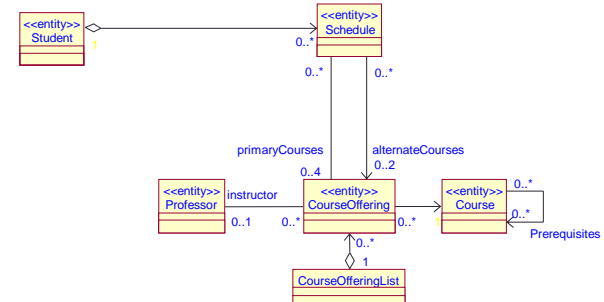
Example: Registration Package
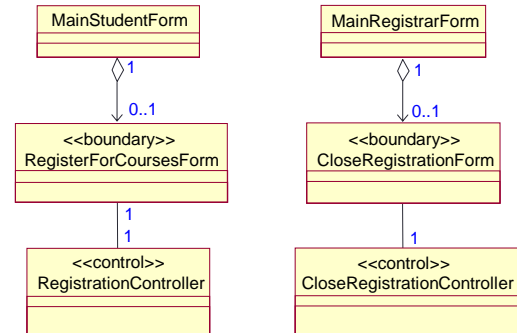
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Example: University Artifacts Package: Generalization

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Example: University Artifacts Package: Associations

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Example: External System Interfaces Package

<<Interface>>
IBillingSystem

<<Interface>>
ICourseCatalogSystem

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