Seminar 4  
Functional Requirements  
Domain Models  
Semester 1, 2005

Procedure for Object-Oriented Systems Analysis

- Step 1. Identify the business events and make an event table.
- Step 2. Identify the use cases and produce a use case diagram for the system.
- Step 3. Produce a domain model showing the concepts, attributes and associations in the problem domain of the system.

SOURCE: STUMPF & TEAGUE Chapter 5

Domain Model

Concepts, Attributes, and Associations

- A concept is an abstraction of a thing, a person, or an idea. It is represented by a rectangle. (Class/ data object)
- An attribute is a characteristic of a concept which may have a data value or be able to be described by data. Attribute names appear in the lower compartment of the concept rectangle.
- An association is a significant connection between concepts and their data representations. It is represented by a line connecting a pair of concepts.

Identifying concepts

- Look for nouns or noun phrases describing the problem domain.
- Include a concept in the domain model when the system needs to store data about the concept to respond to a future event.

Some concept categories

- Business transactions  
  - sale; payment
- Catalogs  
  - product catalog; parts catalog
- Containers  
  - bin; airplane
- External systems  
  - Credit Card authorization system;
- Organizations  
  - Sales Department; Airline
Some concept categories ctd.

- **Roles of people**
  - student; registrar
- **Specifications (descriptions of things)**
  - product specification; contract
- **Tangible objects**
  - cash register; seat
- **Things in a container**
  - stock item; passenger
- **Business transaction line items**
  - sale line item; invoice item

Values

- **Values describe instances.**

<table>
<thead>
<tr>
<th>Concept</th>
<th>Student</th>
<th>Department</th>
<th>Seat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attributes: 043278077</td>
<td>17 Hedge Ave.</td>
<td>Psychology</td>
<td>3</td>
</tr>
<tr>
<td>Wallis, Frances</td>
<td>7th Floor, Bldg 45</td>
<td>June Whitney, Head</td>
<td>X view access</td>
</tr>
</tbody>
</table>

Attributes (continued)

- **Attributes describe concepts.**

<table>
<thead>
<tr>
<th>Concept</th>
<th>Student</th>
<th>Department</th>
<th>Seat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attributes: studentIdentifier</td>
<td>studentName</td>
<td>departmentName</td>
<td>section</td>
</tr>
<tr>
<td>address</td>
<td>contactPerson</td>
<td>major</td>
<td>number</td>
</tr>
<tr>
<td>classLevel</td>
<td>row</td>
<td>restricted access</td>
<td>disabled access</td>
</tr>
</tbody>
</table>

Associations

- **A significant connection between problem-domain concepts or between classes.**
Associations

FIGURE 5.7

SOURCE: STUMPF & TEAGUE Chap. 5

Identifying associations

Common associations checklist:
Concept A is a physical part of concept B
A is physically contained in/on B
A is logically contained in B
A is a line item of business transaction B
A is a member of B
A is an organizational subunit of B
A is related to transaction B

Instances of Associations

There are instances of associations as well as instances of concepts.
Association: Enrolled In
Instance: studentIdentifier = 41068 associated with
sectionNumber = CIS-4-01

FIGURE 5.6

Reflexive Associations

A concept may be associated with itself.

FIGURE 5.12

Multiplicity of Associations

The multiplicity of an association is the number of instances of a concept which can be associated with one instance of another concept.

Each end of an association is labeled with the minimum and maximum values of its multiplicity.

0..1
1..1
* signifies unlimited (more or many)
* alone means zero or more
Whole-to-Part Associations

The UML provides ways to model two types of whole-to-part associations – aggregation and composition.

Example of an Aggregation

Example of a Composition

Aggregation and Composition

Categories of Whole-to-Part Associations

• Assemblies of parts
• Members of groups
• Containers and their contents

Typical Models – Domain Model