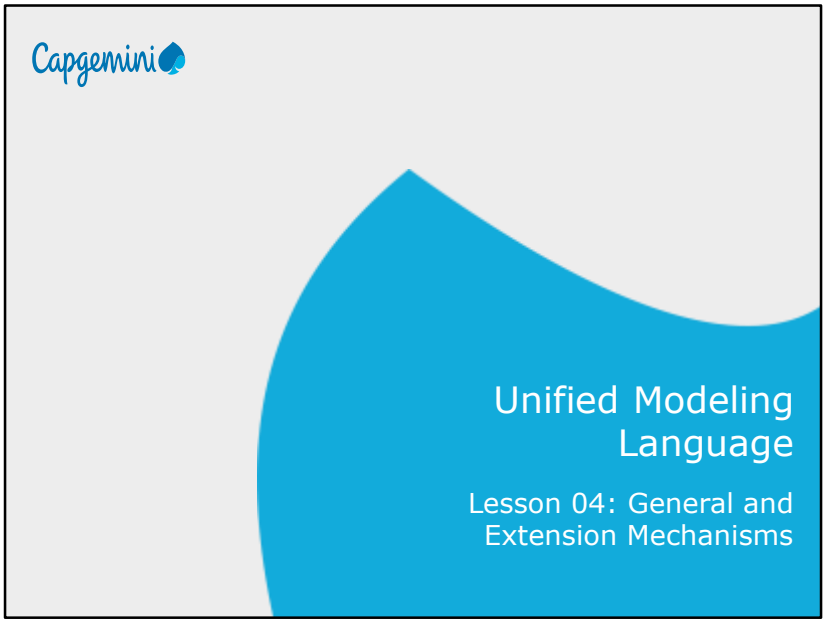

Capgemini
Unified Modeling Language
Lesson 04: General and Extension Mechanisms

Lesson Objectives

- To understand the following topics:
  - General mechanism
    - Adornment
    - Notes
  - Extension mechanism
    - Constraints
    - Tagged Values
    - Stereotypes

4.0: General and Extension Mechanisms

Overview

- General Mechanisms
- Extension Mechanisms

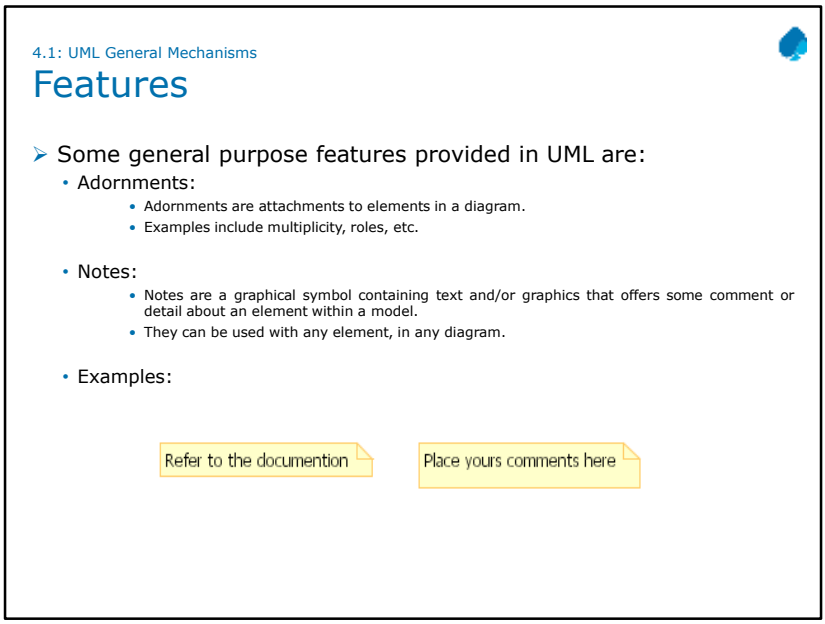
General and Extension Mechanisms:

We have completed our discussions on the various UML views, and their associated diagrams and modeling elements.

We will now focus on the General and Extension mechanisms available in UML.

The General Mechanisms help in giving further details in terms of comments (notes), etc.

The Extension mechanisms help in taking care of situations where existing UML notations may not suffice.



UML General Mechanisms:

General mechanisms include Adornments and Notes.

Adornments are attachments to elements in a diagram.

Notes are used to provide comments or additional documentation about a model element.

4.2: UML Extension Mechanisms

Features

- The Extension mechanism allows modelers to make extensions without modifying the modeling language.
- The extensibility mechanisms are:
  - Constraints
  - Tagged values
  - Stereotypes
- Since this is a deviation from the standard form, it should be used with care.

UML Extension Mechanisms:

UML, being a language, has a fixed set of notations with associated notation and semantics. However, we may need constructs that are not provided for in UML.

Instead of users of UML adding their own notations, UML provides for ways by which extensions can be made to the existing modeling language.

These Extension Mechanisms of constraints, tagged values, and stereotypes are meant for “customizing” and “extending” UML. However, they need to be used with care and should be well documented. After all they still are deviations from the standards.

4.2: UML Extension Mechanisms

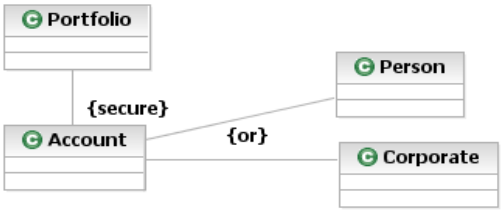
Constraints - Features

- Constraints:
  - Constraints extend the semantics of a UML building block by adding new rules or modifying existing ones.
  - Constraints are used to supply conditions for association, list item, dependency, etc.
  - Constraints can express restrictions and relationships for which no appropriate UML notation is available.

4.2: UML Extension Mechanisms

Examples

- Examples:



UML Extension Mechanisms – Constraints:

Constraints are strings, which are enclosed in curly parenthesis, that are used to add on to the meaning of an existing notation. They are typically used for indicating conditions or restrictions.

For example:

> The relationship between classes Bank Account and Portfolio is shown as a “secure relationship”. The constraint {secure} is added on to the association relationship thereby extending the meaning.
>
> Similarly, the constraint {or} in the example denotes that the bank account class may be related to Person, or the Corporation class.

There are some standard constraints, as well.

> For example: abstract, global, concurrent, etc.

4.2: UML Extension Mechanisms

Tagged Values - Features

- Tagged Values:
  - Tagged Values extend the properties of a UML building block, thus allowing for creation of new information.
  - A tagged value is a pair of strings – tag string and value string.
  - Tagged value can be used with any element to store information.
- For example:

UML Extension Mechanisms – Tagged Values:

Properties of model elements can be extended by using tagged values. A “keyword” indicates the “tag”, and “values” represent “value of tag”.

In case the “value” is omitted, the property is assumed to be Boolean with value as TRUE.

For example:

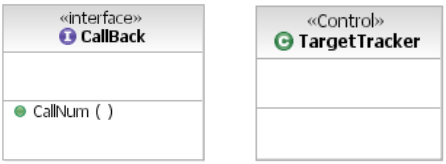
The persistent tag, which is a pre-defined tag, indicates nature of persistence of the class GL account.

The release tag of the TargetTracker class indicates the version of release of this class.

4.2: UML Extension Mechanisms

Stereotypes Features

- Stereotypes:
  - Stereotypes extend the vocabulary of UML to allow for creation of new kinds of building blocks.
  - Stereotypes use existing UML elements.
  - They exist either as predefined or user defined stereotypes.
  - For example:



UML Extension Mechanisms – Stereotypes:

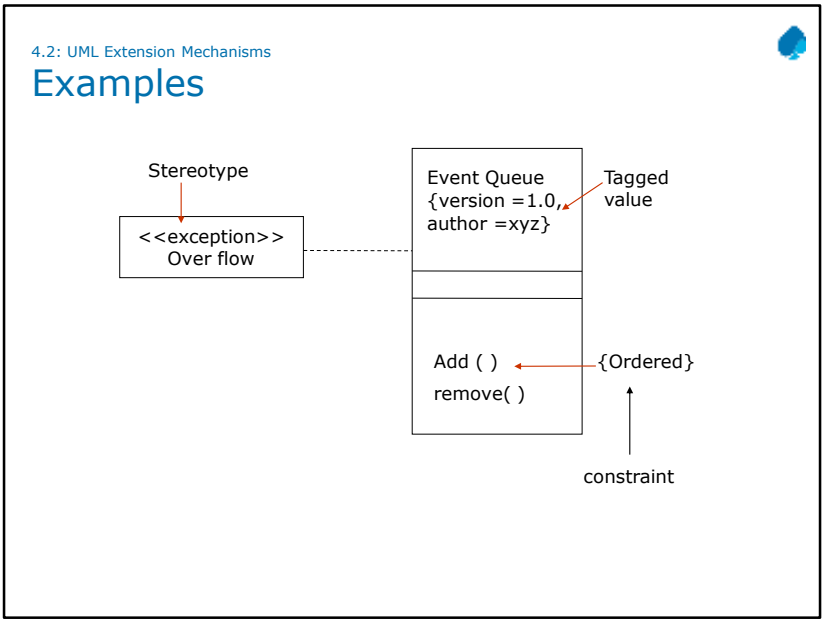
Stereotypes are strings enclosed in guillemots (<< >>). They are mechanisms by which model elements can be “marked” or “classified” to introduce new modeling element.

For example: The interface stereotype may be used to indicate that class may contain only externally accessible methods.

The stereotype control may indicate nature of Target Tracker class as the Control Class in the system.

There are many standard stereotypes.

For example: ‘becomes’ indicates that source and target represent same instances at different points in times, may be with different roles or states.



Examples of UML Extension Mechanisms:

In the Class Diagram shown in the slide, the stereotype “exception” indicates that “Overflow” is a class meant for handling exceptions that occur in the “Event Queue” class.

The tagged values for Event Queue give information about the version and author of the Event Queue.

The constraint “Ordered” associated with the method “Add()” of “Event Queue” denotes that elements are added to the “Event Queue” based on some ordering.

Summary

- In this lesson, you have learnt:
  - General mechanisms include:
    - Adornments: to indicate roles and multiplicity.
    - Notes: that will have some comments.
  - Extensibility mechanisms include:
    - Constraints: Extend the semantics of a UML building block by adding new rules.
    - Tagged values: Allow creation of new information.
    - Stereotypes: Provide mechanisms by which model elements can be marked or classified to introduce new modeling element.

Review Question

- Question 1: ___ is a UML general mechanism used to give additional information about a model element.
- Question 2: The UML extension mechanism ___ can be used to extend the language by adding new notations.

Answers to review question

Question 1: Notes

Question 2 : Tagged Values