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FACULTY OF ENGINEERING & TECHNOLOGY

BCS-503: Object Oriented Techniques

Lecture-04

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OBJECTIVES

In this PPT, you will learn to:

- ❖Identify the evolution, scope and building blocks of UML
- ❖Types of UML Diagrams
- ❖Use Case Diagrams
- ❖Class Diagrams
- ❖Object Diagrams

INTRODUCTION OF UML

- Unified Modeling Language (UML) is a standard language for creating blueprints that depicts structure and design of the software system.
- We can use Unified Modeling Language (UML) for modeling systems that can range between enterprise information systems to distributed Web-based applications.
- There are several tools available, such as Rational Rose, Jude, AgroUML, Visio, and Poseidon, which you can use to design software systems by using Unified Modeling Language (UML).

EVOLUTION OF UML

- The evolution of UML began with the need for a modeling language in which you can develop models of object-oriented software systems.
- During the mid 1970s and late 1980s
- Object-oriented modeling languages were developed for analysis and design of the software.
- The most prominently used languages were:
  - ✓ Booch's Booch'93
  - ✓ Jacobson's Object Oriented Software Engineering (OOSE)
  - ✓ Rumbaugh's Object Modeling Technique-2 (OMT).
- In October 1994, the unification of Booch'93, OMT, and OOSE led to the release of version 0.9 and 0.91 of UML.

SCOPE OF UML

- Rational Software Corporation defines UML as follows: **“The Unified Modeling Language (UML) is a language for specifying, constructing, visualizing, and documenting the artifacts of a software-intensive system.”**
- Artifacts include requirements, architecture, design in terms of classes, objects or interfaces, source code, tests, prototypes, and the software releases of a software system.
- UML can be defined as a language for:
  - ✓ UML is a language for Specifying artifacts
  - ✓ UML is a language for visualizing artifacts
  - ✓ UML is a language for Constructing artifacts
  - ✓ UML is a language for Documenting artifacts

BUILDING BLOCKS OF UML

The building blocks of UML include the components that are necessary for creating models of the software systems. The three types of UML building blocks are:

1. **Basic UML constituents:** **Include the static, dynamic, grouping, and annotational constituents of UML.**

2. **Relationships:** **Depict the relations between various constituents of a UML model.**

3. **Diagrams:** **Represent the various artifacts of a system graphically.**

TYPES OF UML DIAGRAMS

UML provides the following thirteen diagrams to represent the structure and design of a software system:

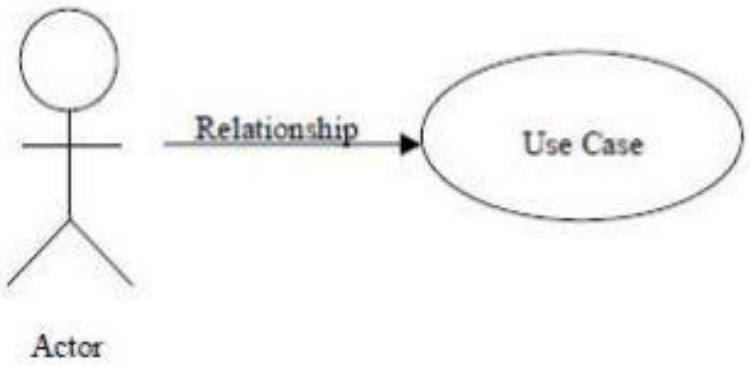
1. Use case diagrams
2. Class diagrams
3. Object diagrams
4. Communication diagrams
5. Sequence diagrams
6. State Machine diagrams
7. Activity diagrams
8. Package Diagrams
9. Component diagrams
10. Deployment diagrams
11. Timing Diagrams
12. Composite Structure Diagrams
13. Interaction Overview Diagrams

USE CASE DIAGRAMS

A use case diagram

- Depicts the various operations that a system performs.
- It contains use cases, actors, and their relationships.
- Use cases are the sequence of actions that form a single unit of work for an actor

The following figure depicts the graphical notation for a use case diagram.

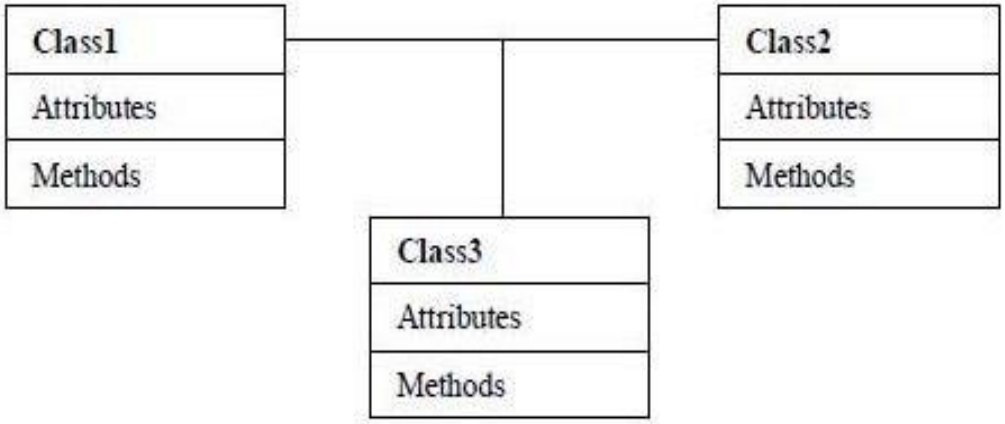


Graphical Notation for a Use Case Diagram

CLASS DIAGRAMS

- A class diagram represents a set of classes, interfaces, and their relationships.
- You can represent a class in a rectangular box with three compartments

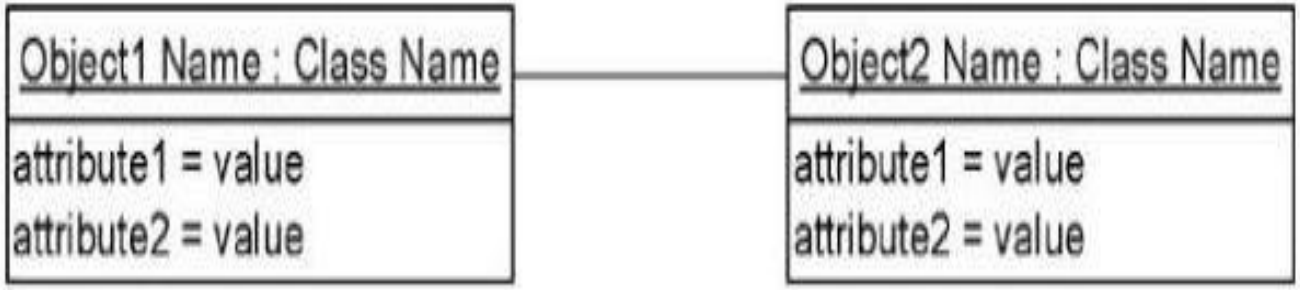
The following figure shows the graphical notation for classes along with their attributes, methods, and relationships.



Graphical Notation for Classes

OBJECT DIAGRAMS

- An object diagram represents an instance of a class diagram.
- You represent an object in a rectangular box with two compartments.



Graphical Notation for an Object Diagram

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8. https://www.tutorialspoint.com/java/index.htm

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Multiple Choice Question:

Q1. What does a simple name in UML Class and objects consist of?

a) Letters

b) Digits

c) Punctuation Characters

d) All of the mentioned

Multiple Choice Question:

Q2. A Class consists of which of these abstractions?

a) Set of the objects

b) Operations

c) Attributes

d) All of the mentioned

Multiple Choice Question:

Q3. A class is divided into which of these compartments?

a) Name Compartment

b) Attribute Compartment

c) Operation Compartment

d) All of the mentioned

Multiple Choice Question:

Q4. An attribute is a data item held by which of the following?

a) Class

b) Object

c) All of the mentioned

d) None of the mentioned

Multiple Choice Question:

Q5. An object symbol is divided into what parts?

a) Top compartment

b) Bottom Compartment

c) All of the mentioned

d) None of the mentioned

Summary

In this PPT, you learned that:

- Unified Modeling Language (UML) is a standard language for creating blueprints that depict the structure and design of the software system. It is used to specify, visualize, construct, and document the artifacts of a software system.
- The building blocks of UML consist of basic constituents, relationships, and diagrams. The basic constituents include the structural, behavioral, grouping, and annotational constituents.
- UML diagrams enable you to visualize the software system by graphical representation of the various constituents.