LESSON TITLE

Country	Cambodia
Language	■ English ■ Local Language
Course Title	Software Engineering
Lesson Title	17. Class Diagram
SME	Mr. TAL Tongsreng
Submission Date	November 03rd, 2015
Version	1.0

Please provide the outline of course which will

☐ A : Text-based + Audio
☐ B : Text-based + Video
☐ C : Only Video

Activity Diagram	
	1. What is a class? 2. Getting Started with Classes in UML 3. Visiblity 4. Class properties 5. Static Parts of Your Classes

Please provide the introduction / overview on this lesson

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☐ C : Only Video

Overview
In this chapter, you are going to learn about • Definition of Class and its usage • Know Class representation in UML • Know types of Visibility • Know Attributes and Methods of a Class • Know Static Attributes and Operations

1. Introduction > 1.2 Learning Content

Please make sure the hierarch of the content is well formed.
Please organize the lesson in 3-5 main topics and use 3-level headings.

Level 1	Level 2	Level 3
1. What is a class?	1.1 Abstraction	
	1.2. Encapsulation	
	1.3. Simple Example	
2. Get started with classes in UML	2.1. Form of class in UML	
	2.2. Attributes	
	2.3. Operations	
3. Visibility	3.1. Package	
	3.2. types of visibility	
	3.3. Example	

Please make sure the hierarch of the content is well formed.
Please organize the lesson in 3-5 main topics and use 3-level headings.

Level 1	Level 2	Level 3
4. Class properties	4.1. Attributes in detail	
	4.2. Operations in detail	
	4.3. Example	
5. Static parts of your classes	5.1. Static Attributes	
	5.2. Static Operations	
	5.3. Example	

1. Introduction > 1.4 Learning Objectives

Please provide objective of the lesson by high light keyword and follow (Audience, Behavior, Condition, Degree) to write the objective

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Objective
Upon completion of this chapter, you will be able to • Define elements in Class Diagram • Identify Classes • Define form of classes in UML • Define package, visibility of a class in Class Diagram • Use Static attribute and operations in Class Diagram

Please provide keywords of the lesson with explanation

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Keywords	Description
Class	a set or category of things having some property or attribute in common and differentiated from ot hers by kind, type, or quality.
Attribute	A state of an object of a class.
Operation	A method, function, what it can do or can be done.
Package	a grouping of related types (classes, interfaces, enumerations and annotations) providing access protection and name space management.
Visibility	An Access control to properties or a class.

☐ A : Fill in the blank
☐ B : Short answer question
☐ C : Multiple Choice

Feedback type
☐ A : Text-based short answer
☐ B : Text-based short answer and more information
☐ C : Video based feedback

Pre-Test

Question	Possible answers	Correct Answer	Feedback of the question
Which one is Person?	1. Paper 2. Gardener 3. Taxi meter	2. Gardener	Paper is thing. Taxi meter is Car.

☐ A : Fill in the blank
☐ B : Short answer question
☐ C : Multiple Choice

Feedback type
☐ A : Text-based short answer
☐ B : Text-based short answer and more information
☐ C : Video based feedback

Pre-Test

Question	Possible answers	Correct Answer	Feedback of the question
Which on is not b elong to Tree?	1. Fruit 2. Leaf 3. Pencil	3	Fruit is produced by Tree. Leaf is a part of th e Tree.

☐ A : Fill in the blank
☐ B : Short answer question
☐ C : Multiple Choice

Feedback type
☐ A : Text-based short answer
☐ B : Text-based short answer and more information
☐ C : Video based feedback

Pre-Test

Question	Possible answers	Correct Answer	Feedback of the question
Which adjective describe a Ball?	1. Orange 2. Rounded 3. Easy-going	1, 2	3. Easy-going describes manner or attitude of person.

2. Learn> Topic: 1. What is a class?

(1) Learning Contents

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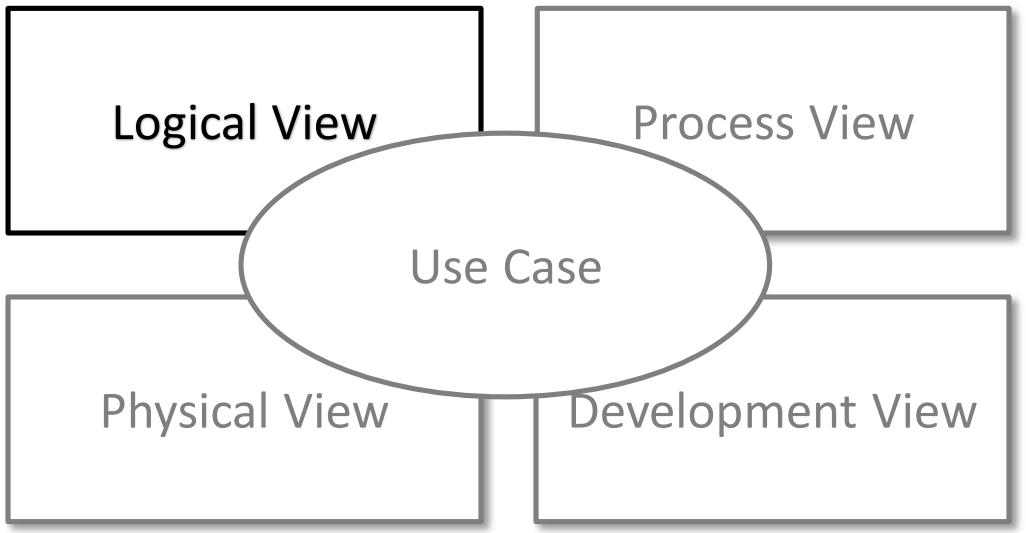
- Classes are at the heart of any object oriented system
- The system's structure is made up of a collection of pieces referred to as objects
- Classes describe the different types of objects



2. Learn> Topic: 1. What is a class?

(1) Learning Contents

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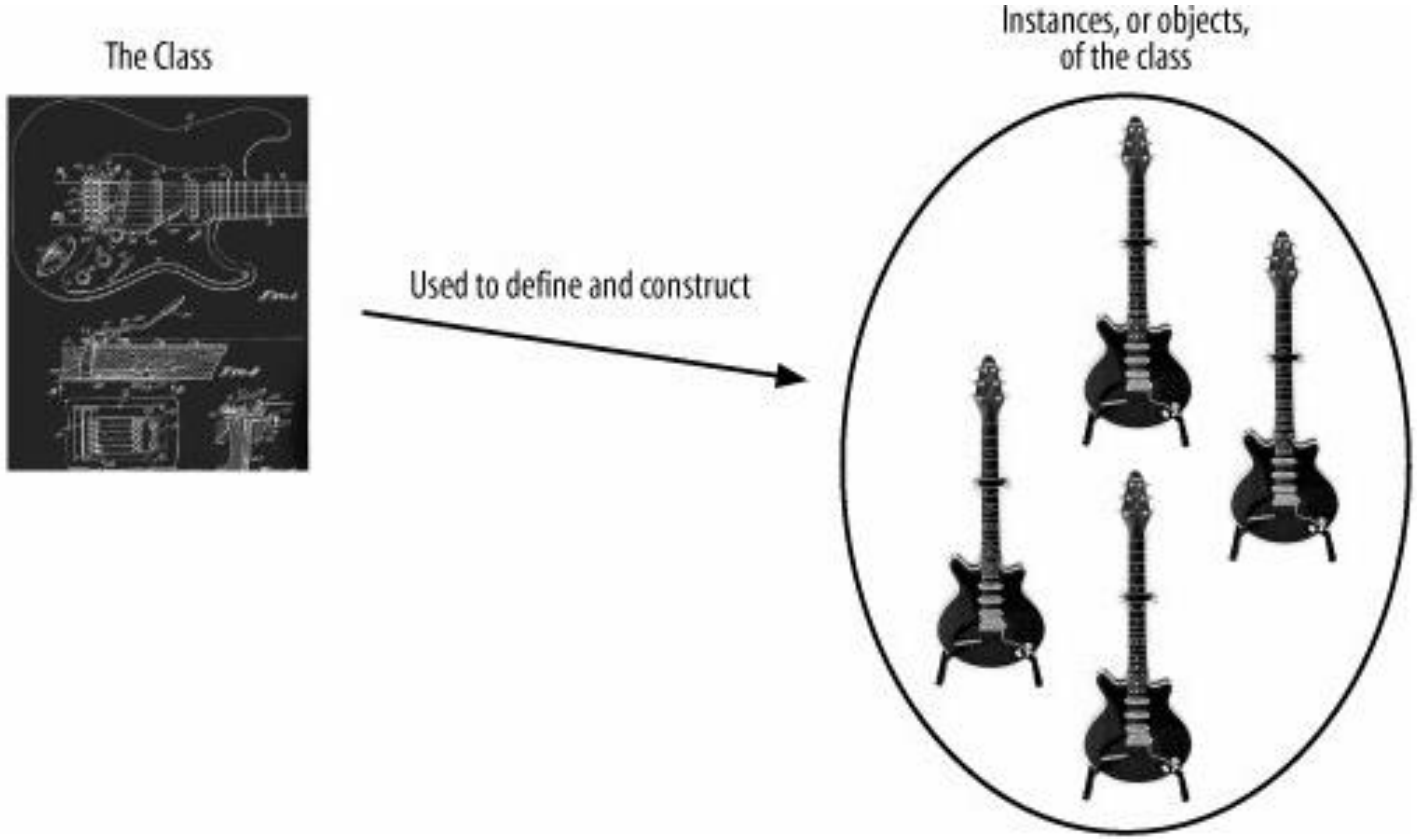
- A class is a type of something
- A class contains 2 pieces of information
  - State information
  - Behavior



2. Learn> Topic: 1. 1. Abstraction

(1) Learning Contents	☒ A : Text-based + Audio ☐ B : Text-based + Video ☐ C : Only Video
	Discarding irrelevant details within a given context ▪ Getting the right level of abstraction for a class is often a real challenge ▪ We should focus on the information that the system needs instead of the one tha t may be irrelevant

2. Learn> Topic: 1.2. Encapsulation

(1) Learning Contents	☒ A : Text-based + Audio ☐ B : Text-based + Video ☐ C : Only Video
	Enables a class to hide the inner details of how it works from the outside ▪ With encapsulation, a class can change the way it works internally as long as tho se internals are not visible to the rest of the system ▪ The changes to what happens inside a class will not have an effect on how the cl ass is interacted

2. Learn> Topic: 1.3. Simple Example

(1) Learning Contents

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Ball class example

- Attributes
  - Size
  - Type
  - Model
  - Price
  - Color
  - Weight
  - Condition
  - …
- Operations
  - Refill wind
  - Change price
  - Shoot
  - …

2. Learn> Topic: 2.1. Form of class in UML

(1) Learning Contents

☒ A : Text-based + Audio
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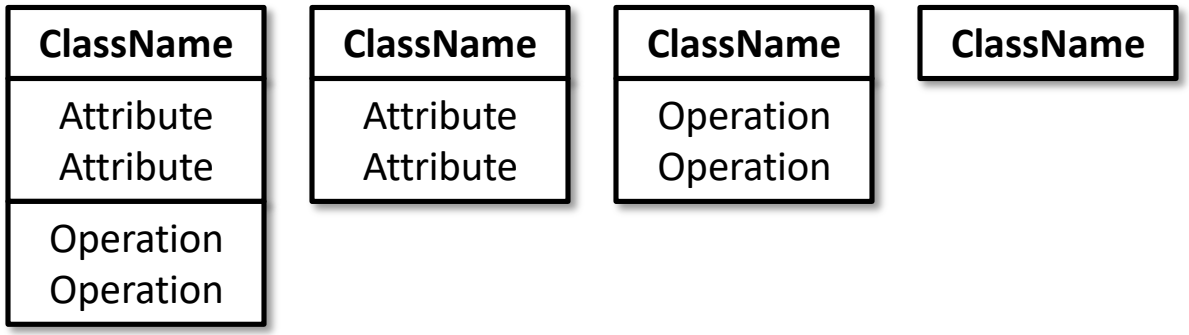
- A class in UML is drawn as a rectangle split into up to three sections
  - The top section contains the name of the class
  - The middle section contains its attributes
  - The final section contains the operations (behaviors that the class exhibits)
- The attributes and operations sections are optional
- Four different ways of showing a class in UML notation



2. Learn> Topic: 2.2. Attributes

(1) Learning Contents	☒ A : Text-based + Audio ☐ B : Text-based + Video ☐ C : Only Video
	▪ Attributes of a class is state of the class. It describes the class. Example: Attributes of Book Class: 1. Color, 2. Number of pages, 3. Weight, 4. Price, 5. Author 6. Editor 7. Title 8. Subtitle 9. Date of publication 10. …

2. Learn> Topic: 2.3. Operations

(1) Learning Contents	☒ A : Text-based + Audio ☐ B : Text-based + Video ☐ C : Only Video
	▪ Class Operations are what an object of a class can do. Example of Book Class: 1. Open the book 2. Open page number 3. Read content in page 4. Update price 5. Put mark on the book 6. Tear a piece of the book 7. Sell the book 8. Close the book 9. …

(1) Learning Contents

☒ A : Text-based + Audio
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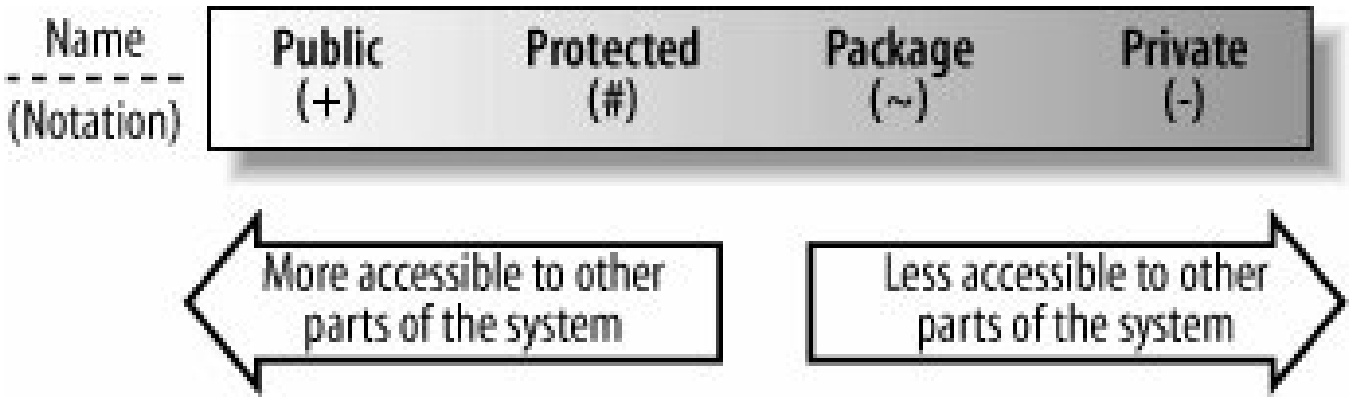
▪ Visibility is the way a class selectively reveals its operations and data to other classes

▪There are 4 different types of visibility that can be used to control access to attributes, operations, and even the classes themselves



2. Learn> Topic: 3.1. Package

(1) Learning Contents	☒ A : Text-based + Audio ☐ B : Text-based + Video ☐ C : Only Video
	▪ Package is a grouping of related types (classes, interfaces, enumerations and annotations) providing access protection and name space management ▪ We can consider package as a classroom or a folder. To access item in that package/classroom/folder, we need to open it and go into it. What if it is locked? Need to have permission!

(1) Learning Contents

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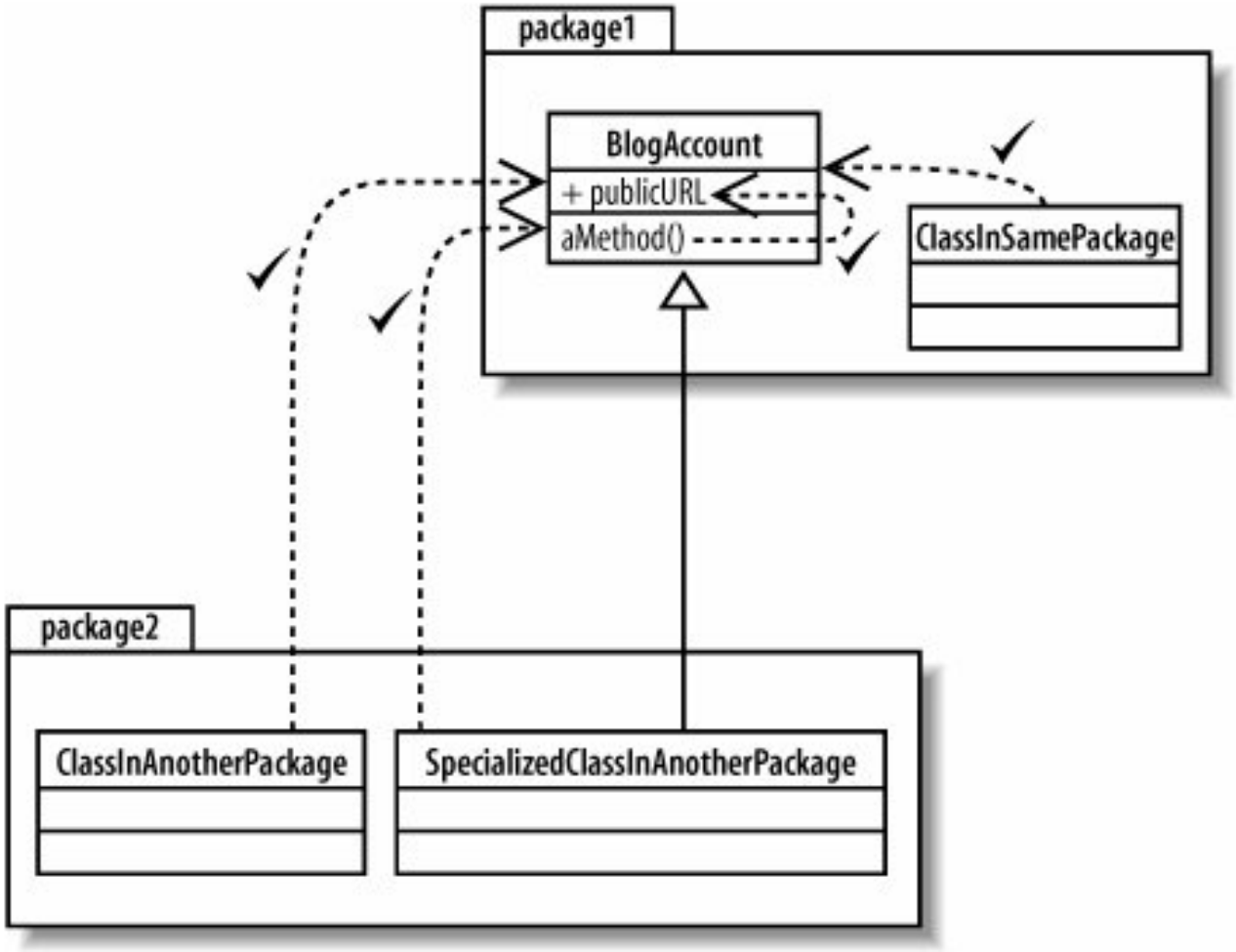
- Public visibility: plus sign (+)



(1) Learning Contents

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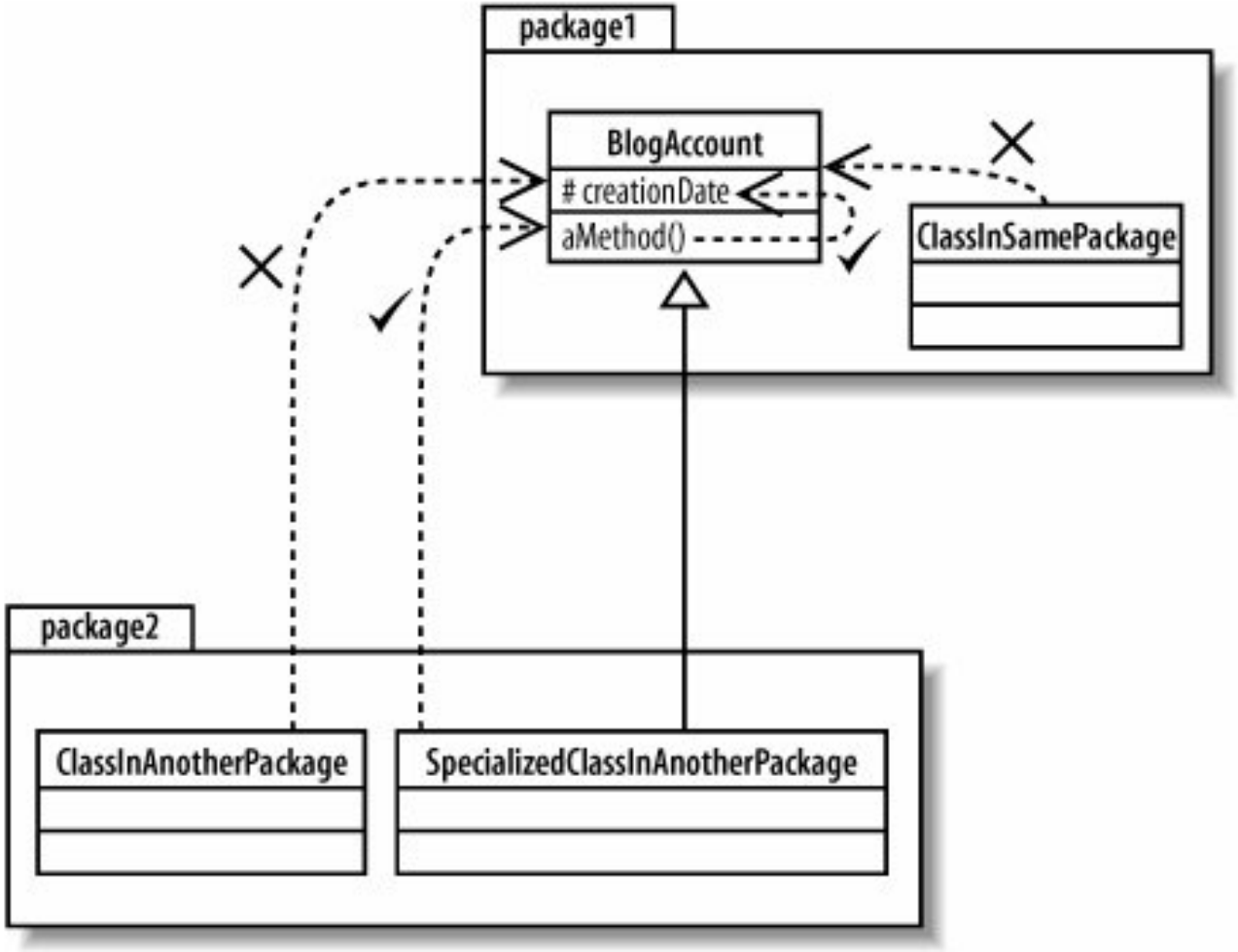
☐ C : Only Video

- Protected visibility: hash symbol (#)



(1) Learning Contents

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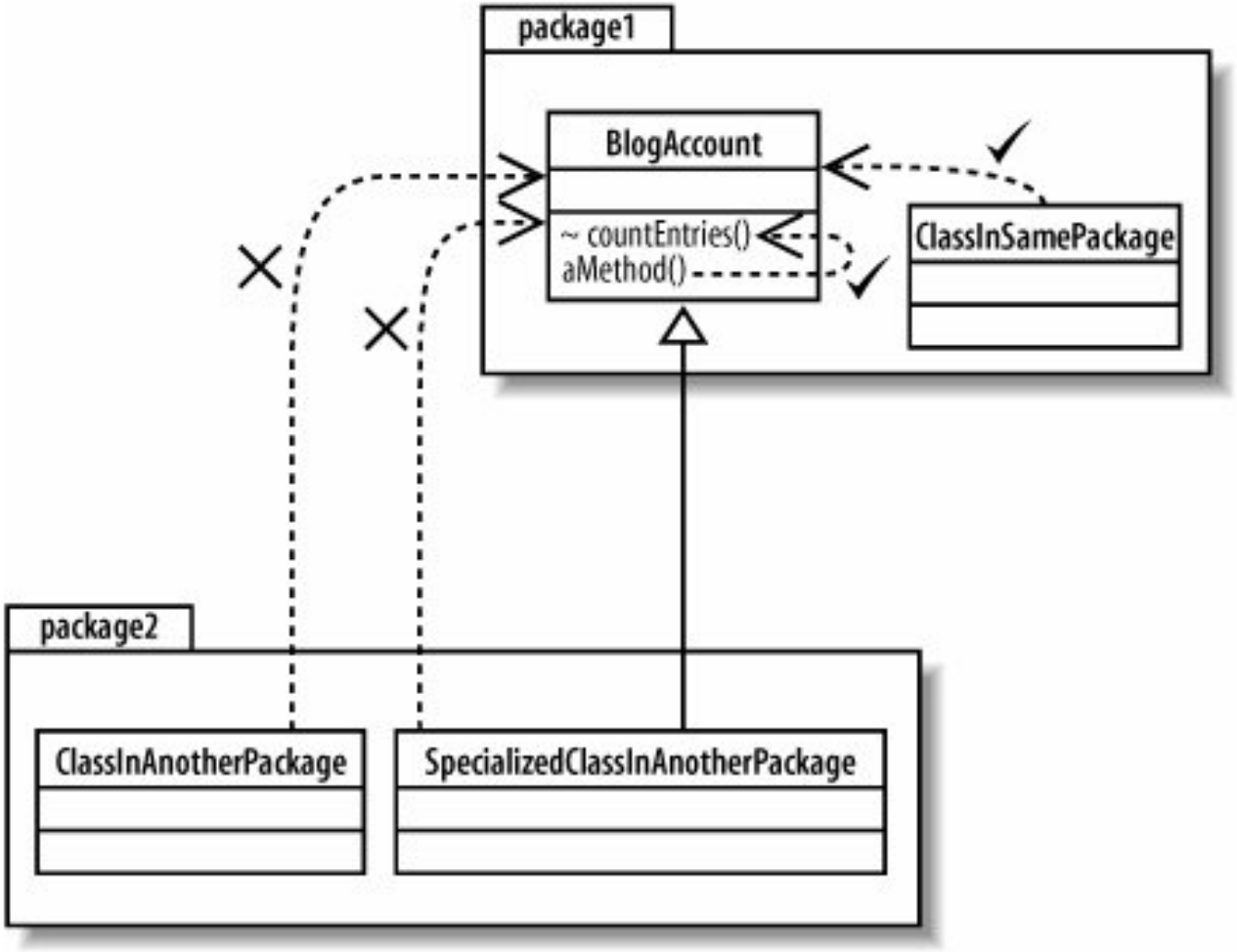
- Package visibility: tilde (~)



(1) Learning Contents

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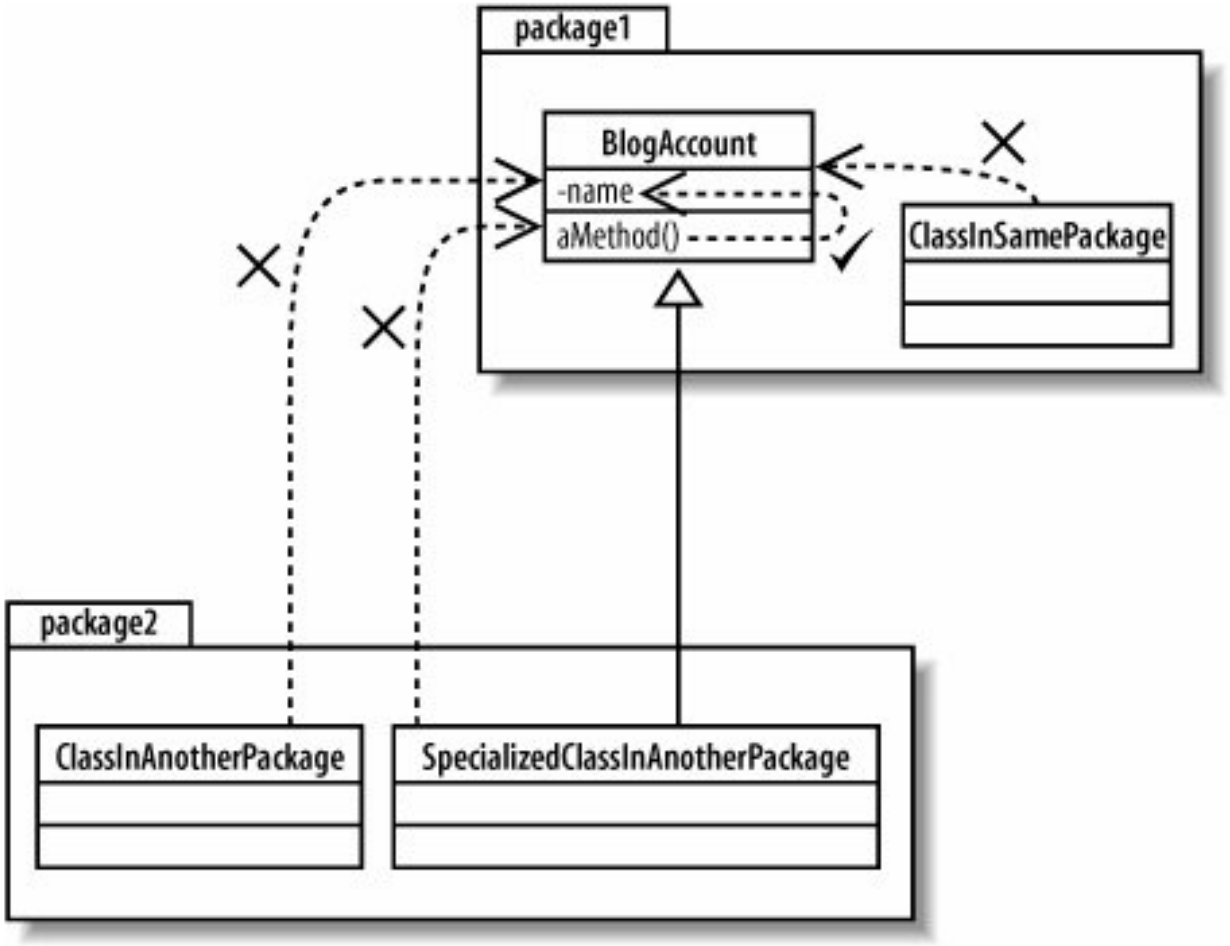
☐ C : Only Video

- Private visibility: Minus sign (-)



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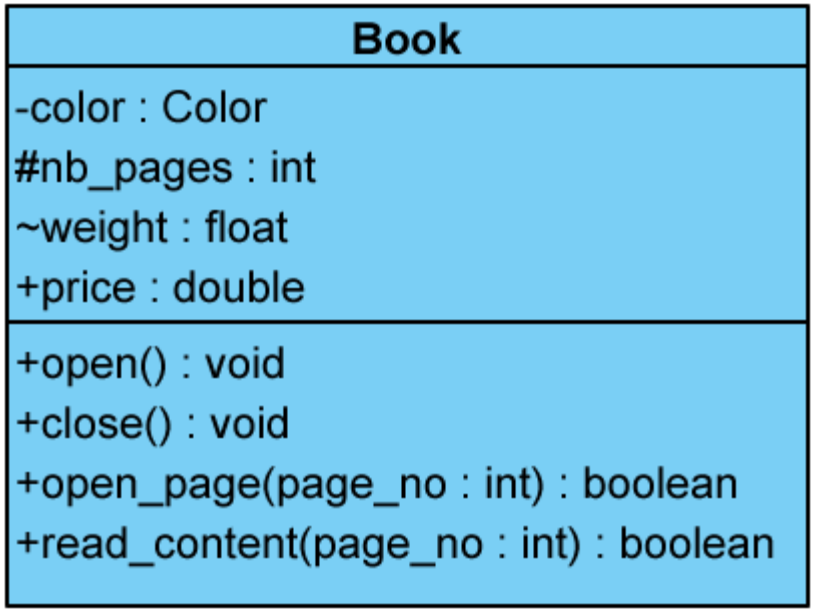

2. Learn> Topic: 4. Class Properties

(1) Learning Contents	☒ A : Text-based + Audio ☐ B : Text-based + Video ☐ C : Only Video

	▪ Class properties contain:
	  ▪ Attributes: have name, visibility, and type
	  ▪ Operations: have name, visibility, return type, and parameter (s)

(1) Learning Contents

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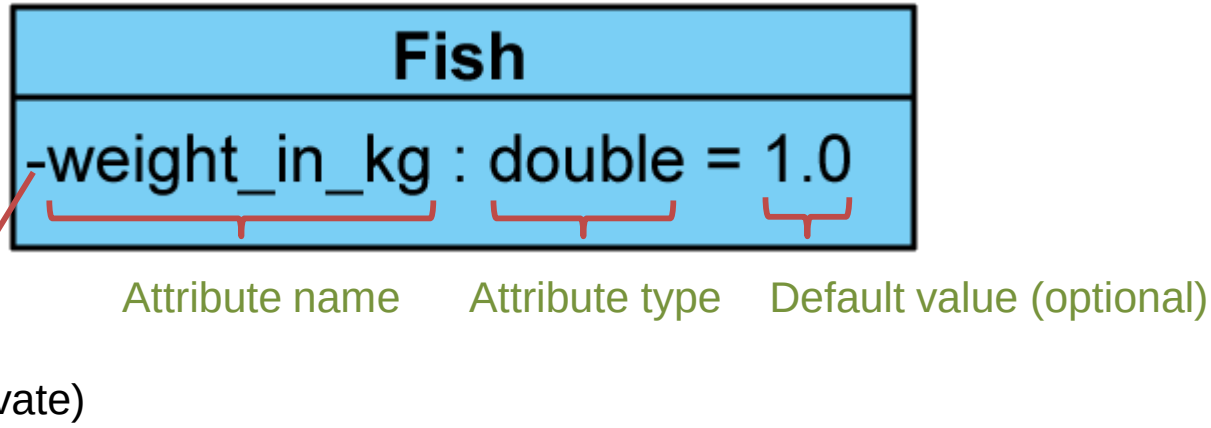
☐ C : Only Video

- Form



- Types:
  - basic types or
  - another Class type

(1) Learning Contents

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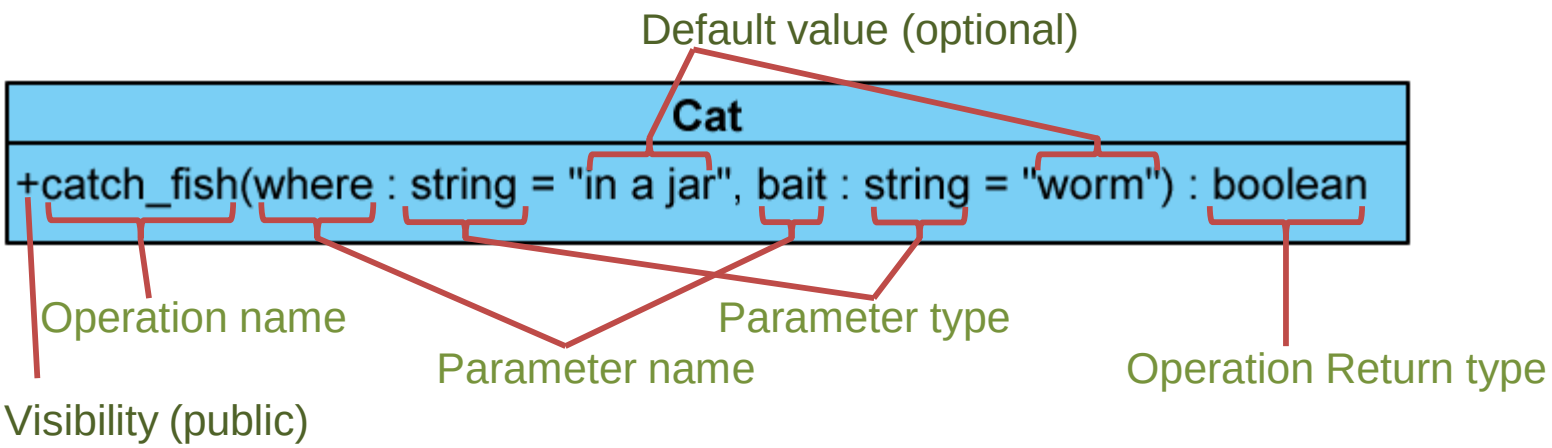
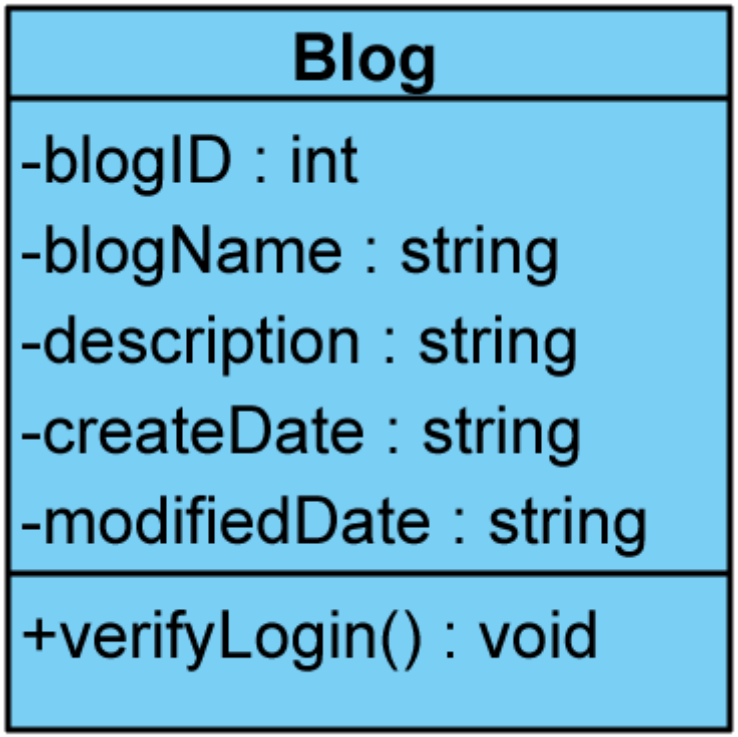
☐ C : Only Video

- Form



- Return Types and Parameter Types:
  - basic types or
  - another Class type

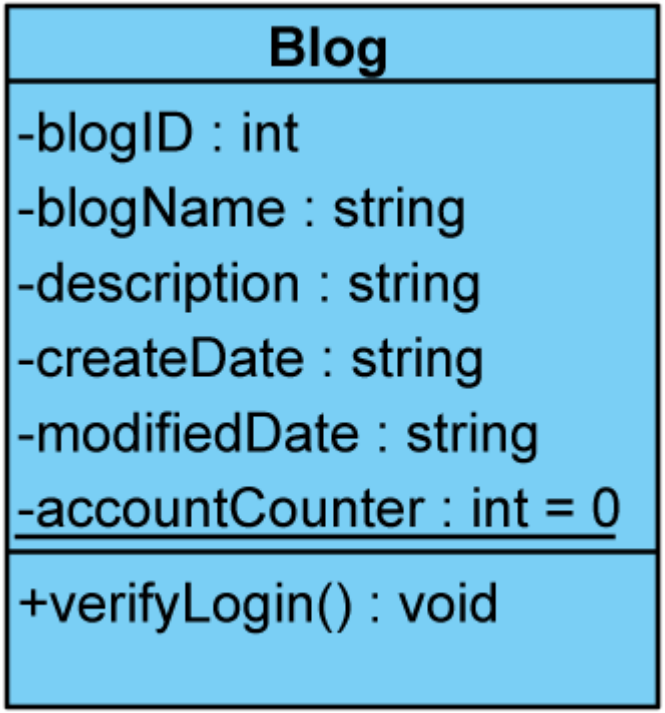
(1) Learning Contents	☒ A : Text-based + Audio ☐ B : Text-based + Video ☐ C : Only Video



(1) Learning Contents

☒ A : Text-based + Audio
☐ B : Text-based + Video
☐ C : Only Video

- Operations, attributes, and even classes themselves can be declared as static
- A static operation or attribute is shared by all of the objects of the same class
- It is associated with the class itself and has a lifetime beyond that of any objects that are instantiated from the class
- In UML, an attribute or operation is made static by underlining it



(1) Learning Contents

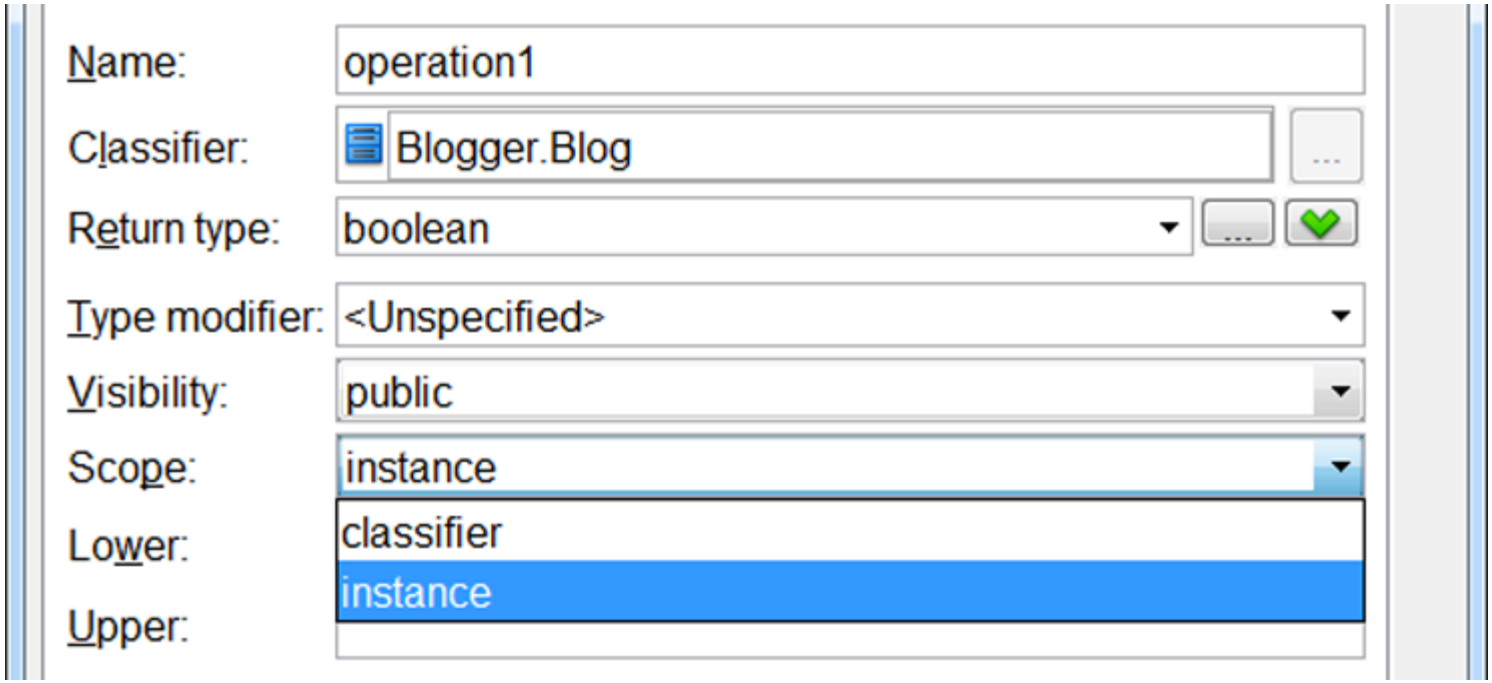
☒ A : Text-based + Audio
☐ B : Text-based + Video
☐ C : Only Video

- Static attributes are called Classifier or Class Variable or Class Attribute
- It is a shared attribute among any other instanced objects of a class
- In Visual Paradigm, we can set an attribute as static by selecting Classifier in sel ect box that contains 2 possible values such as Classifier and Instance.

(1) Learning Contents

☒ A : Text-based + Audio
☐ B : Text-based + Video
☐ C : Only Video

- Static operations are called Classifier or Class Method or Class Operation
- It is a shared method among any other classes that have access permission to t his operation
- In Visual Paradigm, just like static attribute, we can set an operation as static by selecting Classifier in select box that contains 2 possible values such as Classifier and Instance.



(1) Learning Contents

☒ A : Text-based + Audio
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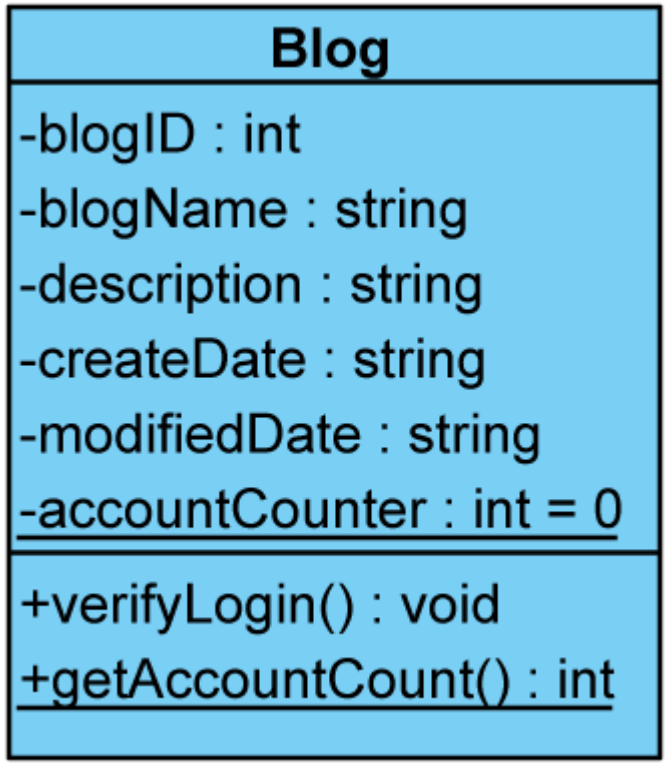
☐ C : Only Video

- Blog Class has 2 static properties:
  - accountCounter of type *int* with initial value is *0*
  - getAccountCount method with return type is *int*



3. Test

Question	Possible answers	Correct Answer
1. Class diagram describes:	a) Physical architecture of the system b) Logical view of the s ystem c) All actions to imple ment the system	b) Logical view of the system
2. Completing blank field:	Static operation is called ……..	Classifier
3. Choose a name that is not Class Di agram Element:	a) Use Case b) Include c) Association d) Activity e) Extends	d) Activity
4. Package is used to:	a) Name and activity b) Group actions perfo rm a specific goal c) Name a group of rel ated types d) Represent optional use cases	b) Name a group of related types
5. What are different between norma l attribute and static attribute?	a) Attribute can not sta tic	c) Life time of it

4. Practice

☐ A : Fill in the blank
☐ B : Short answer question
☐ C : Multiple Choice

Feedback type
☐ A : Text-based short answer
☐ B : Text-based short answer and more information
☐ C : Video based feedback

Practice

No.	Exercise	Solution
1.	Draw Class diagram of ATM system (see detail in Moodle)	
2,	Draw Class diagram of Insurance System	
3,	Draw Class diagram of Check-in-system	

5. Outro > 5.1 Summarize

Please give a lesson summary.
Each topic can be summarized into a sentence, diagram, or even a word.

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Summarize

- Class diagram shows the logical structure of the system.
- Class diagram components include Class and Package.
- A Class contains properties such as attributes and operations.
- Package is to group similar classes and provide access protection and name space.
- Static can be applied to classes, attributes and operations.

Provide references if you think the students need.

Reference

- Miles, R. (2006). Learning UML 2.0. O'Reilly
- Chonoles, M. & Schardt, J. (2003). UML 2 for Dummies. Wiley Publishing
- http://www.visual-paradigm.com/features/
- http://staruml.io/support
- http://staruml.sourceforge.net/v1/documentations.php
- http://www.math-cs.gordon.edu/courses/cs211/ATMExample/UseCases.html

5. Outro > 5.3 Next Lesson

This is the end of the lesson.
Ending message and introduction to next lesson including lesson title and topics should be given.

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☐ C : Only Video

Next Lesson Title	**Advanced Class Diagram** 1. Class Relationships 2. Composition 3. Aggregation 4. Abstract Classes 5. Interfaces