LESSON TITLE

Country	Cambodia
Language	■ English ■ Local Language
Course Title	Software Engineering
Lesson Title	16. Activity Diagram
SME	Mr. TAL Tongsreng
Submission Date	October 04th, 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. Activity Diagram Essentials 2. Activities and Actions 3. Decisions and Merges 4. Doing Multiple Tasks at the Same Time 5. Time Event

Please provide the introduction / overview on this lesson

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

Overview
In this chapter, you are going to learn about • Definition of Activity and Action • Know different Activity and Action • Know how to use Decisions and Merges • Know how to show multi-tasking in Activity diagram • Know how to use Time Event in Activity diagram

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. Activity Diagram Essentials	1.1 Nodes and Actions	
	1.2. Edge or Path	
	1.3. Simple Example	
2. Activities and Actions	2.1. Activities	
	2.2. Action	
	2.3. Example	
3. Decisions and Merges	3.1. Decisions	
	3.2. Merges	
	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. 4. Doing Multiple Tasks at the Same Time	4.1. Forks	
	4.2. Joins	
	4.3. Computer assembly workflow	
5. Time Event	5.1. Time wait	
	5.2. Recurring Time Event	
	5.3. Example	

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

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

Objective
Upon completion of this chapter, you will be able to • Define elements in Activity Diagram • Identify different between Activity and Action • Use conditions in diagram and merge 2 control flows into one • Use Multi-tasking in Activity Diagram • Use Time delay and wait in Activity Diagram

Please provide keywords of the lesson with explanation

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

Keywords	Description
Workflow	the sequence of industrial, administrative, or other processes through which a piece of work passes from initiation to completion.
Node	a point in a diagram at which lines or pathways intersect.
Decision	the action or process of deciding something or of resolving a question.
Fork	the point where something divides into two parts.
Merge	Opposite of fork. Merge combines to form a single entity.

1. Introduction > 1.5 Pre-Test

☐ 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 sentence e xpress an action?	1. This student is v ery clever. 2. My lovely mothe r is preparing me al to pagoda. 3. Books are in libr ary right now.	2. My lovely mo ther is preparin g meal to pago da.	“Very clever” is an adjective represe nts characteristic of a person, so it i s not an action.

☐ 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
Choose the correct order of Activity of making frying egg?	1. Warm the pan with frying oil 2. Take off the shell and put the egg into the pan 3. Buy the eggs from the market	3, 1, 2	

☐ 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

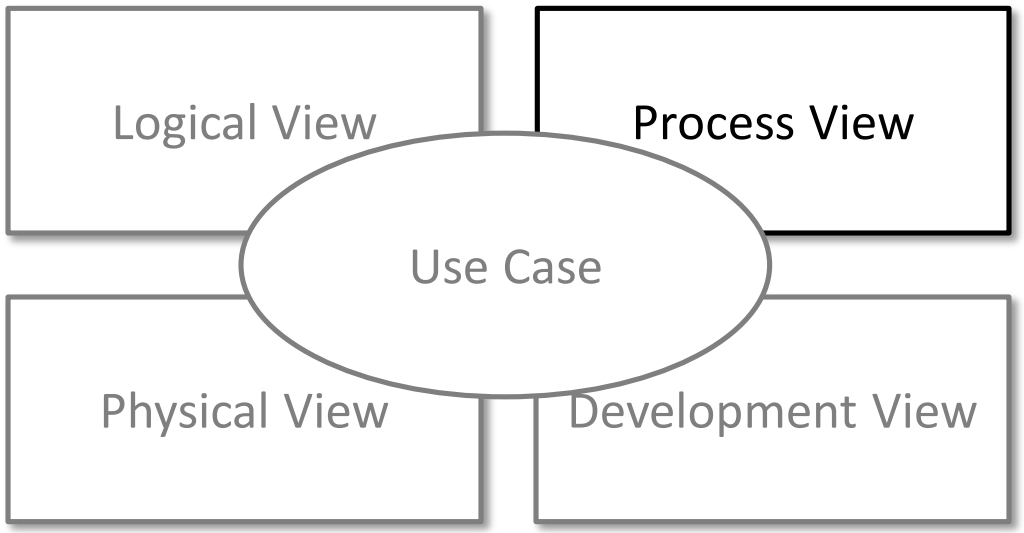
Pre-Test

Question	Possible answers	Correct Answer	Feedback of the question
A Requirement said “System should be able to make a cup of hot coffee 3 in 1.”, Which order of actions is correct?	1. Boil water in a kettle, take a cup, pour water, put coffee 3 in 1, mix it well. 2. Take a cup, put coffee 3 in 1, pour water, mix it well, boil water in a kettle. 3. Boil water in a kettle, put coffee 3 in 1, mix it well, pour water, take a cup.	1	2, is not correct because the coffee is mixed well in the cup with cold water 3, is not correct because the coffee is mixed well in the kettle, then pour it out without the cup.

(1) Learning Contents

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

- Use cases show what your system should do. Activity diagrams allow you to specify how your system will accomplish its goals
- Activity diagrams are particularly good at modeling business processes
- Activity diagrams are the only UML diagram in the process view



2. Learn> Topic: 1. 1. Nodes and Actions

(1) Learning Contents

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

- Initial node
  - Notation: filled circle
  - It marks the start of the activity

- Activity final node
  - Notation: two concentric circles with a filled inner circle
  - It marks the end of the activity

2. Learn> Topic: 1. 1. Nodes and Actions

(1) Learning Contents

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

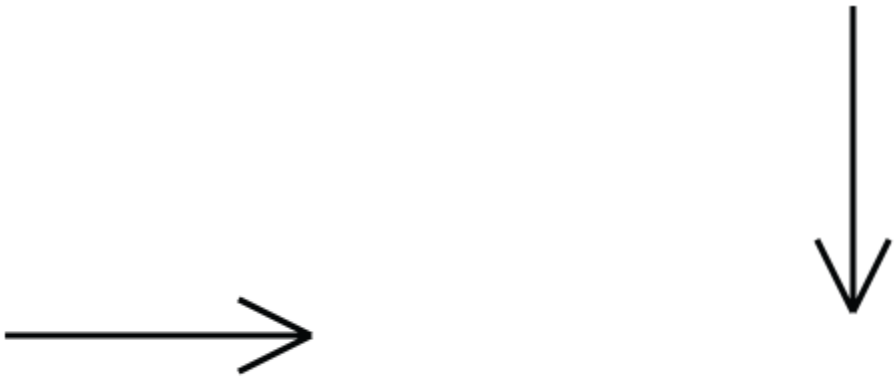
- Action
  - Notation: rounded rectangle
  - Actions are the important steps that take place in the overall activity
  - An action could be:
    - a behavior performed,
    - a computation,
    - or any key step in the process

2. Learn> Topic: 1.2. Edge or Path

(1) Learning Contents

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

- Notation: arrowed line
- It shows the direction of flow from one action to the next
- Incoming edge: a line going into a node
- Outgoing edge: a line exiting a node

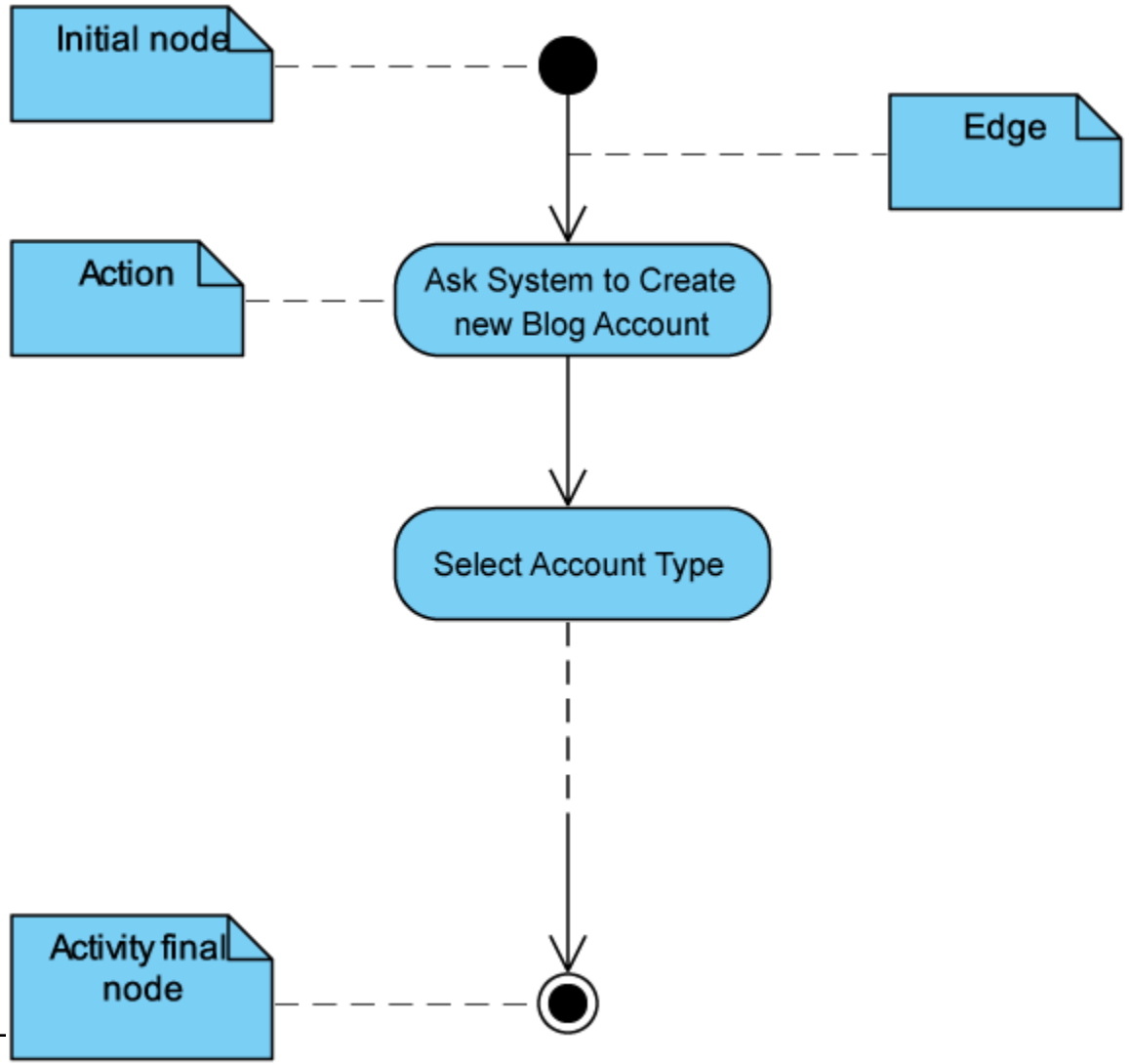


2. Learn> Topic: 1.3. Simple Example

(1) Learning Contents

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

▪ Create new Blog Account example



2. Learn> Topic: 2. Activities and Actions

(1) Learning Contents	☒ A : Text-based + Audio ☐ B : Text-based + Video ☐ C : Only Video
	▪ The word "activity" is often mistakenly used instead of "action" to describe a step in an activity diagram, but they are not the same ▪ An activity is the process being modeled, such as ▪ washing a car ▪ booking a guesthouse ▪ making coffee ▪ An action is a step in the overall activity, such as 1. Lather, 2. Rinse, and then 3. Dry

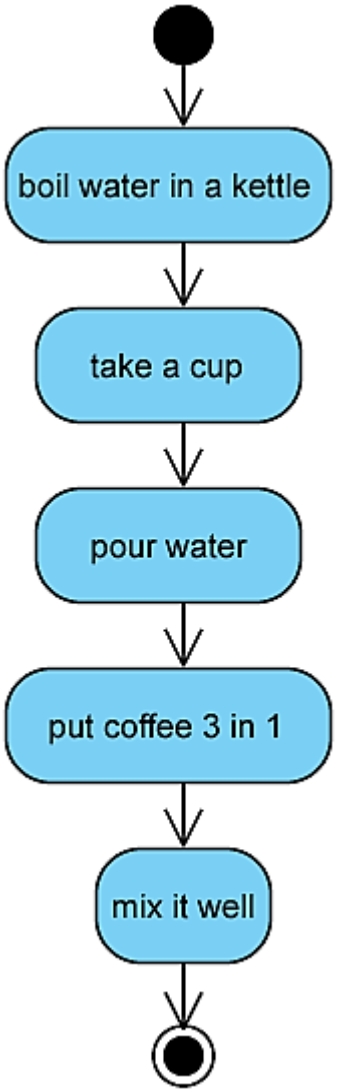
(1) Learning Contents

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

- Activity presents a process or workflow being modeled

Example: Making Coffee activity:

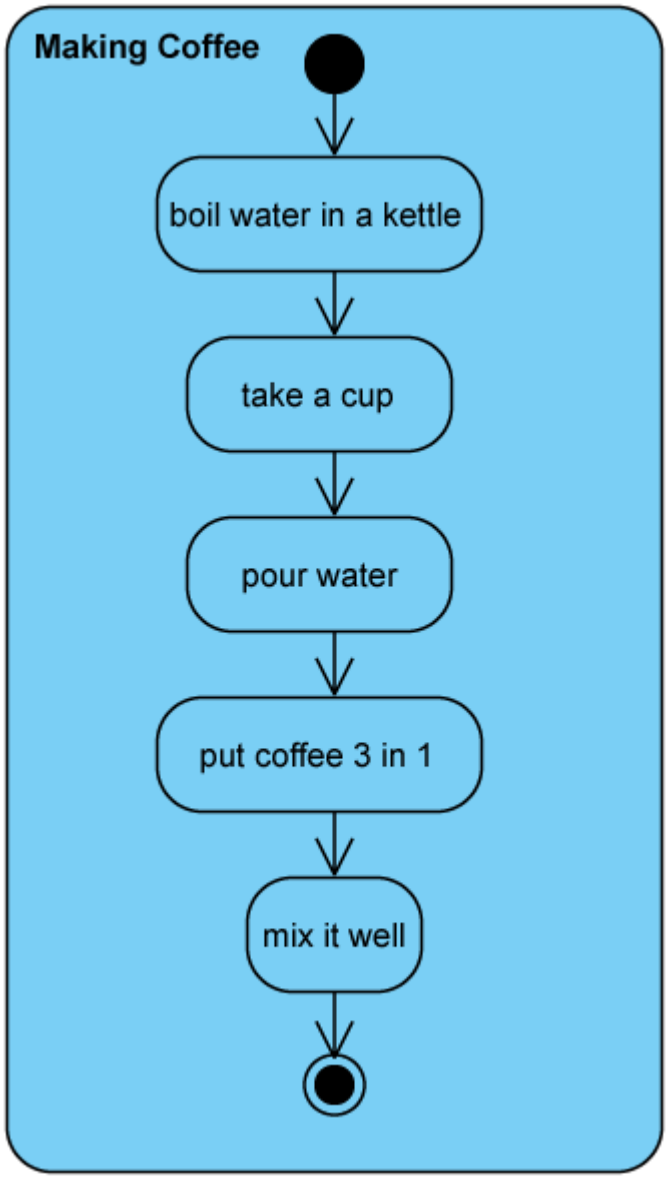
1. First, boil water in a kettle,
2. take a cup,
3. pour water,
4. put coffee 3 in 1,
5. mix it well



(1) Learning Contents

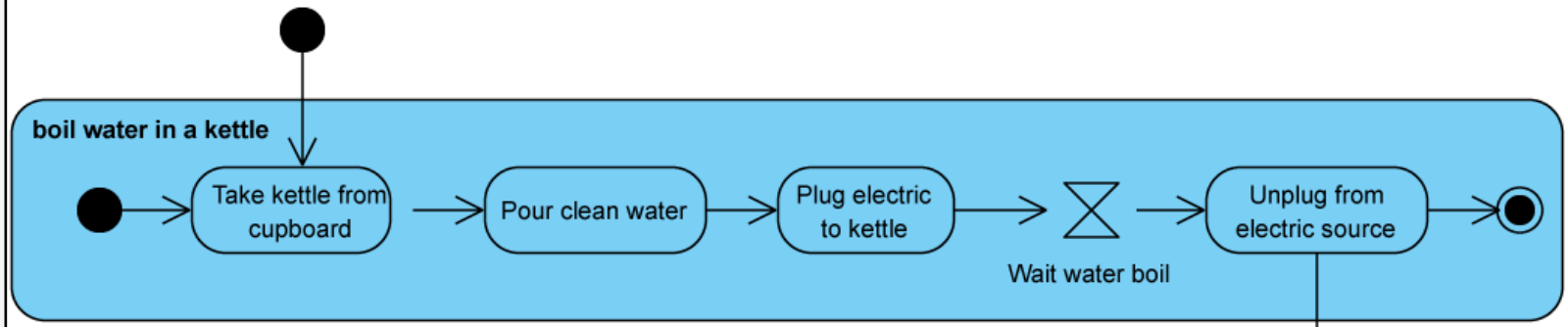
☒ A : Text-based + Audio
☐ B : Text-based + Video
☐ C : Only Video

- Activity Frame
  - Notation: rounded rectangle
  - It encloses the entire activity
  - The name of the activity is put in the upper left corner

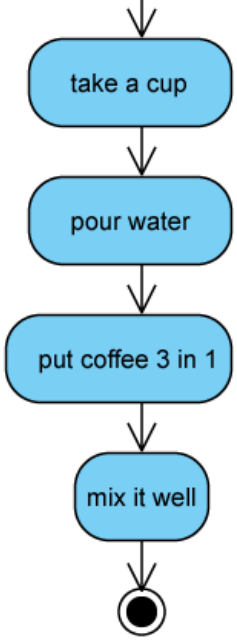


(1) Learning Contents

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



- Action is a step in overall Activity
  Each step of making coffee Activity is an action.
  An action can become activity when that action contains more actions to do (it becomes Activity Frame).
  Example: Boil water in a kettle:
  1. Take the kettle from the cupboard
  2. Pour clean water from a tab into the kettle
  3. Plug the electric to kettle and heat the kettle
     (Suppose that the kettle is electric kettle)
  4. Wait until the water boil
  5. Unplug the kettle from electric source



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

- Washing car workflow:
  1. Lather,
  2. Rinse, and then
  3. Dry

2. Learn> Topic: 3. Decisions and Merges

(1) Learning Contents

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

- Decision

  Decisions are used when you want to
  execute a different sequence of actions depending on a condition

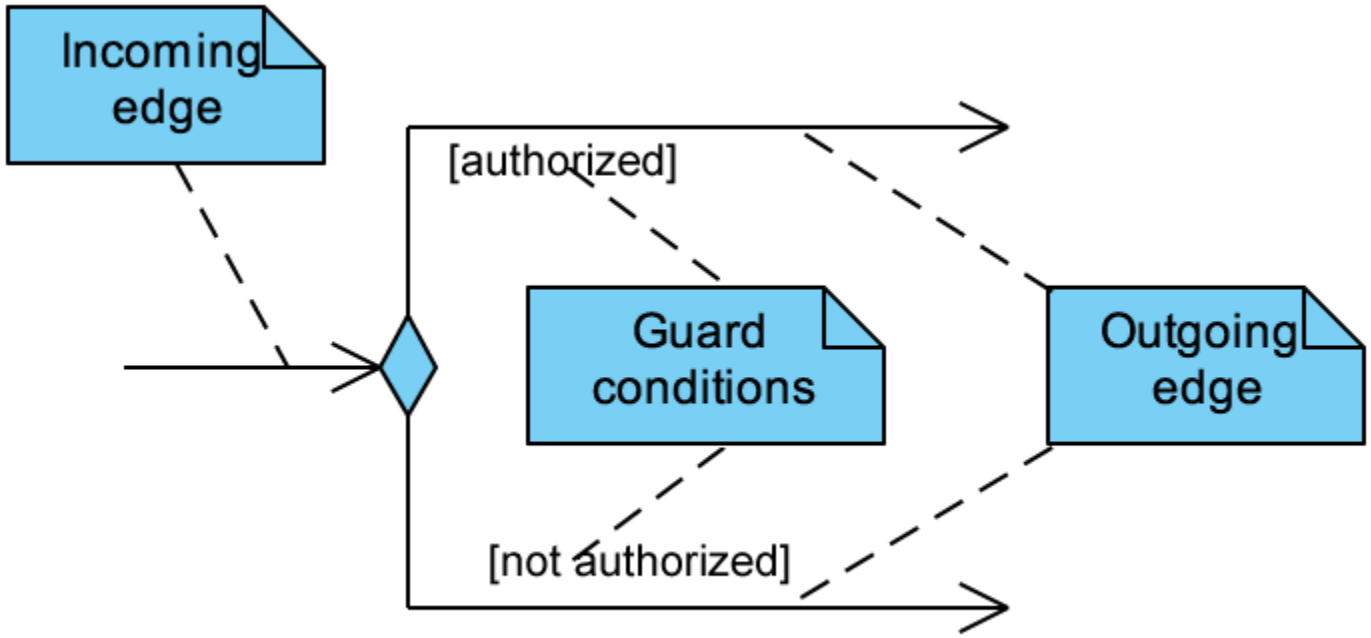
- Merge

  The branched flows join together at a merge node,
  which marks the end of the conditional behavior started
  at the decision node

(1) Learning Contents

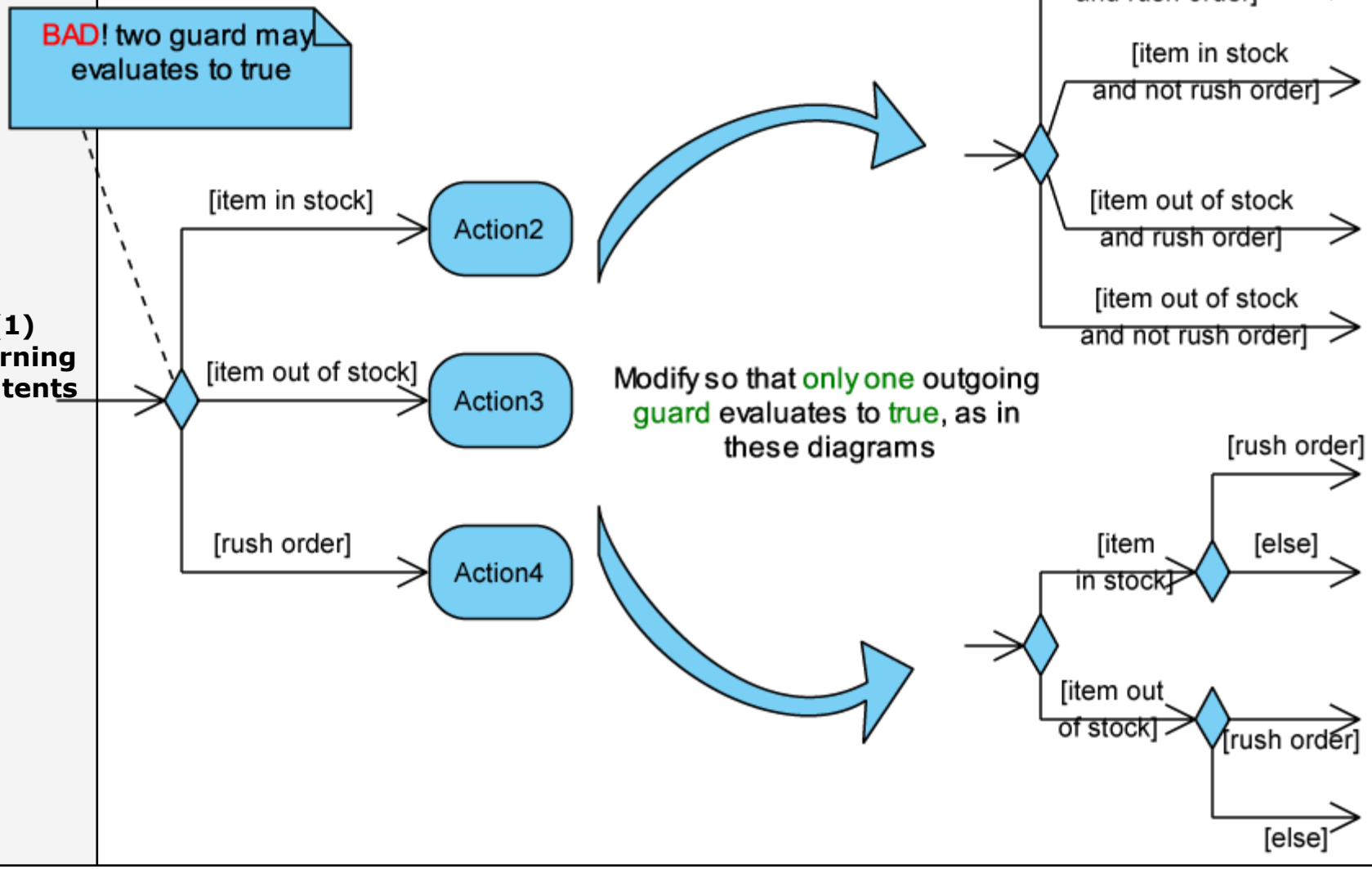
☒ A : Text-based + Audio
☐ B : Text-based + Video
☐ C : Only Video

- Notation: diamond-shaped node with one incoming edge and multiple outgoing edges
- Each branched edge contains a guard condition written in brackets
- Guard conditions determine which edge is taken after a decision node
- Guard conditions are statements that evaluate to true or false



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

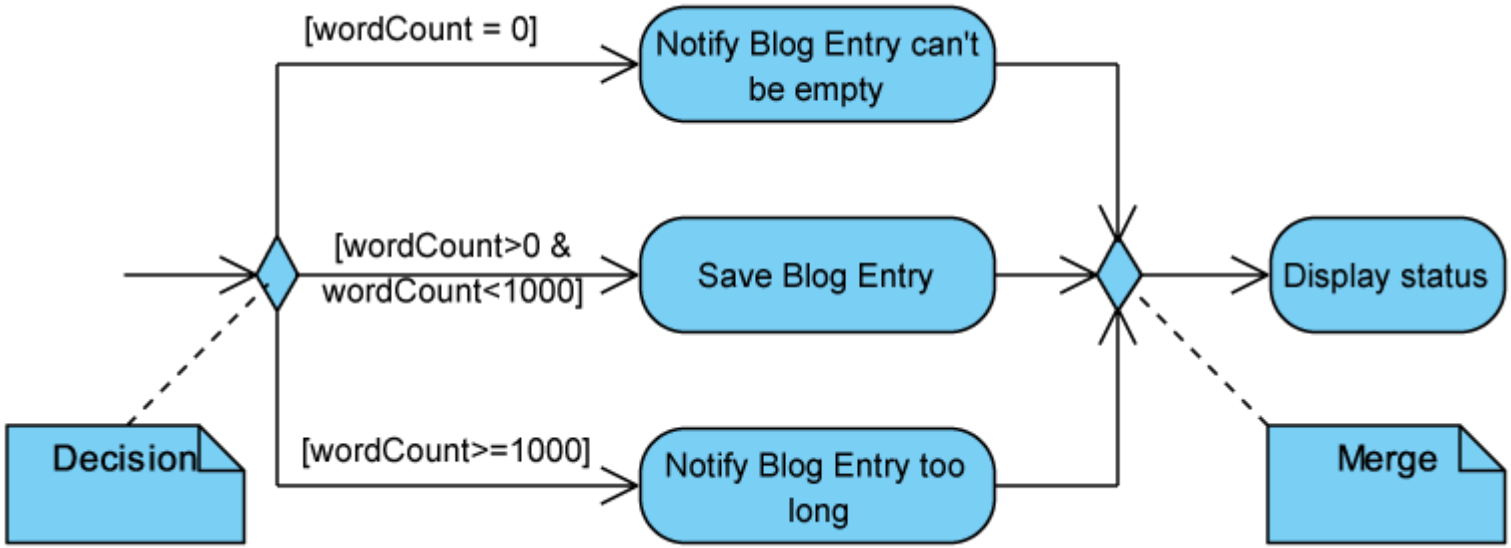
(1) Learning Contents



(1) Learning Contents

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

▪ Notation: diamond-shaped node with multiple incoming edges and one outgoing edge



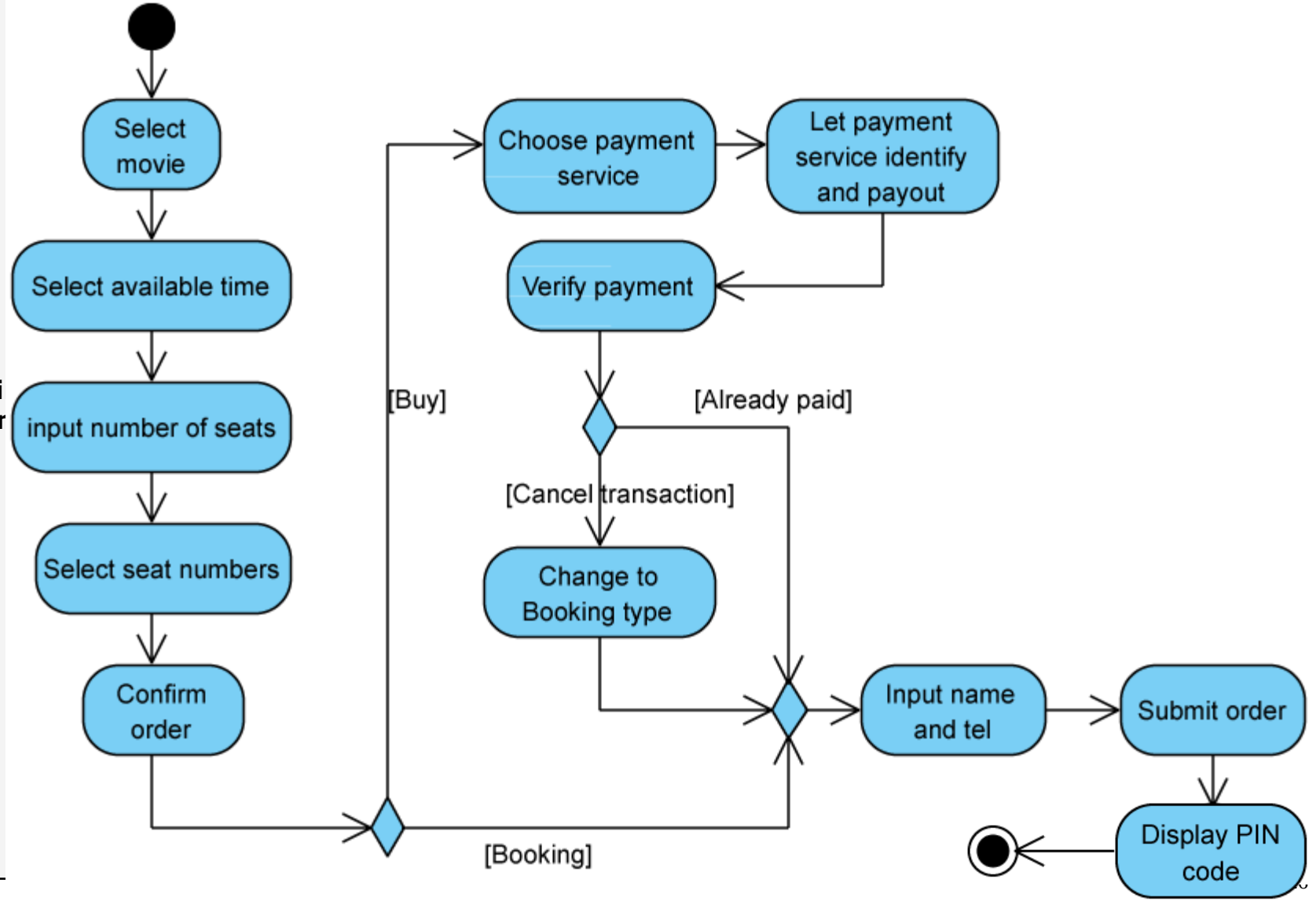
2. Learn> Topic: 3.3. Example

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

	▪ Movie ticket buying and reservation system, user can:
	  ▪ select a movie
	  ▪ select available time
	  ▪ input number of seats
	  ▪ choose the available seat number (s)
	  ▪ confirm order
	  ▪ choose between book or buy the ticket directly
	  ▪ In case booking:
	  ▪ input detail information including name and tel
	  ▪ In case buying:
	  ▪ choose payment service (PayPal, Wing, Amk, TrueMoney, etc.)
	  ▪ let payment service identify user account and payment
	  ▪ verify payment service to make sure that user has already been paid
	  ▪ If user cancel transaction, let user make booking
	  ▪ otherwise, let user input detail information including name and tel
	  ▪ submit order

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

(1) Learni Conter



2. Learn> Topic: 4. Doing Multiple Tasks at the Same Time

(1) Learning Contents

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

- Some tasks can be done in parallel.

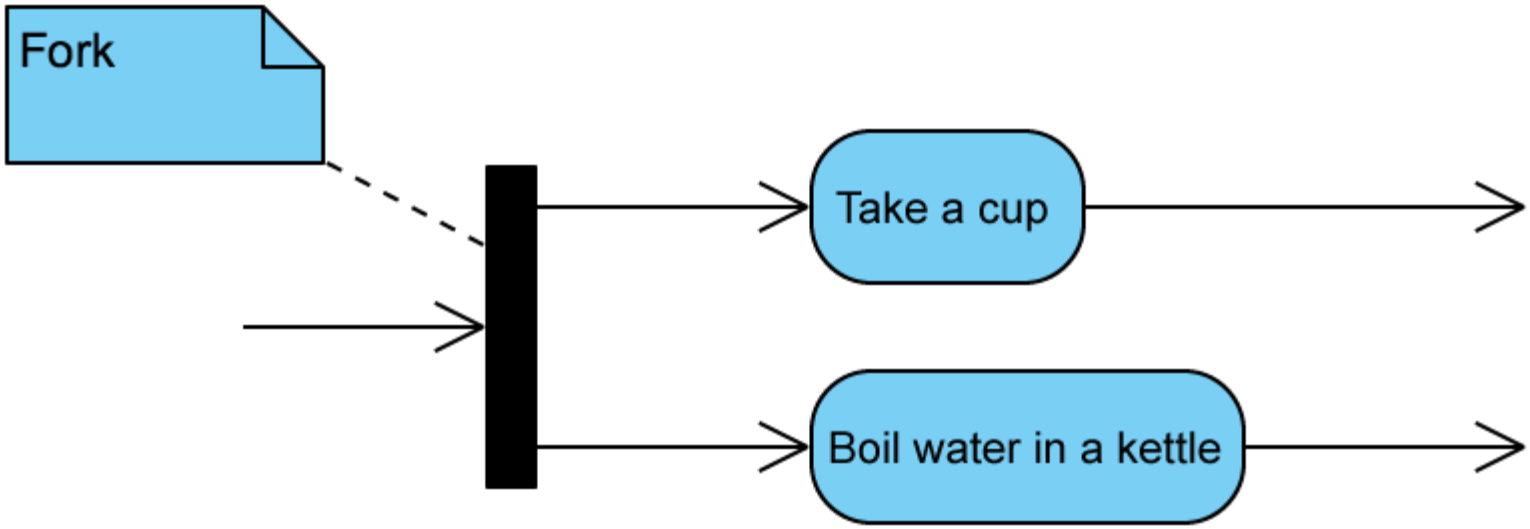
Doing this to:

- Shorten the time we work
- Make an activity to be done by multiple persons (share the work)
- Reduce time wait

(1) Learning Contents

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

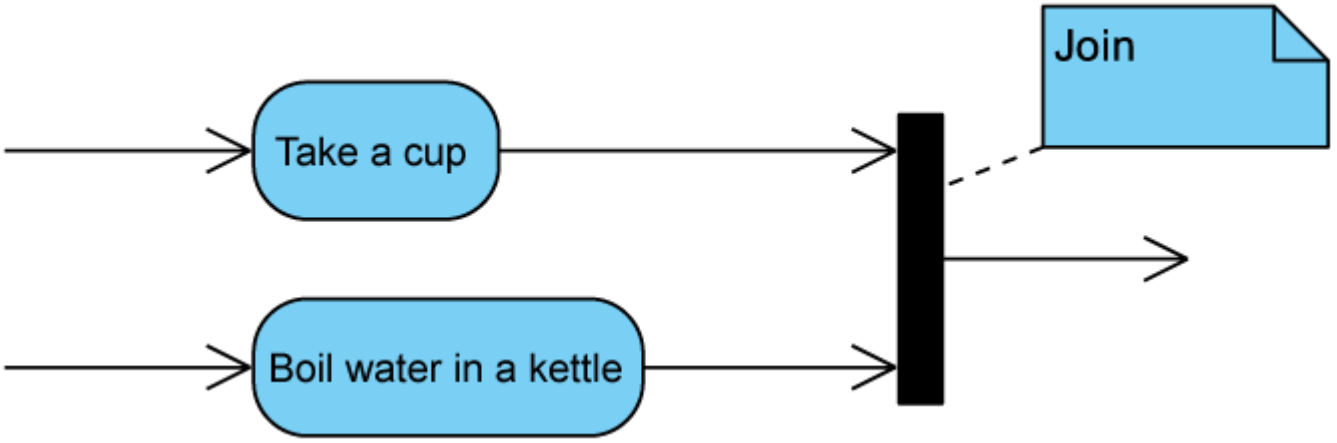
- Fork is the point where workflow divides into two or more parts
- Notation: thick bar
- After a fork, the flow is broken up into two or more simultaneous flows
- the actions along all forked flows execute
- Forks have multiple outgoing flows
- For example, in making coffee workflow, we can boil the water and at the same time, we take a cup and put coffee 3-in-1.



(1) Learning Contents

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

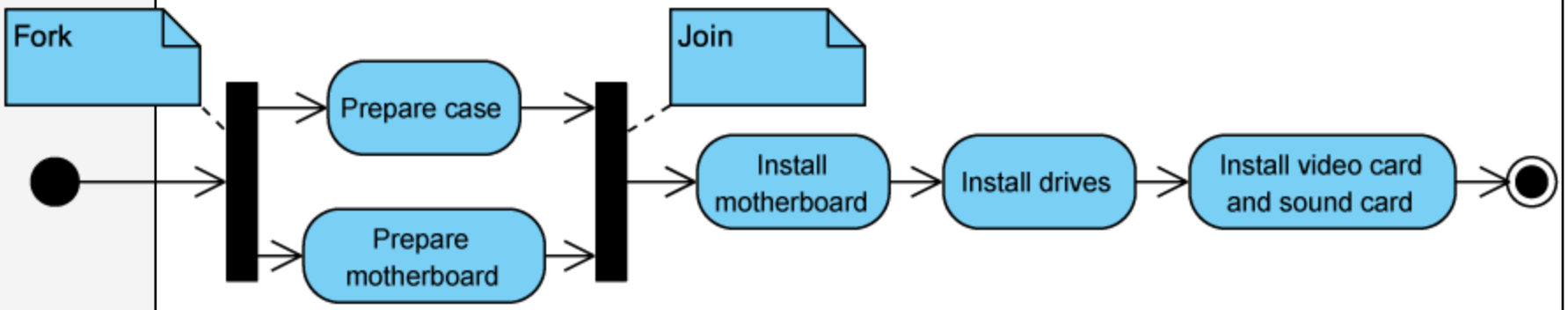
- Join is to connect many fork flows together into one flow
- Notation: thick bar
- All incoming actions must finish before the flow can proceed past the join
- Join have multiple incoming flows



(1) Learning Contents

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

- Example: computer assembly workflow
  1. Prepare the case
  2. Prepare the motherboard
  3. Install the motherboard
  4. Install the drives
  5. Install the video card and sound card
- This work flow is modeled ***sequentially***
- But Prepare case and prepare motherboard can done in parallel.



(1) Learning Contents

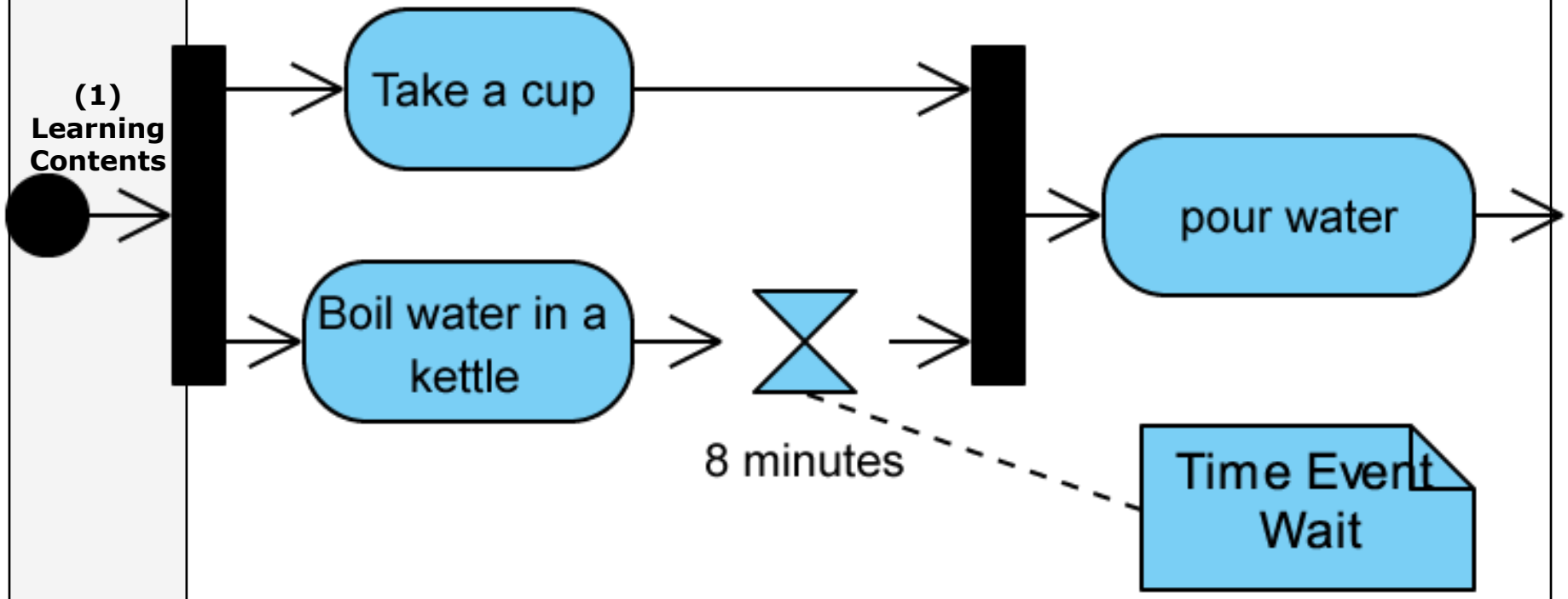
☒ A : Text-based + Audio
☐ B : Text-based + Video
☐ C : Only Video

- Sometimes time is also a factor in your activity
  - Example in Making coffee workflow,
    boiling water action is required to wait until water boil.
  - Example in Online ordering products process,
    after buying, client needs to wait for transportation period of 3 days.

event time

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

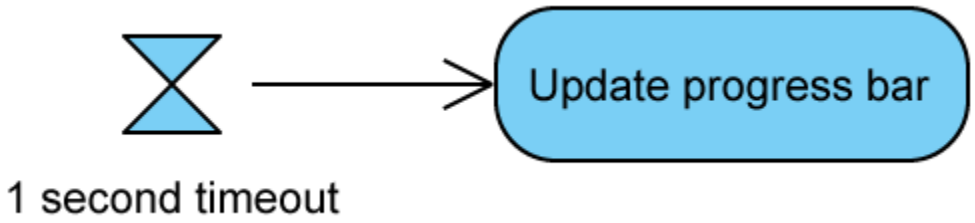
- Time event is used to model a wait period
  - Notation: an hour glass symbol with the amount of time written next to it
  - The incoming edge to the time event indicates that the time event is activated once



(1) Learning Contents

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

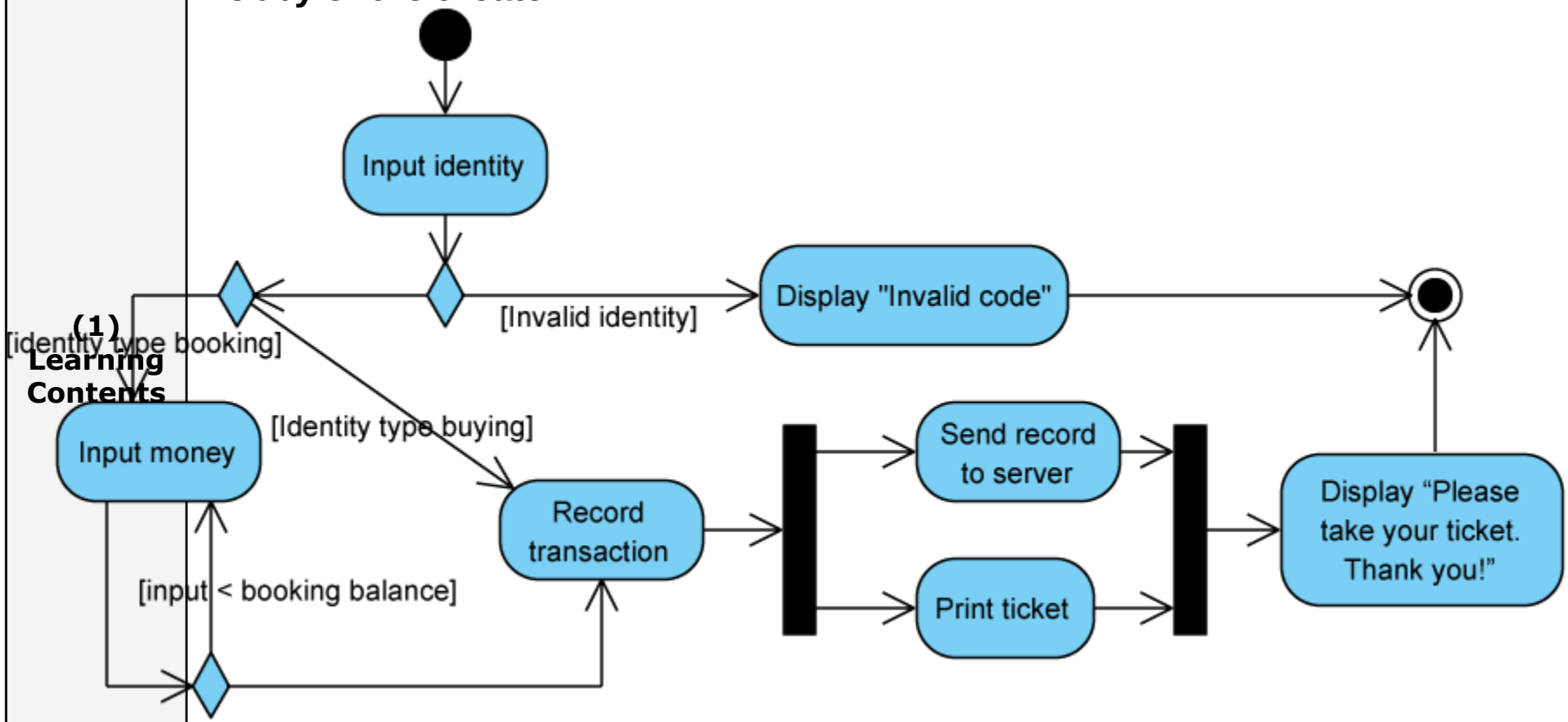
- A time event with no incoming flow is a recurring time event
- It can be an alternative way to start an activity (which is launched periodically)



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

	Lobby of the theater
	This example is continued from previous ticket booking system. This system is to p rint the ticket, buy and check booking or buying (phone number and PIN code).
	The system:
	▪ Let user input the identity (phone number and PIN code)
	▪ In case invalid identity, reject it with message “invalid code”
	▪ Otherwise,
	  ▪ In case booking, ask user to pay in place, wait until user input enough mone y
	  ▪ Send information server to store as history and accounting
	  ▪ At the same Print ticket
	  ▪ And also display message “Please take your ticket. Thank you!”

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



3. Test

Question	Possible answers	Correct Answer
1. Activity diagram describes:	a) Activities of development process b) how your system will accomplish its goal c) Process of making activity d) All features in project	b) how your system will accomplish its goal
2. Completing blank field:	Activity diagrams are particularly good at modeling……	business processes
3. Choose a name that is not Activity Diagram Element:	a) Time Event b) Action c) Association d) Activity e) Decision	c) Association
4. Activity Frame is used to:	a) Name and activity b) Group actions perform a specific goal c) Represent an action that has name d) Sub System e) Represent optional actions	b) Group actions that has the same goal
5. What are different between Fork and Decision?	a) Incoming flow is only one	b) Has many Outgoing flows c) Execution flow

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 Activity diagram of ATM system (see detail i n Moodle)	
2,	Draw Activity diagram of Insurance System	
3,	Draw Activity 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.

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

Summarize

- Activity diagram shows the process of the system.
- Activity diagram components include Initial node, final node, action, activity, control flow, decision, merge, fork and join.
- Control IF…ELSE is represented with Decision node, then Merge node to merge back.
- Forks are used to enable us do multiple tasks at the same time, and Joins are used to eliminate multi-tasking.
- Time Event has 2 types including waiting time and event trigger time.

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.

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

Next Lesson Title	**Class Diagram** 1. What is class? 2. Getting started with classes in UML 3. Visibility 4. Class properties 5. Static parts of your classes