WIA2002: Software Modelling
Semester 1, Session 2016/17

Lecture 7: Business Process Modelling -
UML Activity Diagrams

Learning Objectives

- Understand the purpose of activity diagrams.
- Understand the best practices to follow when modelling business processes.
- Understand the notation of activity diagrams.
- Be able to draw activity diagrams.

Activity diagrams

- Portray the primary activities and the relationships among the activities in a process.
- Can be used to model everything:
  - Model a **high-level business workflow** that involves many different use cases.
  - Model the **details of an individual use case**.
  - Model the specific details of an **individual method**.
- In a nutshell, activity diagrams can be used to model any type of process.

Purpose of Activity Diagrams

Purposes:

- to model a task.
- to model the behaviour in a business process independent of objects.
- to describe a function of a system represented by a use case.
- to describe the logic of an operation.
- to model the activities that make up the life cycle in the Unified Process.

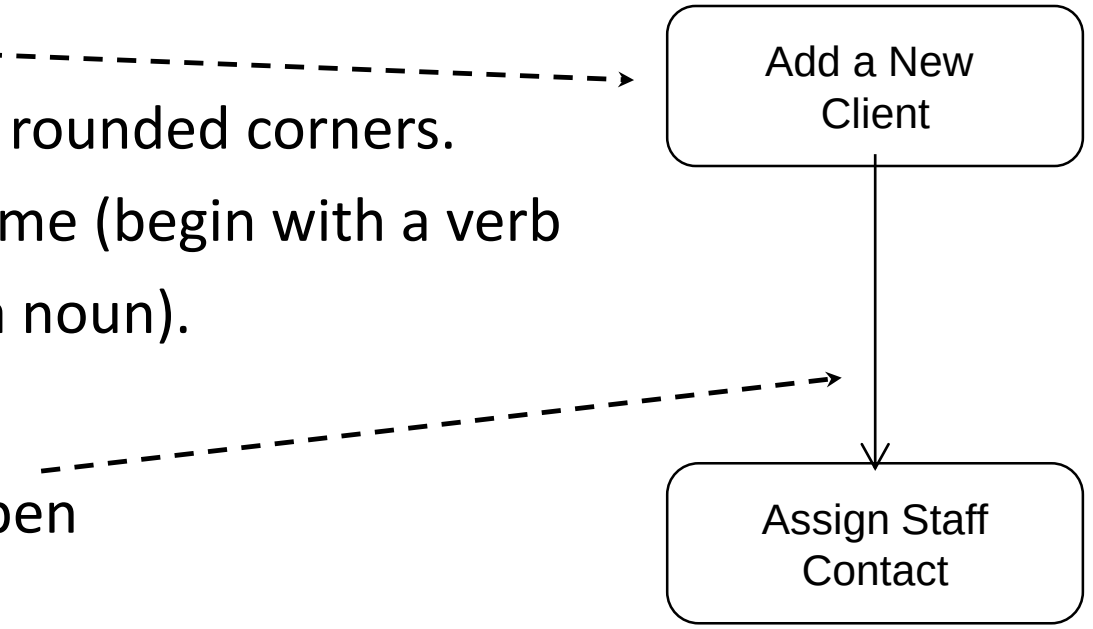
Best practices for modeling business processes

- Martin Schedlbauer* provides a set of best practices to follow when modelling business processes:
  1. Be realistic, because it is virtually impossible to identify everything.
  2. Be agile because even though we might not identify every single feature of a business process , the features that we do identify should be identified in a rigorous manner.
  3. All modelling is a collaborative/social activity.
  4. Do not use a CASE tool to do the modelling but use whiteboards instead. However, once the process is understood, it is a good idea to use a CASE tool to document the process.
  5. Process modelling should be done in an iterative manner.
  6. When modelling a business process, stay focused on that specific process.
  7. Remember that a business process model is an abstraction of reality (should not include every minor task in the current description of the business process)

**Martin Schedlbauer, The Art of Business Process Modeling: The Business Analysts Guide to Process Modeling with UML & BPMN (Sudbury, MA: The Cathris Group, 2010).*

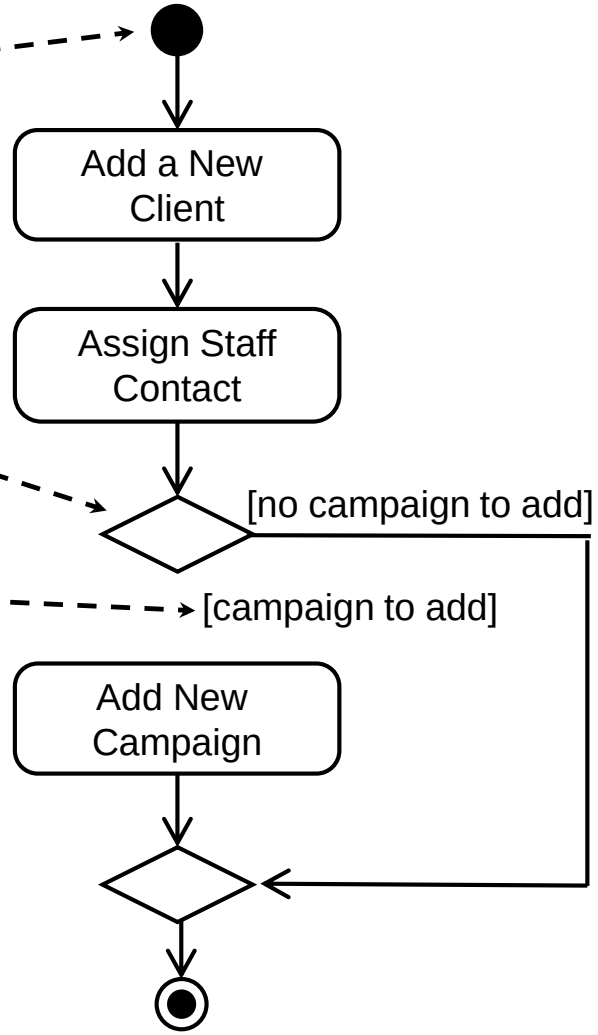
Notation of Activity Diagrams

- Actions
  - rectangle with rounded corners.
  - meaningful name (begin with a verb and end with a noun).
- Control flows
  - arrows with open arrowheads.
  - model the paths of execution through a business process.



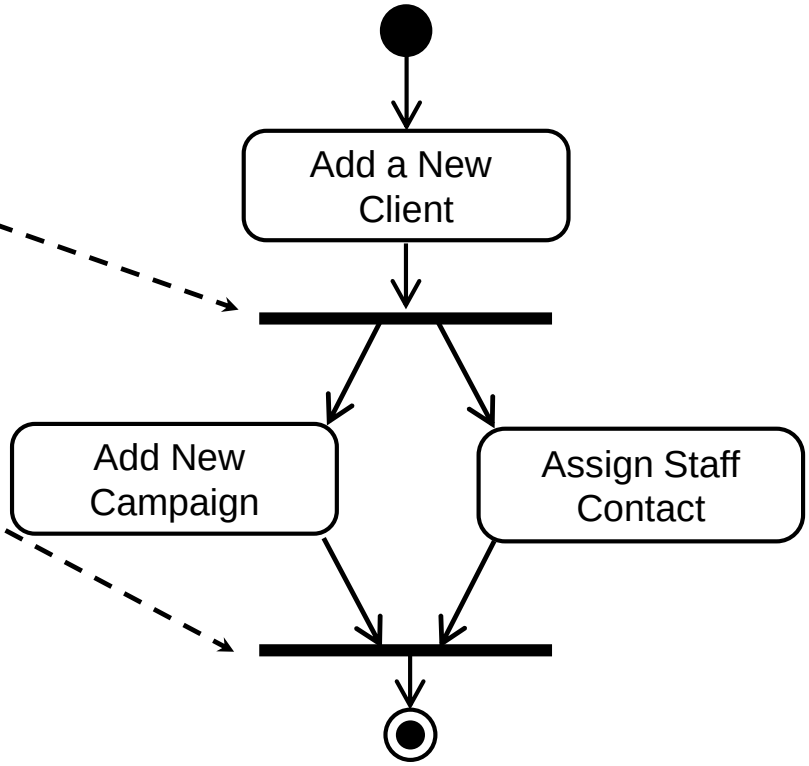
Notation of Activity Diagrams

- Initial node
  - black circle.
- Decision nodes (and merge nodes)
  - diamond.
- Guard conditions
  - in square brackets.
- Final node
  - black circle in white circle.



Notation of Activity Diagrams

- Fork nodes and join nodes
  - thick bar.
- Actions carried out in parallel



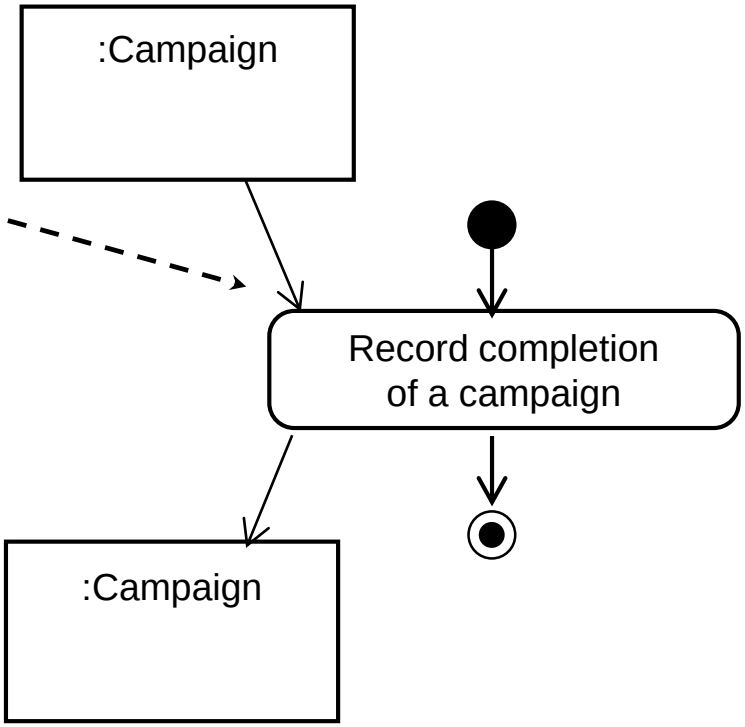
Notation of Activity Diagrams

- In UML 1.X multiple flows from an action were implicitly Or-ed.
- In UML 2.0 they are implicitly AND-ed.
- Guard conditions do not have to be mutually exclusive, but it is advisable that they should be.
- Decisions should be strictly nested, but…

  … a merge point can be combined with a following decision point.

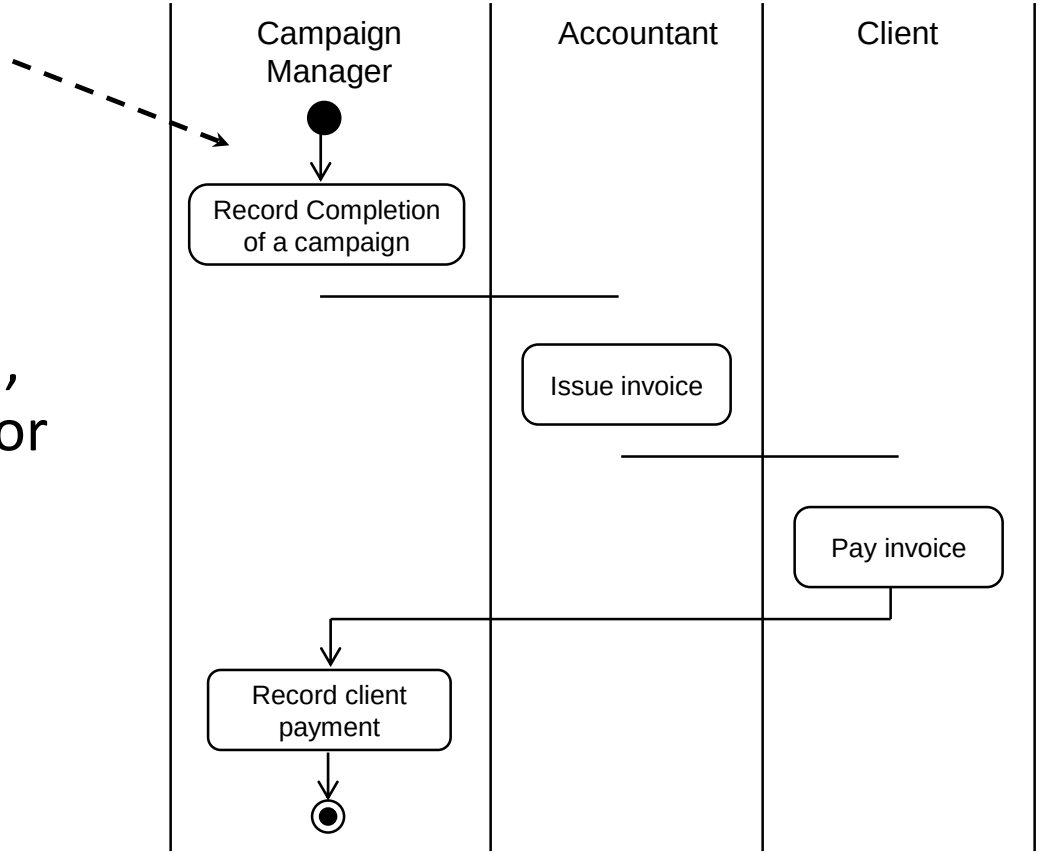
Notation of Activity Diagrams

- Object flows
  - open arrow.
  - show the flow of an object from one activity (or action) to another activity (or action).
- Objects
  - rectangle.
  - optionally shows the state of the object in square brackets.



Notation of Activity Diagrams

- Activity Partitions (Swimlanes)
  - vertical columns.
  - labelled with the person, organisation, department, object or system responsible for the activities in that column.



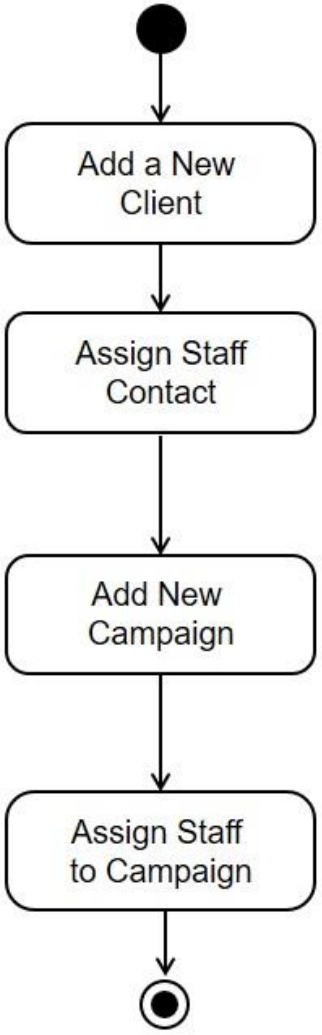
Drawing Activity Diagrams

- What is the purpose?
  - This will influence the kind of activities that are shown.
- What is being shown in the diagram?
  - What is the name of the business process, use case or operation?
- What level of detail is required?
  - Is it high level or more detailed?

Drawing Activity Diagrams

1. Choose a business process.
   - Review the requirements definition and the use-case diagram created to represent the requirements.
2. Identify actions.
   - What happens when a new client is added in the Agate system?
     - Add a New Client.
     - Assign Staff Contact.
     - Add New Campaign.
     - Assign Staff to Campaign.
3. Organise the actions in order with flows.

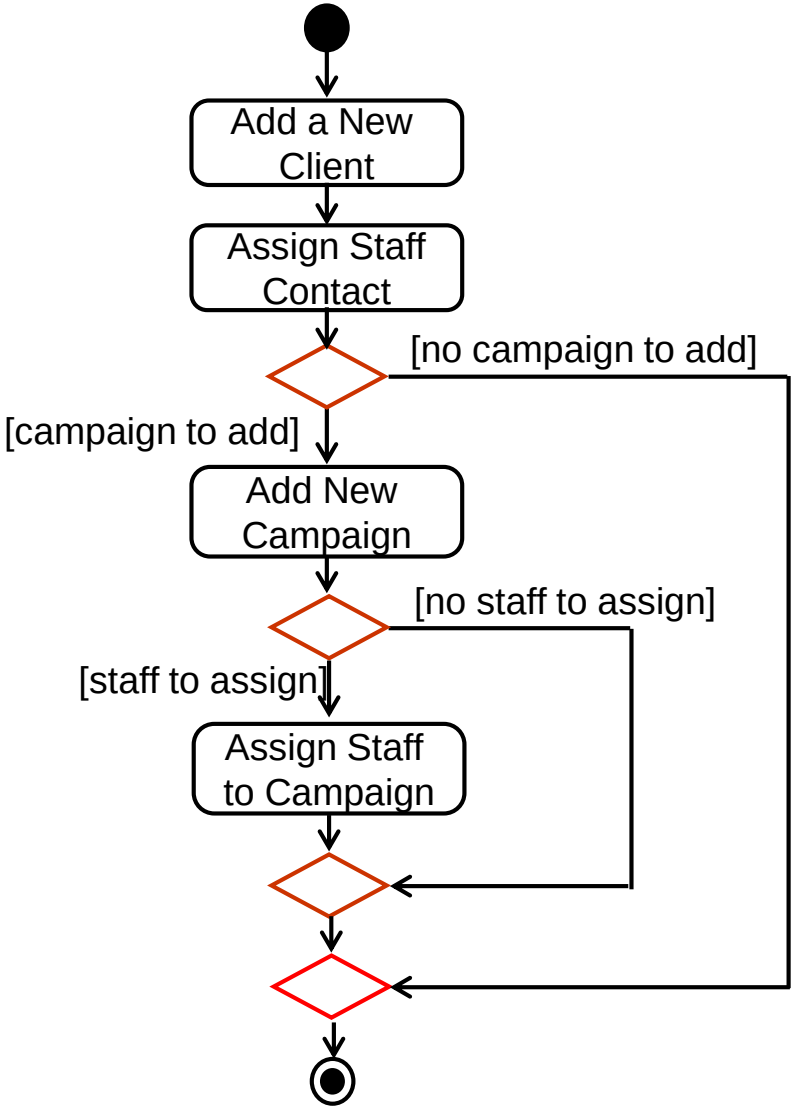
Drawing Activity Diagrams



Drawing Activity Diagrams

4. Identify any alternative flows and the conditions on them.
   - sometimes there is a new campaign to add for a new client, sometimes not.
   - sometimes they will want to assign staff to the campaign, sometimes not.
5. Add decision and merge nodes, flows and guard conditions to the diagram.

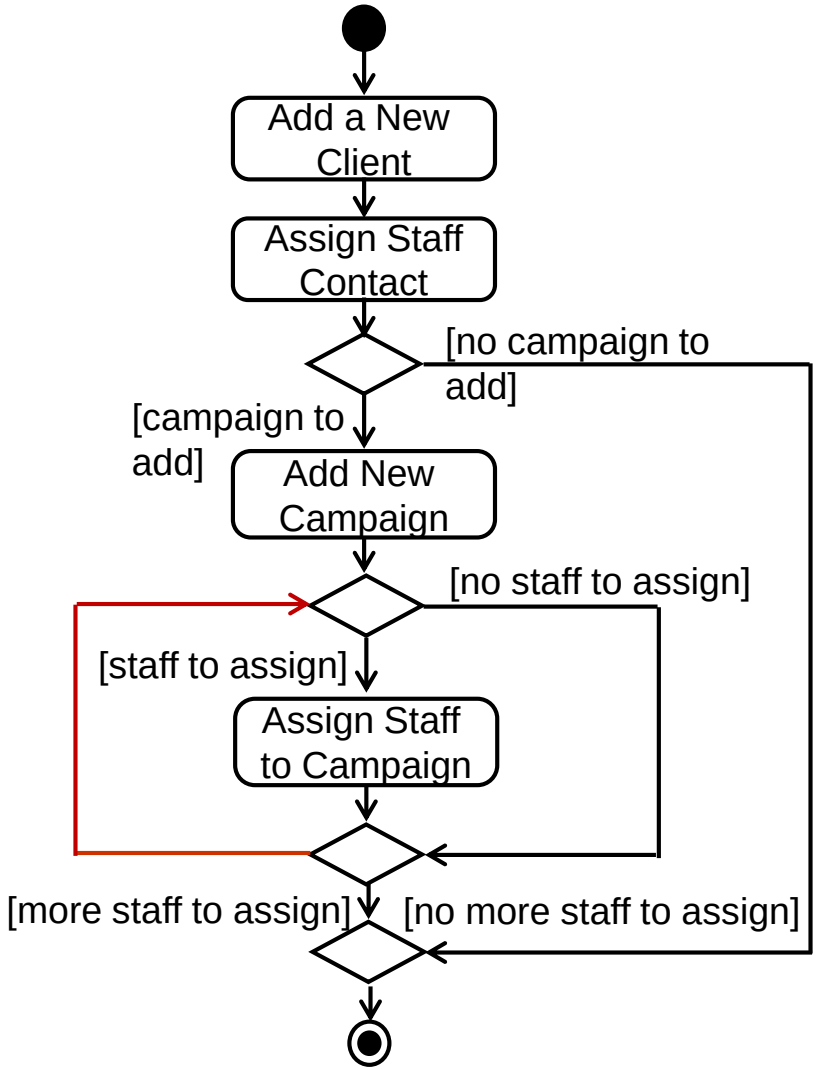
Drawing Activity Diagrams



Drawing Activity Diagrams

6. Identify any actions that are carried out in parallel.
   - there are none in this example.
7. Add fork and join nodes and flows to the diagram.
8. Identify any processes that are repeated.
   - they will want to assign staff to the campaign until there are no more staff to add.
9. Add decision and merge nodes, flows and guard conditions to the diagram.

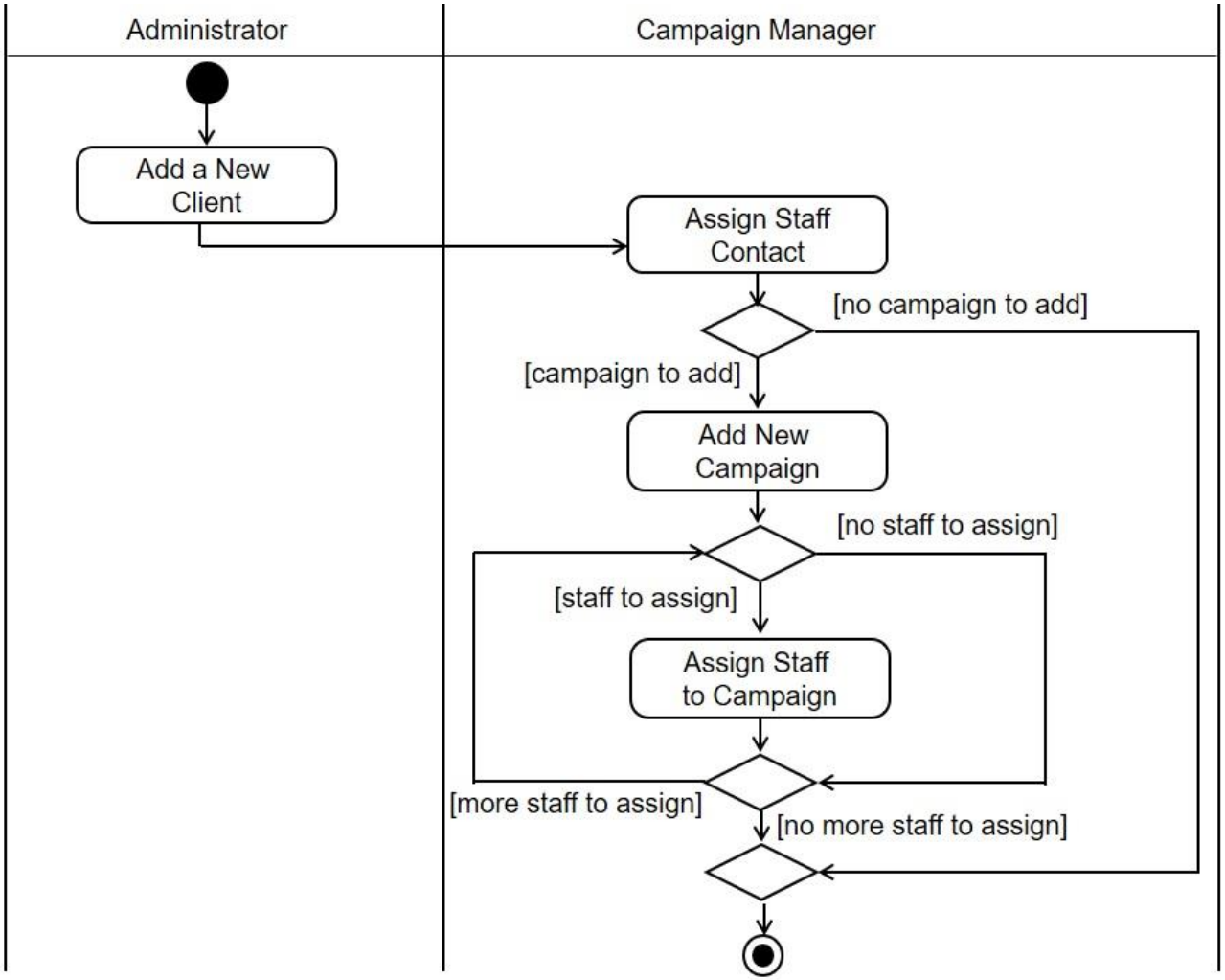
Drawing Activity Diagrams



Drawing Activity Diagrams

- Are all the activities carried out by the same person, organisation or department?
- If not, then add swimlanes to show the responsibilities
- Name the swimlanes
- Show each activity in the appropriate swimlane

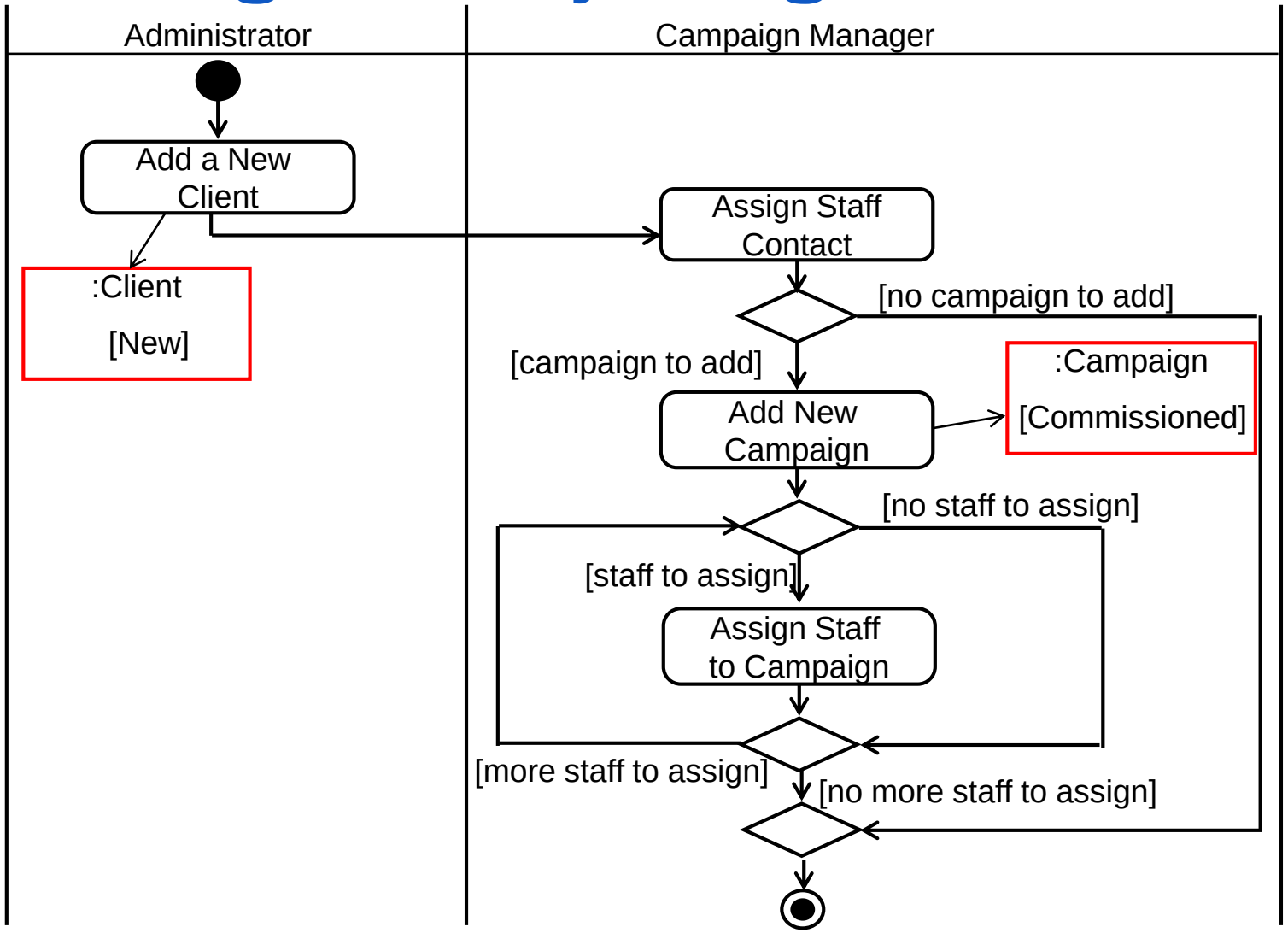
Drawing Activity Diagrams



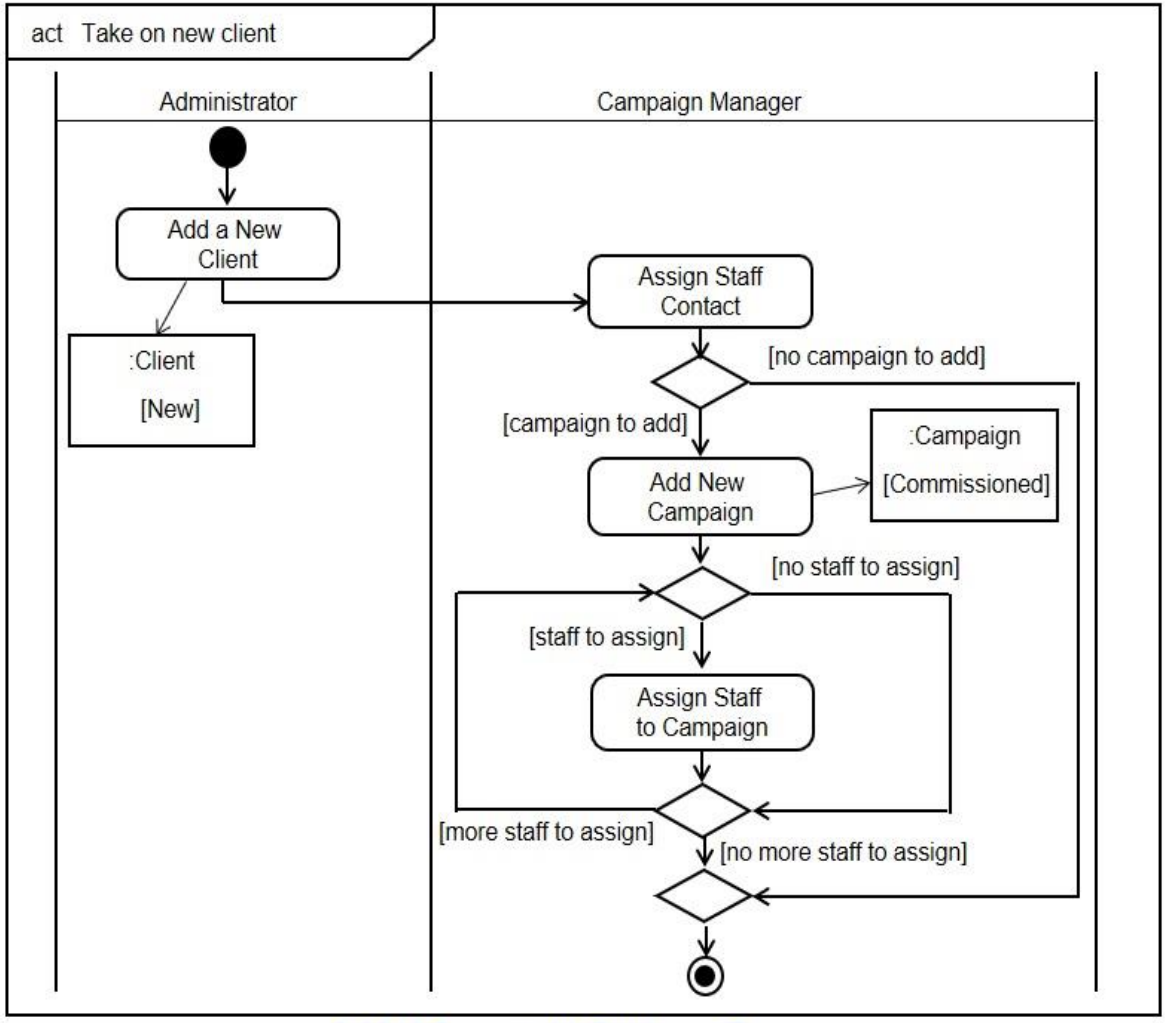
Drawing Activity Diagrams

- Are there any object flows and objects to show?
  - these can be documents that are created or updated in a business activity diagram.
  - these can be object instances that change state in an operation or a use case.
- Add the object flows and objects.

Drawing Activity Diagrams



Drawing Activity Diagrams



Key points

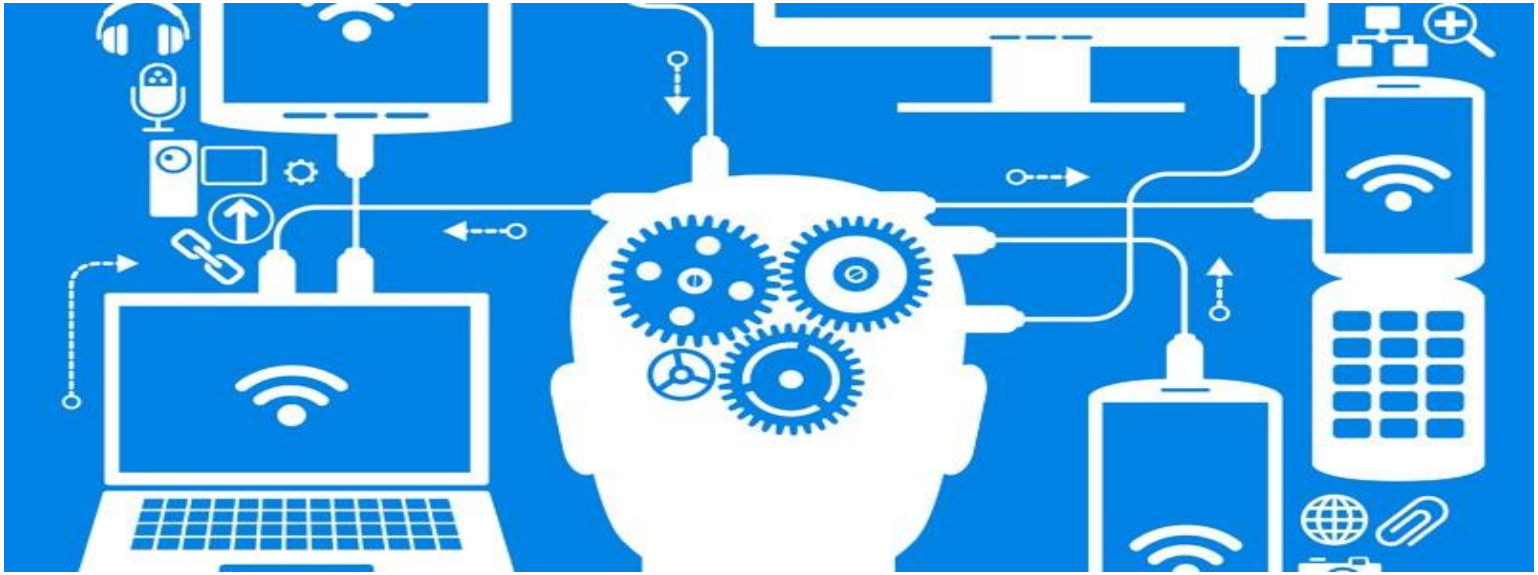
In this lecture you have learned about:

- The purpose of activity diagrams.
- The best practices to follow when modelling business processes.
- The notation of activity diagrams.
- How to draw activity diagrams.

References

- Alan Dennis, Barbara Haley Wixom & David Tegarden. 2015. Systems Analysis and Design with UML, 5th edition, Wiley.
- Simon Bennett, Steve McRobb & Ray Farmer. 2010. Object Oriented Systems Analysis and Design using UML 4th Edition, McGraw-Hill.

In the next lecture..



Lecture 8: UML Interaction Diagrams –
Part 1 (Sequence Diagrams)