CSSE 374:
UML Activity Diagrams

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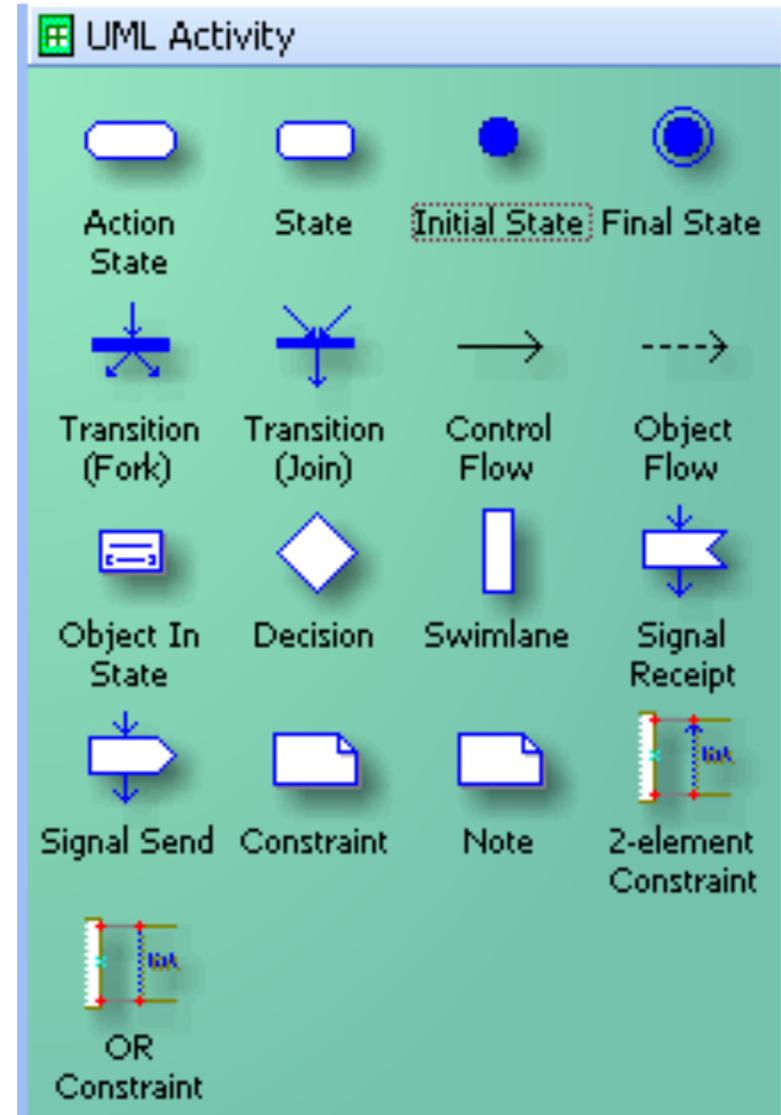
Learning Outcomes: Patterns, Tradeoffs

Identify criteria for the design of a software system and select patterns, create frameworks, and partition software to satisfy the inherent trade-offs.

- Hear some real-world from Jeremy Price, at SRI

- Examine the use of UML Activity Diagrams
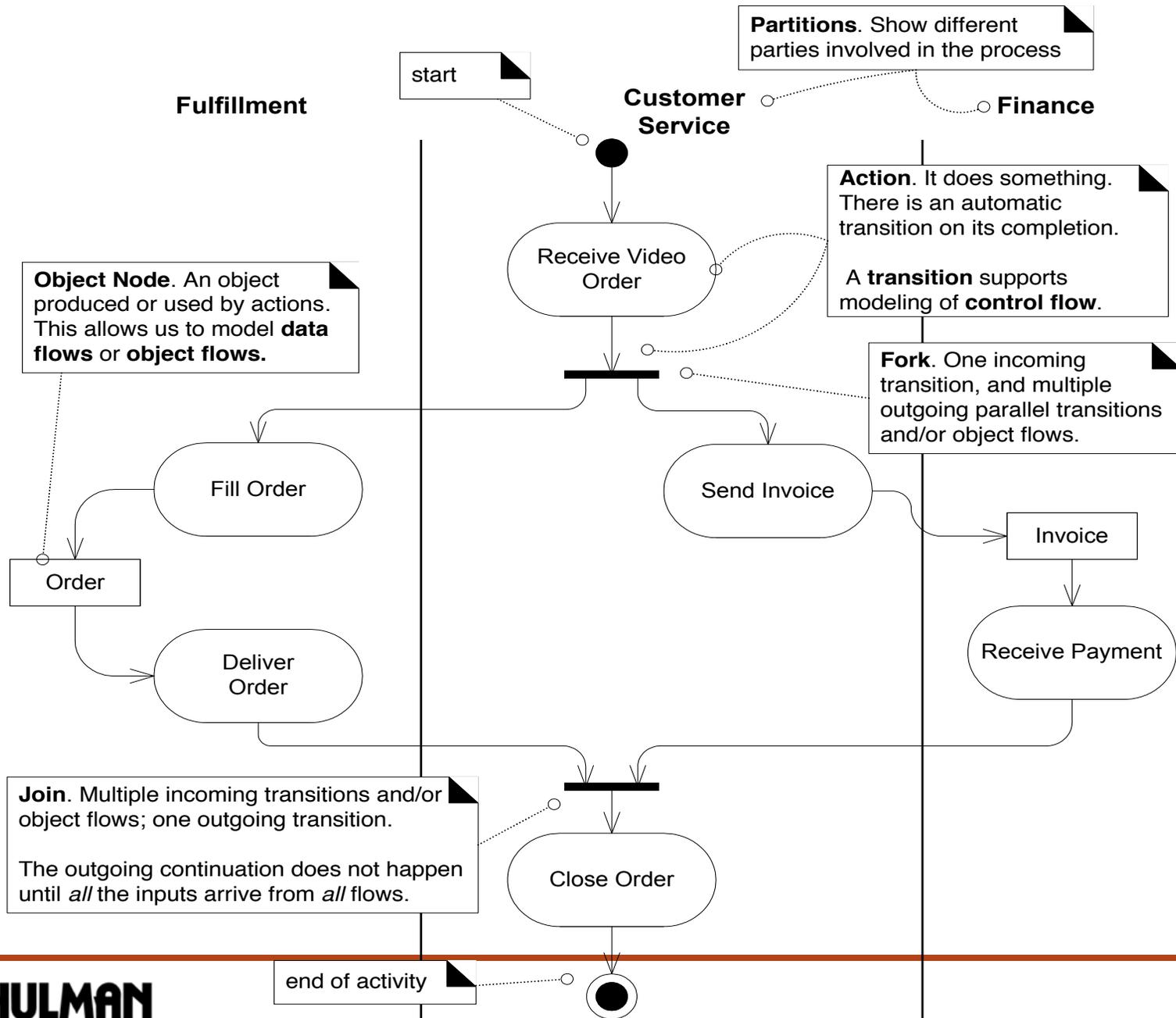
- Design Studio with Team 2.5

UML Activity Diagrams

- **Essentially Modern Version of Flowcharts and/or Data Flow Diagrams**
  - ☐ **Easy to understand**

- **Used to model:**
  - ☐ **Business processes**
  - ☐ **Workflows**
  - ☐ **Data Flows**
  - ☐ **Complex algorithms/UCs**

UML Activity

Action State · State · Initial State · Final State
Transition (Fork) · Transition (Join) · Control Flow · Object Flow
Object In State · Decision · Swimlane · Signal Receipt
Signal Send · Constraint · Note · 2-element Constraint
OR Constraint

Activity Diagram UML Syntax

Partitions. Show different parties involved in the process

start

Fulfillment

Customer Service

Finance

Action. It does something. There is an automatic transition on its completion.

A **transition** supports modeling of **control flow**.

Receive Video Order

Object Node. An object produced or used by actions. This allows us to model **data flows** or **object flows**.

Fork. One incoming transition, and multiple outgoing parallel transitions and/or object flows.

Fill Order

Send Invoice

Invoice

Order

Receive Payment

Deliver Order

Join. Multiple incoming transitions and/or object flows; one outgoing transition.

The outgoing continuation does not happen until *all* the inputs arrive from *all* flows.

Close Order

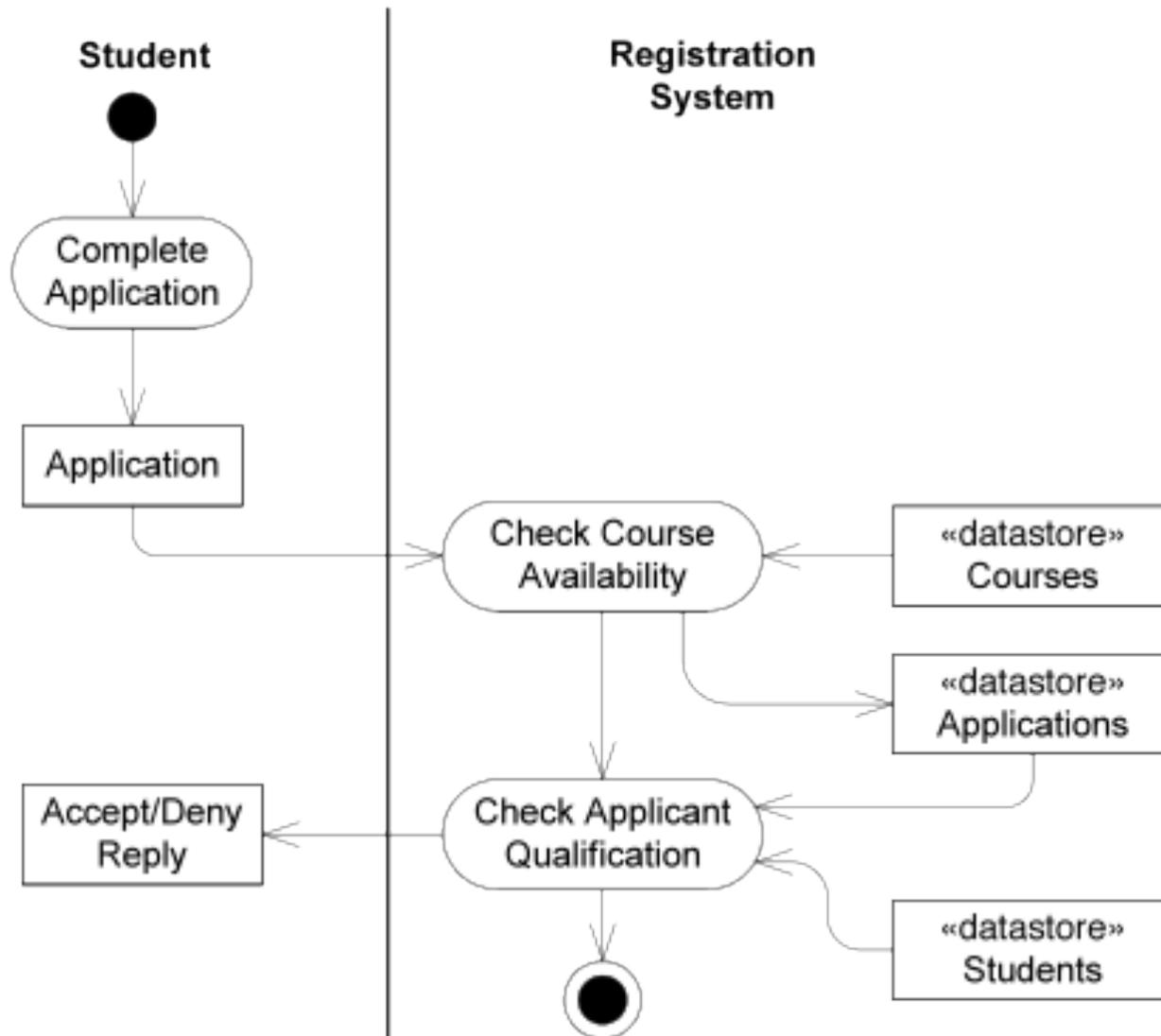end of activity

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Old Data Flow Diagram

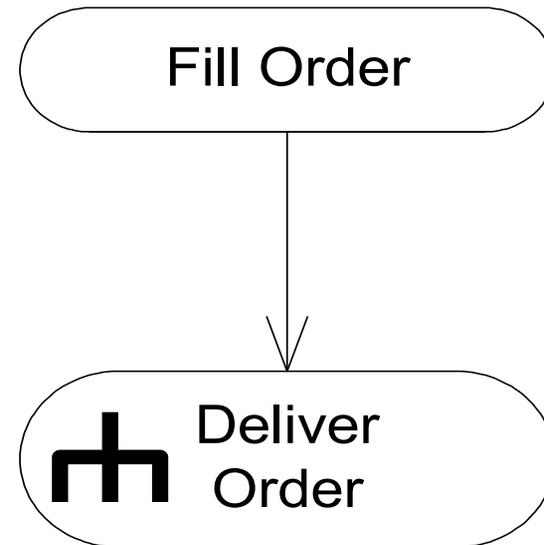**DFD for Automated Course Registration System**
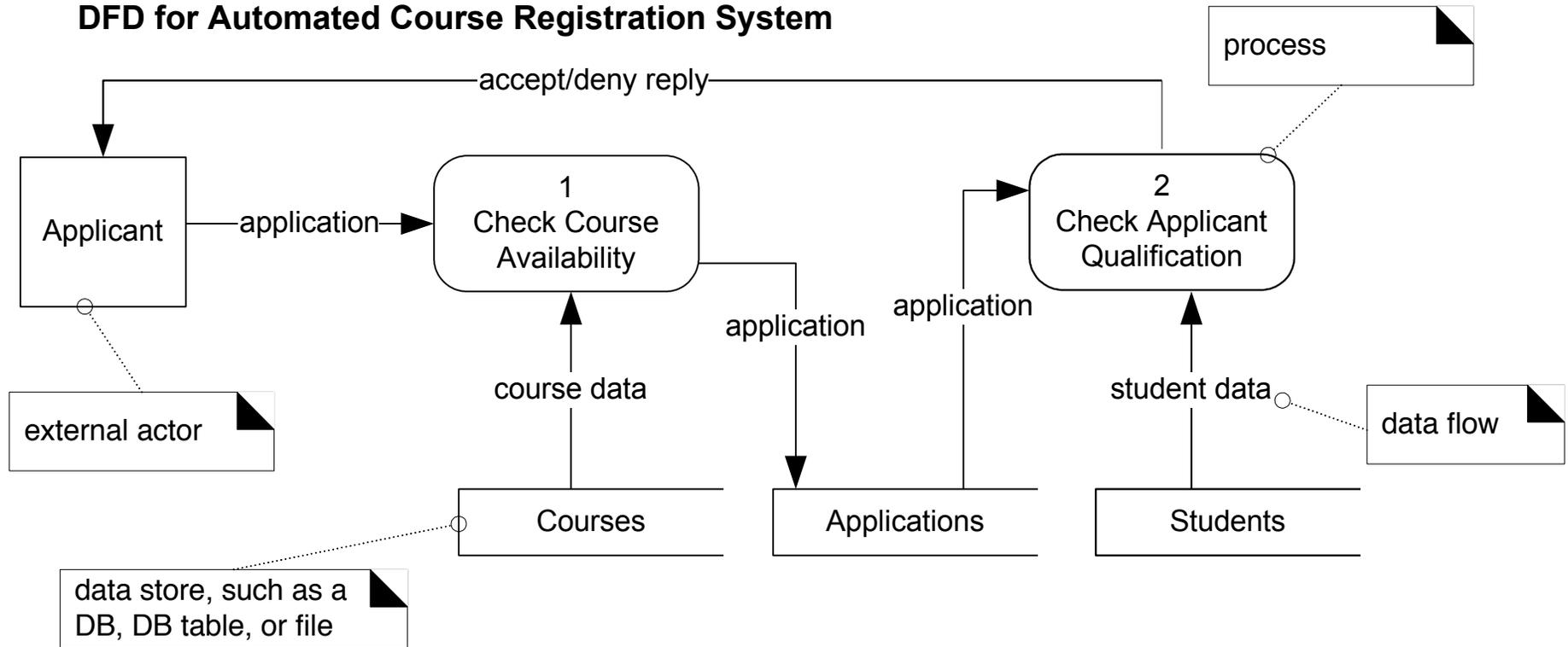
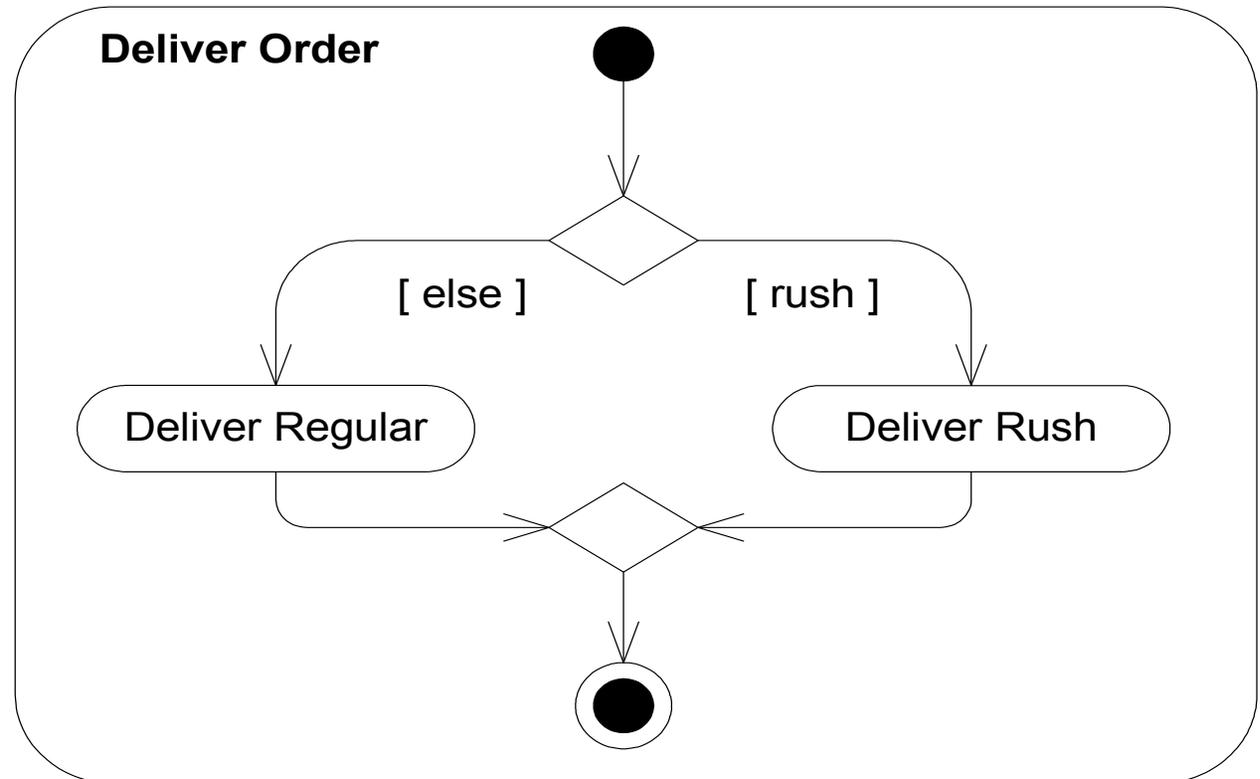# Now done as Activity Diagram

Hierarchy Representation: Rake Symbol

the "rake" symbol (which represents a hierarchy) indicates this activity is expanded in a sub-activity diagram

Fill Order

Deliver Order

Expanded Delivery Order Activity Diagram

Decision: Any branch happens. Mutual exclusion

Merge: *Any* input leads to continuation. This is in contrast to a *join*, in which case *all* the inputs have to arrive before it continues.
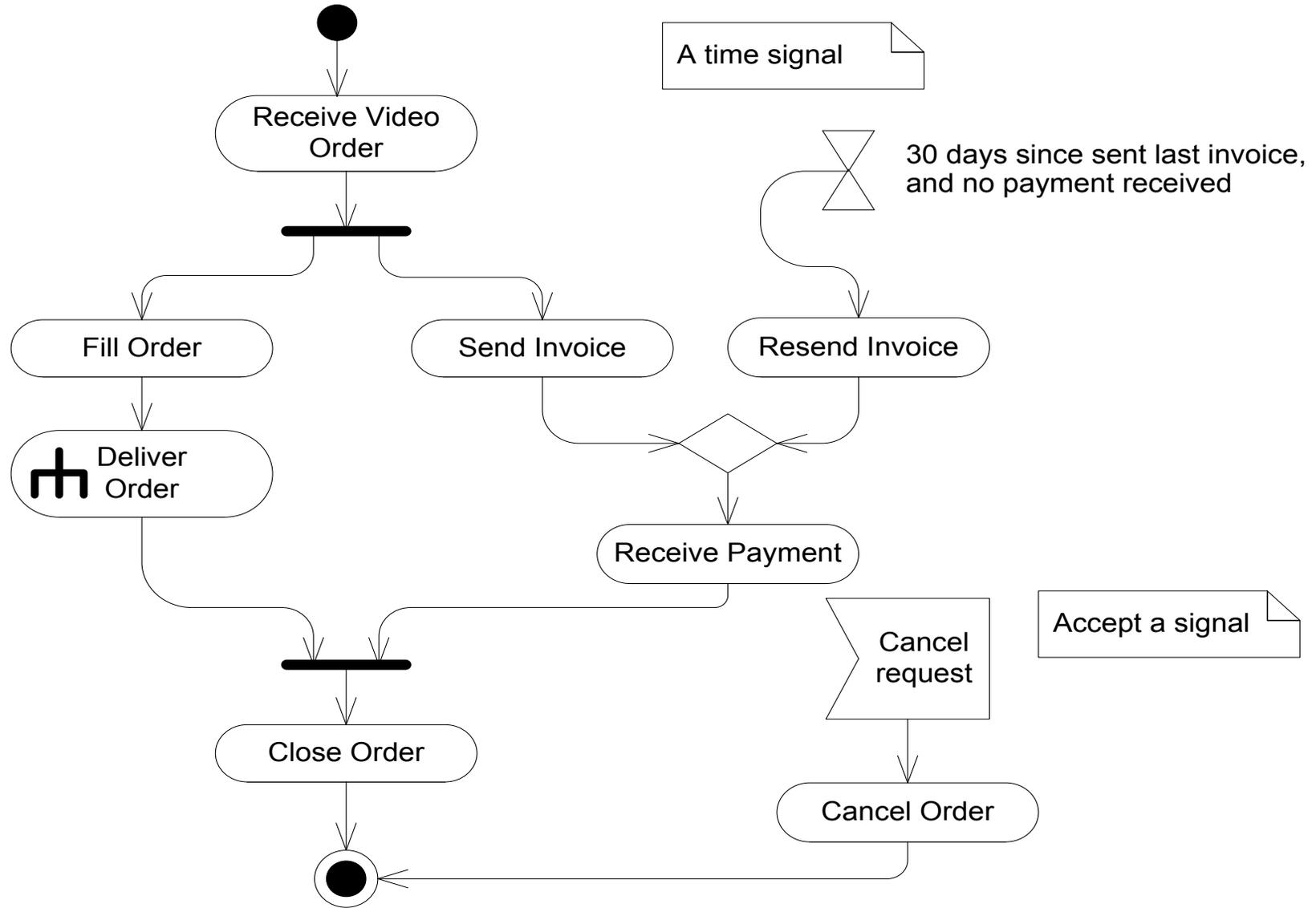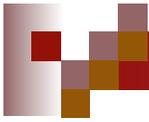
Deliver Order

[else]   [rush]

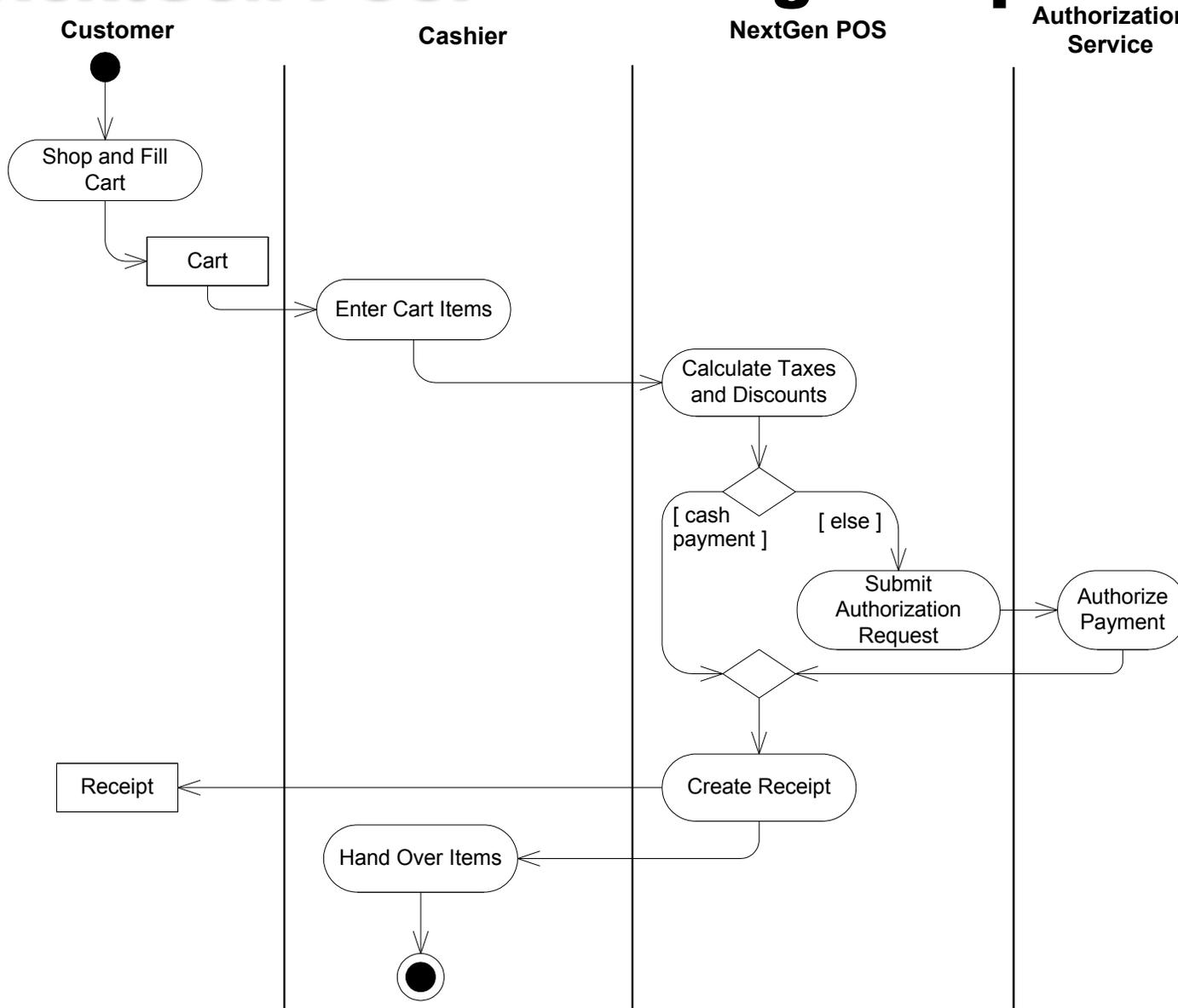Deliver Regular   Deliver Rush

Post Office Showdown
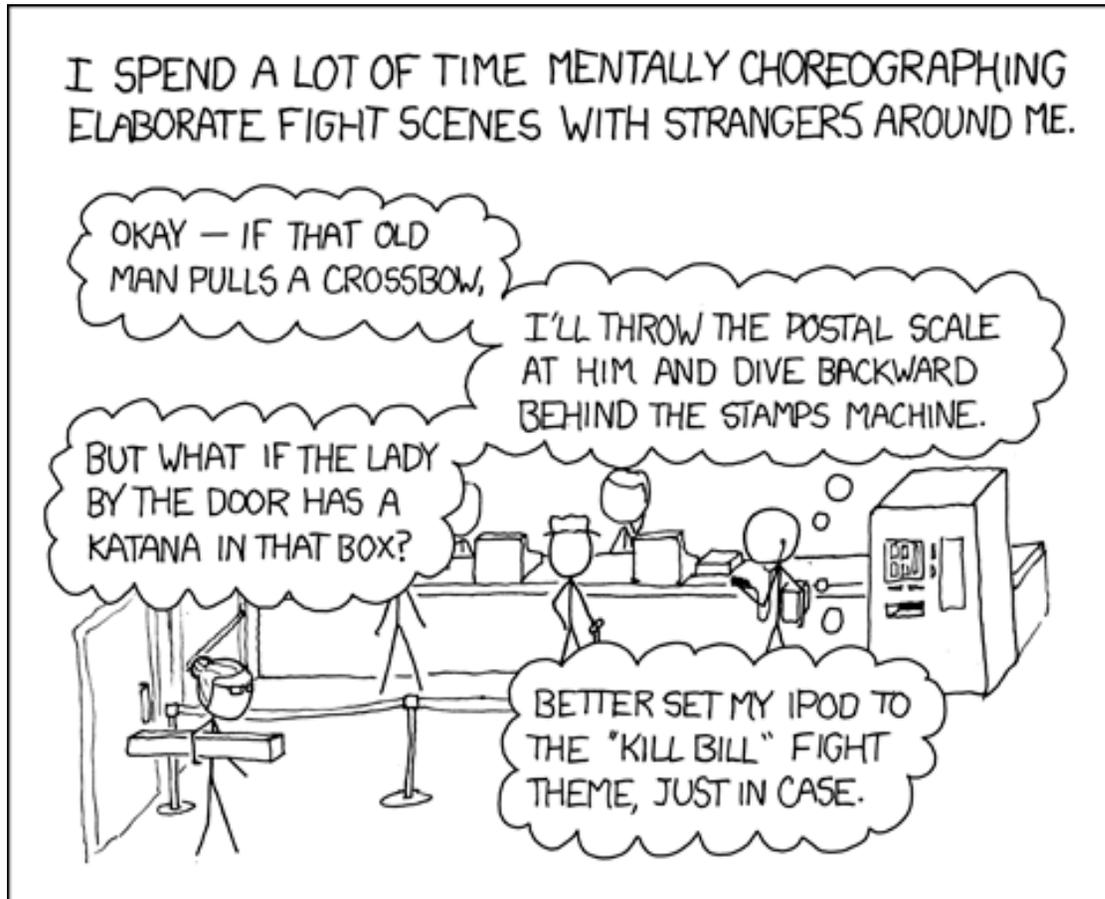
Think that he might be watching too many martial arts films?

Signal Notation

NextGen POS: Reducing Complexity

NextGen Process Sale UC benefits from activity diagram due to its complexity

Activity Diagram Guidelines

- **Use when need to depict processes with complex flow**
  - ☐ **Conditional or iterative**

- **Use rake notation for sub-activity diagrams**
  - ☐ **Keeps parent diagram simple**

- **Maintain a consistent level of abstraction within a diagram**

Exercise on Activity Diagrams

- Break up into your teams

- Sketch an activity diagram for creating an account, with username & password, on a website. Be sure to include swim lanes for the User, the System, and an external CAPTCHA Service. Your diagram should include:

- a check that the password is valid,

- a check that the username has not already been used

- a check that user entered CAPTCHA text correctly

- The last two checks should be done in parallel, the first by the System and the second by the CAPTCHA Service.
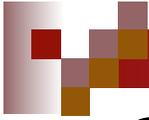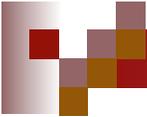
Go for it...

Here's an example of a CAPTCHA, or Completely Automated Public Turing test to tell Computers and Humans Apart:

following   finding

Design Studios

Objective is to share your design with others to communicate the approach or to leverage more eyes on a problem.

- Minute or so to set up…
- 5-6 minute discussion
- 1-2 minute answering questions

1. Team 2.5 – Academic Paper Cataloging System

Help Me Help You

- **Pre-break course evaluation on ANGEL**

- **Please take 10 minutes or so to help me improve the course**
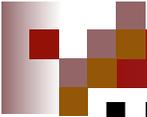
Homework and Milestone Reminders

- **Read Chapters 30 and 31 (through page 515)**

- **Milestone 4 – Junior Project Design with More GRASP'ing**
  - Due by 11:59pm on Friday, January 28th, 2011

- **Homework 6 – BBVS Design using GoF Patterns**
  - Due by 11:59pm Tonight, Tuesday, February 1st, 2011