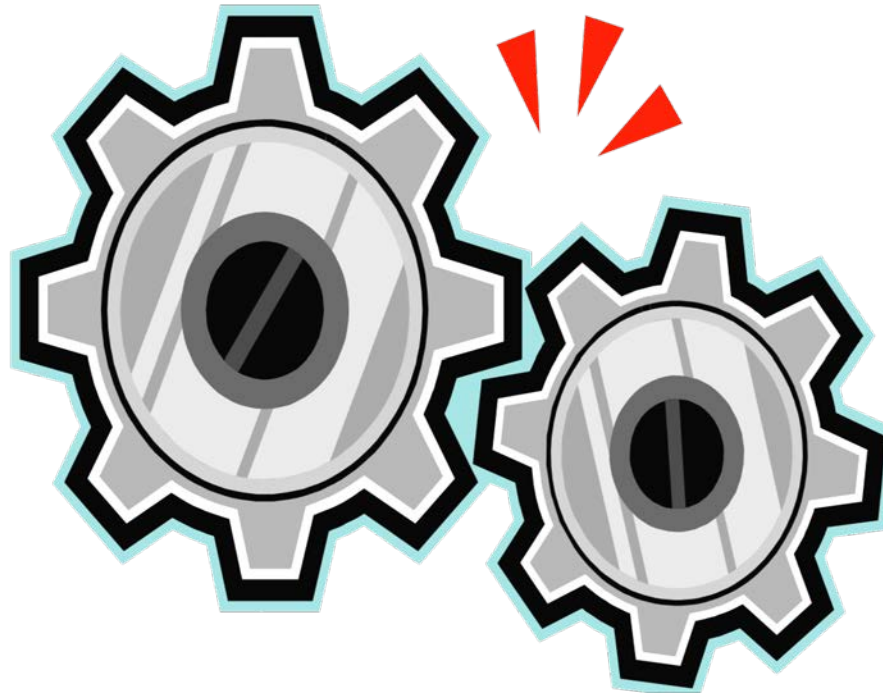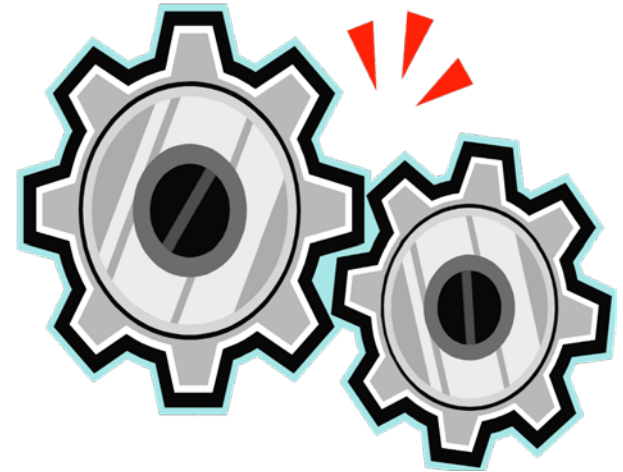# Introduction

- **Behavioral Diagrams**
- **Use Case Diagram**
- **Sequence Diagram**
- **State Diagram**
- **Activity Diagram**

Behavioral Diagrams

Behavioral Diagrams

- **Interactions**
- **Functionality**
- **Verbs and Actions**

Use Case Diagram

- **User Tasks**
- **System Interactions**
- **What not How**

Online Bill Pay

Customer

Pay Bill

<<extend>>

<<include>>

Schedule Recurring Payment

Authenticate User

Skip Scheduled Payment

Manage Scheduled Payment

Terminate Scheduled Payment
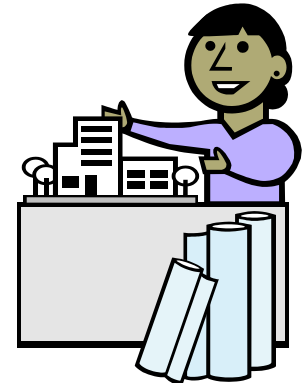
Payment Processing Service
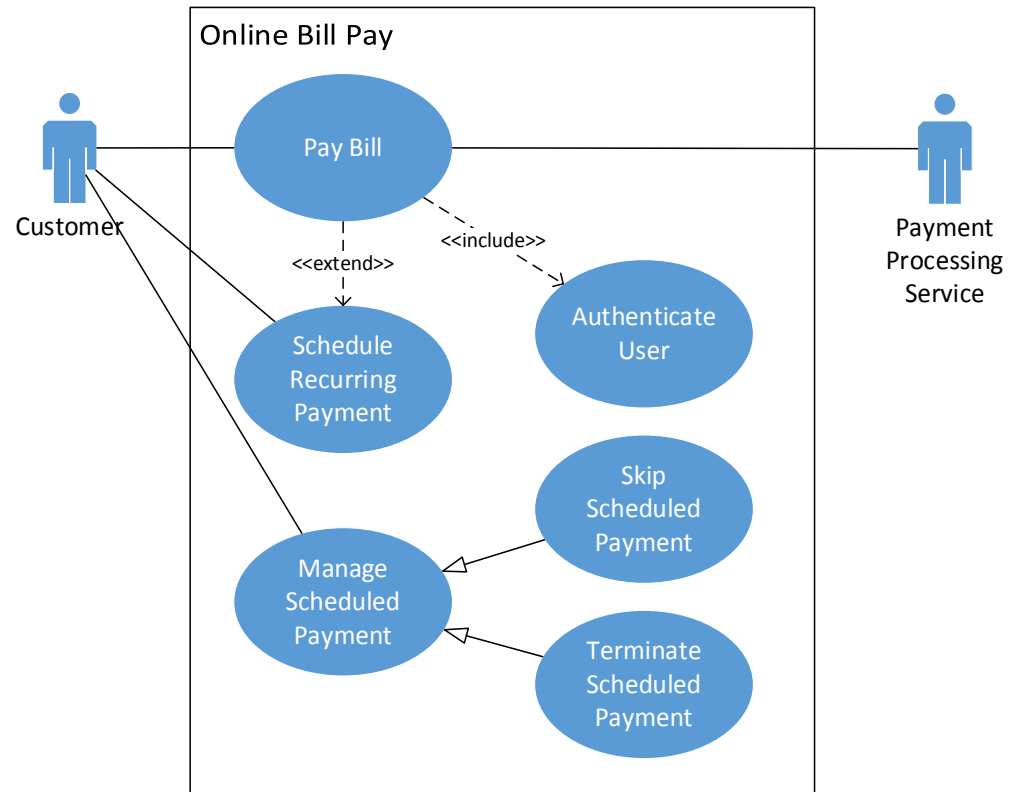
Common Users of Use Case Diagrams
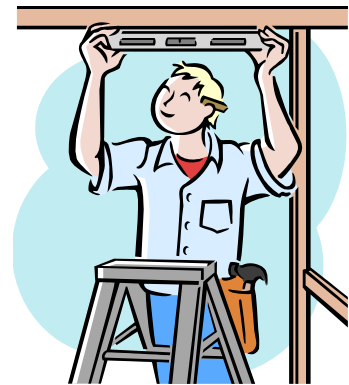
Product Owner

Business Analyst

Architect

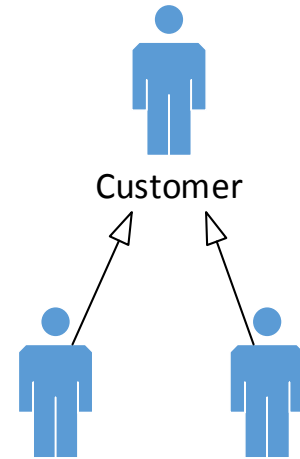Operations

Quality Assurance

Developer

Actors

- **People**
  - Roles
- **Generalization**
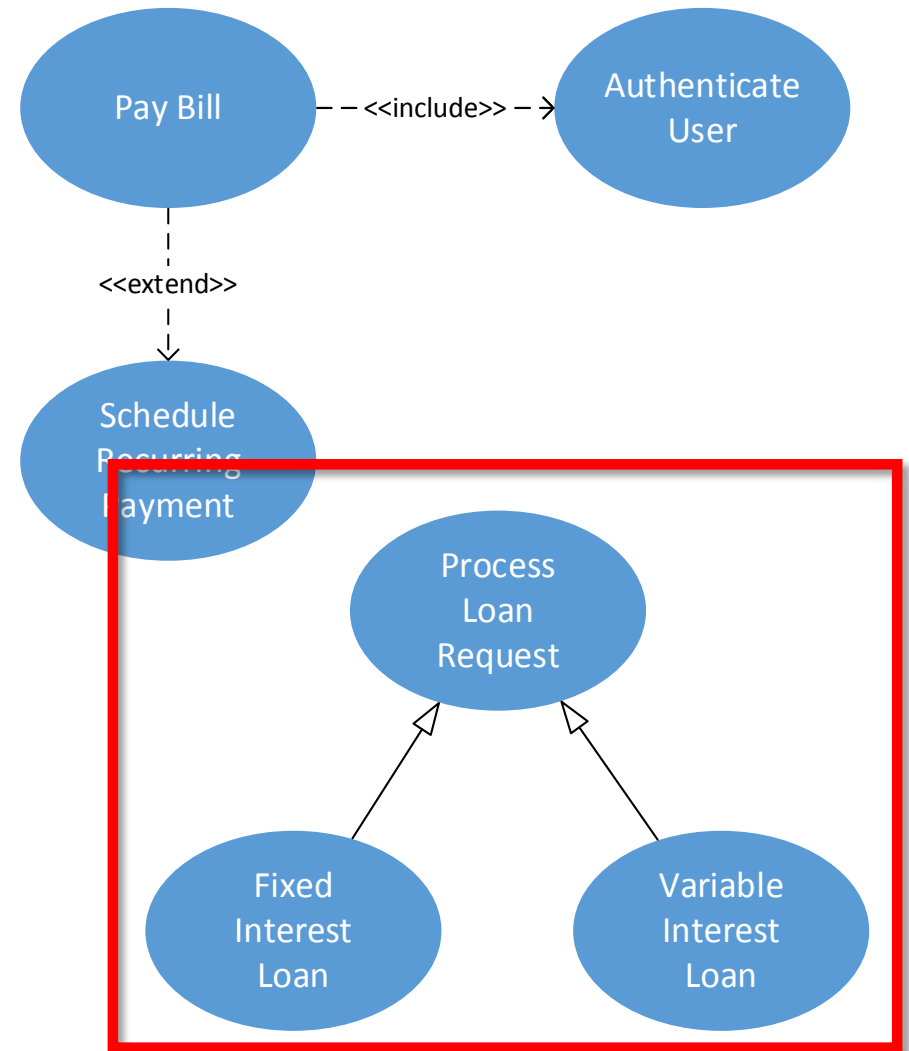- **Systems**

Account Holder
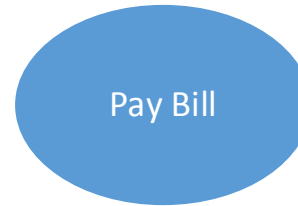
Customer

Individual   Commercial

Payment
Processing
Service

Use Cases

- **Simple name**
- **User Tasks**
- **System Interactions**
- **Factor out common processes (<<include>>)**
- **Identify optional additions (<<extend>>)**
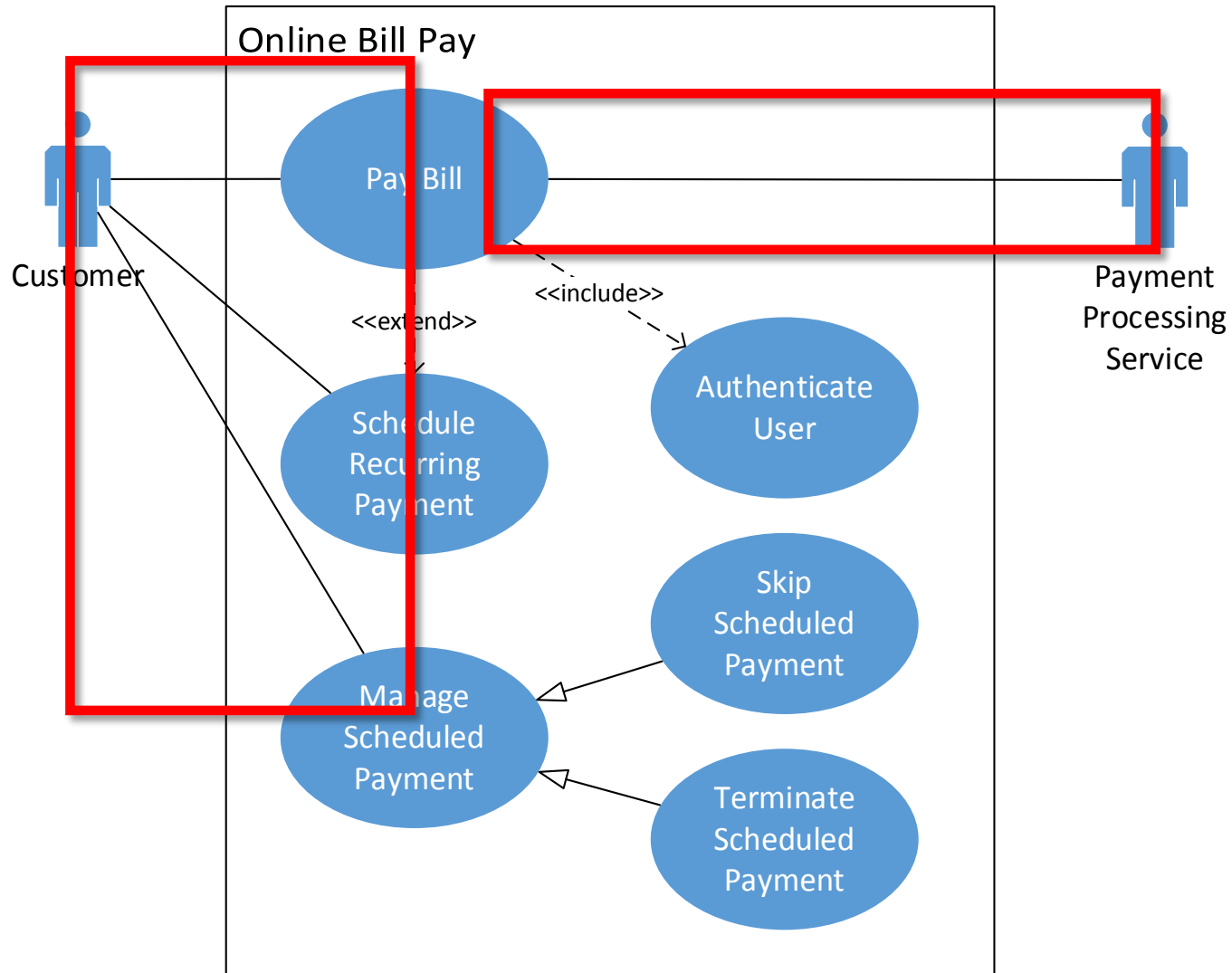- **Generalize**

Scenarios

- **One Use Case may have many scenarios**
- **Scenario**
  - Steps in process
  - Branches
  - Extensions
  - Exceptions
- **Use Case vs. Use Case Diagram**
  - Pre-Conditions
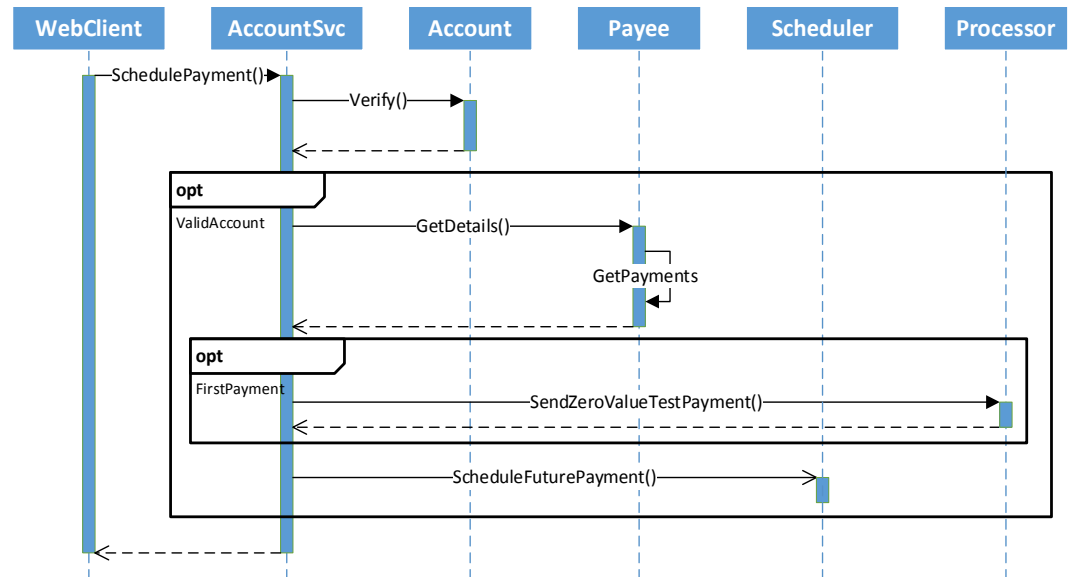 - Post-Conditions
- **May Relate to User Stories**

Pay Bill

Basic Use Case Diagram

Online Bill Pay

Customer

Pay Bill

<<extend>>

<<include>>

Schedule Recurring Payment

Authenticate User

Skip Scheduled Payment

Manage Scheduled Payment

Terminate Scheduled Payment

Payment Processing Service

Sequence Diagram

- **Object Interaction**
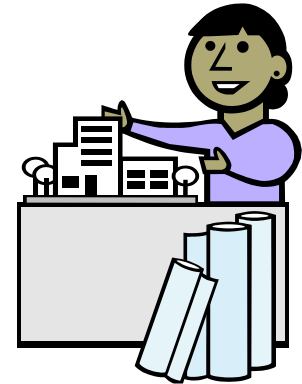- **Focus on time/order**

Common Users of Sequence Diagrams

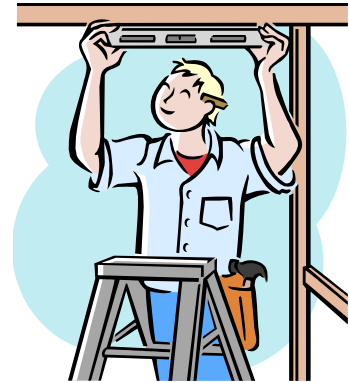Product Owner
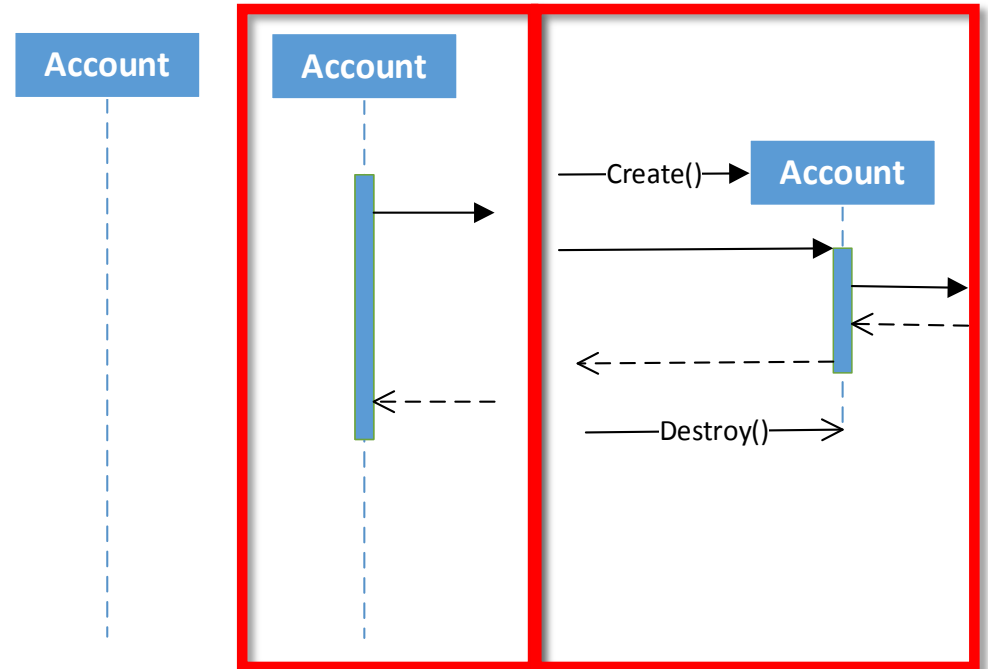
Business Analyst

Architect

Operations

Quality Assurance

Developer

Classes

- **Lifeline**
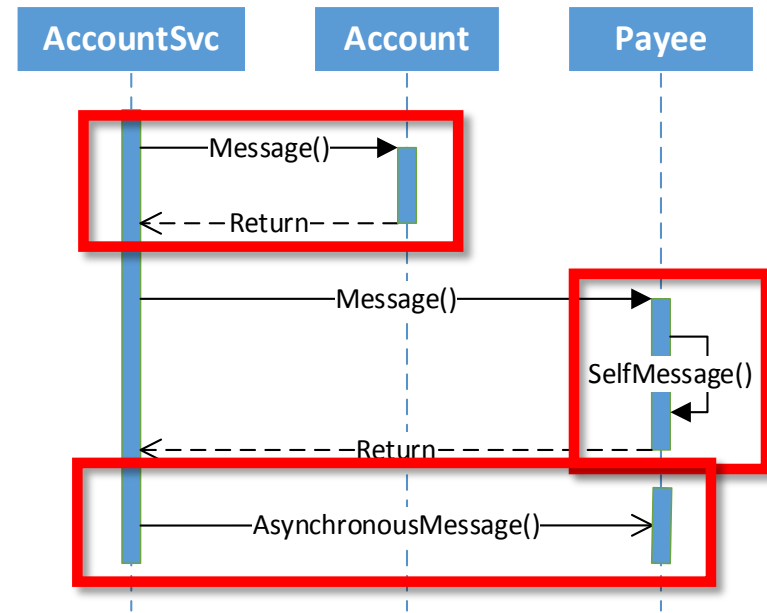- **Focus of Control**
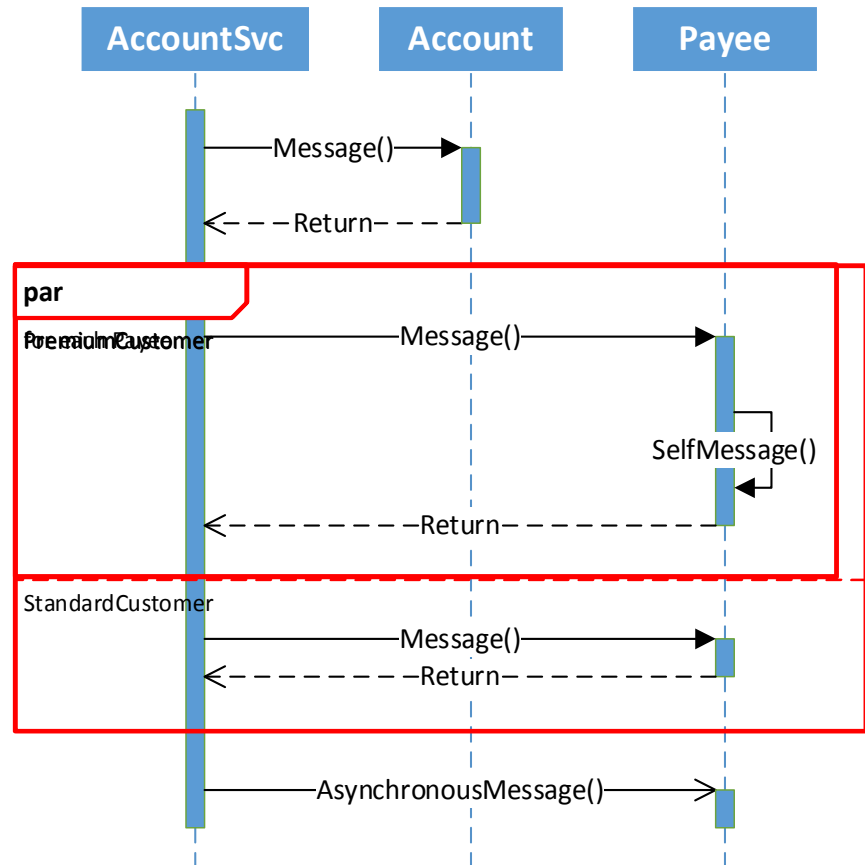- **Object Lifetime**
  - Creation
  - Termination

Messages

- **Message**
- **Return**
- **Self Message**
- **Asynchronous**

Structured Control

- **Looping**
- **Optional**
- **Conditional**
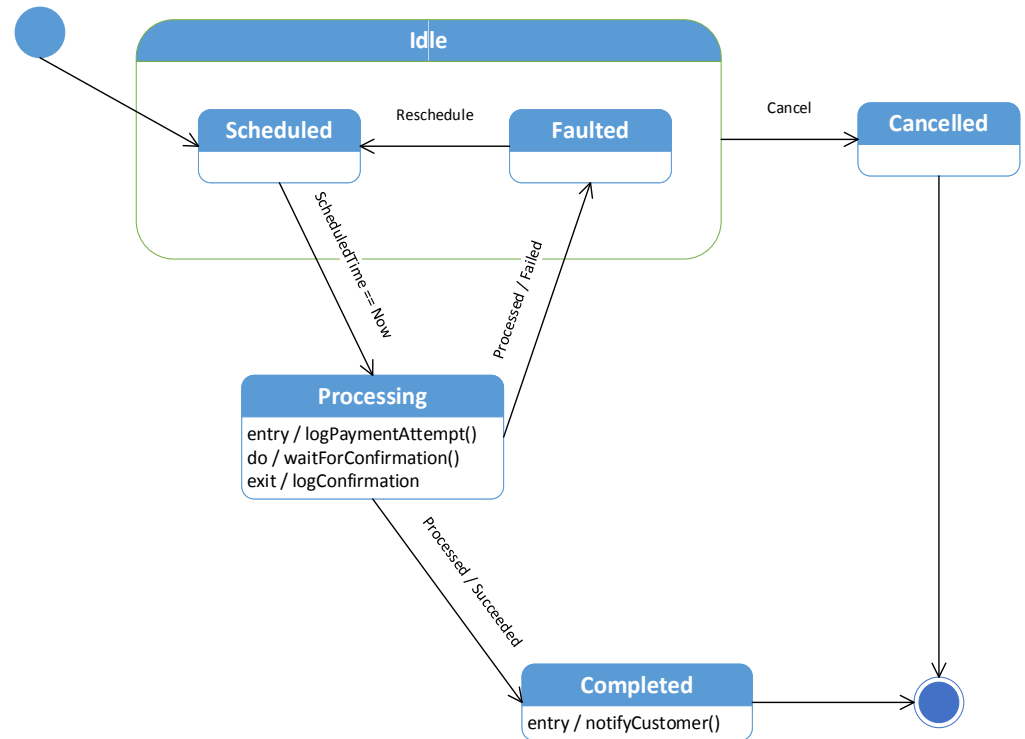 - □ [else]
- **Parallel**

Basic Sequence Diagram
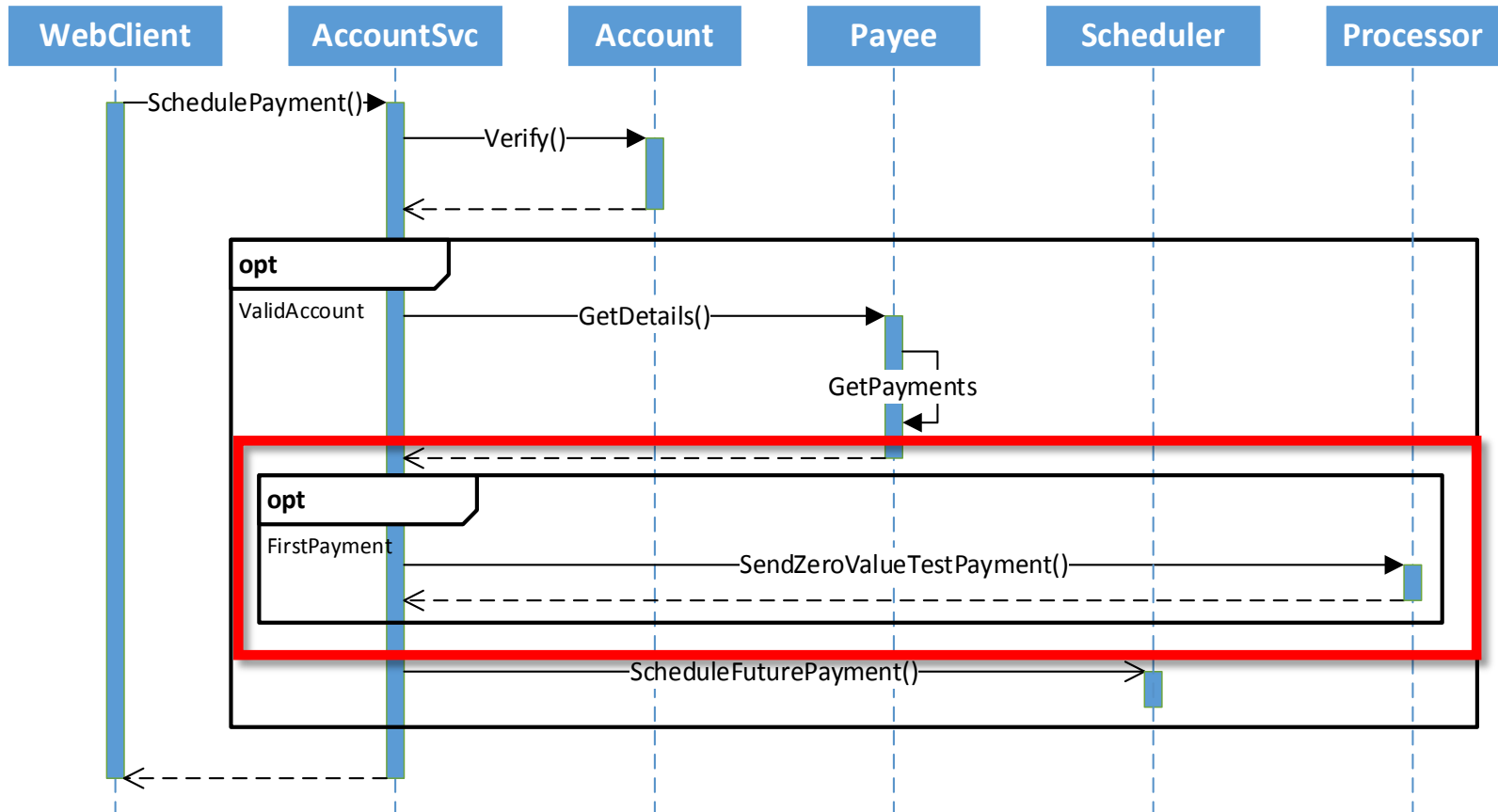
State Diagram

- **Model states of an object**
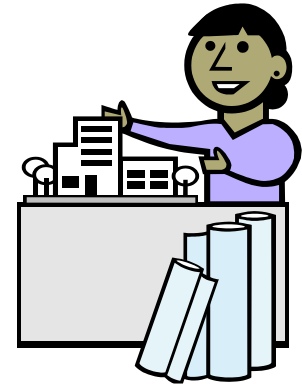- **Reactive objects**

Common Users of State Diagrams
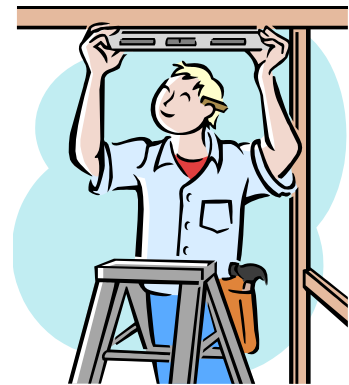
Product Owner

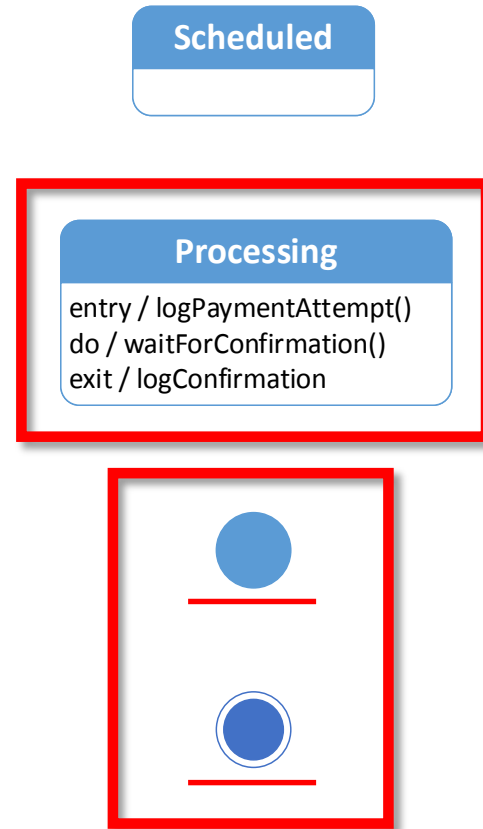**Business Analyst**

Architec
t

Operations

Quality Assurance

Developer

States

- **Basic**
- **Internal Behavior**
- **Special**
  - Initial
  - Final

Scheduled

Processing

entry / logPaymentAttempt()
do / waitForConfirmation()
exit / logConfirmation

Transitions

- **Basic**
- **Transition**
- **Event**

Composite State

Idle

Scheduled — Reschedule → Faulted

Cancel

Cancelled

ScheduledTime == Now

Processed / Failed

Processing
entry / logPaymentAttempt()
do / waitForConfirmation()
exit / logConfirmation

Basic State Diagram

Idle

Scheduled

Faulted

Reschedule

Cancel

Cancelled

ScheduledTime == Now

Processed / Failed

Processing

entry / logPaymentAttempt()
do / waitForConfirmation()
exit / logConfirmation

Processed / Succeeded

Completed

entry / notifyCustomer()
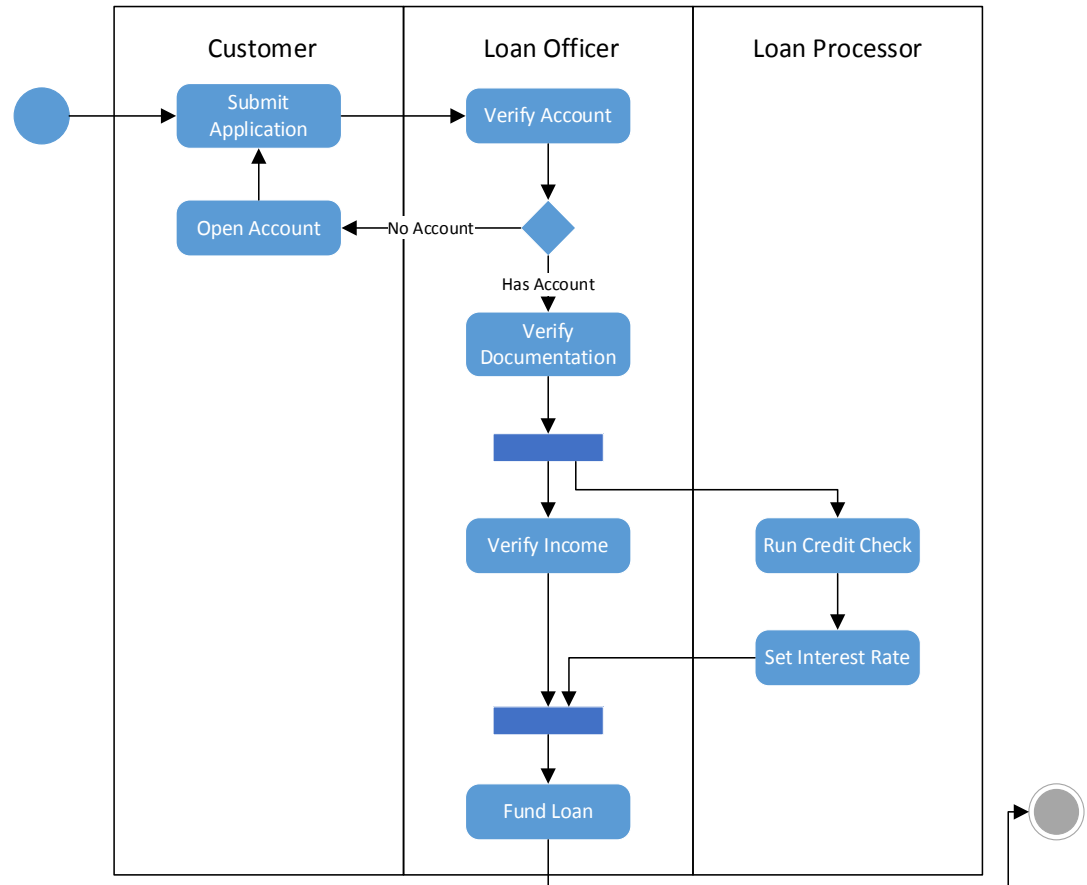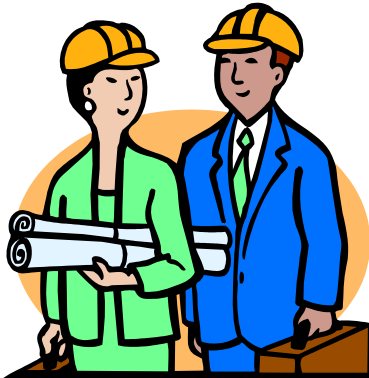
Activity Diagram
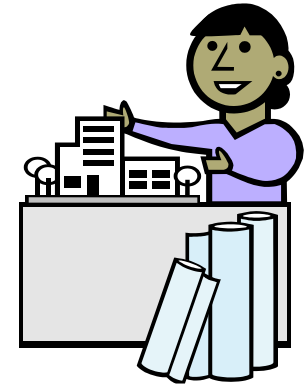
- **Workflows**
- **Operations**

Common Users of Activity Diagrams
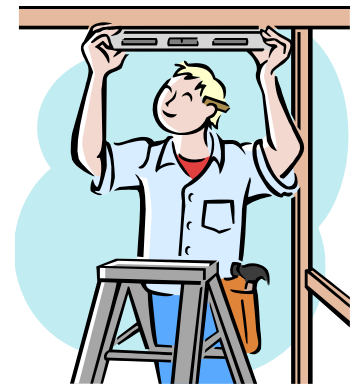
Product Owner

Business Analyst

Architect

Operations
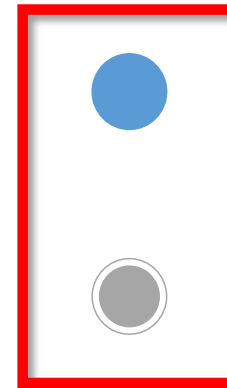
Quality Assurance

Developer
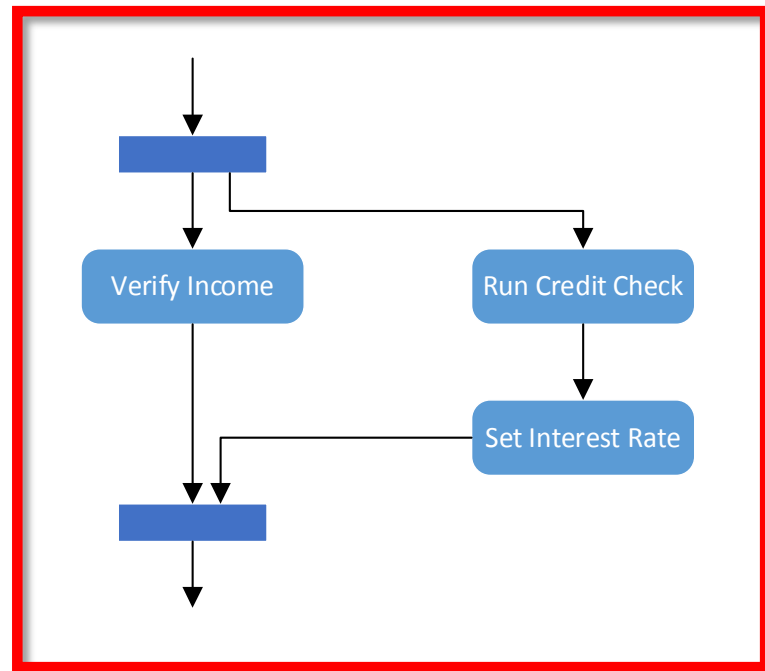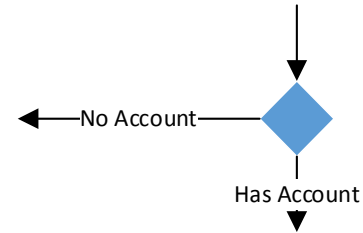
Actions and Activities

- **Actions**
  - Single Step
- **Activity**
  - Multiple Step
    - Decomposed in own diagram
- **Special**
  - Initiation
  - Completion

Submit Application

Flow Control

- **Decision / Branch**
- **Fork and Join**

Basic Activity Diagram

Customer	Loan Officer	Loan Processor

Submit Application → **Verify Account**

Open Account ← No Account ◆

Has Account

Verify Documentation

Verify Income   **Run Credit Check**

Set Interest Rate

Fund Loan
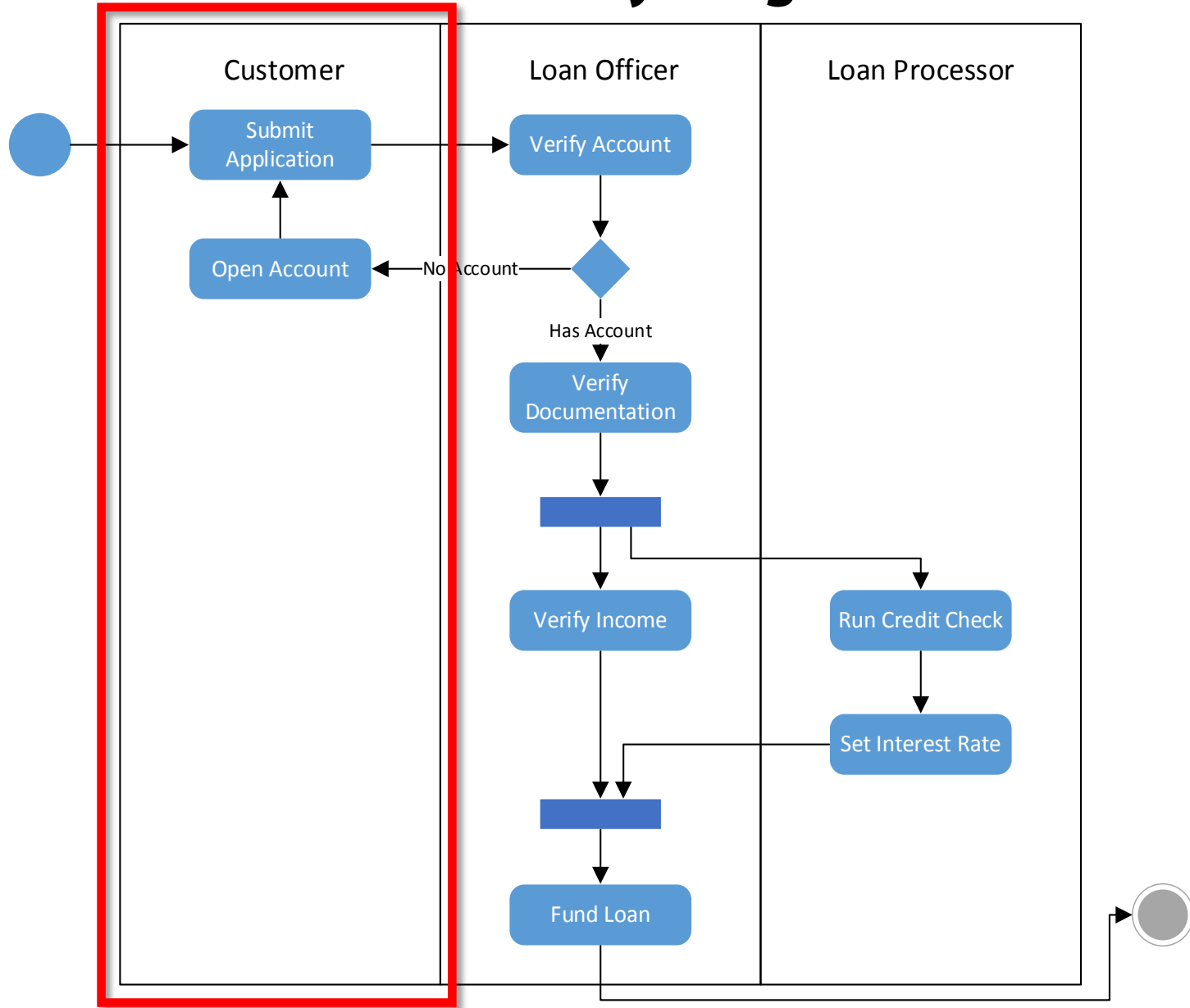
Summary

- **Behavioral Modeling**
  - System Logic
  - Algorithms
  - Flows
- **Use Case Diagrams**
  - Functionality / Features
- **Sequence Diagrams**
  - Time ordered messages between objects
- **State Diagrams**
  - Transitions between states for an object
- **Activity Diagrams**
  - Enhanced flowchart