Module 2

Software Process and Agile Practices

Module 2 Overview (Week 2)

- Topic 2.1 – Introduction to Processes
  - What is a process?
  - Software engineering activities
- Topic 2.2 – Process Models
  - From linear models to modern iterative and parallel models
  - Prototyping
- Topic 2.3 – Agile Practices
  - Extreme programming
  - Scrum

Learning Outcomes

- Distinguish between different process models for organizing software production
- Gauge the applicability of process models for a software development project
- Apply the fundamentals of Agile software development and management practices

Module 2- Topic 2.1

Introduction to Processes

Topic Outline

- Processes and Practices
  - Recall the importance of process
  - The concept of a process
- Software Engineering Activities
  - Key activities
  - The inputs and outputs of each activities

Recall the Importance of Process

- It takes the sustained work of many people with different skill sets to make great software products

- A process organizes the work on a product through its lifetime
  - Where you should start
  - Complete things in a logical order
  - Steps are not missed or overlooked

- A process also lays out rules and responsibilities for everyone on the development team

What is a Process?

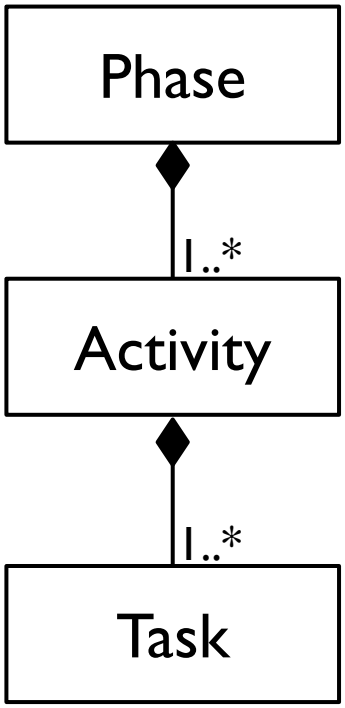
Phases of a Lifecycle Process

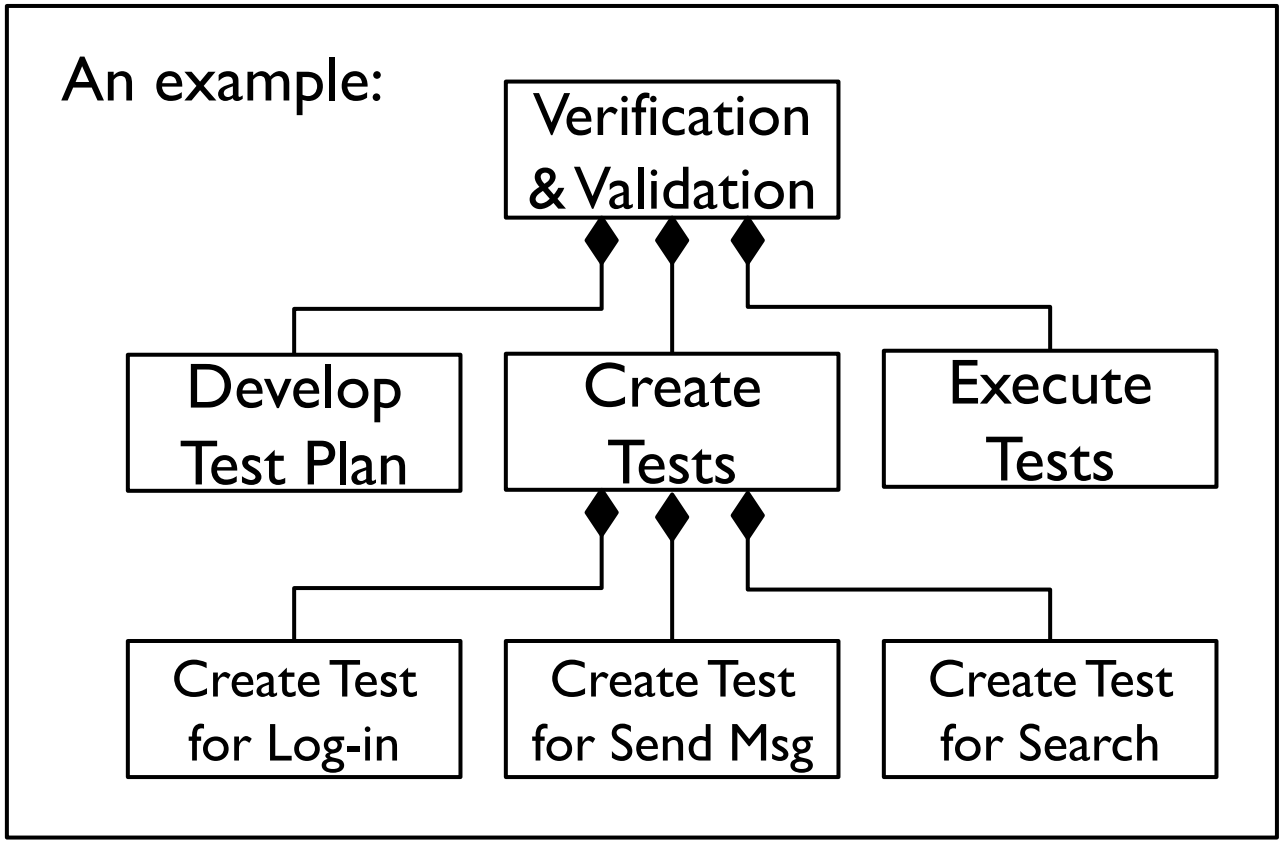
- A lifecycle process
  - From the initial conception of the idea to the eventual retirement of the product
- Lifecycle processes generally share a high level notion of Phases
  - Specification – define what the software will do
  - Design and implementation – figure out the optimal way to structure the software
  - Verification and validation – test the software for bugs and ensure the system is delivering what the client needs
- Depending on the process models, these phases can be known by different names
  - Waterfall – levels; Spiral – quadrants
- The process of software development is not like following a recipe from beginning to end
  - Software can last a long time, and undergo many changes

Learn more in Topic 2.2. Process Models

Phases – Activities - Tasks

- Phases are composed of activities. Activities are groups of related tasks.





Quick Question

Your development team have been commissioned to work on a database for a major bank. For obvious reasons, your client is very concerned with security. Your team come up with many security features that could be implemented into the product.

In what phase of a software life cycle process would this activity occur?

A. Specification
B. Design and implementation
C. Verification and validation

Quick Question

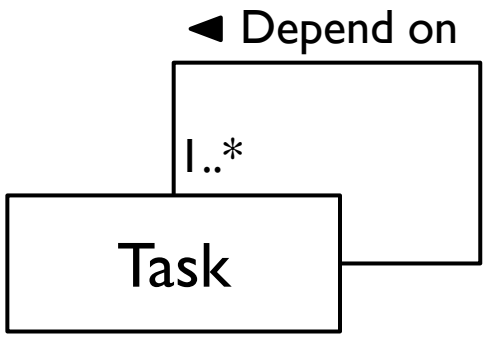
You have been assigned to a new project. In this project, your team is developing a new database and checkout system for the local library. It uses a mobile app to checkout books to the user's account.

Which of these assignments is an activity and not a task?

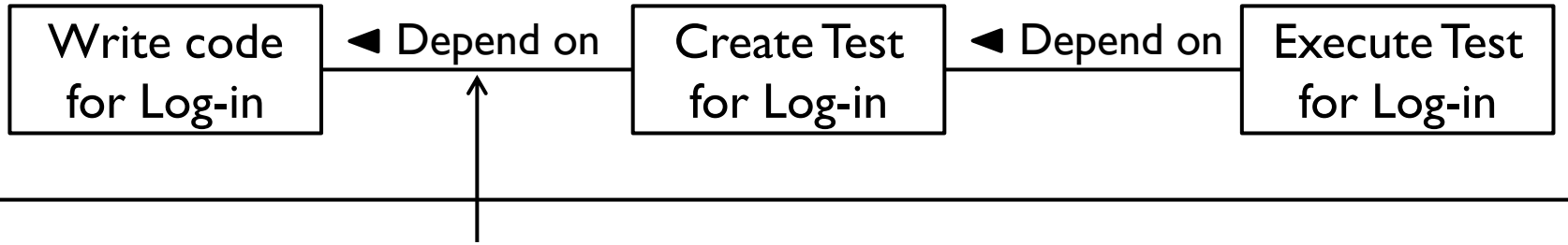
A. writing source code for adding new books to the database
B. set up the database
C. writing the text for the user account help page
D. executing tests for creating an account

Task Dependencies

- Tasks may have dependencies on other tasks



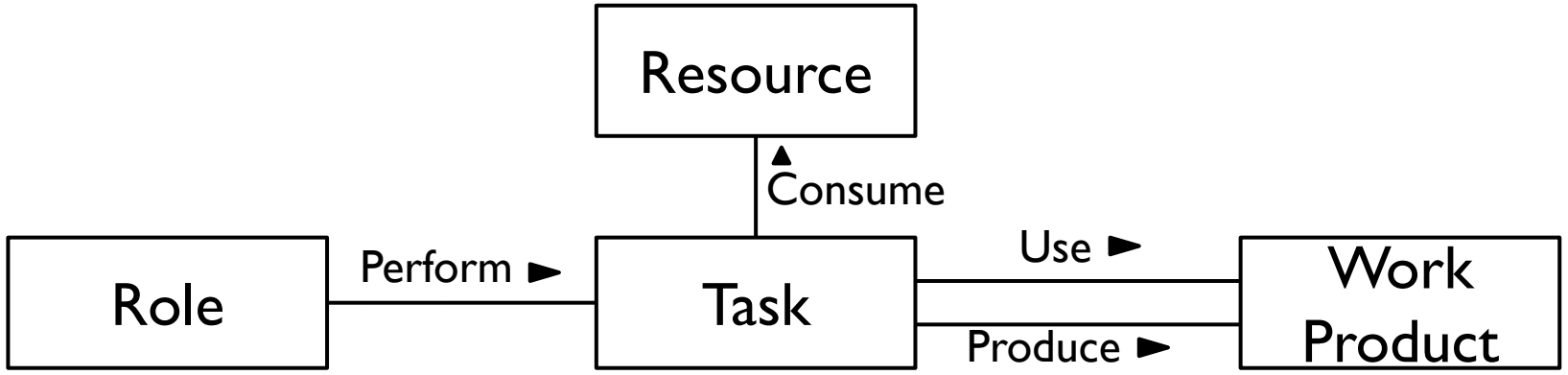
An example:

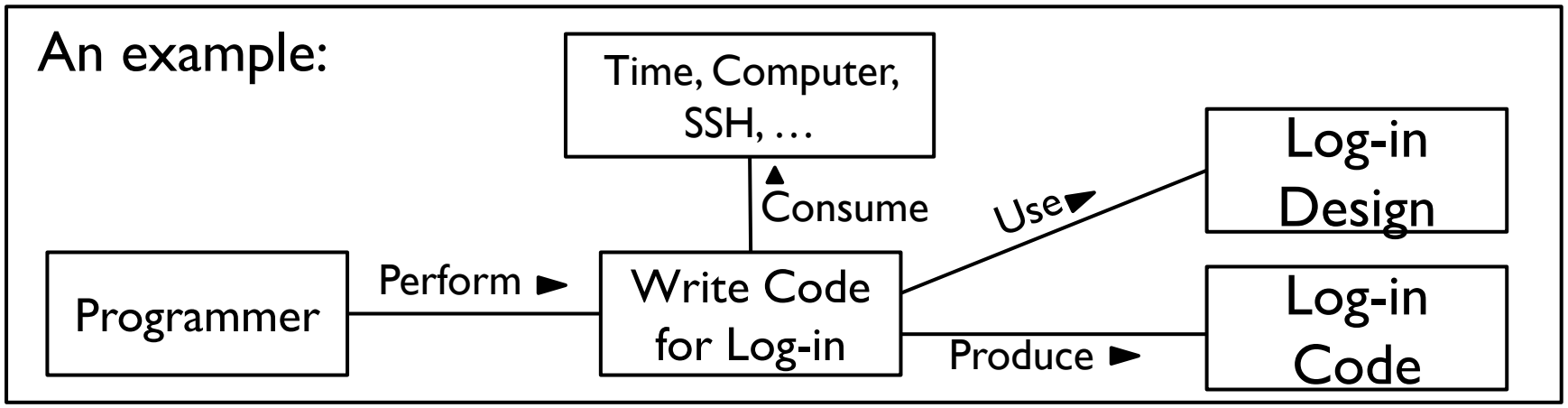


Is this dependency always true? Check Test-Driven Development in Module 4 – Topic 4.2 – Lesson 4.2.2

Tasks – Roles – Work Products – Resources

- A role performs a task; a task (may) uses a work product and produces a work product; a task consumes a resource





Quick Question

Let's imagine writing an essay as a software engineering activity. If the completed essay is the output work product, what do you think would be the best input work products?

A. Time and money
B. An outline and notes previously generated on the topic
C. A computer and keyboard
D. A researcher and a writer

Quick Question

You are working for a chain of coffee shops. Your client wants your development team to create an app that allows end users to pay for their coffees with the application. You are working on the formulating potential approaches activity with your development team.

What would an input work product be for this activity?

A. Estimations
B. Defined metrics
C. Internal documentation
D. Backlog of requirements.

Do We Miss Something?

- Phases – activities – tasks: what to do and in which order
- Roles – who will do what
- Resources & work products – what will be consumed, used, or produced

How can we use processes more effectively?

Processes – Practices - Methodologies

- Practices are tactics that provide guidelines and rules for aspects of developments
  - Specification, design & implementation, verification & validation, planning, monitoring, communication, …
- Practices are often gathered into a methodology
  - E.g., Scrum is an agile methodology which contains agile practices.
- Methodologies are often based on certain values, principles, and philosophy
  - E.g., the agile manifesto provides a philosophy, and an agile methodology provides the specific guidelines and rules
- Processes and practices are flexible and customisable
  - See supplementary Reading 3.6 Building Right Product: Industry Examples to find how big companies like Google, IBM customizes processes and practices

Quick Question

You and your development team are working hard to implement some agile practices into your development. One practice you chose to adopt is delivering a working prototype to your client every two weeks for feedback.

What phase of a process does this practice belong?

- Specification
- Design and implementation
- Verification and validation

Software Engineering Activities

Software Engineering Activities

PROJECT MANAGEMENT PHASE

- Creating a Process
- Setting Standards
- Managing Risks
- Performing Estimations
- Allocating Resources
- Making Measurements
- Improving Process

SPECIFICATION PHASE

- Identifying Needs
- Eliciting Requirements
- Expressing Requirements
- Prioritizing Require'ts
- Analysing Require'ts
- Managing Require'ts
- Formulating Potential Approaches

DESIGN & IMPLEMENTATION PHASE

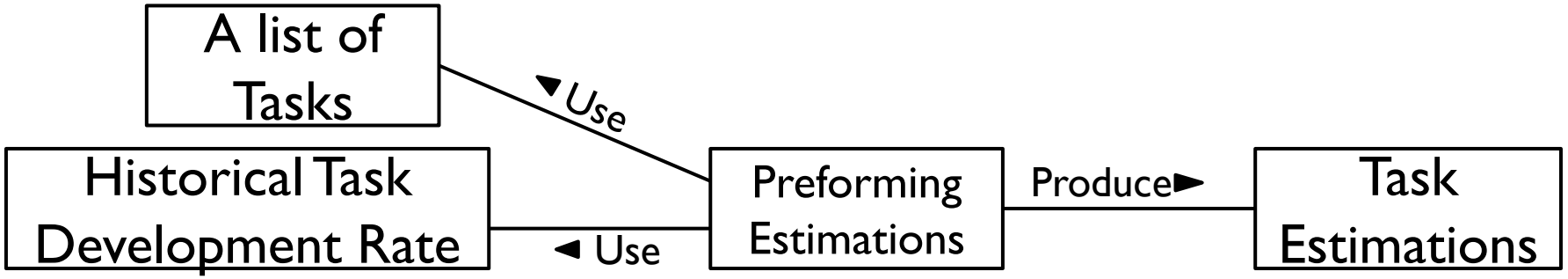
- Designing Architecture
- Designing Databases
- Designing Interfaces
- Creating Executable Code
- Integrating Functionality
- Documenting

VERIFICATION & VALIDATION PHASE

- Developing Test Procedures
- Creating Tests
- Executing Tests
- Reporting Evaluation Results
- Reviewing & Auditing
- Client Demonstrations
- Conducting Retrospectives

Project Management Phase

- Ongoing throughout the development
- An example of input – activity – output



- Our focus in this course: making measurements
  - Defining, calculating and analysing metric data

If you would like to learn more about project management, check courses like COMP3120 Managing Software Development

Specification Phase

- The requirements for the product are determined in this phase
- It does not only occur at the beginning of development

- Activities in specification phase are covered in
  - Module 3 Right Product – Client Needs and Software Requirements

Design & Implementation Phase

- This phase is out of scope of this course. Check courses like COMP2130 Software Analysis and Design.

- Still need documenting? Don't we value working software over comprehensive documentation?

- YES. Documentation is a still very important part of software development
  - Internal documents – help new developers
  - External documents – instruction manuals or training materials for the end user to use

Verification & Validation Phase

- Can you tell the differences?
  - Validation – whether the product satisfies the needs of your client
  - Verification – whether the product does what it is intended to do
- V&V does not just occur at the end of production
- Activities in V&V phase are covered in
  - Module 3 – Topic 3.5 Validating Requirements
  - Module 4 – Reviews, Testing, Metrics for Software Improvement

Software Engineering Activities Covered in This Course

PROJECT MANAGEMENT PHASE

- Creating a Process
- Setting Standards
- Managing Risks
- Performing Estimations
- Allocating Resources
- Making Measurements
- Improving Process

SPECIFICATION PHASE

- Identifying Needs
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