# Activity 9: Software Development

Software development activities are grouped into four main categories: ***analyze***, ***design***, ***code***, and ***test***. This activity explores ways to organize these categories into a software development life cycle (SDLC).

## Model 1 Finding & Fixing Errors

Estimate how long (seconds, minutes, hours, days, weeks, months, or years) it typically takes to correct an error in software when it is found by:

| | | |
|---|---|---|
| a. | a **compiler**, seconds after the file was edited | seconds |
| b. | a **compiler**, later the same day or during a nightly build | hours/days |
| c. | a **pair programming** partner, seconds after the error was made | |
| d. | a **code review**, days or weeks after the file was edited | |
| e. | a **customer** or other user, months after the software is released | |
| f. | a **unit test**, minutes after the file was edited | |
| g. | a **unit test**, later the same day or during a nightly build | |
| h. | a **system test**, shortly before software is released (weeks or months after the file was edited) | |

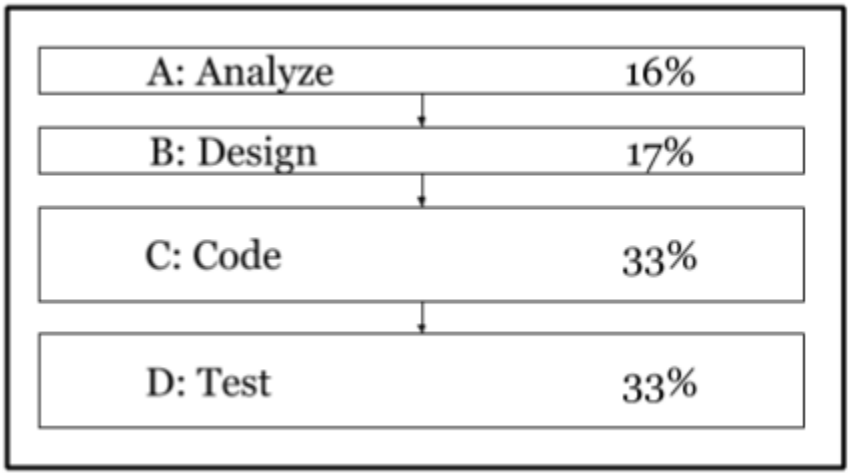
### Questions (5 min) **Start time:** _____

**1**. Describe (or sketch a graph of) the relationship between the time to **find an error** and the time and cost to **repair an error**.

**2**. Explain why we should use an SDLC that finds and fixes errors as quickly as possible.

## Model 2 The Waterfall Model

The following diagram shows the typical percentage of **total cost & effort** for each stage of software development. In practice, these percentages vary widely by project.




**Questions (10 min)** **Start time:** _____

**3**. Based on the Waterfall Model:

a) How many stages are there?

b) Which stage is 1st?

c) Which stage(s) must be finished before **coding** starts?

**4**. Based on the Waterfall Model:

a) What % of total effort is in the **last stage**?

b) What % of total effort is in the **first two stages**?

c) When the project is 25% completed, what % of **analysis** is done?

d) When the project is 25% completed, what % of **coding** is done?

e) When the project is 50% completed, what % of **coding** is done?

f) When the project is 50% completed, what % of **testing** is done?

**5**. It is important to find and fix errors in software.

a) If **coding** errors are found during **C: Code**,
in which stage should they be fixed?

b) If **coding** errors are found during **D: Test**,
in which stage should they be fixed?

c) If **analysis** errors are found during **B: Design**,
in which stage should they be fixed?

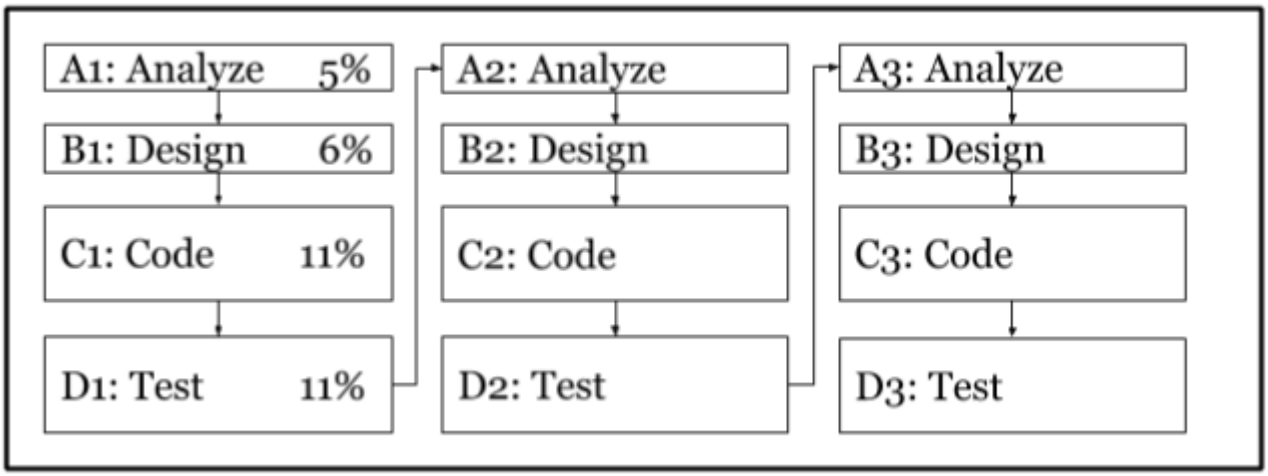
d) If **analysis** errors are found during **D: Test**,
in which stage should they be fixed?

e) Which stage focuses most on **finding** errors?

f) Are major errors in analysis and design more likely
when the project is **similar** to past projects, or **different**?

**6**. Later stages often take more time, effort, and money than expected. Explain why based on your answers to the previous questions.

## Model 3 The Iterative Model



Assume that the total cost & effort is the same for Model 2 and Model 3. They differ only in how the SDLC is organized.

## Questions (15 min) Start time: _____

**7**. Based on the Iterative Model:

a) How many stages are there?

b) Which stage is 7th?

c) Which stages involve design?

d) What % of total effort is for the **first four stages**?

e) What % of total effort is for **testing**?

f) What % of total effort is for **analysis and design**?

**8**. Based on the Iterative Model:

a) During what stage is the project 25% completed?

b) When the project is 25% completed, what % of **analysis** is done?

c) When the project is 25% completed, what % of **coding** is done?

d) When the project is 25% completed, what % of **testing** is done?

e) During what stage is the project 50% completed?

f) When the project is 50% completed, what % of **analysis** is done?

g) When the project is 50% completed, what % of **coding** is done?

h) When the project is 50% completed, what % of **testing** is done?

**9**. It is important to find and fix errors in software.

a) If **analysis** errors are found during **A1: Analyze**,
in which stage could they be fixed?

b) If **analysis** errors are found during **B1: Design**,
in which stage could they be fixed?

c) If **coding** errors are found during **D2: Test**,
in which stage could they be fixed?

d) If **analysis** errors are found during **B2: Design**,
in which stage could they be fixed?

e) Are **analysis** errors likely to cause **design** errors?

f) Are **design** errors likely to cause **coding** errors?

g) Is it better to have **one try** or **several tries**
to remove all errors from the project?

**10**. Explain why each test stage should try to find as many errors as possible.

**11**. Explain why **Iterative** is less likely then **Waterfall** to run into projects later in the project.

*NOTE: The iterative model does not necessarily repeat exactly three times. The key idea is that it repeats each stage multiple times, for the reasons you have identified.*