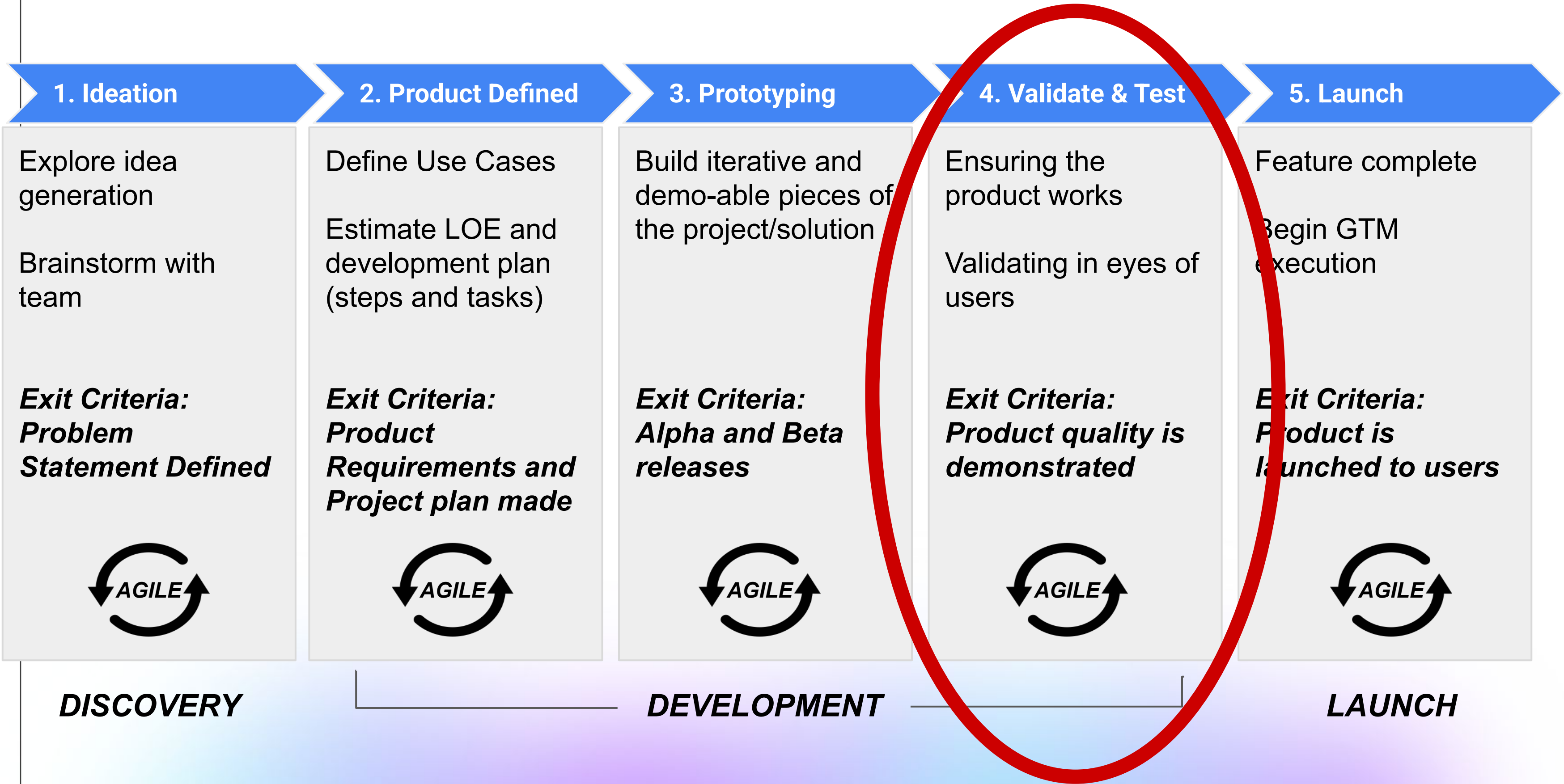
Lecture 12: January 22

Application Testing, Presentation 4, Final Package

Agenda

- **Application Testing / Code Reviews**
- Presentation 4
- Final Package (Team Website)
- Upcoming Deadlines

Post-Alpha Work



1. Ideation	2. Product Defined	3. Prototyping	4. Validate & Test	5. Launch
Explore idea generation Brainstorm with team	Define Use Cases Estimate LOE and development plan (steps and tasks)	Build iterative and demo-able pieces of the project/solution	Ensuring the product works Validating in eyes of users	Feature complete Begin GTM execution
Exit Criteria: Problem Statement Defined	***Exit Criteria: Product Requirements and Project plan made***	***Exit Criteria: Alpha and Beta releases***	***Exit Criteria: Product quality is demonstrated***	***Exit Criteria: Product is launched to users***
AGILE	AGILE	AGILE	AGILE	AGILE

DISCOVERY ***DEVELOPMENT*** ***LAUNCH***

QA Testing

Types of Testing

- Unit Tests
- Integration Tests
- End2End / Manual Tests
- Usability Testing or Heuristic Evaluation

What is testing (for code), and why do we do it

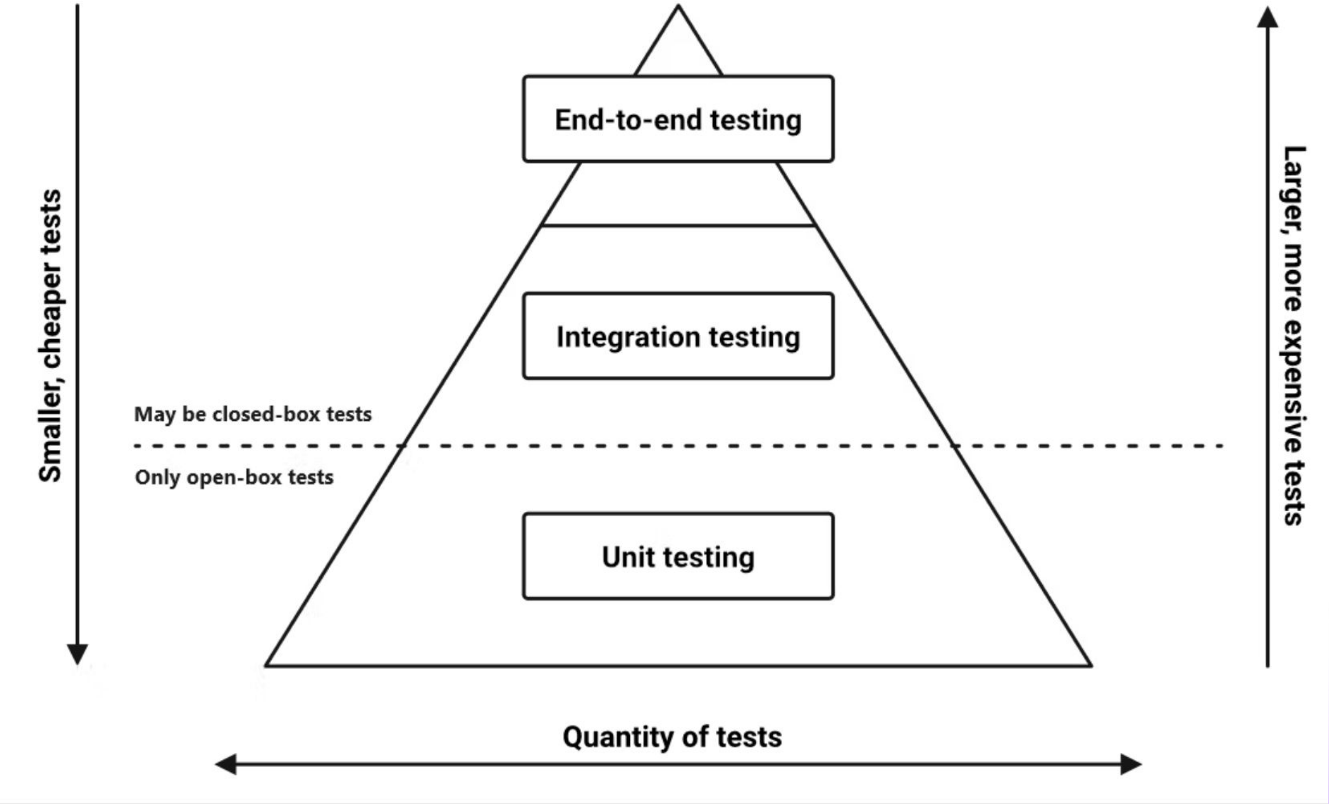
What:

- Tests are a contract with our code: given a value, we expect a result to be returned
- Passing tests **cannot prove the absence of bugs**, but they inform us that code is working in the manner defined by the test

Why:

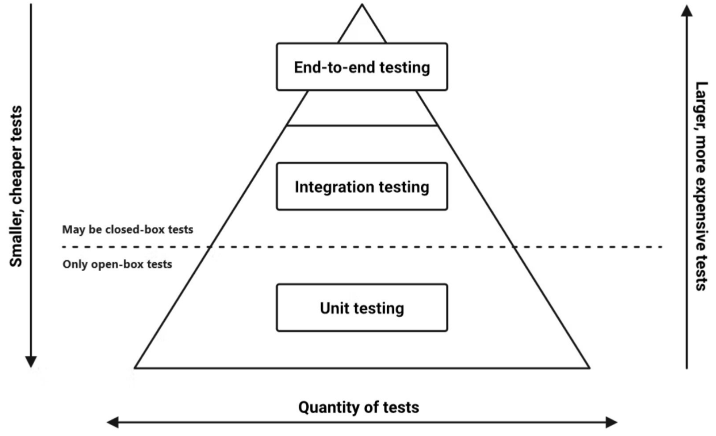
- Modify code with confidence
- Identify bugs early
- Improve system design

Testing Pyramid



Unit Testing

- Test individual components in isolation
- “Open-box” tests
- Tests should be deterministic & fast
- Tests run after every commit
- Mock out dependencies like db calls / external services
- Example:
    - **User authentication**: test that user login correctly validates user credentials & handles errors like incorrect passwords & usernames

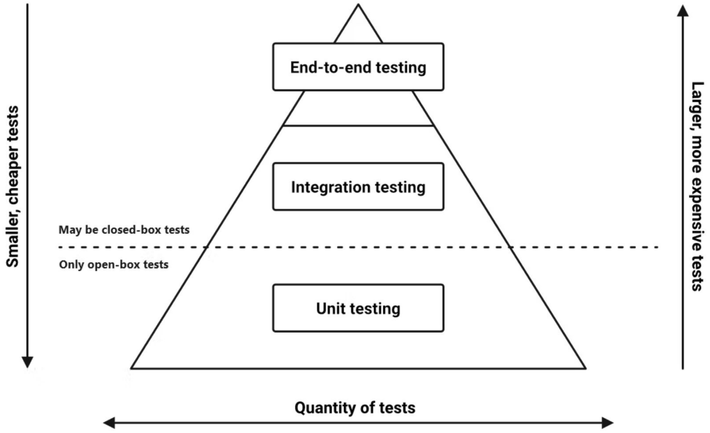


Structuring Unit Tests

- Isomorphism
  - Your test structure should match your code structure
- Naming tests
  - Helpful to include the name of the method and the thing being tested in the test name (eg. test_load_user_data_missing_file)
- Each test should be short and focused
  - A bunch of smaller tests is preferred over one large test
  - Easier to have code reviews of functionality and its tests
  - Test behavior rather than implementation
- Code Coverage
  - Goal: test every piece of functionality
  - Isomorphism helps to visualize this
  - Can use testing tools to gauge code coverage

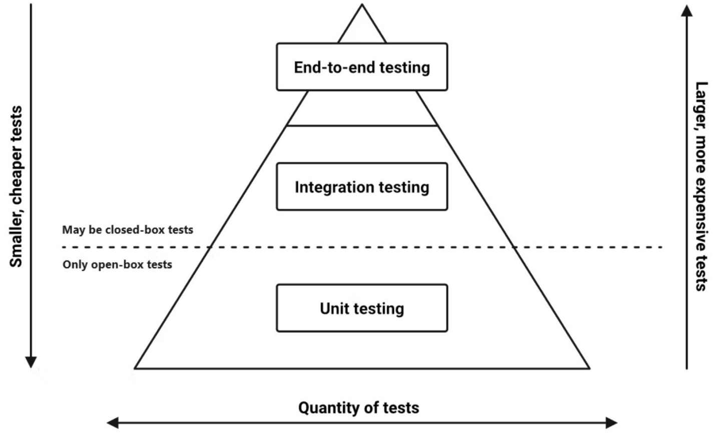
Integration Testing

- How different components interact
- Helps find issues that are not obvious by examining implementation of smaller pieces
- Tests run prior to merging to main
- “closed-box” tests
- Tests have dependencies & require comprehensive setup – real db / api calls
- Example:
    - **State management**: test that changes are written to db & can be read by other users



End2End Testing

- Test full product workflow
- Expensive, sometimes manual
- Happens prior to release
- Example:
  - **Full functionality:** test that UI works correctly w/ backend & features behave as expected



QA Testing

Types of Testing

- Unit Tests
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- Usability Testing or Heuristic Evaluation

Usability Testing

Why?

- You won’t know how good your app is until users use it
- Expert users/builders know too much
- Hard to predict what users will do

Types

- Guided interview
- Journal or Diary Study

Note, User testing answers the question **“Do users need the app?”**, whereas Usability testing answers the question **“Can users use the app?”**

Usability Testing vs Heuristic Evaluation

Usability Testing	Heuristic Evaluation
Potential users test out the user interface with real tasks	Someone looks at the user interface and identifies the problems
Ask users to complete specific tasks	Explain nothing but the purpose of the system
Create structure for how each participant will be guided through tasks	Create rules for how participants can structure their feedback
Performed by potential users	Performed by experts

Structuring and Conducting Usability Tests

Preparing for the Interview

1. Define the goal of the interview (What do you want to learn? What purpose will this achieve?)
2. Define the user groups you'd like to target
3. Prepare any assets (prototypes, mockups, terms, etc.) and make sure they're uniformly defined/tested for users
4. Section your interview into distinct topic areas, so you can orient the user: "Let's start with some questions about your background...Let's move onto [X topic]..."
5. Prepare the interview structure to be easily copy/paste-able so you can take notes during the interview per user
6. Prepare a script if the interview covers a sensitive topic / if there are questions you may anticipate
7. Consider randomizing lists of items if that is an interview question

Choosing Participants

Representative of your persona types

- Use the persona types you have listed in your Writings

Approximate, when needed

- Eg. Looking for professors, so you might interview a TA instead

Incentivize participants

- Swag, Free coffee/pizza, Offering to be a participant in their research

Conducting the Test

- Record the interview
- **[Part 1]** User’s background (so you can section responses, sample questions on next slide)
- **[Part 2]** Ask the user to complete a few tasks within your interface
- **[Closing]** Thank the user for their time!
- Feel free to ask about competition if relevant (for benchmarking, etc.)
- Note that whatever is stated in the conversation should remain private as we haven’t launched anything and some details the user might want to keep private
    - You should say this depending on the sensitivity of the interview topic

Part 1: User’s Background

Understand the user demographic and characteristics to determine how close they fit within your target audience

General Information / Screener Questions

- How old are you?
- Are you graduating soon and looking to move?

Pre-Test Questions

- Have you ever leased an apartment?
- How comfortable are you with browsing real estate marketplace apps?
- When searching for an apartment, do you have a list of must-have’s and if so, what are they?
- Have you ever used Zillow, Apartments.com, or StreetEasy?

Let’s say we’re testing a Real Estate Marketplace app targeted at New Grads

Part 2: Questions about your interview topic

Have the participant complete 3-5 tasks to determine usability of the features

“I have the application loaded on the device here and will ask you to complete a few tasks. Please share your thoughts aloud as you work through the tasks and note that any opinion or feedback you have is valuable to our team.”

- Sign-up / Login Flows
- Create profile and set preferences
- 2-3 use cases from use case document
    - For new grad real estate marketplace app: Search for an apartment, View apartment details, Contact apartment broker, Save apartment listing, View Saved listings

Analyzing Results

Types of Data Collected

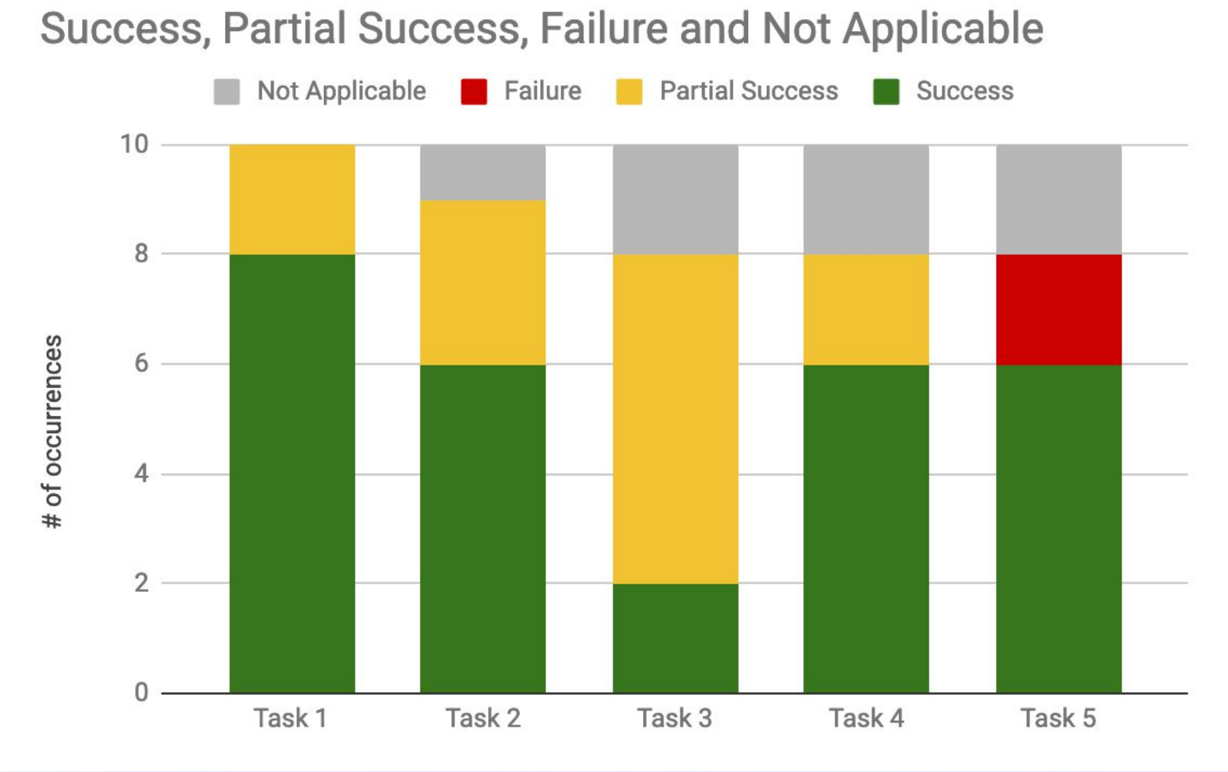
Action-based data

- Summary of tasks that the user successfully or unsuccessfully completed
- Quantitative data
- *Eg. The participant successfully navigated to the Profile and set their price range.*

Thinking out loud data

- Observations of what the user is doing or thinking
- Qualitative data
- *Eg. The participant said they were lost when trying to Save an apartment.*

Quantitative Data



“Thinking out loud” Data

- Prompt the user: “Tell me what you’re thinking”
- Pros:
  - **Understand what** the user is thinking
  - **Understand what** the user is trying to do
  - **Understand what** questions the user has
  - **Understand what** the user is reading or paying attention to on screen
- Cons:
  - May be uncomfortable for the user
  - May take more time to run the interview and process the feedback

Analyzing Qualitative Results

- Collect all feedback into a list
- Rate the items in the list on frequency, severity, and level of effort
  - Frequency: How often did this feedback occur?
  - Severity: Does this issue prevent the user from completing the task or serve as a distraction?
  - Level of effort: How much work will it require to fix this?
- Prioritize the list
- Decide on needed changes
- Note, not all feedback needs to be fixed/addressed

Example Results for a Scheduling App

Priority	Feedback	Frequency	Severity	LOE	Type
1	When I try to search for an apartment within my price range, the filter always resets to the default range and I cannot search.	3	High	M	Bug
1	When I view my Saved apartments, I want to filter by my top housing preferences.	4	Medium	S	Feature Request
2	I would like an email notification when an apartment on my Saved list goes OFF market.	2	Low	L	Feature Request
3	I would like a daily list of recommended apartments similar to my searches.	2	Low	M	Feature Request

Testing for your Project

- Track QA work on sprint board
- When applicable, set goals for Unit tests, System tests, and Usability tests
- For Usability tests (if you have time)
    - Create testing questions and tasks
    - Choose participants
    - Run tests
    - Document results
    - Decide on which results to act on

Code Reviews

Code Reviews

A code review (also referred to as peer code review) is a process where one or two developers analyze a teammate’s code, identifying bugs, logic errors, and overlooked edge cases

- PR Reviews
- Live code pairing

Code Reviews

Considerations

- **Readability**: Are there any redundant comments in the code?
- **Security**: Does the code expose the system to a cyber attack?
- **Test coverage**: Is there a need to test more cases?
- **Architecture**: Does the code use encapsulation and modularization to achieve separation of concerns?
- **Reusability**: Does the code use reusable components, functions, and services?

Don’t review more than 200-400 lines of code at a time.

QA Engineer

Who? Roles and Responsibilities?

- Set goals and objectives for unit test and system test coverage
- Establish framework and principles for testing
- Integrate automated testing software into development process
- Work with Engineering team and Product manager to determine key use cases to address in testing

Industry?

- Any Engineering organization

Agenda

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- **Presentation 4**
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Presentation 4: Skill Refinement

- **Due Date: 2/19, lab may run until 8:40**
- **Goals:**
  - Keep your presentation skills fresh
  - Provide immediate, actionable feedback
- **Expectations**
  - You will present presentation 3 slides (no need to create new content)
  - We will interrupt you & give feedback during the presentation
  - We will have you jump around slides so that everyone receives feedback

Upload slides here before 2/19

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Final Package (Team Website)

Purpose: Store all your project details in one place (good for you & GW!)

Due Date: 5/11

Contents:

- Project Description
- About the team
- Link to GitHub
- Final Presentation Slides (PDF)
- Senior Design showcase poster (PDF)
- Writing 4 (PDF)

Examples:

- https://www.wingwatch.net/
- https://flighteye.github.io/
- https://subtitlevision.github.io/

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For Next Week

Weekly Focus

- Write code for demo 2
- Peer PR reviews

Mentor Meetings

- [Team]: Discuss testing & deployment strategies

Deadlines

- [Team]: Peer PR reviews (**2/2**)
- [Team]: End of January Sprint (**2/2**)
- [Individual]: Demo 2 (**week of 2/3**)

Reminders

- Next week’s lab is in-person office hours. Stop by if you have any questions / need a place to work!
- Don’t forget weekly updates