

Software testing

Requirements, test scenarios, suites and cases

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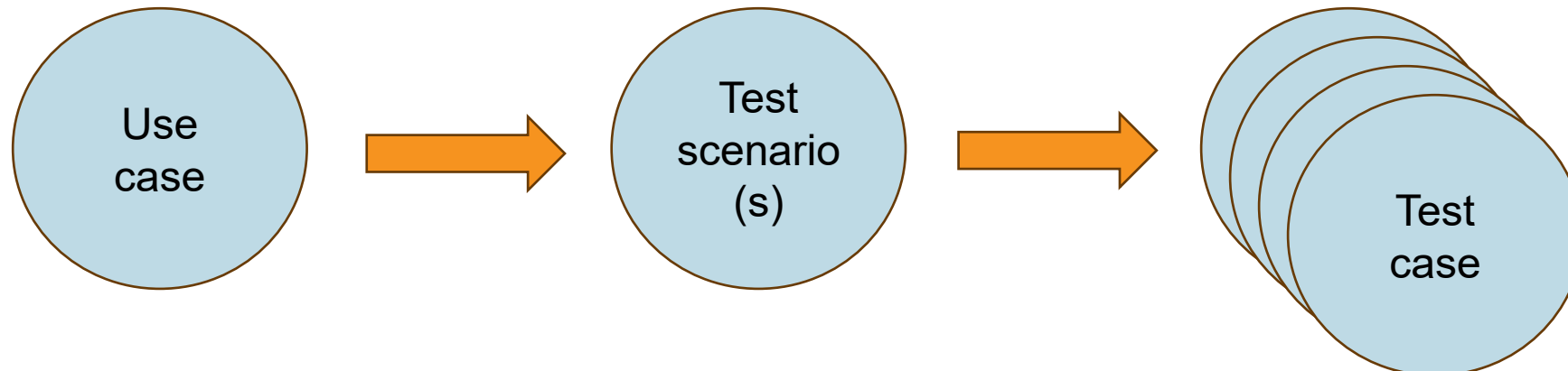
- Requirements
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Requirements

- Developing software is based on requirements
- All testing is based on requirements
- Requirements are documented (backlog, requirement specification, ...)
- Requirements must be testable (e.g. acceptance criteria is defined)
- Also non-functional requirements must be documented and it will affect on testing
- If requirements change, testing must adapt
- Unclear and contradictory requirements will lead to higher costs and testing might become inefficient

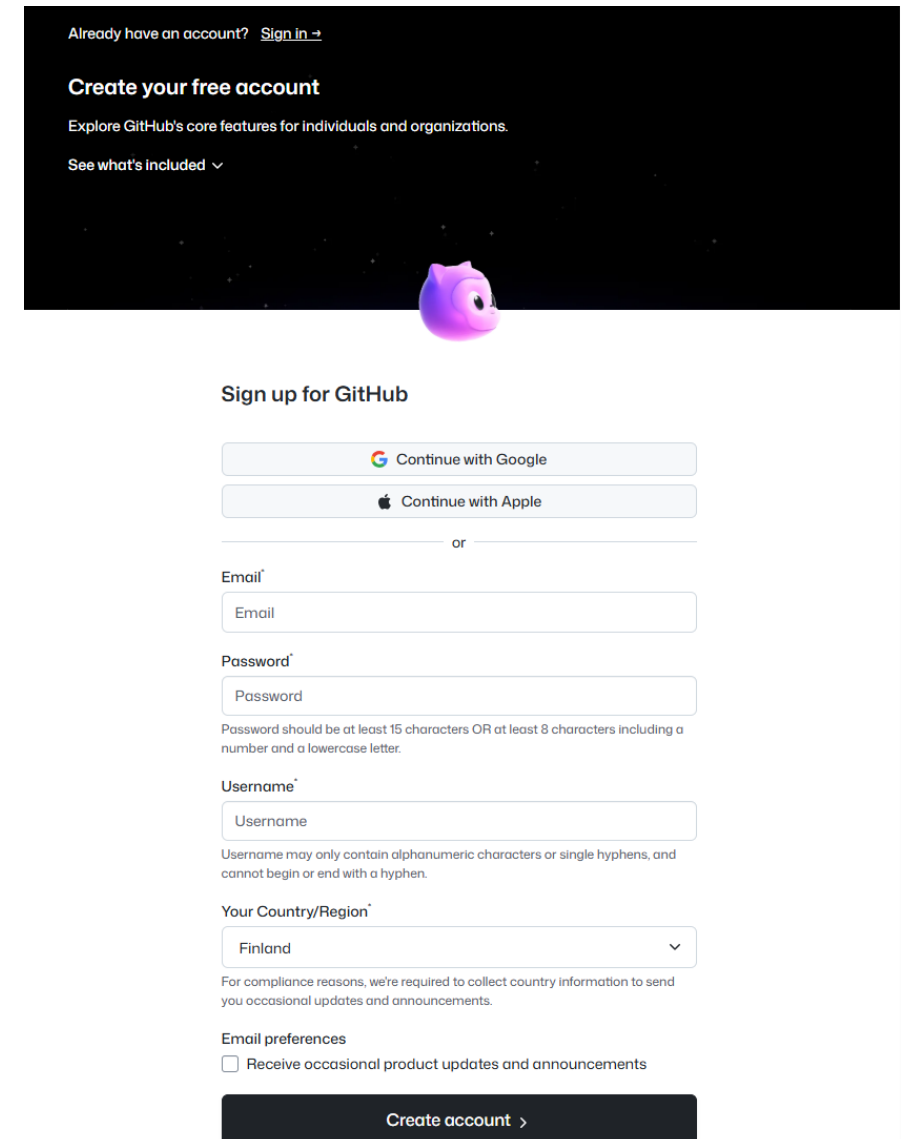
Test scenarios

- A test scenario describes the functionality of a specific aspect to be tested in the software
- High-level description what to test, e.g., Successful account creation
- Behind a test scenario(s), there may be a use case, which describes the user's actions in interaction with the software
- From a use case, one or more test scenarios can be derived
- From a test scenario, one or more test cases can be derived



Test scenarios

- Use case:
As a new GitHub user, I want to create an account so that I can access the platform and use its features.
- Examples of test scenarios
 - o Successful account creation
 - o Invalid or missing input data
 - o Email or username conflicts
 - o Technical or system errors
 - o Security requirements
 - o ...



The image shows the GitHub sign-up page. At the top, there's a dark header with a link to 'Sign in' for existing users. Below this, a section titled 'Create your free account' encourages users to explore GitHub's features. A small, purple, cat-like mascot is visible in the background. The main form area is titled 'Sign up for GitHub' and includes options to 'Continue with Google' or 'Continue with Apple'. Below these, there are input fields for 'Email', 'Password', and 'Username', each with a small asterisk indicating it's required. The password field has a note about its requirements: 'Password should be at least 15 characters OR at least 8 characters including a number and a lowercase letter.' The username field has a note: 'Username may only contain alphanumeric characters or single hyphens, and cannot begin or end with a hyphen.' There's also a dropdown for 'Your Country/Region' with 'Finland' selected. At the bottom, there's a checkbox for 'Email preferences' with the text 'Receive occasional product updates and announcements'. A large 'Create account >' button is at the very bottom.

Already have an account? [Sign in](#)

Create your free account

Explore GitHub's core features for individuals and organizations.

[See what's included](#)

Sign up for GitHub

[Continue with Google](#)

[Continue with Apple](#)

or

Email*

Password*

Username*

Your Country/Region*

Email preferences

☐ Receive occasional product updates and announcements

[Create account >](#)

Test cases

- Test Case refers to the actions performed to verify a specific feature or functionality of the software
- A test case includes instructions for executing the test
 - o Description
 - o Steps
 - o Preconditions (required to execute the test case)
 - o Test data (e.g., inputs)
 - o Expected result

Test case, example 1/3

- Test scenario: Successful account creation
 - o ID: 001
 - o Sign up using valid email, username, password and country
 - o Steps: 1) Go to Github's sign up page, 2) Enter valid email, 3) Enter valid password, 4) Enter valid username, 5) Select country/region, 6) Submit form, 7) Confirm email via verification link
 - o Preconditions: The email address and username must be ones that have not been used for Github registration before.
 - o Test data: Information used with sign up (valid email, password, username and country/region)
 - o Expected result: Account is created successfully

Test case, example 2/3

- Test scenario: Successful account creation
 - o ID: 002
 - o Sign up using valid Google/Gmail account
 - o Steps: 1) Go to Github's sign up page, 2) Select Continue with Google, 3) Google OAuth page login window opens, 4) Enter Gmail address, 5) Enter password, 6) Approve Google authentication (if prompted), 7) Accept Github's terms and conditions (if asked), 8) Confirm creation of the Github account
 - o Preconditions: Valid Google/Gmail account which is not currently used for Github account
 - o Test data: Username/email and password for valid Google/Gmail Account
 - o Expected result: Account is created successfully

Test case, example 3/3

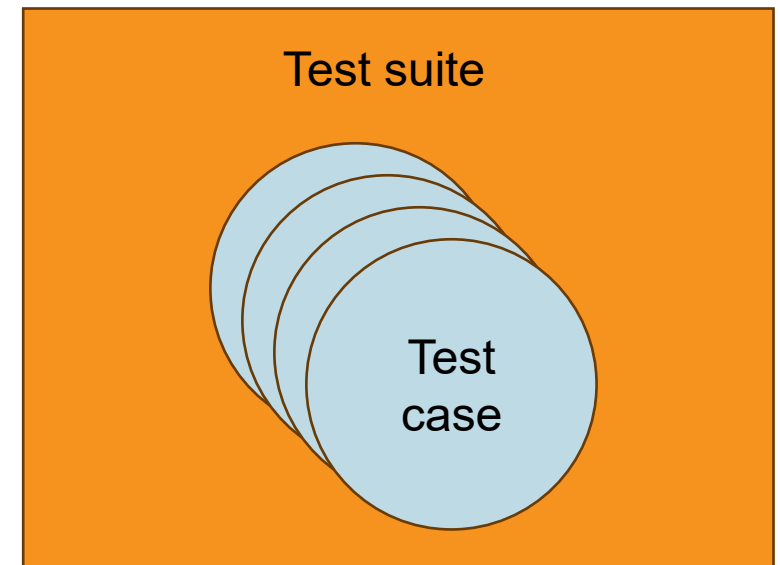
- Test scenario: Invalid or missing input data
 - o ID: 001
 - o Description: Attempt to sign up leaving email field empty
 - o Steps: 1) Go to Github's sign up page, 2) Leave email field empty, 3) Enter valid username, 4) Enter valid password, 5) Select country/region, 6) Submit form
 - o Preconditions: The username must be one that have not been used for Github registration before.
 - o Test data: Information used with sign up (email left blank, password, username and country/region)
 - o Expected result: Validation error "Email is required"

A good test case

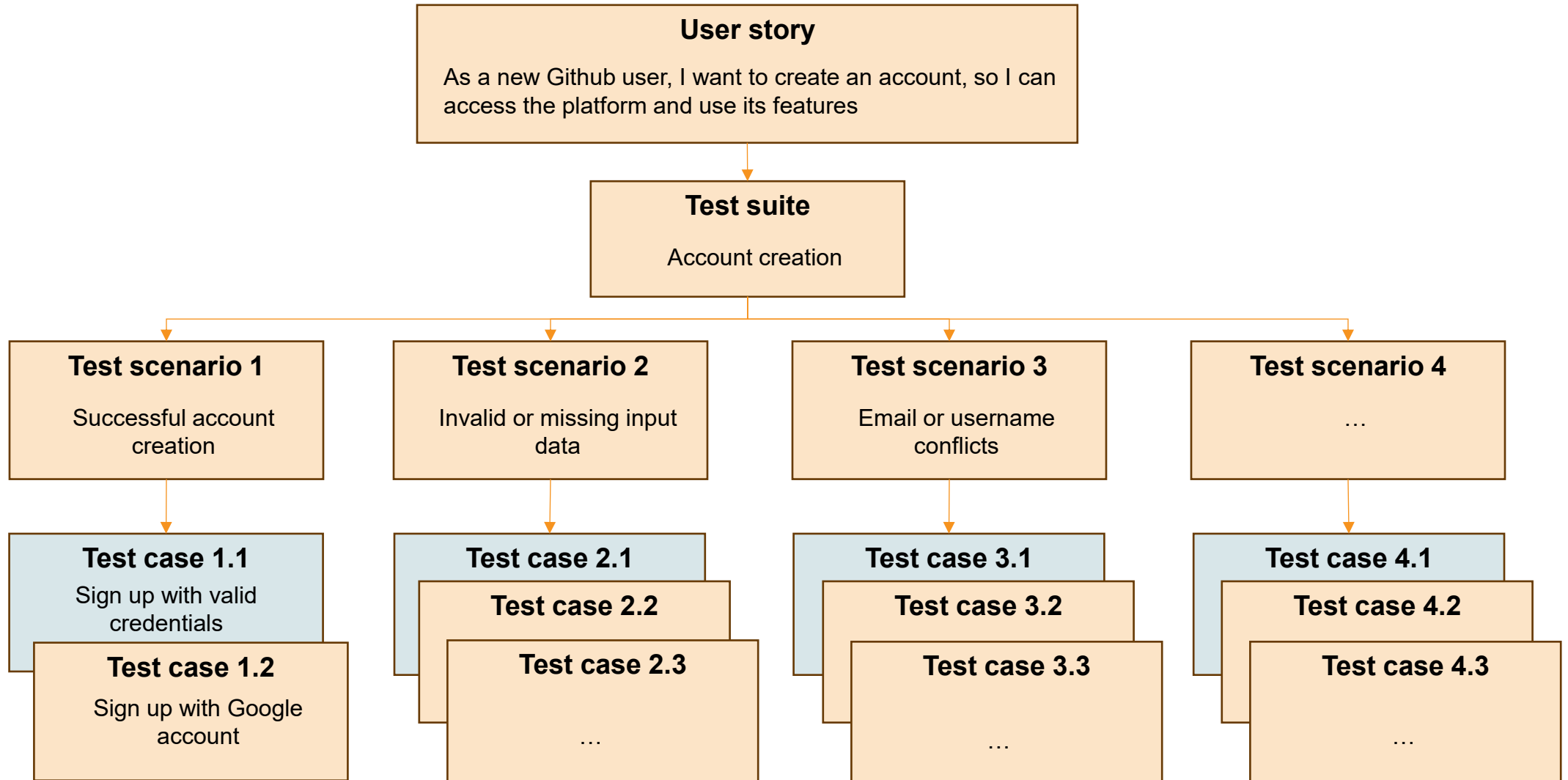
- Simple and easy to understand
- Designed from the perspective of the software user
- Does not include unnecessary steps or repetition
- Easy to identify from the requirements
- Easy to trace to the requirements
- Repeatable and reusable
- Contributes to building 100% test coverage

Test suite

- A test suite is a collection or group of related test cases, which can be very numerous over the software's lifecycle
- Use to organize test cases, especially when doing automated testing
- Depending on the size of the software, there can be tens, hundreds, thousands, etc., of test cases
- AI enables an extremely large number of test suites and cases



User story, test suite, scenario and cases



Traceability

- Traceability refers to the ability to connect each requirement to the test cases
- Confirms, that all requirements are covered by tests (test coverage)
- Helps identify requirements that are not yet tested
- Makes easier to track changes in requirements and update related test cases
- Supports analyzing impact off requirement changes

