**Cause Effect Graph :**

* Cause-effect graphing is a technique used in test case design.
* The relationships between causes (inputs or conditions) and effects (outputs or results) are mapped.
* It's useful in identifying the various conditions that can affect the behaviour of the system.

**Cause Effect Graph of Login Phase :**

**Step 1: Identify the Inputs (Causes)**

In the case of a **login** system, the primary inputs (causes) can include:

1. **Username** (V/I)
2. **Password** (V/I)
3. **Account status** (Locked/Unlocked)
4. **Captcha** (C/I)

**Step 2: Identify the Expected Outcomes (Effects)**

The possible outcomes (effects) of the login process can be:

1. **Login successful**
2. **Login failed (invalid username)**
3. **Login failed (invalid password)**
4. **Login failed (account locked)**
5. **Login failed (captcha incorrect)**

**Step 3: Create Cause-Effect Graph**

Now we need to map the causes (inputs) to their effects (outputs). Let’s form the cause-effect graph:

* **Cause 1: Username (V/I)s**
* **Cause 2: Password (V/I)**
* **Cause 3: Account Status (locked/unlocked)**
* **Cause 4: Captcha (C/I)**

From these inputs, we can derive the following relationships:

1. **Valid Username and Password** → Login **successful** (Effect)
2. **Valid Username and Invalid Password** → Login **failed (invalid password)**
3. **Invalid Username** → Login **failed (invalid username)**
4. **Unlocked Account and Incorrect Captcha** → Login **failed (incorrect captcha)**
5. **Locked Account** → Login **failed (account locked)**

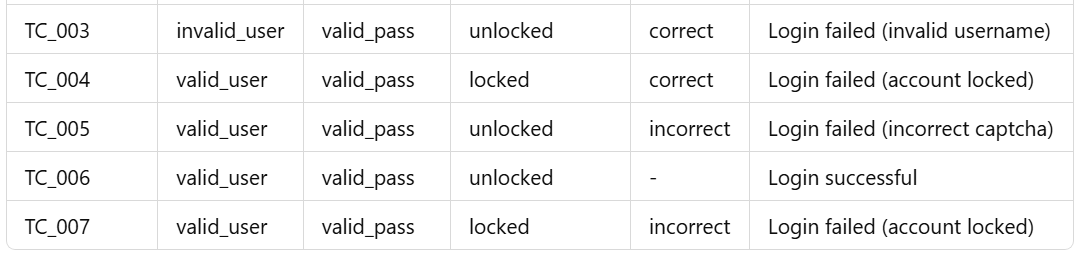
**Step 4: Derive Test Cases from the Graph**

Now we can create test cases from the cause-effect graph by considering different combinations of causes and their expected effects.

1. **Test Case 1: Valid Username, Valid Password, Unlocked Account, Correct Captcha**
   * Expected Effect: **Login successful**
2. **Test Case 2: Valid Username, Invalid Password, Unlocked Account, Correct Captcha**
   * Expected Effect: **Login failed (invalid password)**
3. **Test Case 3: Invalid Username, Valid Password, Unlocked Account, Correct Captcha**
   * Expected Effect: **Login failed (invalid username)**
4. **Test Case 4: Valid Username, Valid Password, Locked Account, Correct Captcha**
   * Expected Effect: **Login failed (account locked)**
5. **Test Case 5: Valid Username, Valid Password, Unlocked Account, Incorrect Captcha**
   * Expected Effect: **Login failed (incorrect captcha)**
6. **Test Case 6: Valid Username, Valid Password, Unlocked Account, No Captcha**
   * Expected Effect: **Login successful** (assuming captcha is not mandatory in this scenario)
7. **Test Case 7: Valid Username, Valid Password, Locked Account, Incorrect Captcha**
   * Expected Effect: **Login failed (account locked)**

**Step 5: Implement in the Test Case Document**

You can document these test cases in a structured way for execution. Here’s a sample format:



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