

# CSE 403

Software Engineering

Spring 2023

**#23: Debugging**

# Logistics

## WEEK 8

05/15 L: Code Review

05/16 T: R2

DUE: [R2!!!](#)

05/17 L: Debugging

[Release Peer-Review  
\(RPR\)](#)

05/18 P: RPR

05/19 LX: Debbing

# Debugging: What?



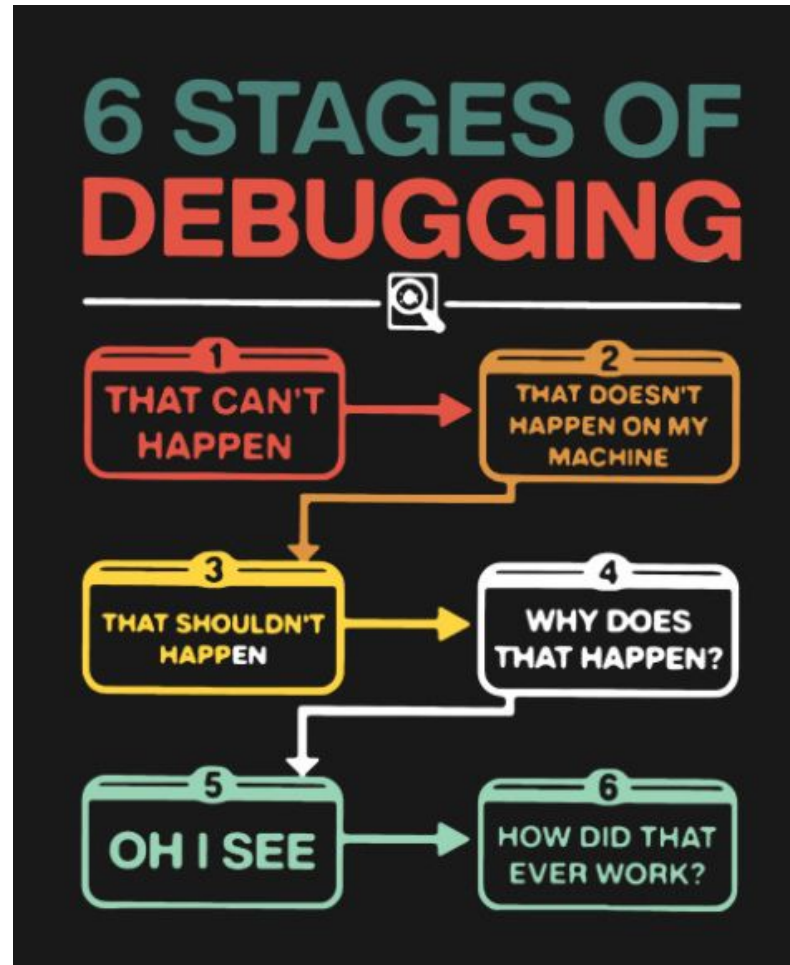
# Debugging: What?

*A bug is an **error of flaw** in a program or system that produces incorrect or **unexpected results**.*

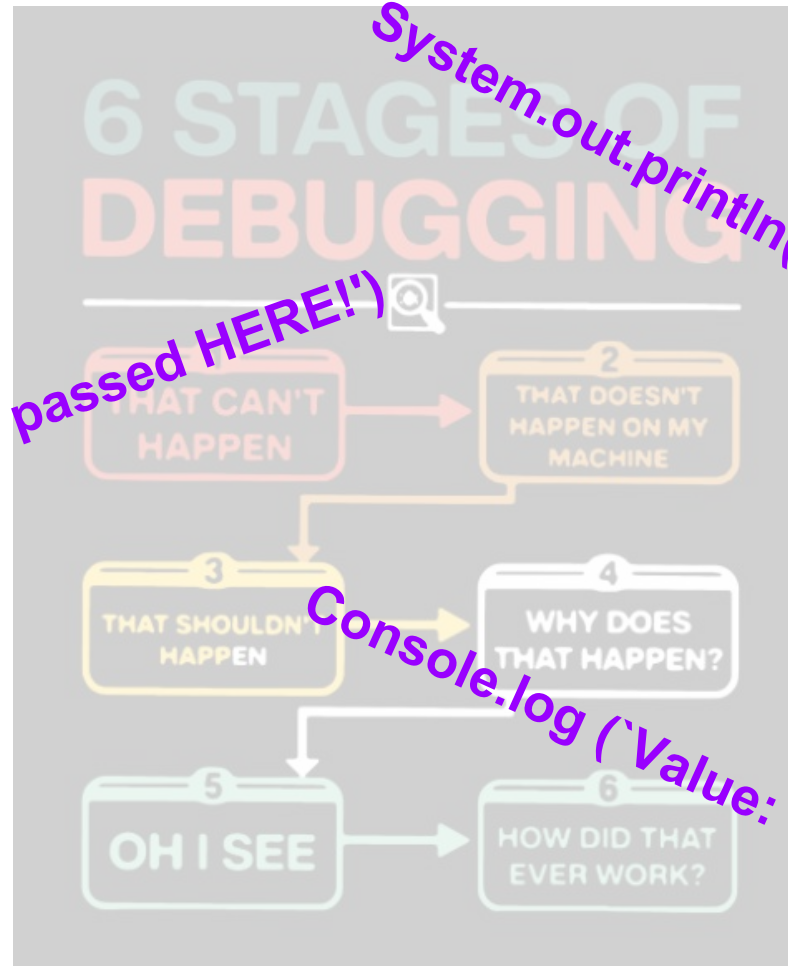
*Debugging is the process to **identify** and **resolve** bugs.*



# Debugging: A process



Debugging: ~~A process~~ Nah! I got this!



System.out.println("I am so smart!")

Console.log ("I passed HERE!")

Console.log (`Value: \${my\_account}`)

# Debugging: A process (a suggestion)

0. Identify & Document


1. Understand & Document



2. Reproduce & Document









3. Investigate & Capture

4. Fix it & Document

# Live Example


 **labinthewild / LITW-API** Private


 Edit Pins  Unwatch


 Code  **Issues** 6  Pull requests  Actions  Projects 1  Security  Insights  Settings

## GET study authorization misbehaving #8


Add time

 Open nigini opened this issue 15 minutes ago · 0 comments



nigini commented 15 minutes ago  Tip ...

If study X is authorized, it can call for any valid study ID and get a 200.  
The expected behavior is only to get a 200 when the call is for ID=X.  
The problem is less of an issue because it is always retrieving the study X content, not any unauthorized content!



<https://github.com/nigini/SWEng/pulls>



# 0. Identify & Document

Step 1: What the heck?

Step 2: This is broken, yall! (i.e., issue report)

Step 3: Feel like a hero!

# 1. Understanding (& improve documentation)

How is the program failing?

What are the assumptions to justify this error?

**What inputs or conditions are causing the error?**

(focus of next in-class activity!)

Is this an error in our understanding?

Is this really a bug in the code?

## 2. Reproduce (& improve documentation)

Can one replicate the bug?

Can I rule out other issues? (i.e., config, code synch, etc.)

Can I pinpoint a version of the code?

Can I refine the assumptions and conditions?

### 3. Investigate & Capture

What are my hypotheses about what is wrong?

What are the components involved in this?

Can I narrow down to a Class, method, line?

How can I test my hypothesis?

(print vs debugger vs tests)

How can I CAPTURE the bug?

(create an automated way/test to trap this damn bug in the future!)

## 4. Fix it!

Have I really trapped the bug?

What change will fix the bug?

Remember TDD?

- Trap with a test (red bar)
- Change the code
- Test pass!!!

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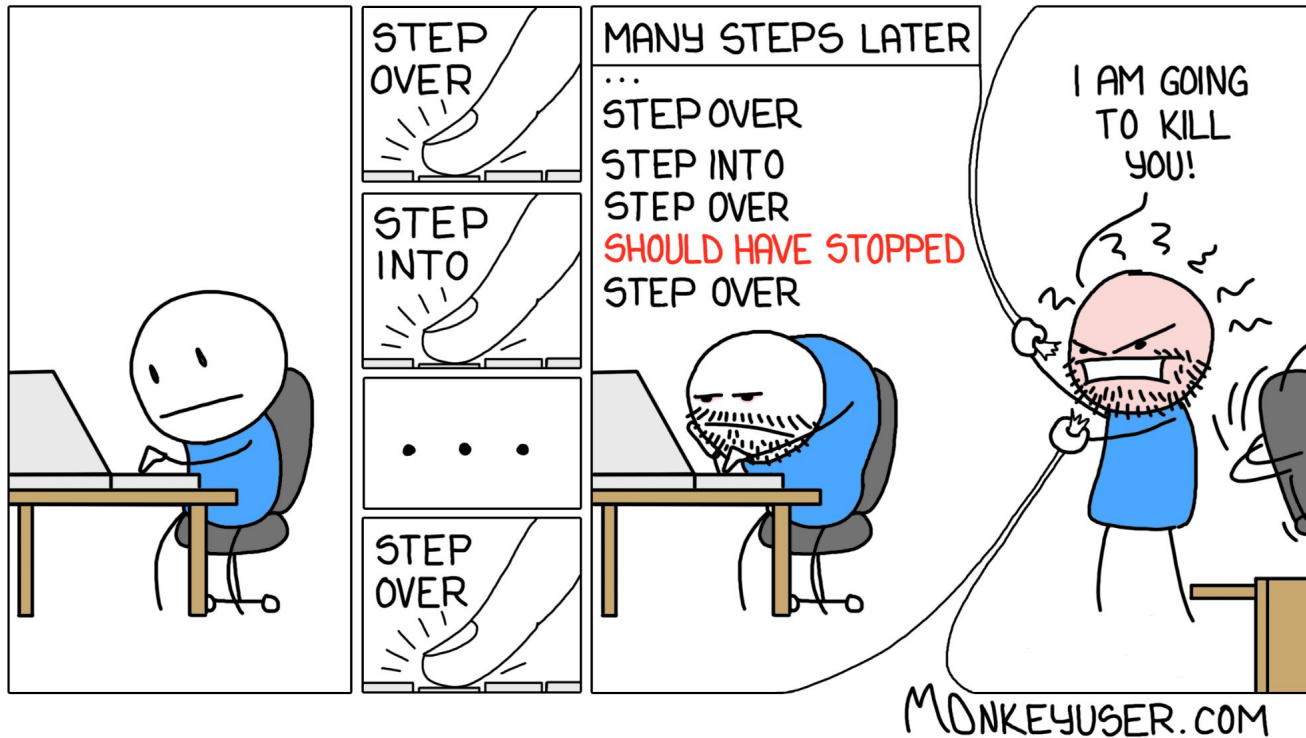
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**Delta Debugging:** finding a minimal set of conditions that expose the bug in complex cases. [\[VIDEO\]](#)

# Debugging...

## STEP BY STEP DEBUGGING



Questions, please!