

# **Unit Testing & Debugging**

Android Development

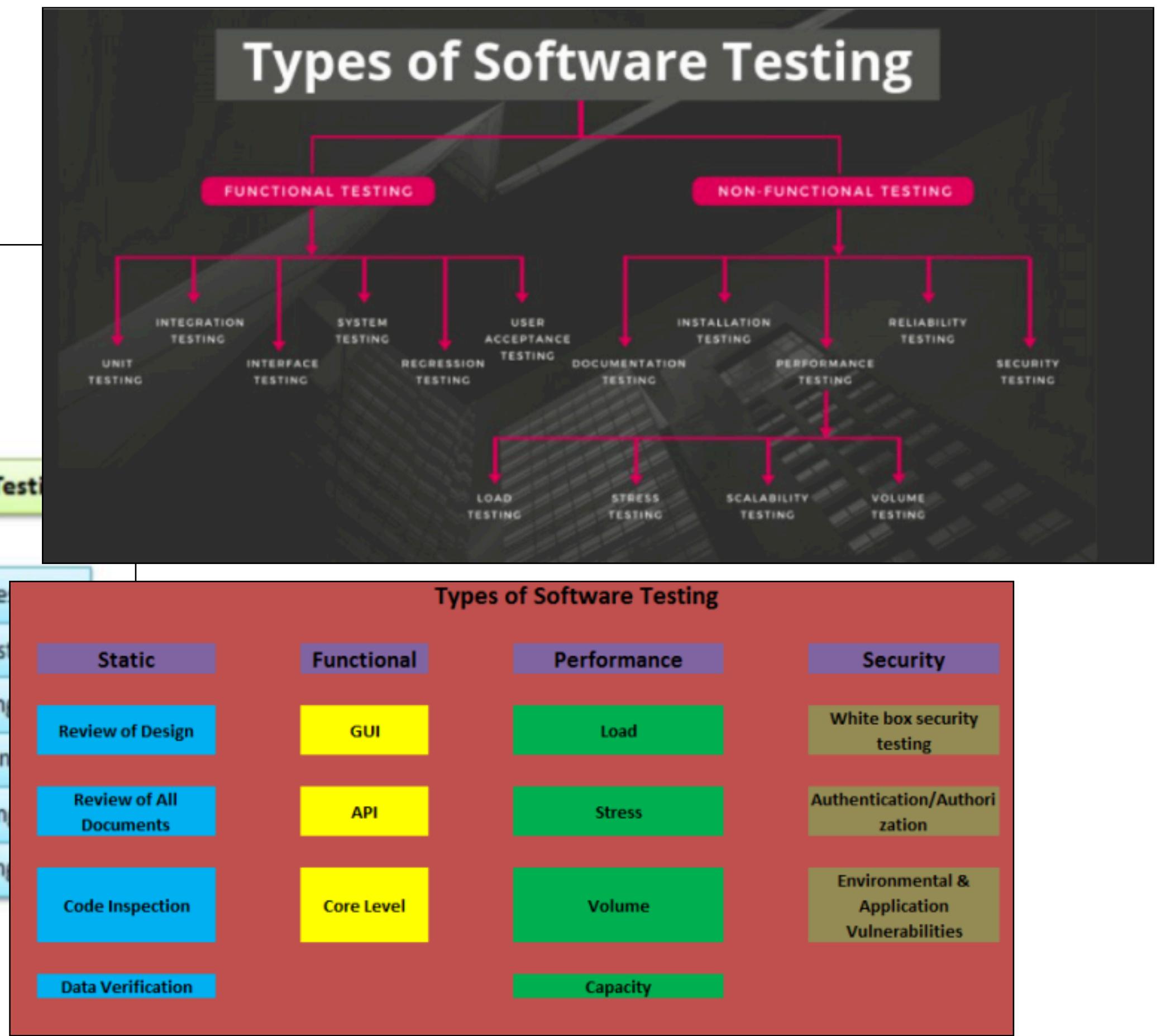
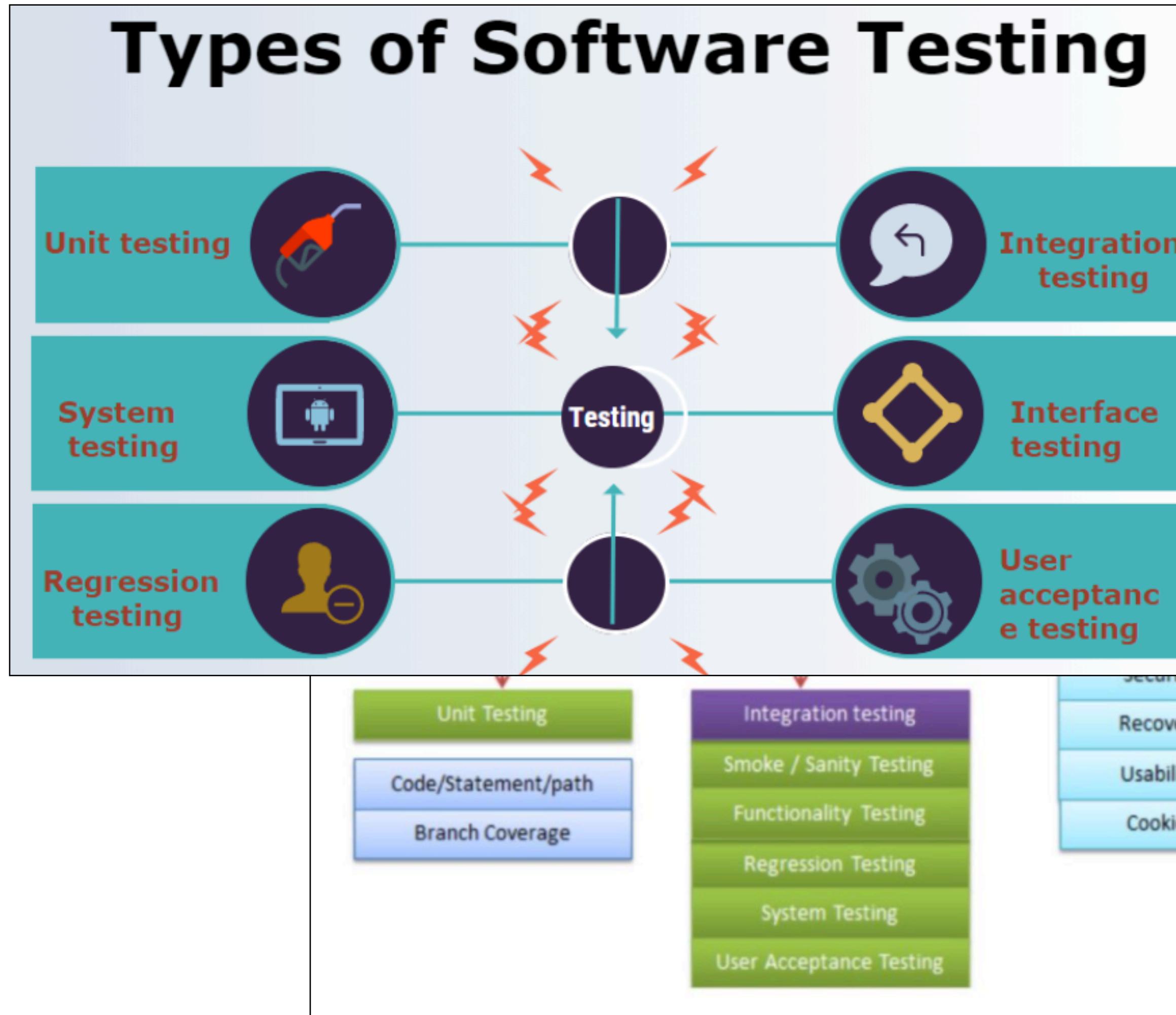
NIFR 2023

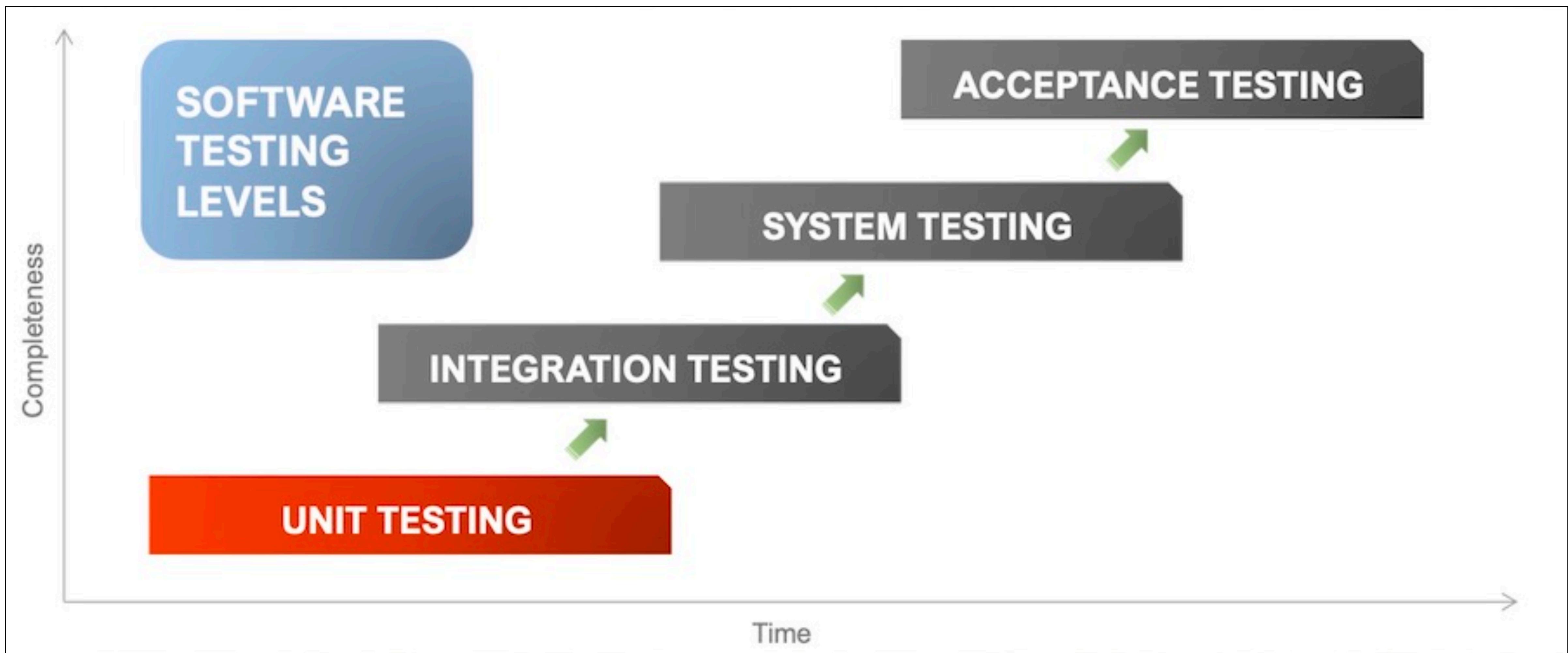
Digital Kultur  
Emne **feedback** torsdag

# Unit tests

- Software testing
- Unit testing
  - Positive/Negative testing
  - Equivalence partitioning
  - Boundary Value analysis

# Software testing





## SERVICES, OPGAVELØSNING OG SUPPORT



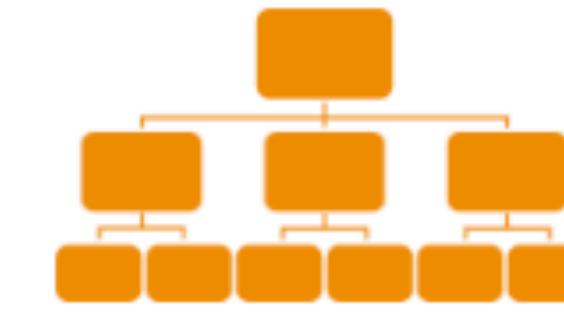
VÆRKTØJSIMPLEMENTERING



PERFORMANCETEST



BROWSER-KOMPATIBILITET



RÅDGIVNING OM  
TESTORGANISATION



AUTOMATISERET TEST



UDARBEJDELSE AF  
TESTCASES



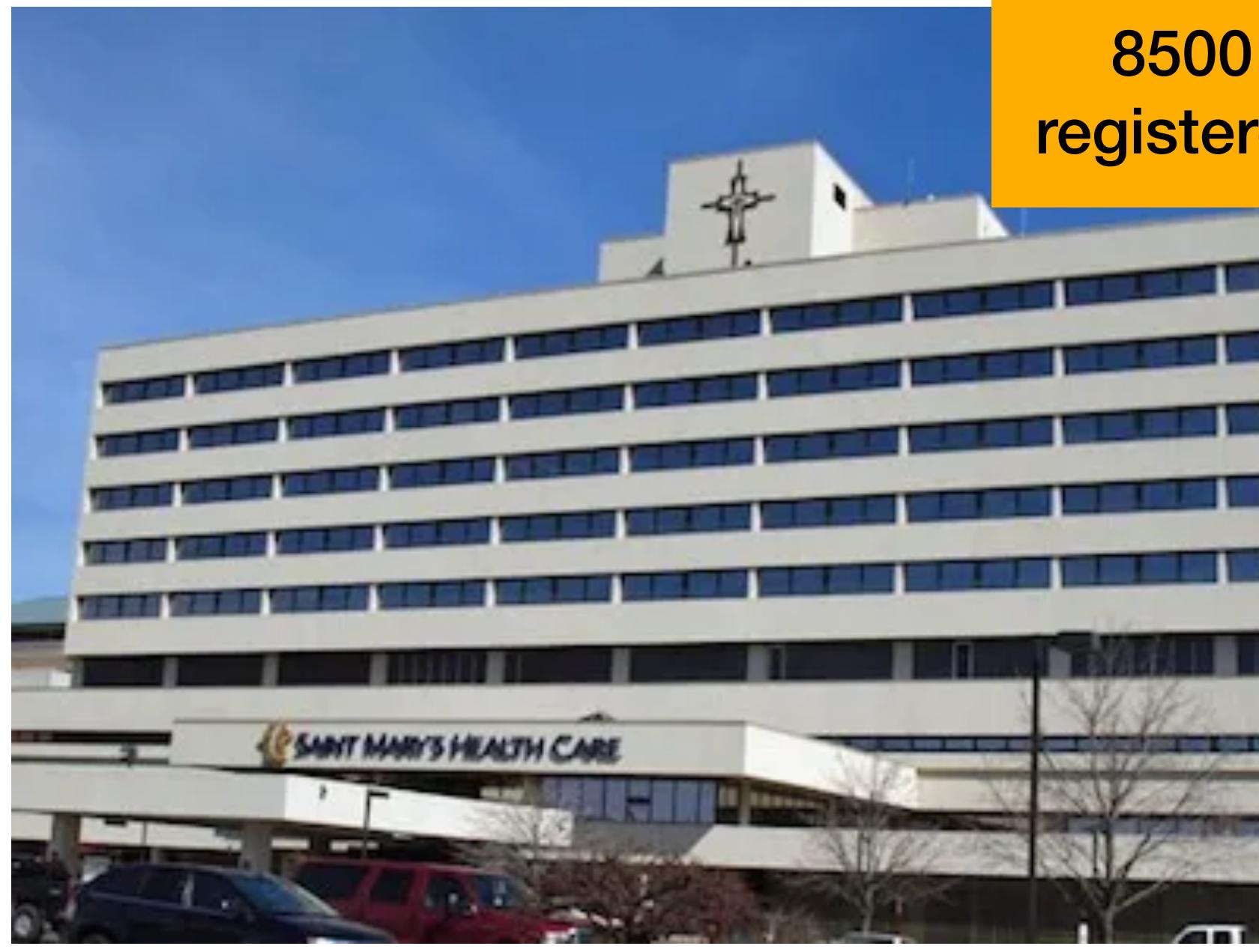
AFVIKLING AF TESTCASES



TESTSTRATEGI



TESTPLAN



St. Mary Mercy:  
8500 patients  
registered as dead



Knight Capital:  
440.000.000\$

YOUR CART      3 items

	Amazon Echo Dot 47740-10	- [ ] + \$39.99
	Kodak Gold zoo Film 40030-10	- [ ] + \$11.99
	Polaroid® Snap Instant Camera 42730-10	- [ ] + \$89.00

FREE AND EASY RETURNS  
Send it back within 30 days of receiving your order  
[More info](#)

TOTAL

Order subtotal	\$140.98
Shipping	\$5.00
<b>TOTAL</b>	<b>\$145.98</b>

CHECKOUT

Wrong calculation



OnClick Event



Summation

**YOUR CART** 3 items

Amazon Echo Dot 47740-10	- 1 + \$39.99
Kodak Gold 200 Film 40030-10	- 1 + \$11.99
Polaroid® Snap Instant Camera 42730-10	- 1 + \$89.00

**FREE AND EASY RETURNS**  
Send it back within 30 days of receiving your order  
[More info](#)

**TOTAL**

Order subtotal	\$140.98
Shipping	\$5.00
<b>TOTAL</b>	<b>\$145.98</b>

**CHECKOUT**

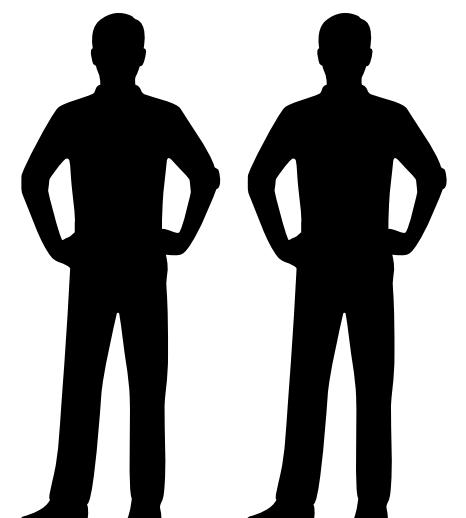
Wrong calculation



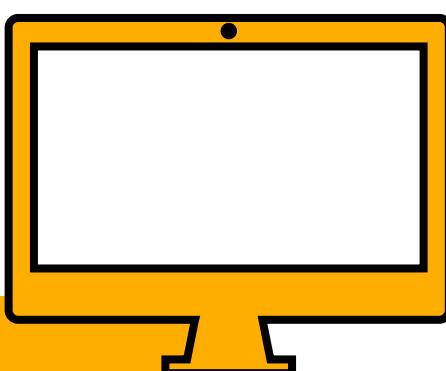
List updated



Persistance

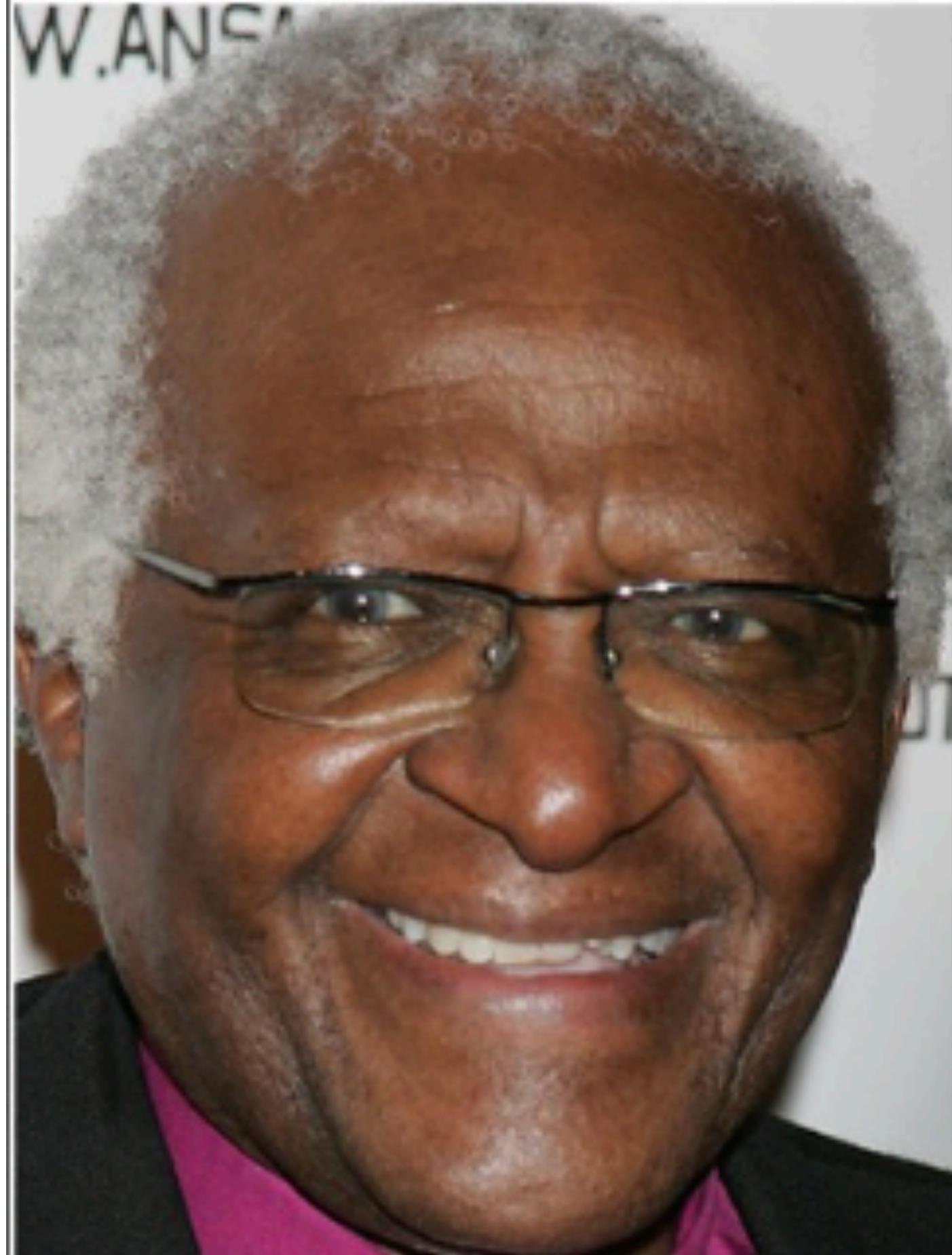


Session/user logic



Render logic

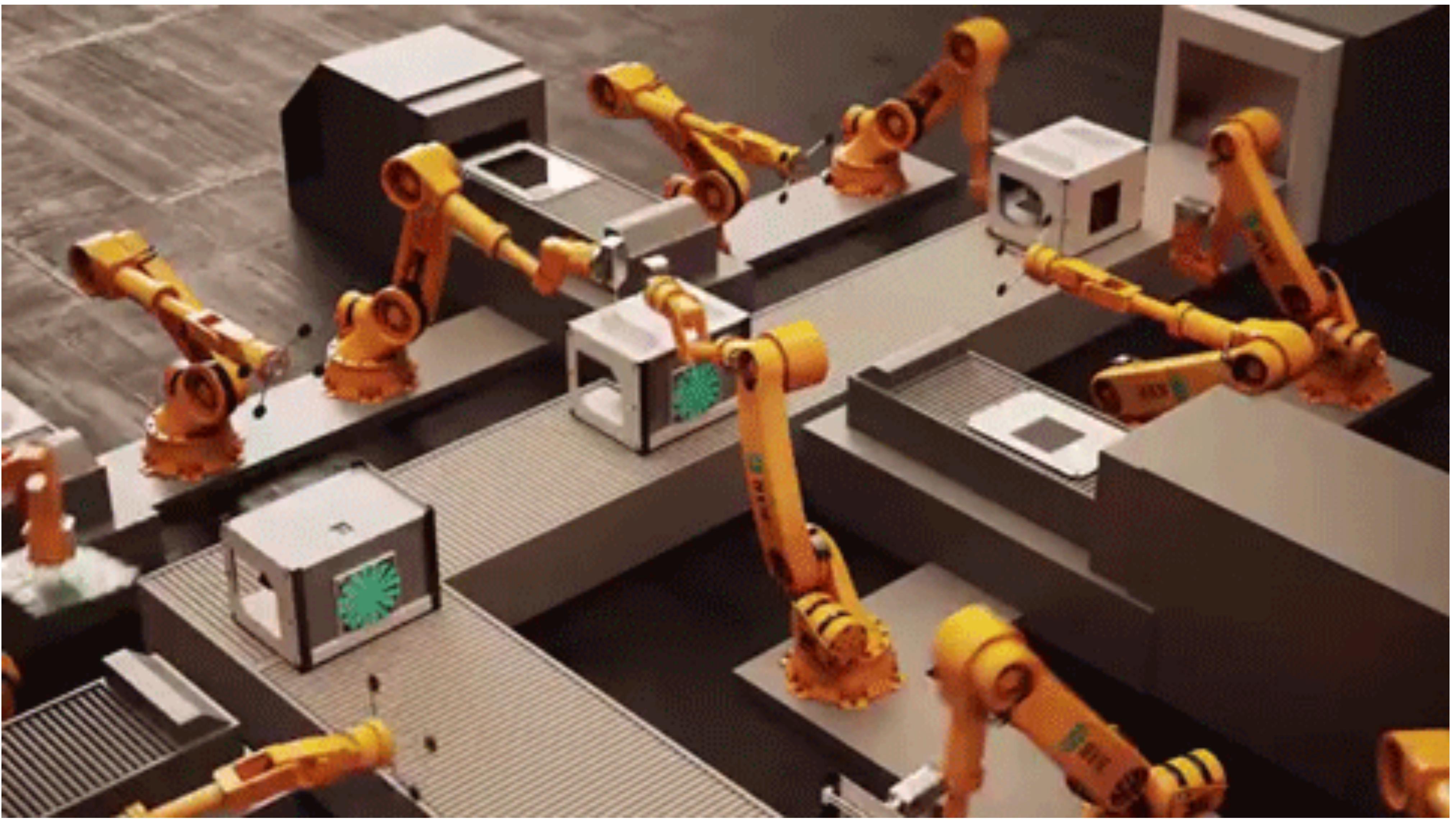
WANS



There is only one way to eat an elephant, a bite at a time.

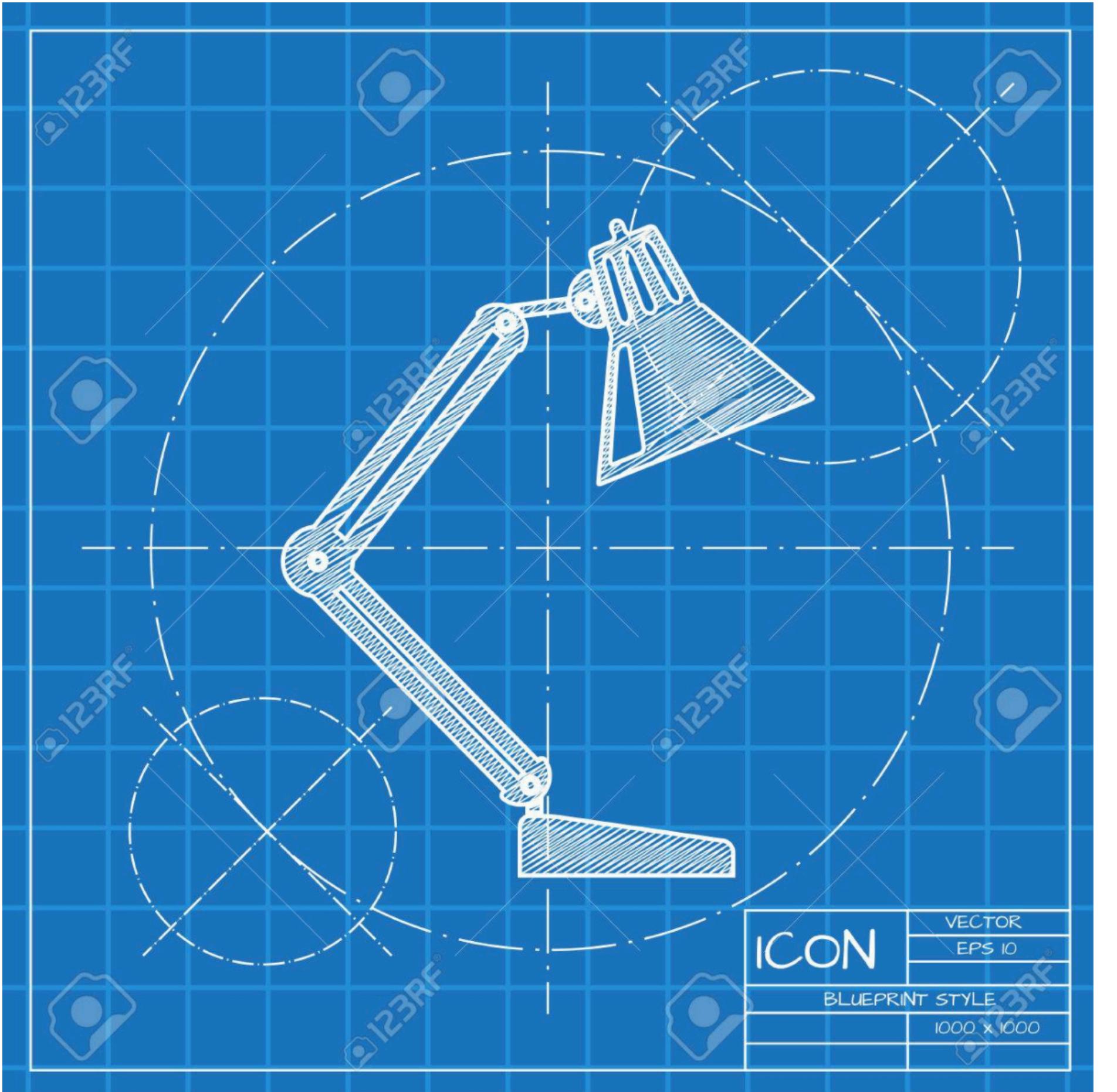
— *Desmond Tutu* —

AZ QUOTES

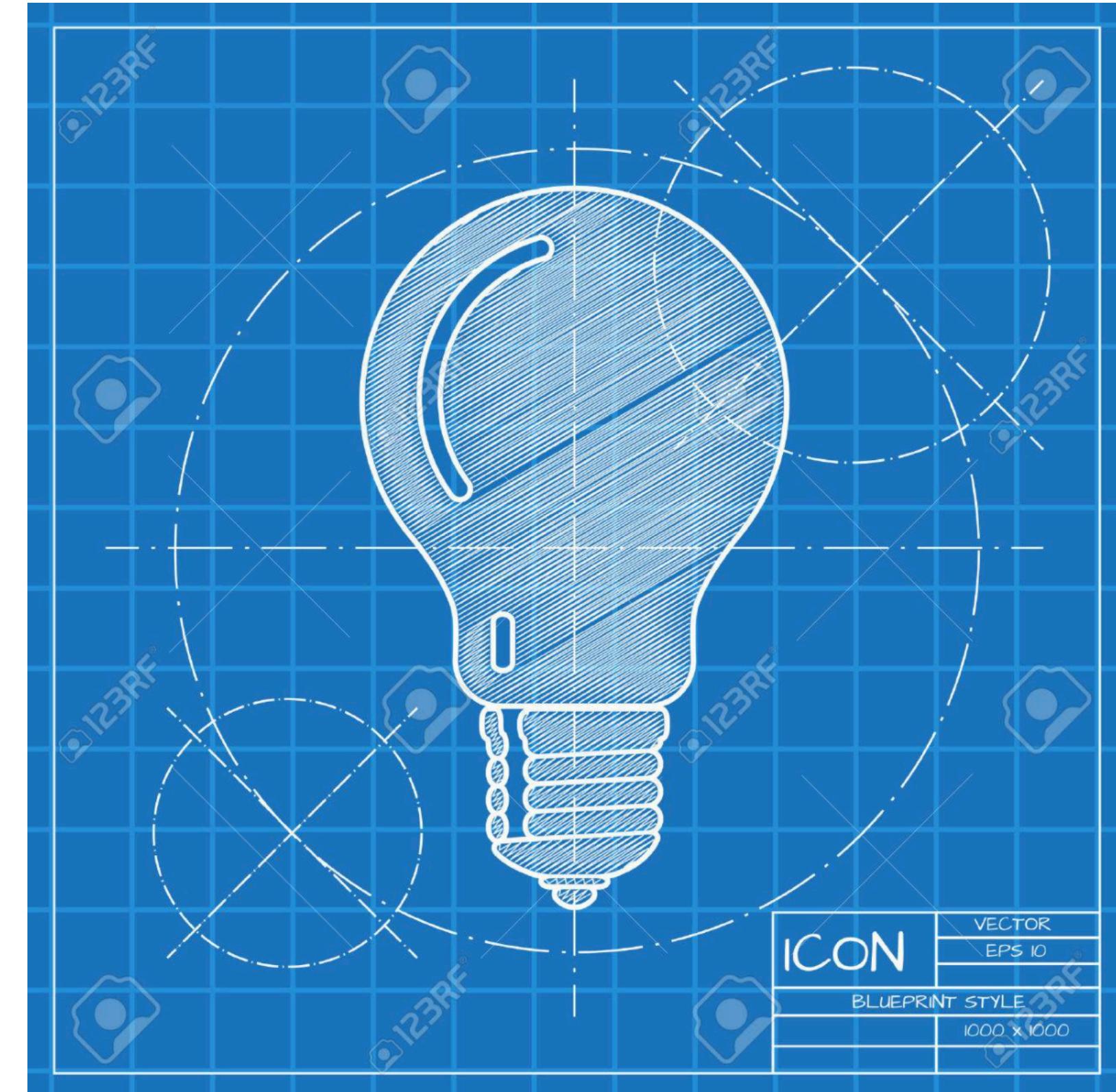


# The unit in unit-testing

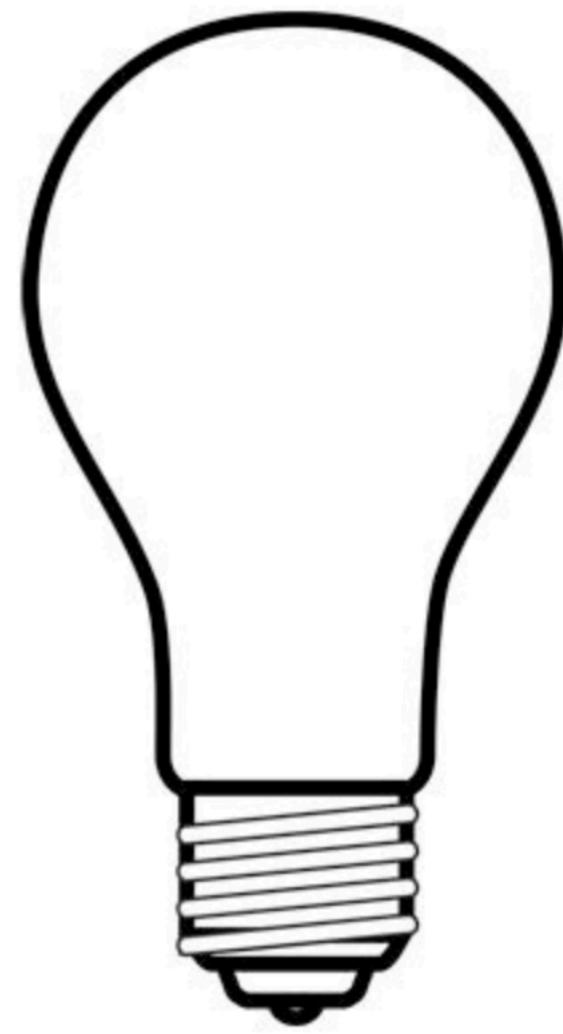
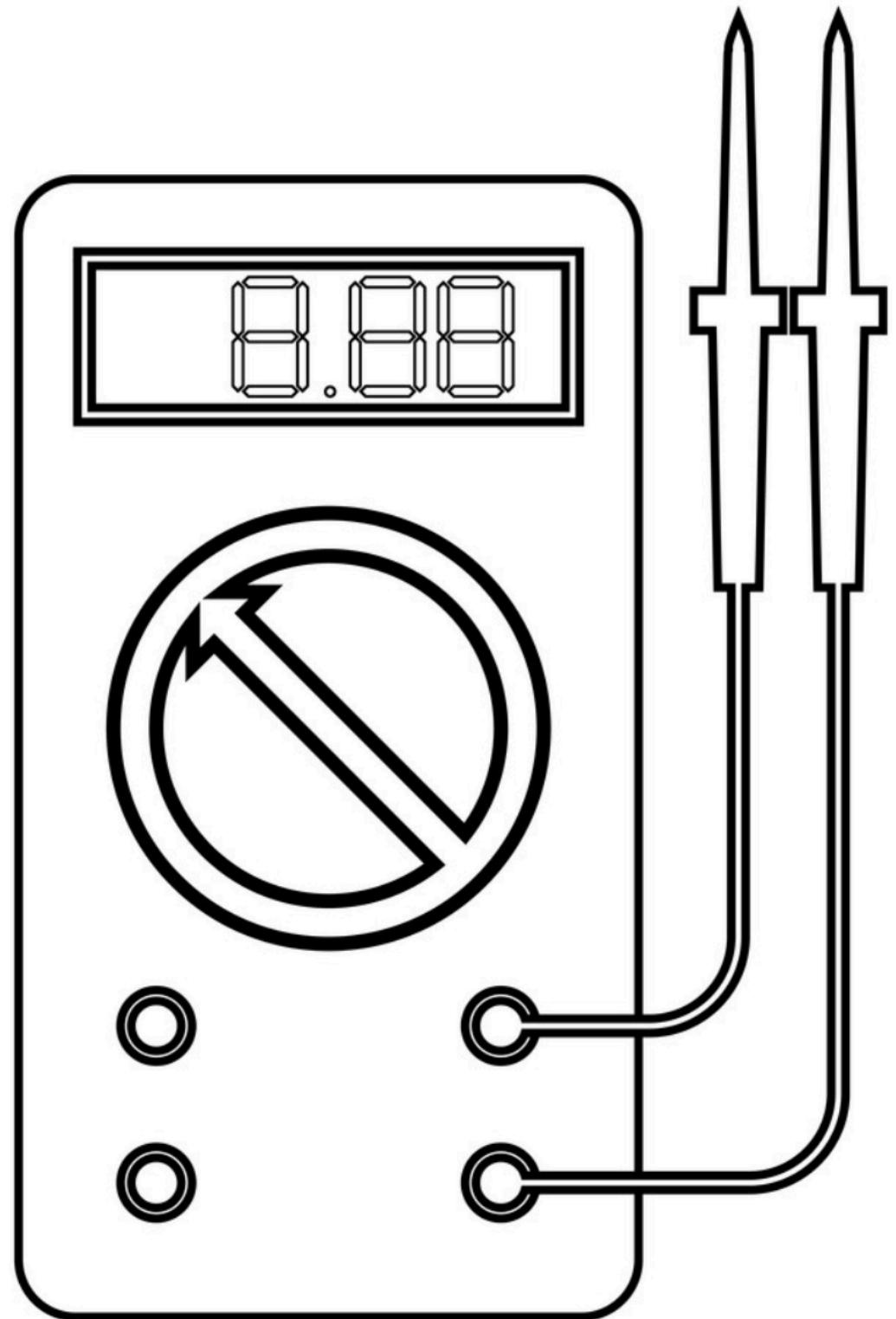
System



Unit



# Unit-test



# Classes/Object = units

The image shows four news articles from a Danish newspaper, each with a small thumbnail image and a snippet of text:

- Poul Madsen overhørte advarsler:** Brutal leder på Ekstra Bladet gav ansatte ondt i maven i årevis
- 5 vigtige detaljer du skal kende, før du anmoder om dine feriepenge**
- Frankrigs jungle:** »Jeg vil vise dig et sted. Du vil ikke tro det, når du ser det«
- 5 hjerter:** Det handler ikke om alkohol eller kvindeligt selskab. Det handler om noget, der er værre. Ingenting

```
public class FrontPage{  
    private ArrayList<Article> articles;  
    private ArrayList<Advertisements> ads;  
    ...  
}
```

Contains  
→

```
public class Article{  
    private String headline;  
    private String author;  
    private String category;  
    private boolean isOnFrontPage;  
}
```

```

public int dateFashion(int you, int date) {
    if(you <= 2 || date <= 1){
        return 0;
    }
    if(you >= 8 || date >= 8){
        return 2;
    }
    return 1;
}

```

Expected	Run
dateFashion(5, 10) → 2	2 OK <span style="background-color: green;"> </span>
dateFashion(5, 2) → 0	1 X <span style="background-color: red;"> </span>
dateFashion(5, 5) → 1	1 OK <span style="background-color: green;"> </span>
dateFashion(3, 3) → 1	1 OK <span style="background-color: green;"> </span>
dateFashion(10, 2) → 0	2 X <span style="background-color: red;"> </span>
dateFashion(2, 9) → 0	0 OK <span style="background-color: green;"> </span>
dateFashion(9, 9) → 2	2 OK <span style="background-color: green;"> </span>
dateFashion(10, 5) → 2	2 OK <span style="background-color: green;"> </span>
dateFashion(2, 2) → 0	0 OK <span style="background-color: green;"> </span>
dateFashion(3, 7) → 1	1 OK <span style="background-color: green;"> </span>
dateFashion(2, 7) → 0	0 OK <span style="background-color: green;"> </span>
dateFashion(6, 2) → 0	1 X <span style="background-color: red;"> </span>
other tests	OK <span style="background-color: green;"> </span>

Correct for more than half the tests

# Arrange Act Assert example

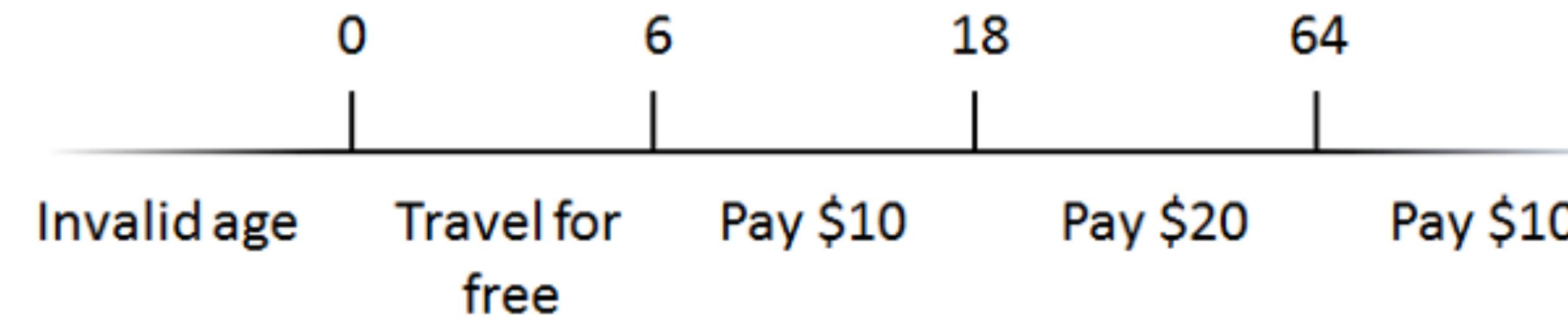
<https://freecontent.manning.com/making-better-unit-tests-part-1-the-aaa-pattern/>

# Test case design: When enough is enough?

Testing all positive numbers?

- Minimizes the number of test cases
- Values are partitioned into equivalence classes if they result in the same program behavior.

- Example:



- A test case is written for *each* partition
- Invalid input are separate equivalence classes

```
// pre: 0 < age  
// post: returns true if age >= 18, otherwise false  
public boolean legalAge(int age)
```

### Test cases (Not legal age)

0 (adjacent partition)

1 (min. value - close to boundary)

10(normal input)

17 (max. value - close to boundary)

18 (adjacent partition)

Invalid	Not legal age		Legal age	
	0	1	17	18

# The Debugger