Digital Interruption

Automating myself out of a job

A pen tester’s guide to left shifting security testing

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DIGITAL INTERRUPTION


DEVELOPERS
DESIGNERS
PROJECT MANAGERS
QA
SYSADMINS
SECURITY
SEEN BY DEVELOPERS
SEEN BY DESIGNERS
SEEN BY PROJECT MANAGERS
SEEN BY QA
SEEN BY SYSADMINS
SEEN BY SECURITY

"We need a pen test"

"Pen testing Sucks" – Pen Testers

- Super boring to test most applications
- Have to report low risk issues
- No one fixes the issues anyway

"Pen testing sucks" - Developers

- Reports padded with low risk issues
- Pen testers don't understand the context of vulnerabilities
- Too much ego
- We can't stop development/releasing comes first

WHO AM I?

- Jahmel Harris
- Pen Tester/Security Researcher at Digital Interruption (@DI_SECURITY)
- Mobile | Radio | Reverse Engineering

- @JayHarris_Sec
- @mcrgreyhats
- @DI_Security

Vincent Yiu @vysecurity · Jun 4

Red tip #86: Red team and attack simulation is not penetration testing. You shouldn't be really testing anything, but simply infiltrating.

1 4 11

Jay Harris @JayHarris_Sec · Jun 4

Way to make terms more confusing 😜 if not testing, what use is red teaming? PT != vuln assessment but RT and PT are pretty interchangeable.

3 1

Vincent Yiu @vysecurity · Jun 4

RT and PT aren't interchangeable... PT is vuln assessment. If PT isn't vuln assessment then what is vuln assessment?

2

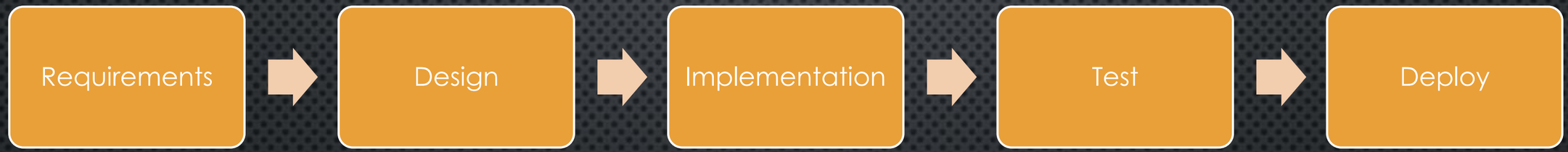
Jay Harris
@JayHarris_Sec

Replying to @vysecurity

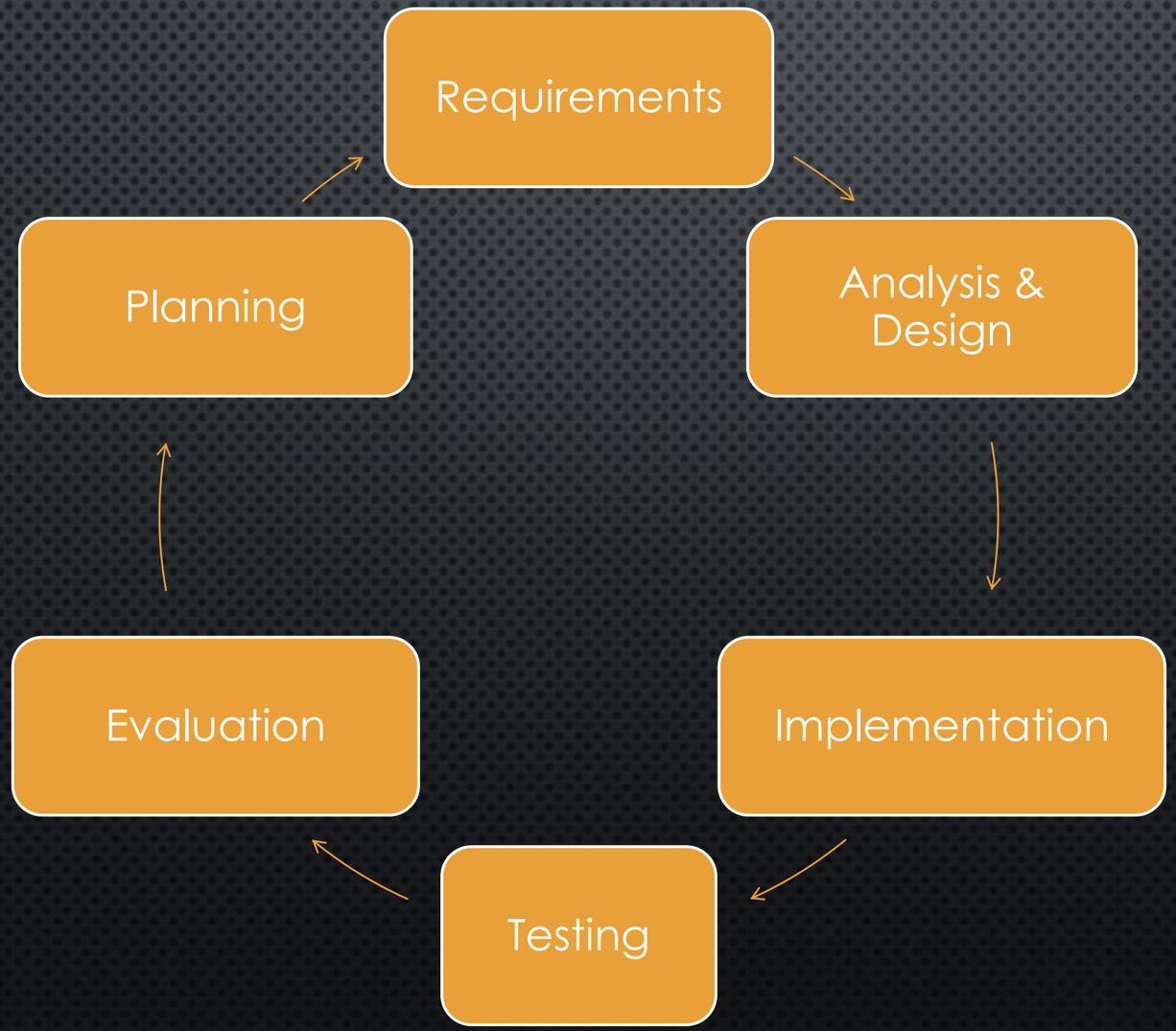
If the infosec community can't agree, no wonder our clients are confused! VA is VA. Pen testing is taking the role of an attacker.

12:32 PM - 4 Jun 2017

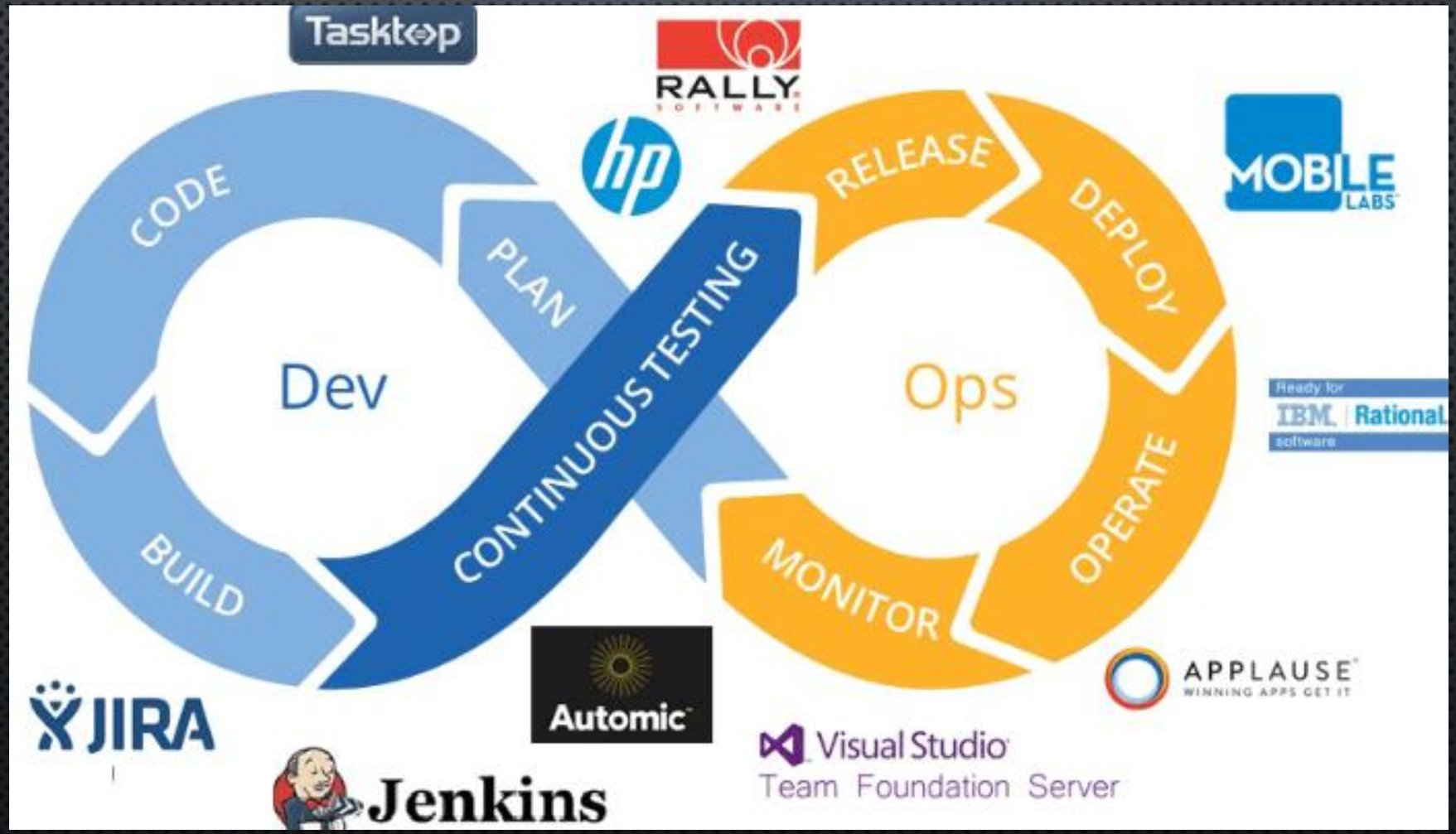
"TRADITIONAL" DEVELOPMENT



AGILE DEVELOPMENT



CI/CD - DEVOPS



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TRADITIONAL PEN TEST

Requirements → Design → Implementation → Test → Deploy

Traditional Pen Test

- Turn up
- Wait for requirements
- Test
- Wait for requirements
- Test
- Leave
- Write Report
- Send report

@JayHarris_Sec

@JayHarris_Sec

@JayHarris_Sec

APP DESCRIPTION (CASE STUDY)

- This app (Android/iOS) is used to make voip calls
- Made up of the clients and web service
- The pen test done from multiple perspectives and a subset shown here

VULNERABILITIES - HIGH

- Mobile Verification Code is Susceptible to Brute-Force Attacks
- Possible To View Other User's Messages
- SSL Validation Disabled
- Directory Traversal In Web Service

VULNERABILITIES - MEDIUM

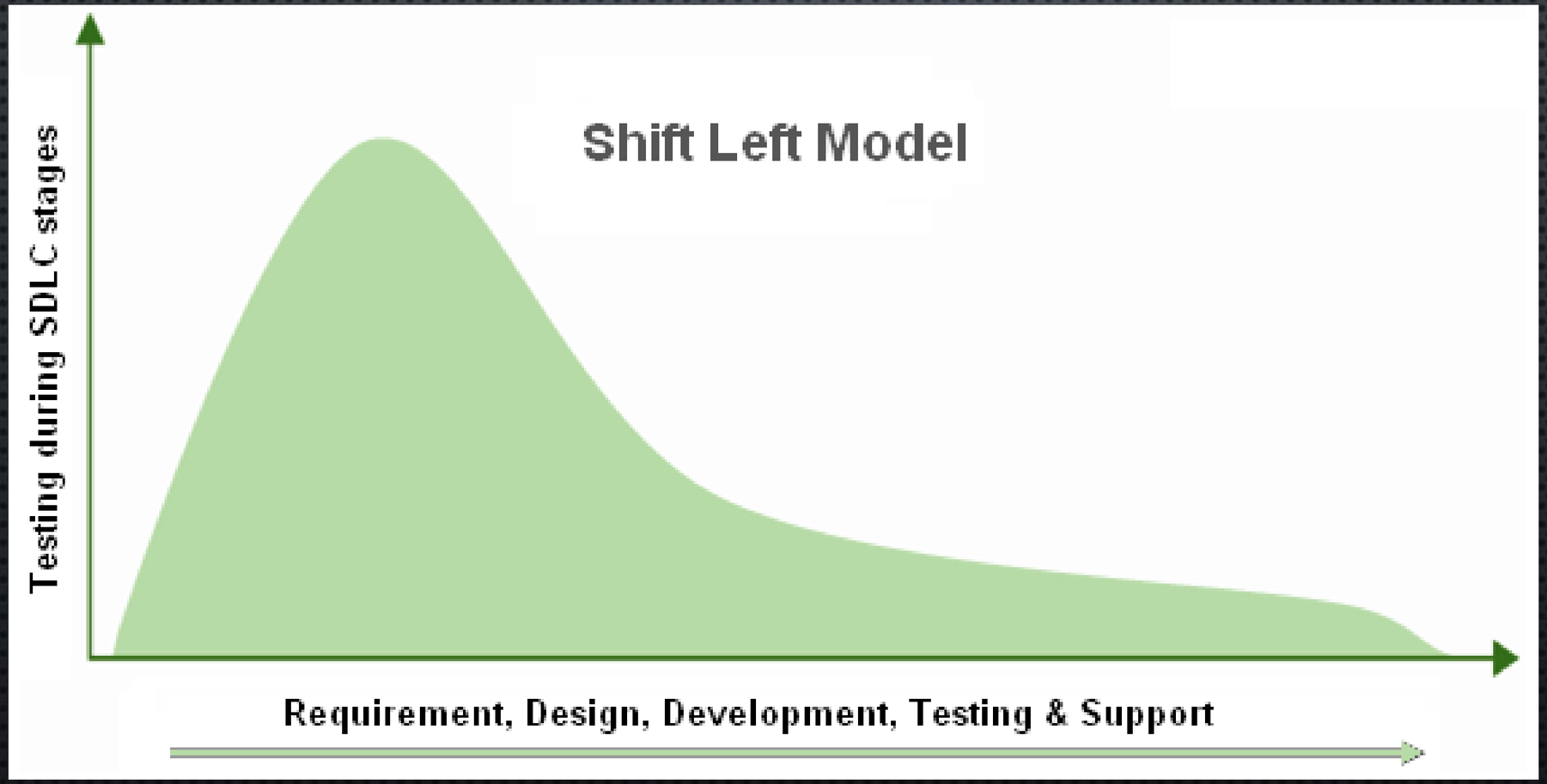
- Backups Allowed
- No Permissions on Android IPC
- Sensitive Information Stored In Application Sandbox
- SQL Injection in Android Content Provider
- Weak SSL/TLS Ciphers Supported
- Weak Authentication in Applications

VULNERABILITIES - LOW

- Apple Transport Security weakened
- Excessive Logging
- Lack of Anti-Debugging
- Version Banner Disclosure
- Lack of root detection

GO LIVE?

SHIFT LEFT SECURITY TESTING



http://blogs.bmc.com/wp-content/uploads/2017/07/Shift-Left-Model.png

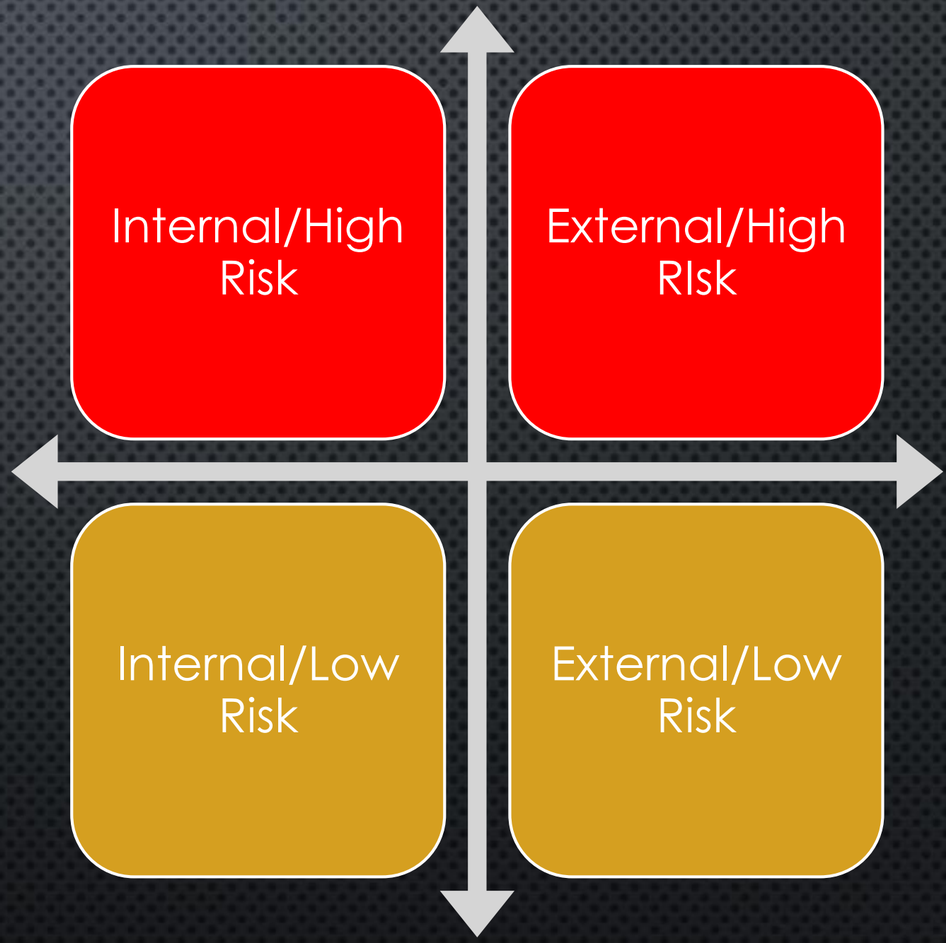
REQUIREMENTS GATHERING

RISK RATING

- THINKING LIKE AN ATTACKER – WHATEVER WORKS
  - THREAT MODELLING
  - PREVIOUS PEN TEST REPORTS
  - ATTACK TREES
  - EXTERNAL HELP

RISK RATING

- AN INTERNAL BROSUREWARE APPLICATION – PFFFFFFT WHO CARES? (UNLESS WE DO)
- FINTECH APPLICATION PROBABLY NEED TO CONSIDER SECURITY



RISK RATING

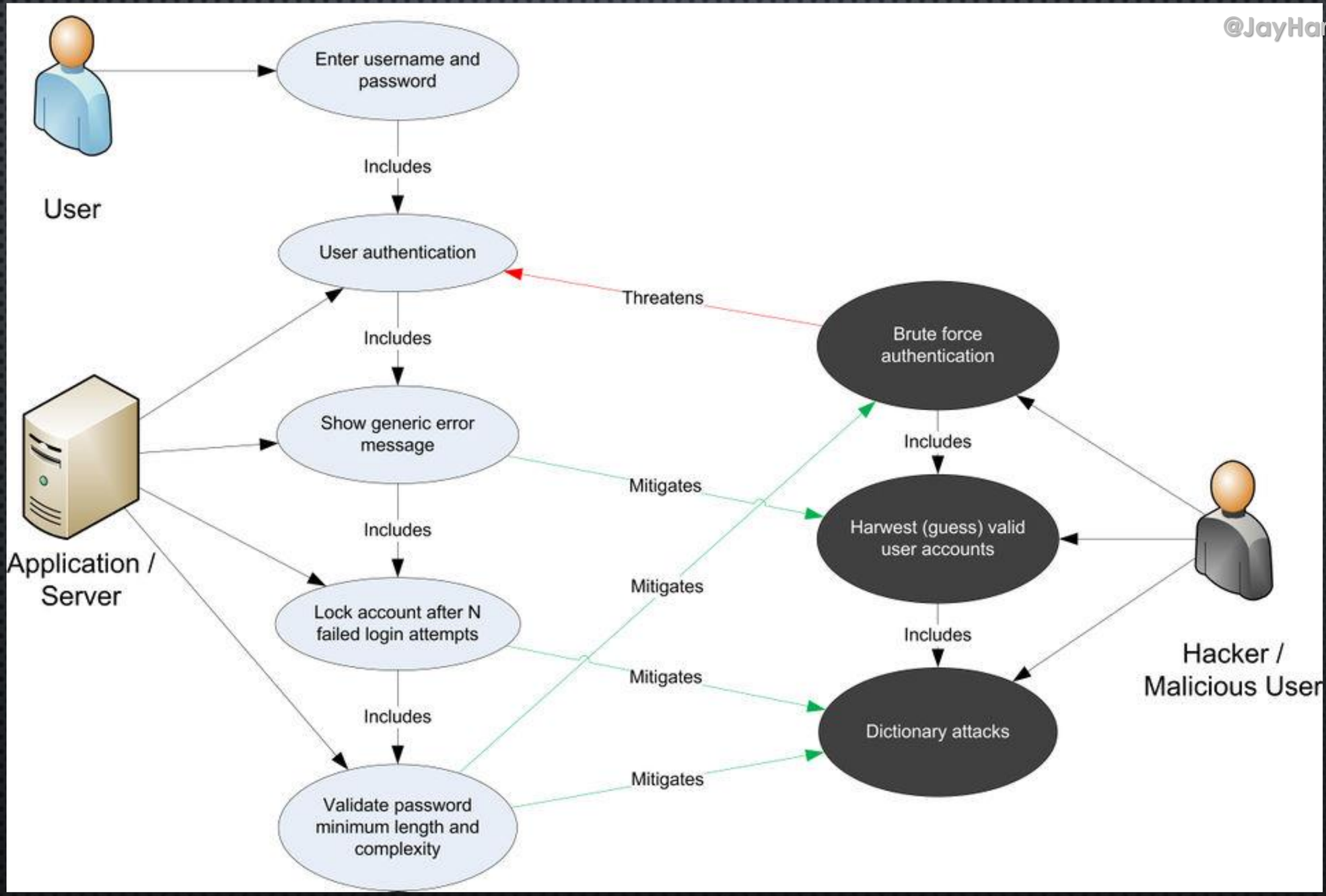
- A user requires knowledge of a username and password to use the application
- A user requires knowledge of their username and password to view their messages
- Sensitive data should not leave the application sandbox
- Sensitive data should be encrypted
- A user requires the MVC to successfully register
- Sensitive data should not be logged
- The application should not run on a rooted device*

Risk Rating – Abuse Stories

- As an attacker, I want to log into the application without knowing the password
- As an Attacker, I want to read files in the application sandbox
- As an attacker, I want to run the application on a rooted device for further vulnerability assessment
- As an attacker, I want to reverse engineer the application in order to perform further vulnerability assessment

Risk Rating – Abuse Stories

- As an attacker, I want to log into the mobile application without knowing the password
  - By brute forcing the password
  - Launching the activity manually
  - SQL Injection
  - ???



SECURITY REQUIREMENTS

- HELP US TO FIND AND ADDRESS SOME DESIGN ISSUES

DEVELOPMENT

Embedding security knowledge in the team

- Training
- Pairing
- Security SME
- Security Champion
- Security code review
- "Chat Ops"

UNIT TESTING

- DEVELOPERS KNOW HOW TO TEST THEIR CODE
- LET'S WRITE SOME UNIT TESTS (SOMEONE ELSE ON THE TEAM)
  - TDD/BDD

UNIT TESTING

Given an attacker can submit a username and password

When they try more than 5 incorrect passwords

Then the account should be locked

```
@Given("an attacker can submit a username and password")
public void AppIsRunning(int width, int height) {
    login = new Authenticator();
}

@When("they try more than 5 incorrect passwords")
public void incorrectPasswordIsTriedMoreThan5Times() {
    for(int i=0;i<=6;++i)
    {
        login.authenticateUser(user,"password")
    }
}

@Then("The account should be locked")
public void theAccountShouldBeLocked(String grid) {
    assertThat(login.accountLocked(username), true));
}
```

VULNERABILITIES - HIGH

- ~~Mobile Verification Code is Susceptible to Brute-Force Attacks~~
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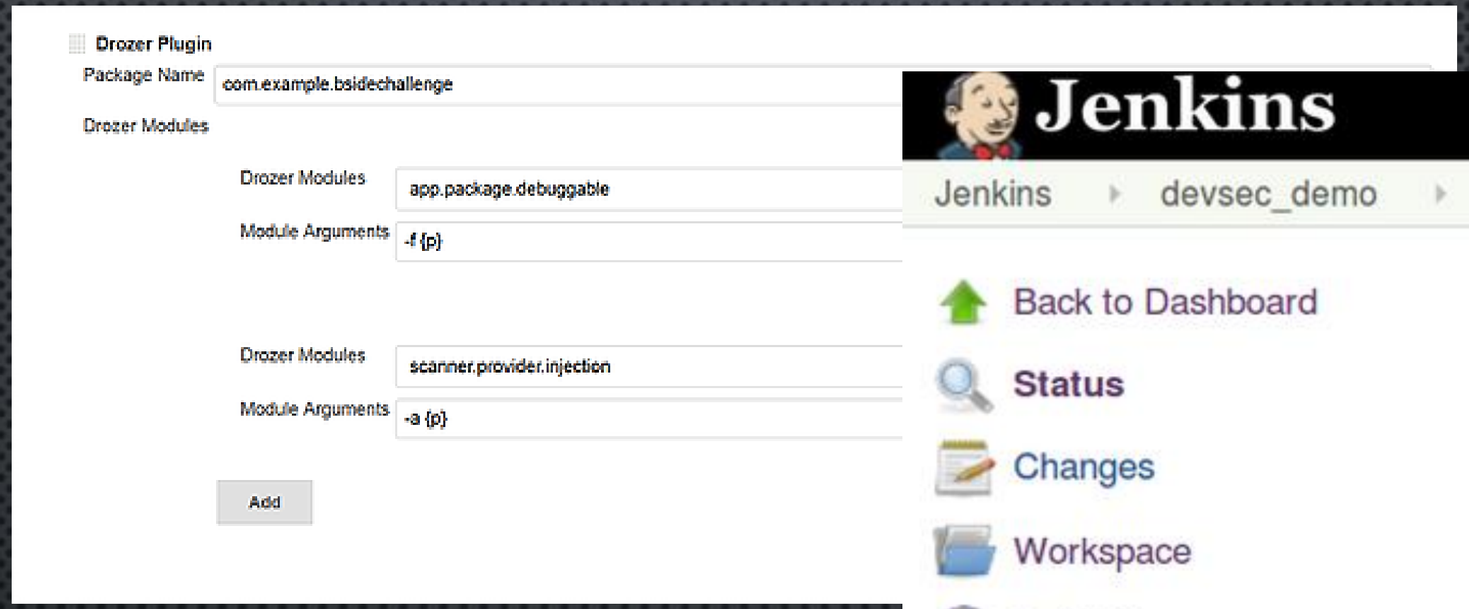
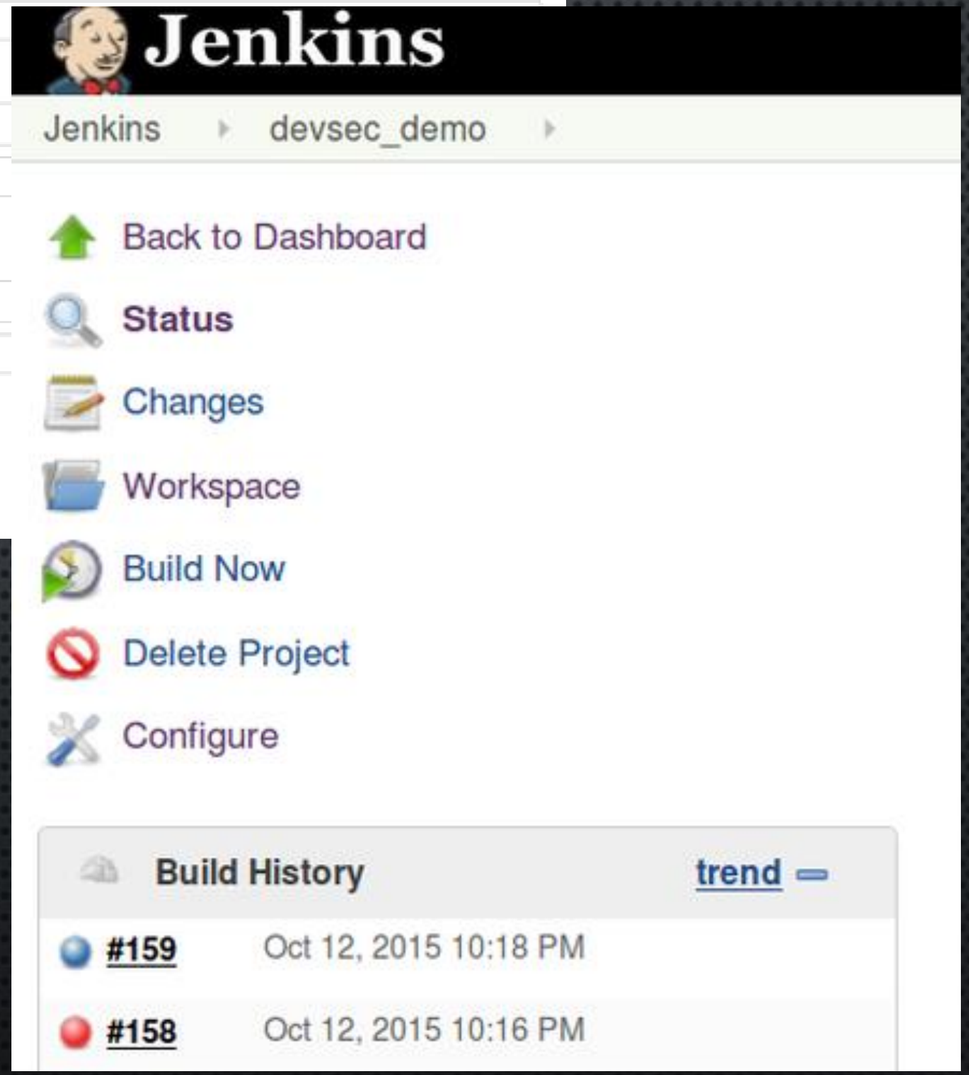
SECURITY TOOLING

- NO MORE HACKER TOOLS FOR HACKERS (PLEASE!)
- TOOLS FOR DEVELOPERS AND TESTERS
  - MAKE OUR OWN (OR AT LEAST WRAPPERS)





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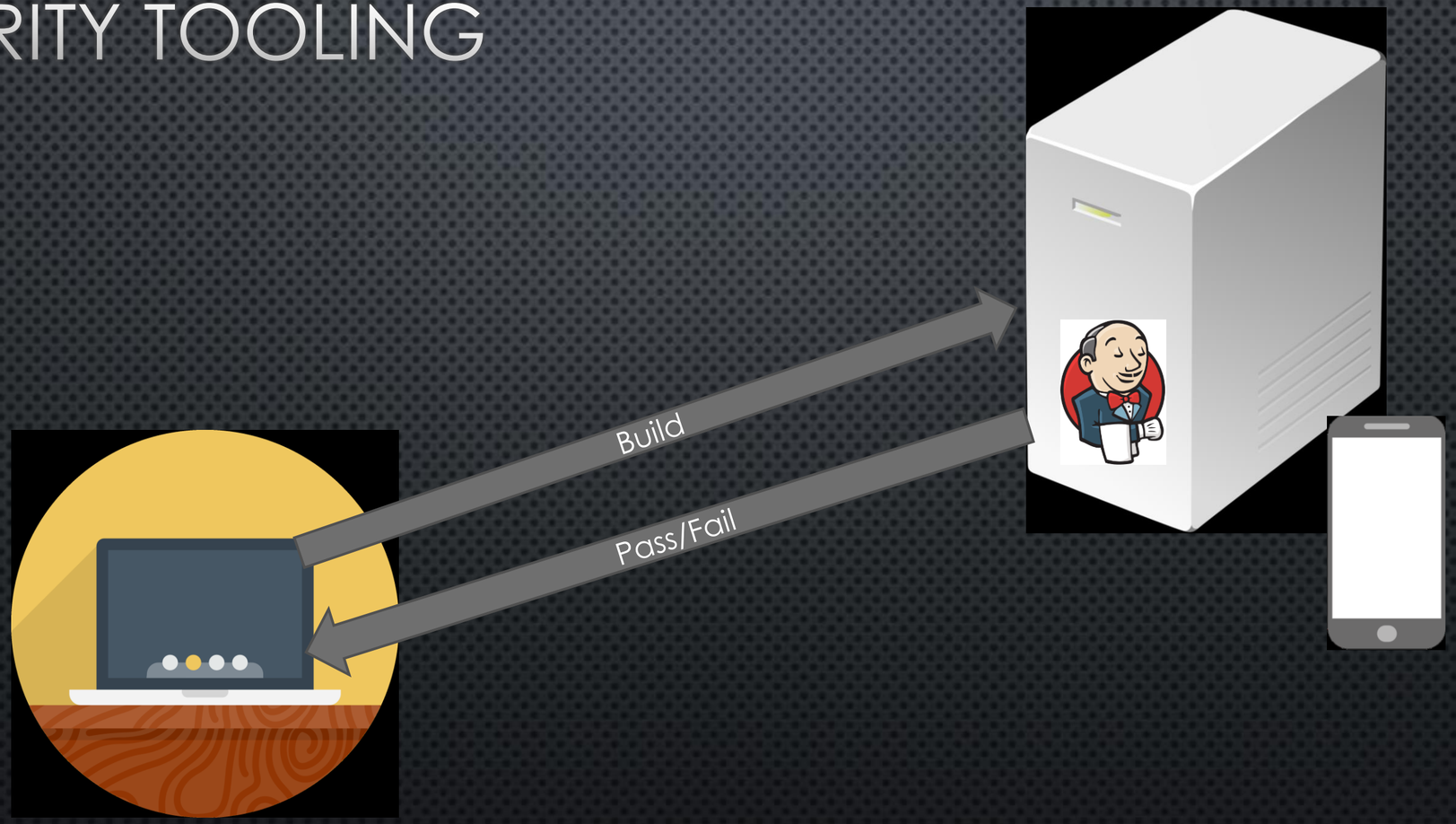
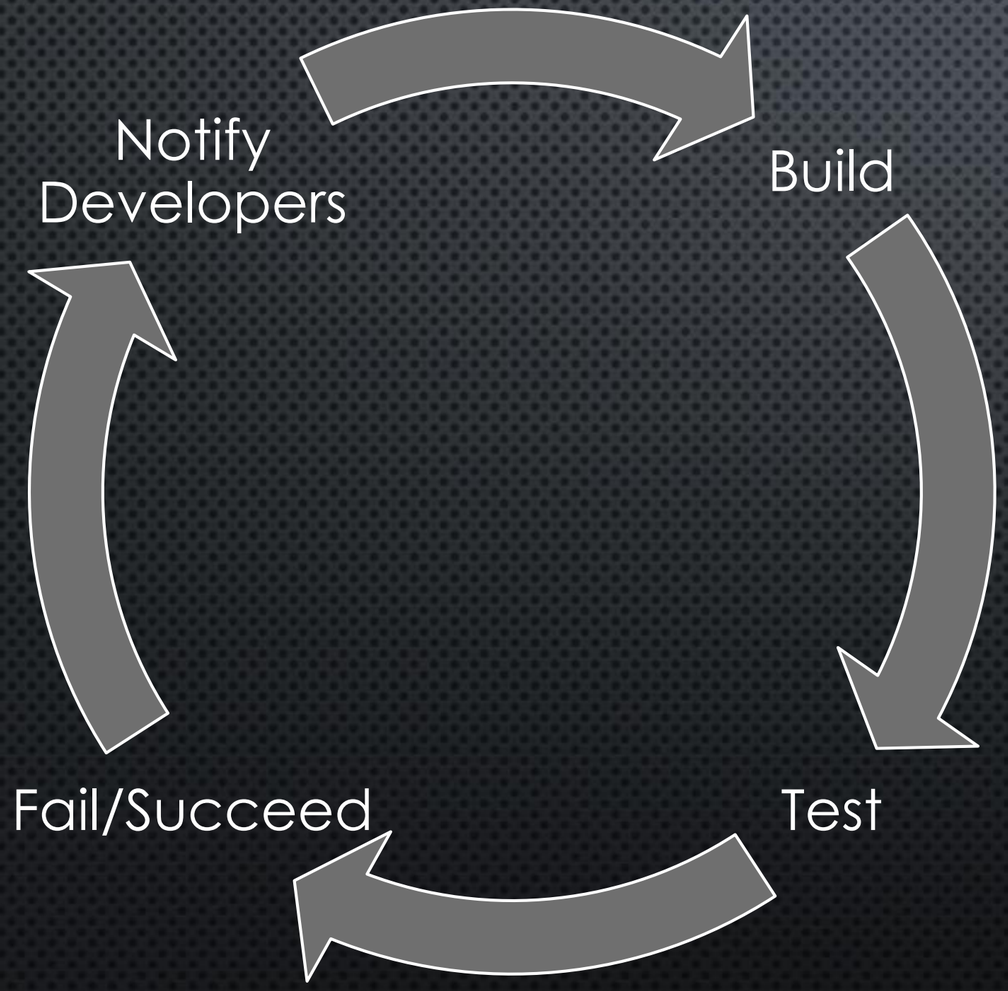
SECURITY TOOLING




Notify Developers
Build
Test
Fail/Succeed

SECURITY TOOLING - SAST

- SOURCE CODE SCANNING
- PATTERN MATCHING
- TAINT ANALYSIS

SECURITY TOOLING - DAST

- Dynamic Testing
- "Harder" than static testing
- Tools exist but should be app aware
- Better for design flaws (maybe)

SECURITY TOOLING - IAST

- DAST WITH INSTRUMENTATION
- HOOKS RUNTIME (E.G. JVM) TO MONITOR THREATS

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WHAT ABOUT INFRASTRUCTURE?

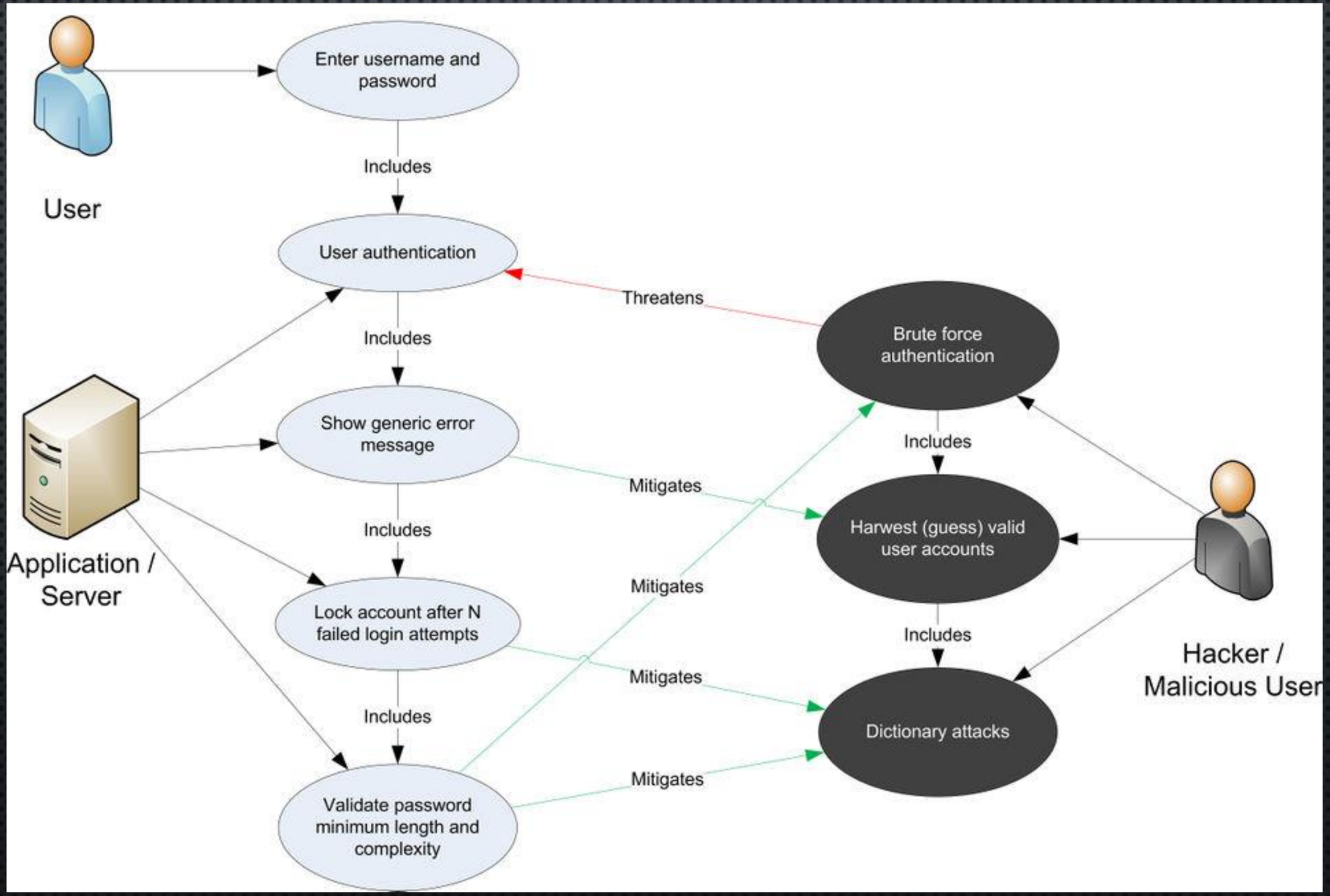
Infrastructure as code

- Key to devops
- Won't talk about it in too much detail – this is a devops conference

QA TESTING

QA TESTING

- Automation testing. How many try to automate security tests?
  - "Security isn't our job"


Enter username and password
Includes
User
User authentication
Threatens
Brute force authentication
Includes
Includes
Show generic error message
Mitigates
Harwest (guess) valid user accounts
Includes
Application / Server
Includes
Mitigates
Lock account after N failed login attempts
Includes
Hacker / Malicious User
Mitigates
Dictionary attacks
Includes
Mitigates
Validate password minimum length and complexity

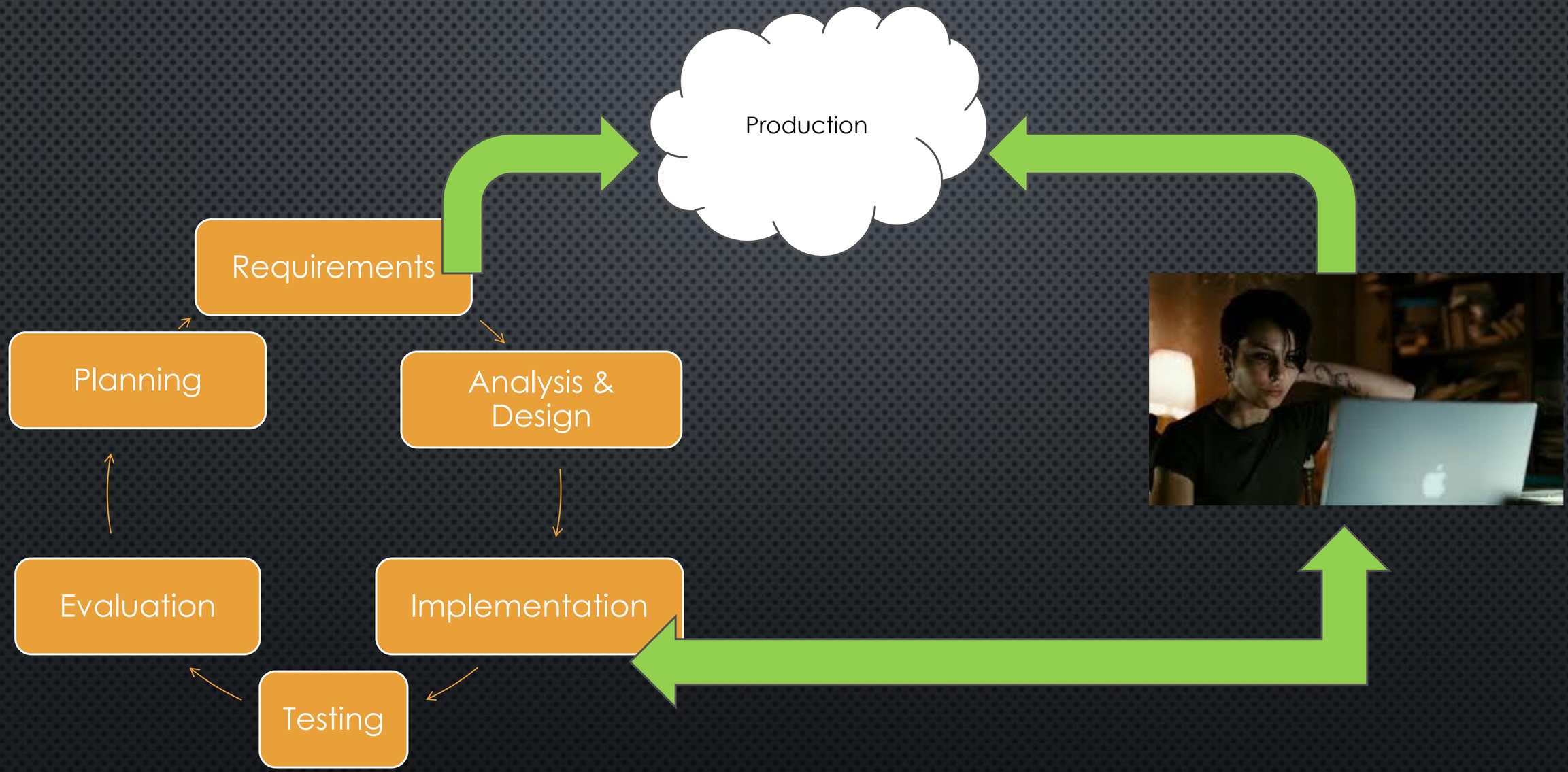
PEN TESTING

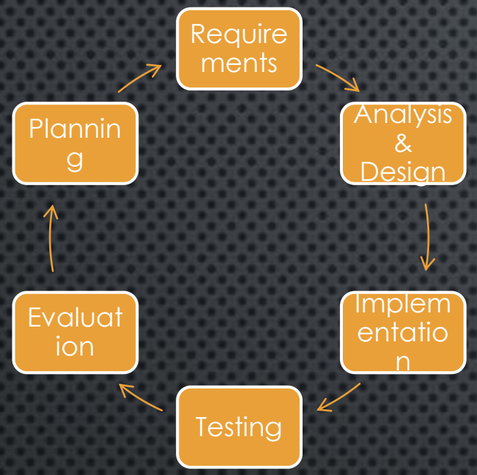
VULNERABILITIES

- Sensitive Information Stored In Application Sandbox
- Weak Authentication in Applications
- Excessive Logging
- Lack of Anti-Debugging
- Lack of root detection

PEN TESTING

- I THOUGHT WE WERE AUTOMATING SECURITY!
- 70%* OF VULNS CAN BE FOUND BEFORE THE PEN TEST
- CHECK LIST TESTS ARE NOW OKAY!
- *YOU* DECIDE WHAT GETS TESTING SINCE EVERYTHING IS AT LEAST PARTIALLY SECURE
- (BUT PEN TESTS ARE PROBABLY STILL NEEDED FOR SOME APPLICATIONS)


Production
Requirements
Planning
Analysis & Design
Evaluation
Implementation
Testing


Require ments
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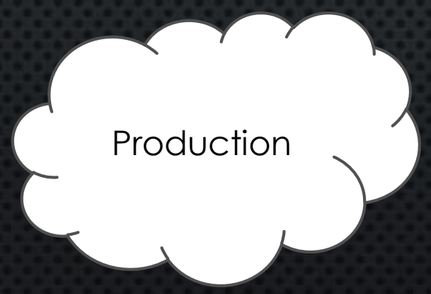
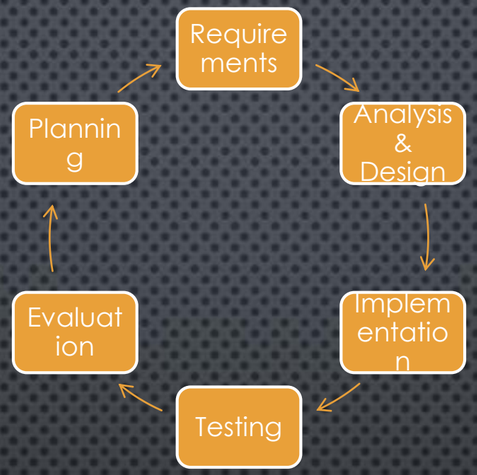

Production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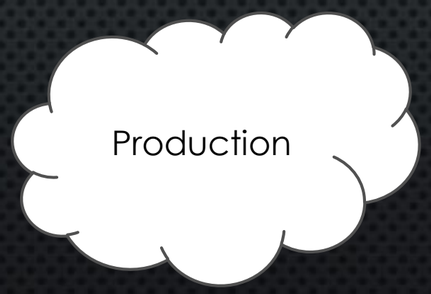
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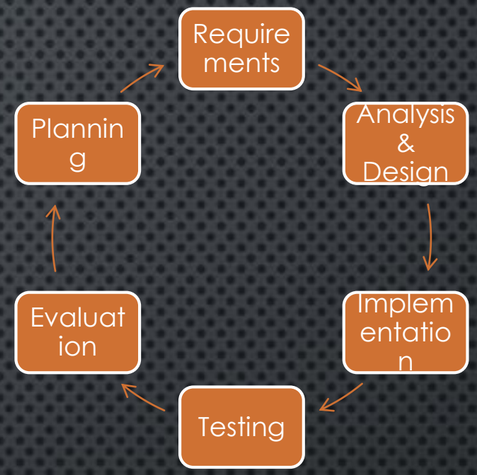
Require ments
Analysis & Design
Implem entatio n
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Plannin g


Production

CAPTURING RESULTS

DAST

QA Testing

SAST

Red Teaming

Vulnerabilities / Risk

QUESTIONS?

@JayHarris_Sec