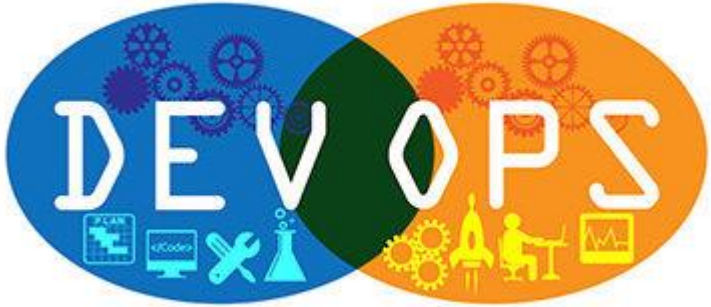
DevOps

Did you finish DevOps pre-class activity?

BEFORE (in-class session)

What do you know about DevOps.

(Please write shortly on PEAR DECK slide)



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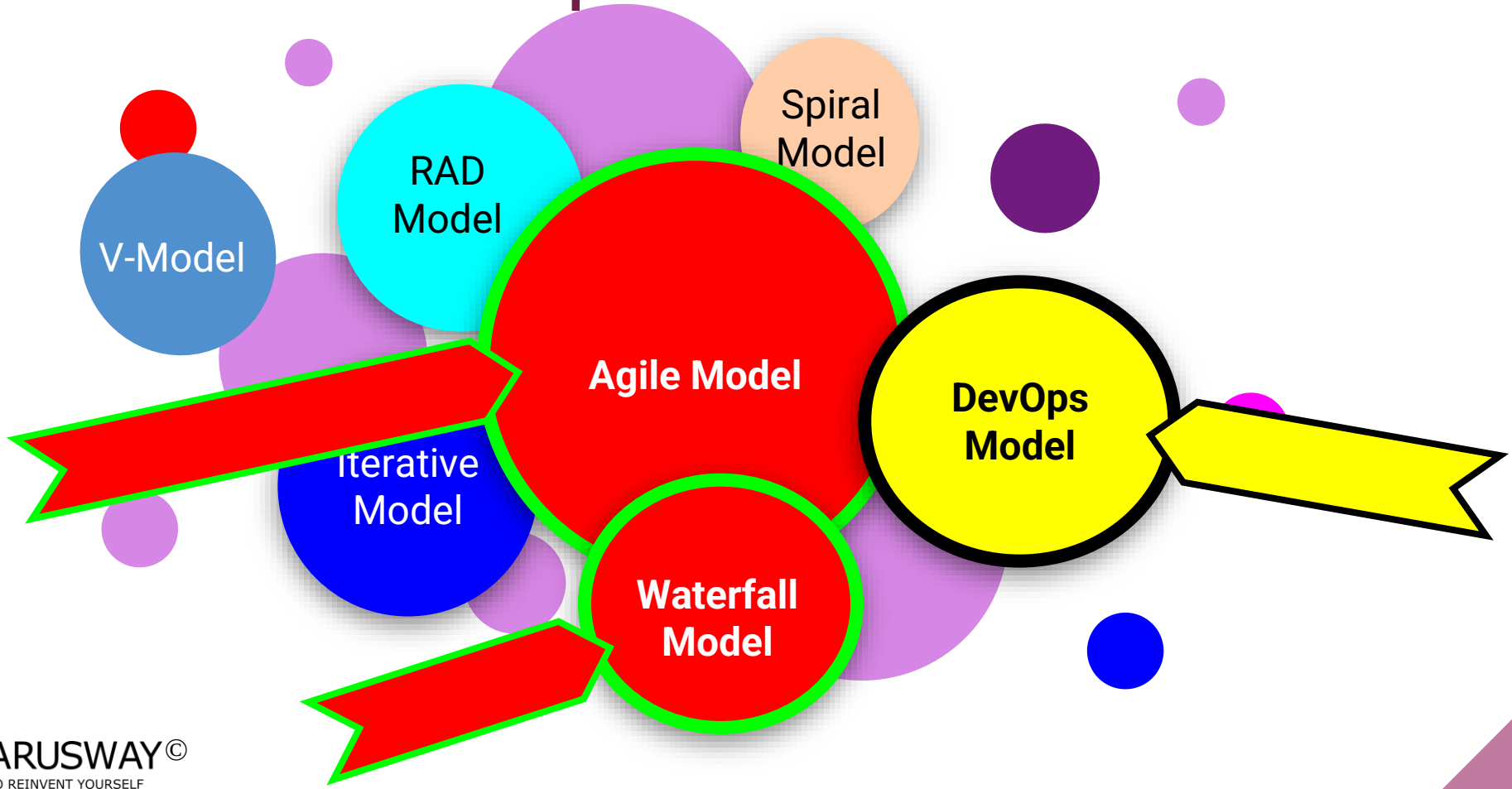
What is DevOps

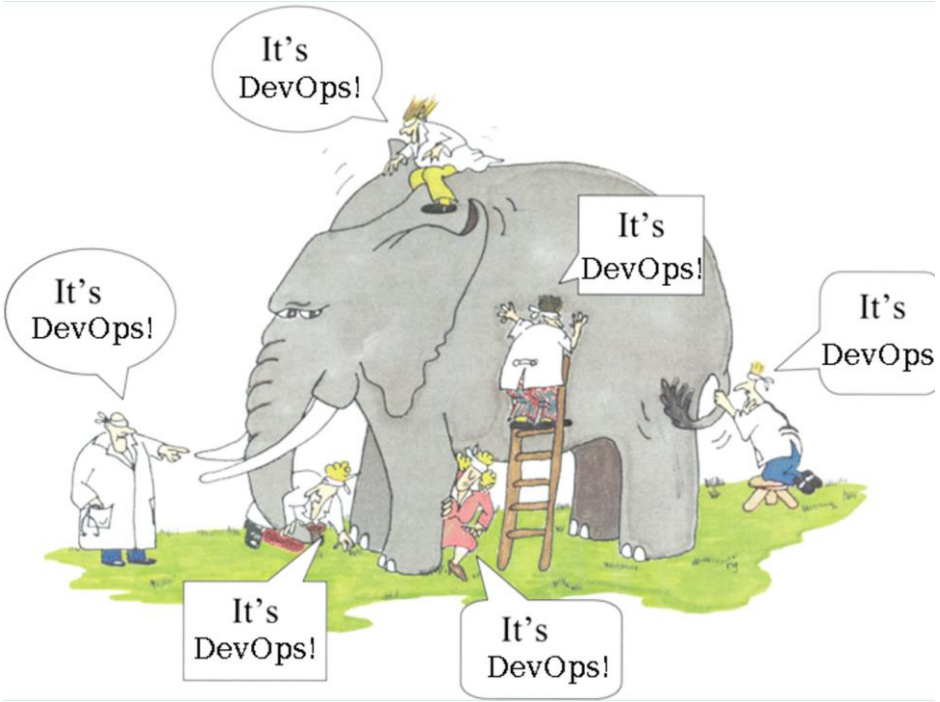
What is DevOps



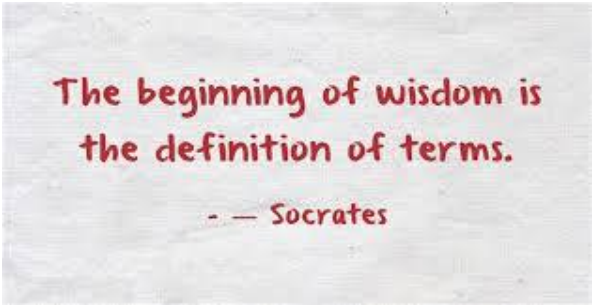
What is DevOps

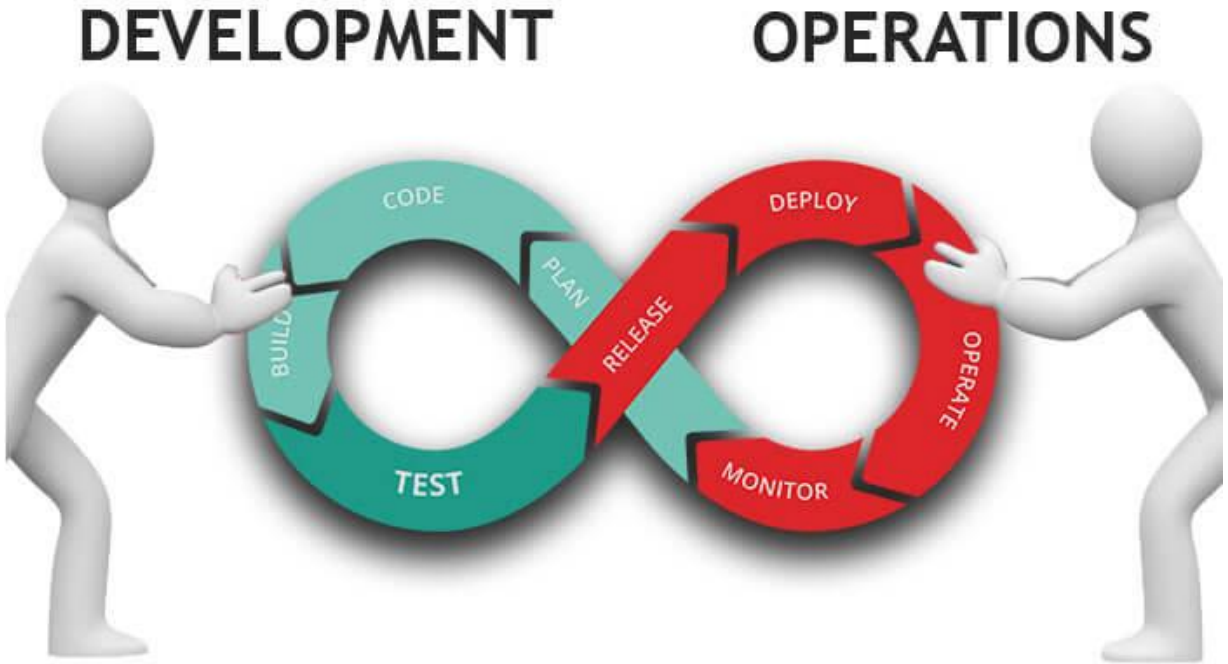
What DevOps is Not...

- a tool
- a role
- a team
- something that can be purchased or simply switched on



What is DevOps





What is DevOps

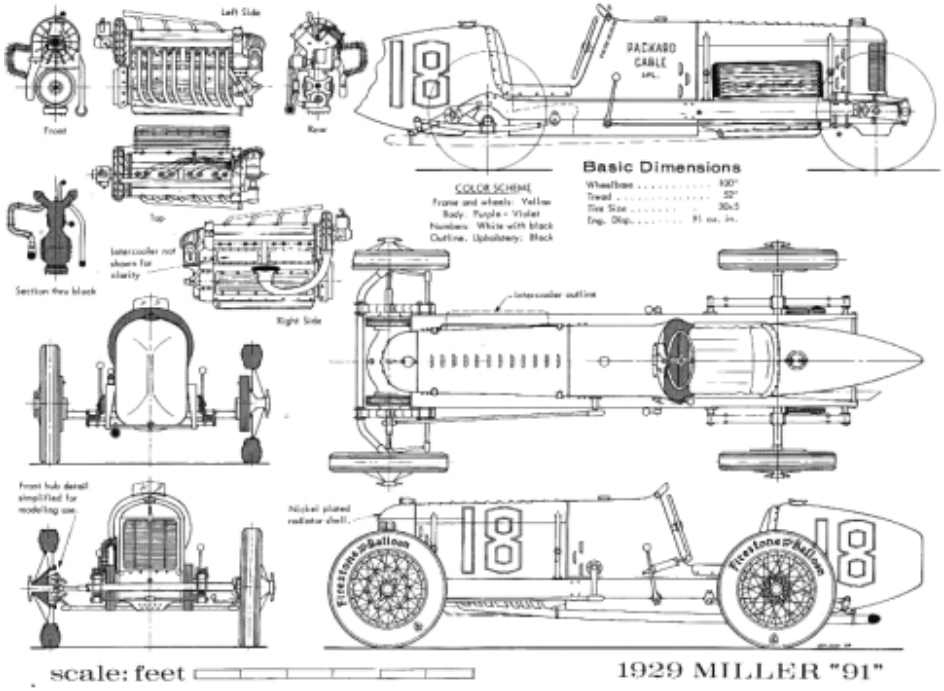
- **DevOps** is a set of practices that combines software **development** (Dev) and IT **operations** (Ops).
- It aims to **shorten** the systems development life cycle and provide **continuous delivery** with **high software quality.**
- DevOps is complementary with Agile software development; several DevOps aspects came from the Agile methodology.
- DevOps addressed the **gap** between Developers and Operations.

What is DevOps

Traditional Development

The Inventors;

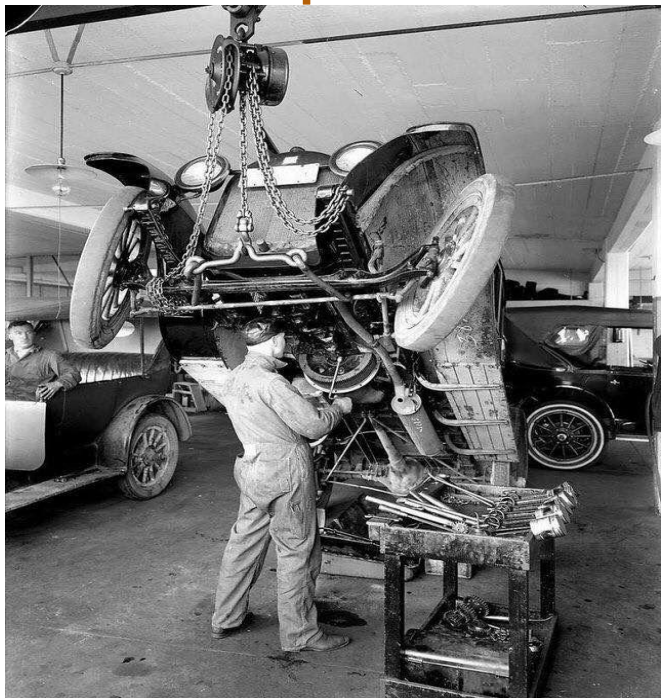
- Create new features and functionality in “dev” environment
- Occasionally deliver new product to operators, along with instructions
- May incorporate feedback from operators in future deliveries
- Rewarded for delivering new features



“The inventors are responsible for changing the system”

What is DevOps

Traditional Operations



The Mechanics;

- Receive new product from developers to be installed and operated
- Expected to keep production systems up and running
- May provide feedback to the inventors for future consideration
- Penalized for downtime

“The mechanics are responsible for keeping the system in operation”

What is DevOps

Roles;

DEVELOPMENT TEAM

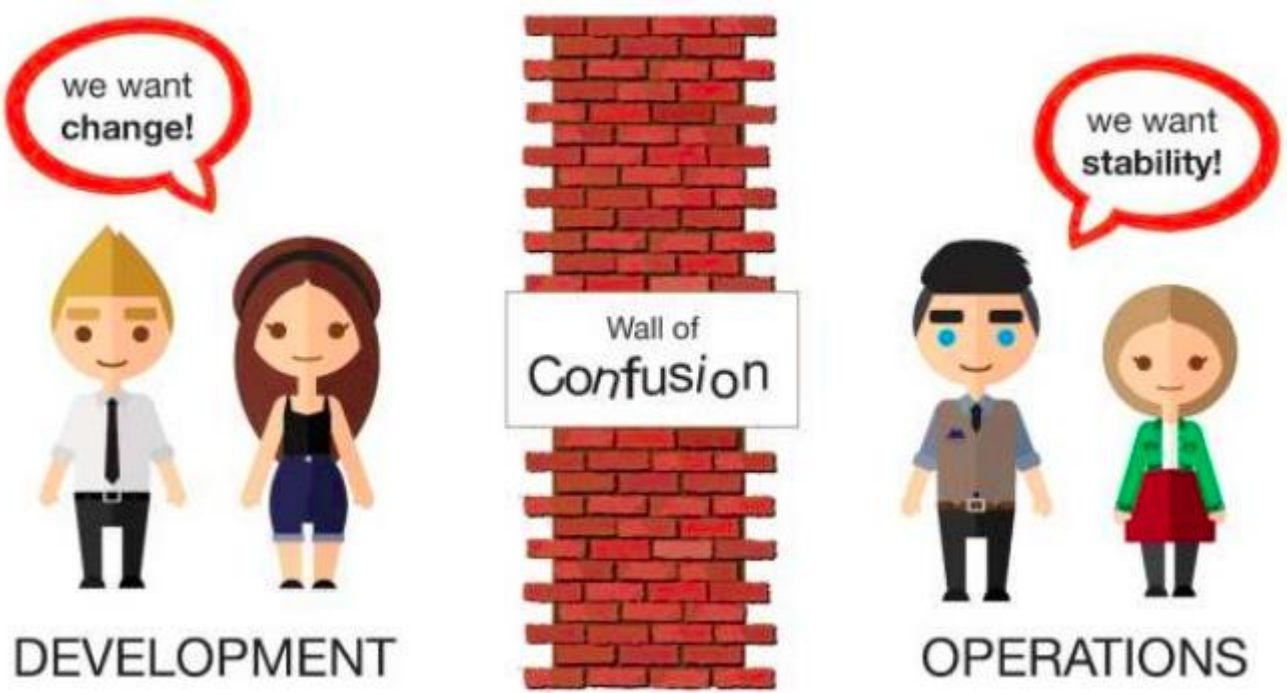
- Project Manager
- Software Architects
- Developers
- Testers/QA, etc.

OPERATION TEAM

- System Administrators
- Database Administrators
- Release Engineers
- Network Engineers
- Security Professionals, etc

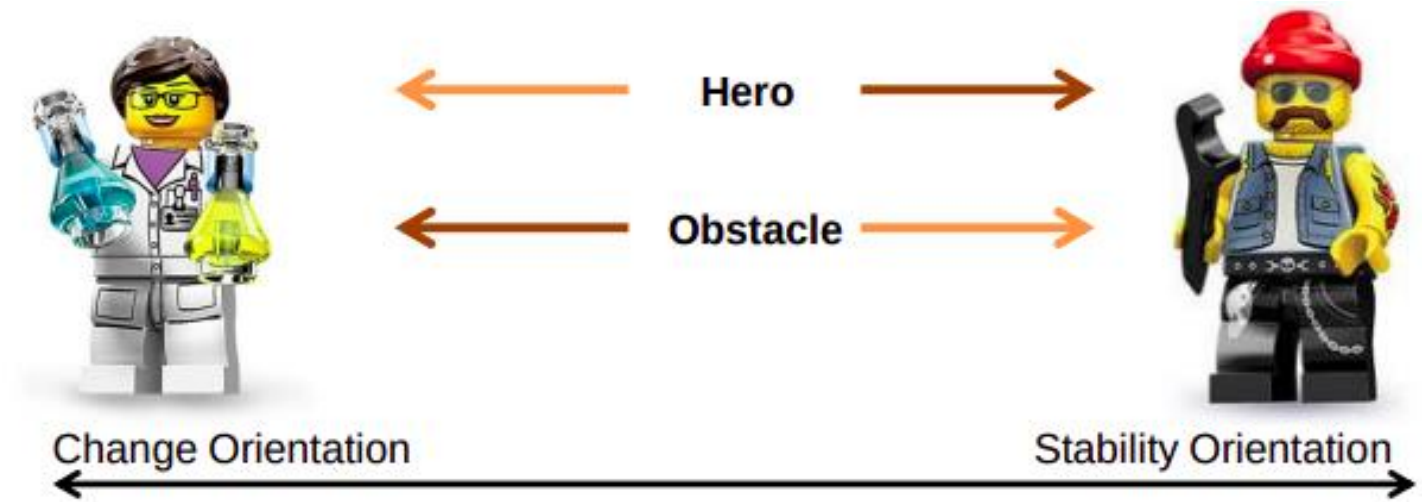
What is DevOps

Responsibilities;



What is DevOps

What is the problem?



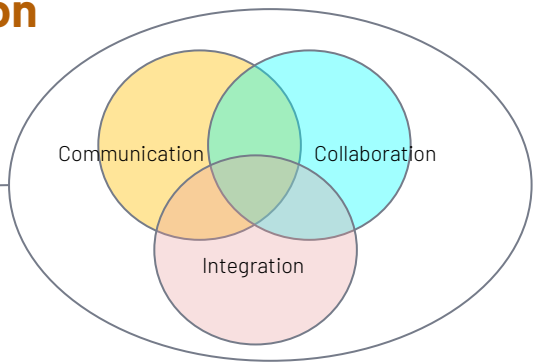
What is DevOps

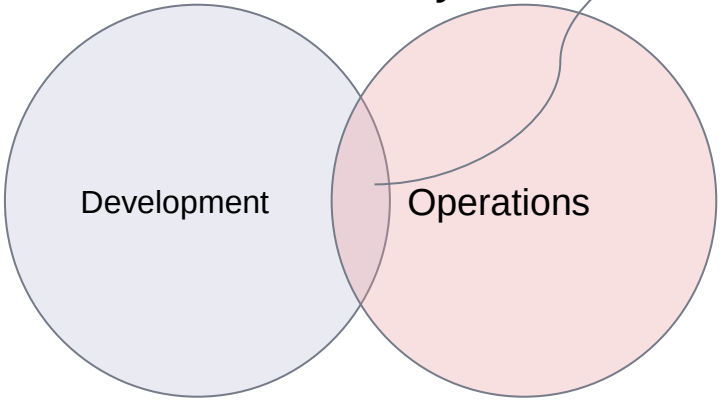
What is the problem?

What is DevOps

Breaking the Silos: Communication, Collaboration, Integration

- How can dev help system stability?
- How can ops help accelerate feature delivery?

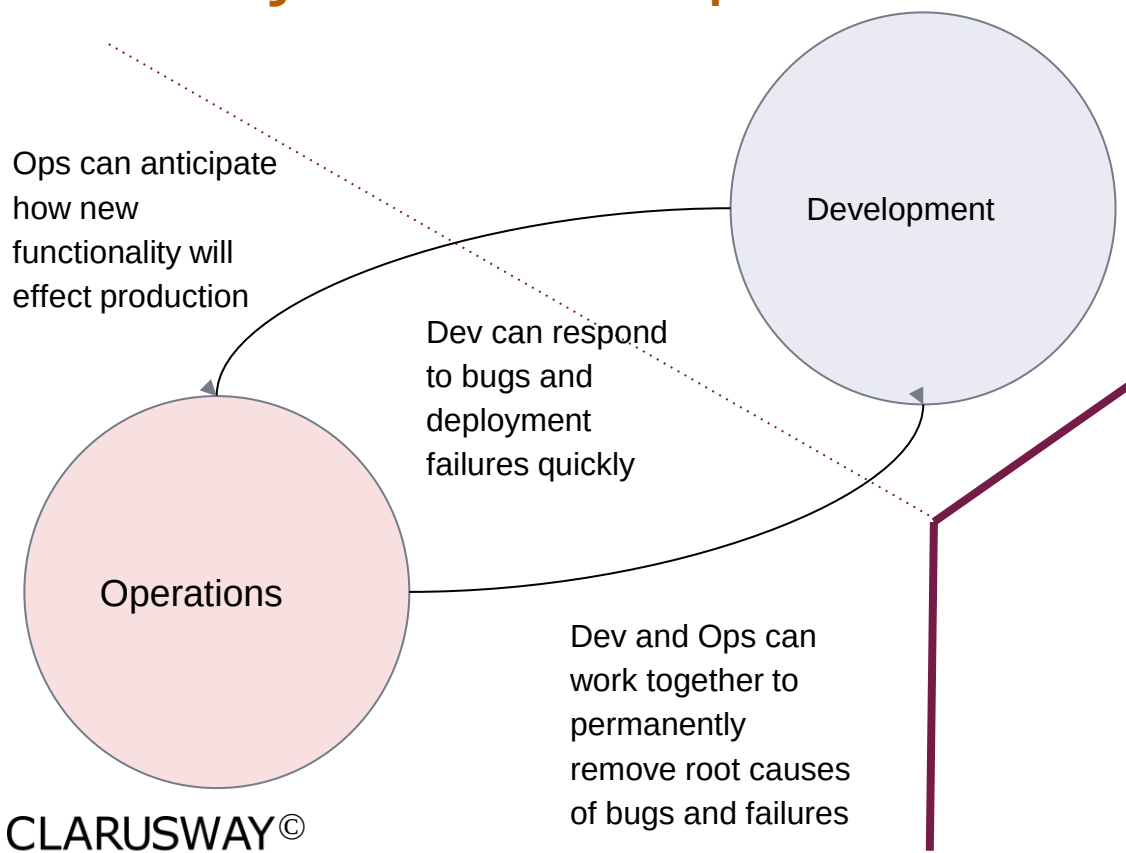




“We can build cross-functional teams around “knowledge overlaps” – people with experience on both sides and “Ops Devs””

What is DevOps

Breaking the Silos:Dev and Ops



- **Ops** trusts dev will provide good code
- **Dev** trusts ops will put code in prod quickly
- Visibility enables “trust but verify”

What is DevOps

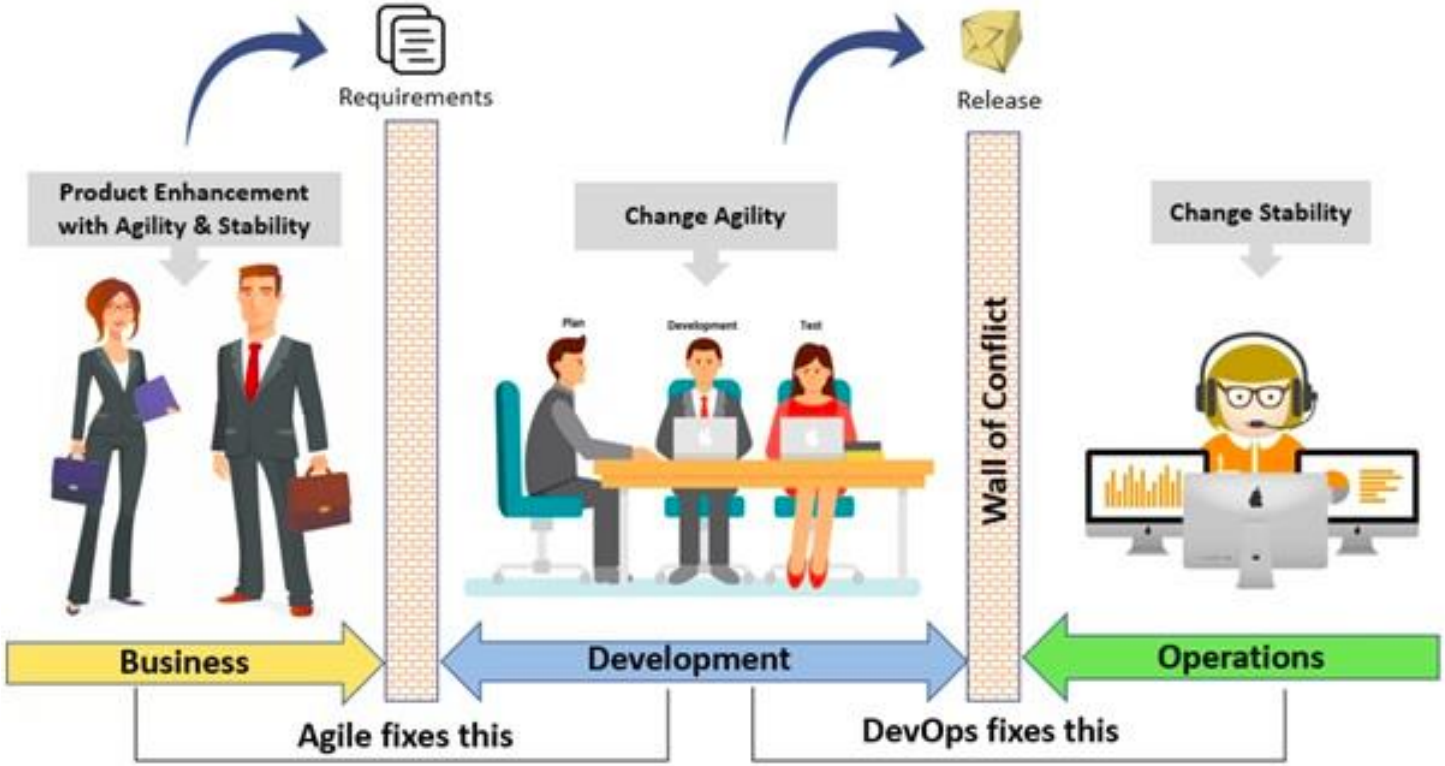
Dev and Ops Working Together

- Create feedback loops between inventors and mechanics
- Expose real-time metrics from ops enabling dev to learn from the system running under real world conditions
- Expose real-time metrics from dev enabling ops to anticipate production needs and provide early input
- Cross-functional teams collaborate to deliver whole working systems including all infrastructure, software code, and configurations

“ Feature delivery + stability become shared goals”

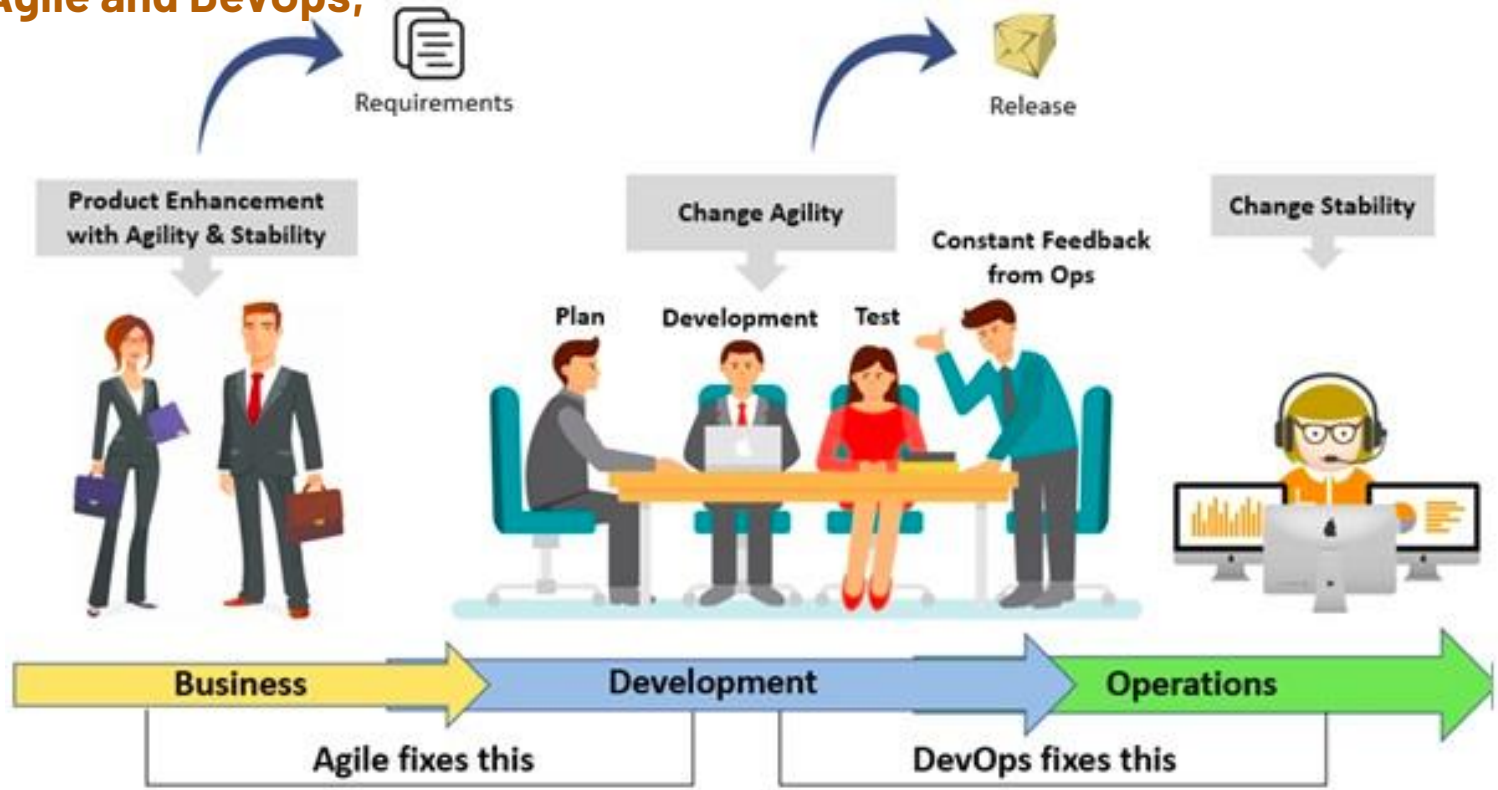
What is DevOps

Before Agile and DevOps;



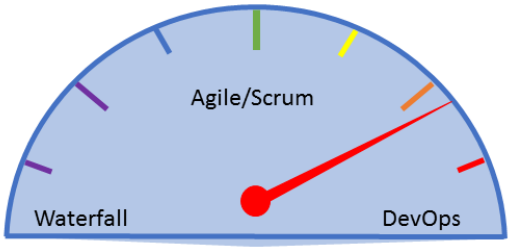
What is DevOps

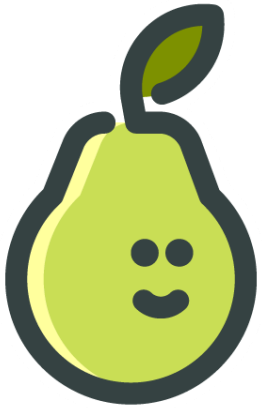
After Agile and DevOps;



What is DevOps

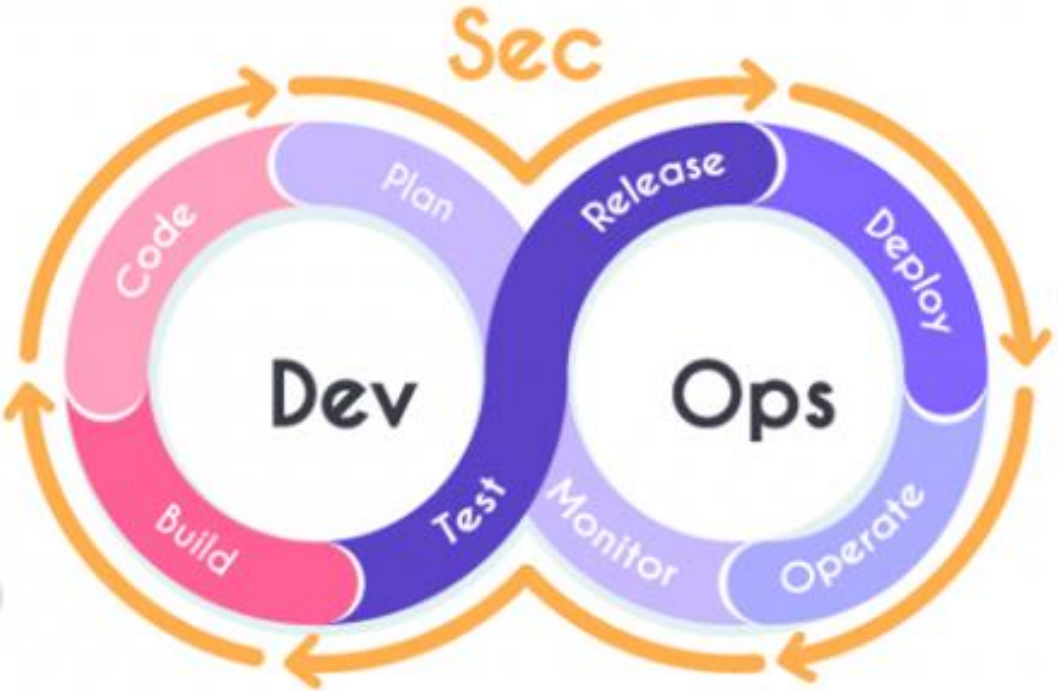
DevOps Culture;



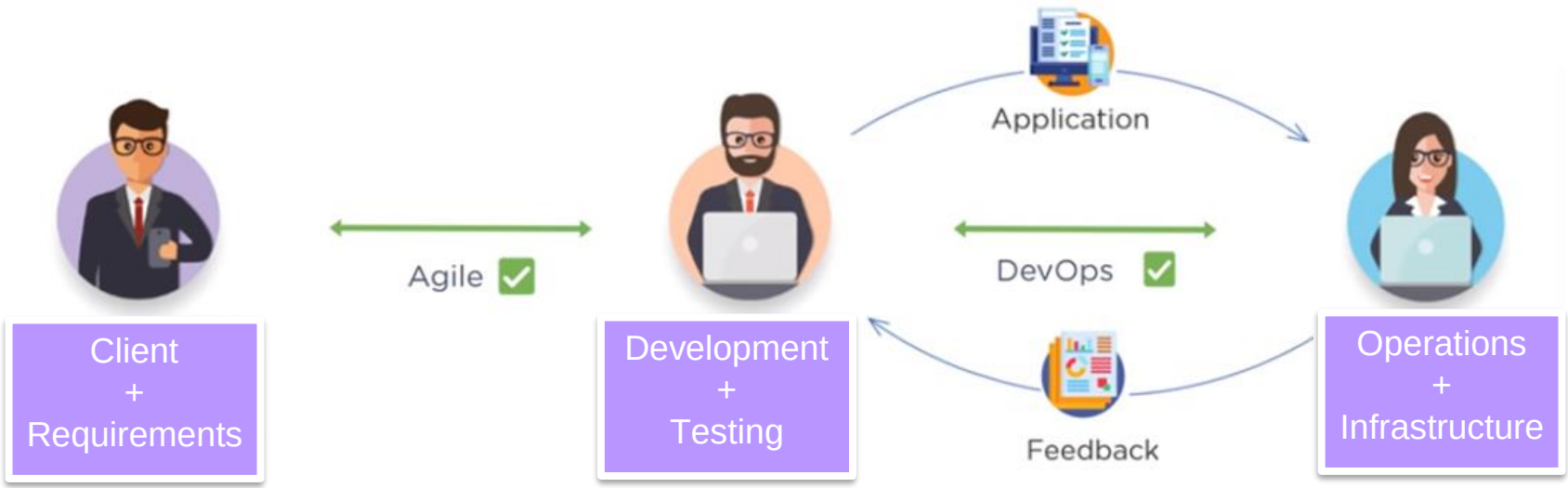


What is DevSecOps?

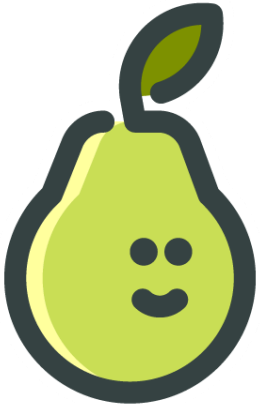
What is DevSecOps



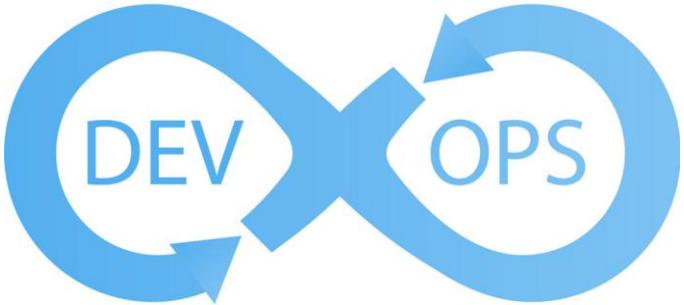
What is DevOps (Summary)



- **DevOps** is an evolution from the Agile Model of software development
- DevOps addressed the gap between Developers and Operations
- The development team will submit the application to the operations team for implementation
- The operations team will monitor the application and provide relevant feedback to developers



What are the DevOps phases?



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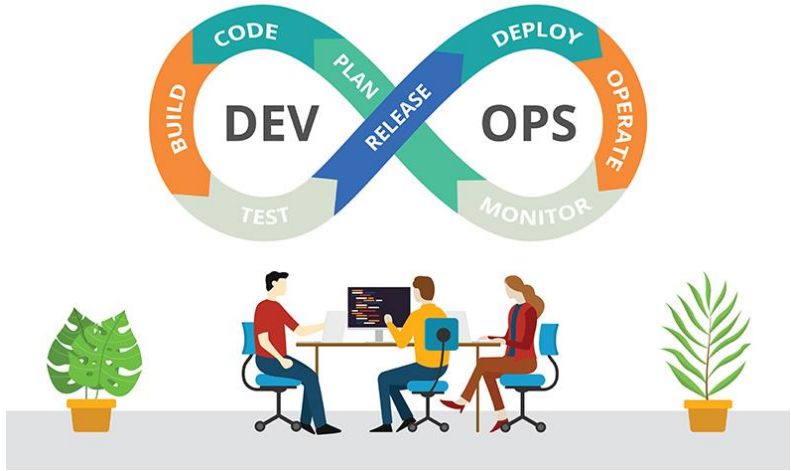
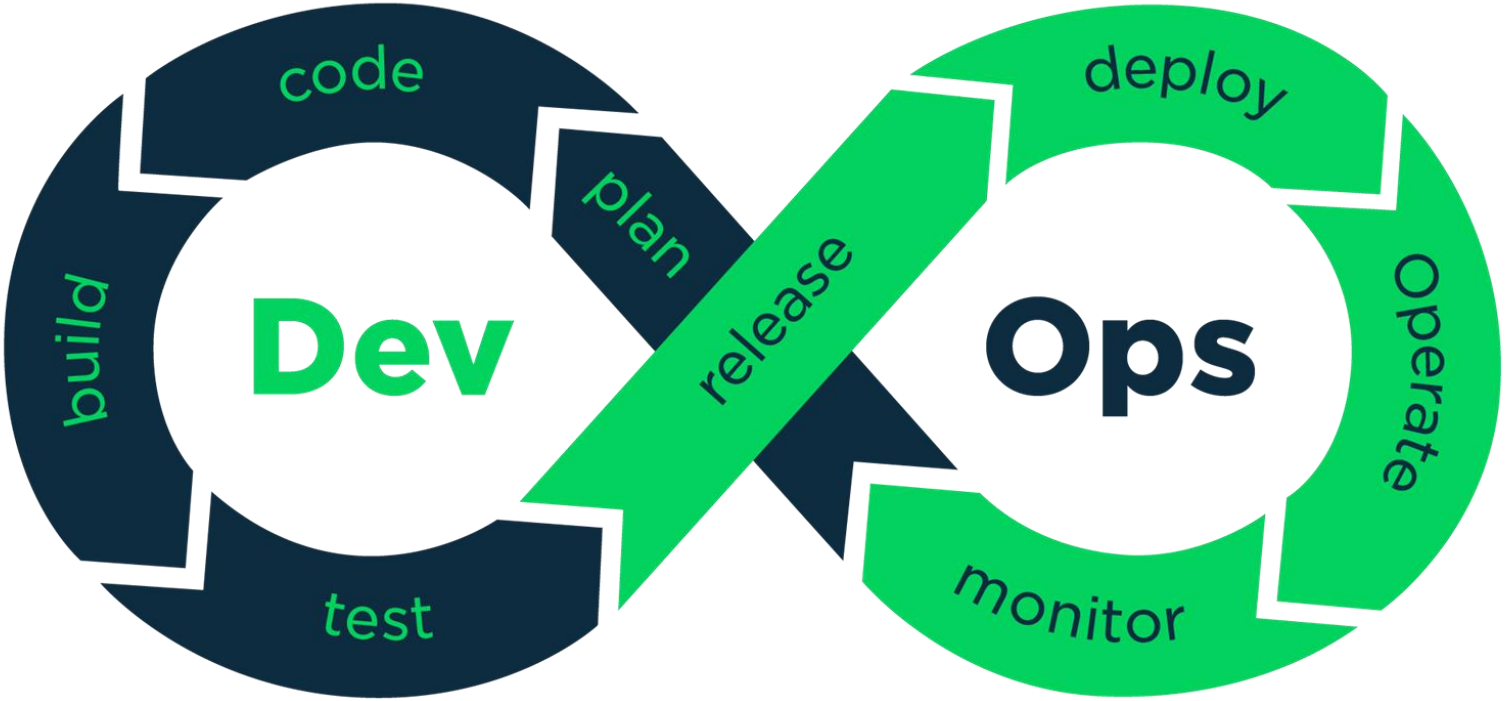
DevOps Phases



DevOps Phases



DevOps Phases

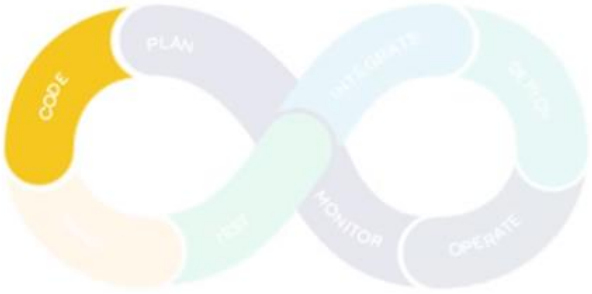
PLAN PHASE

Plan

Business owners and software development team discuss project goals and create a plan

DevOps Phases

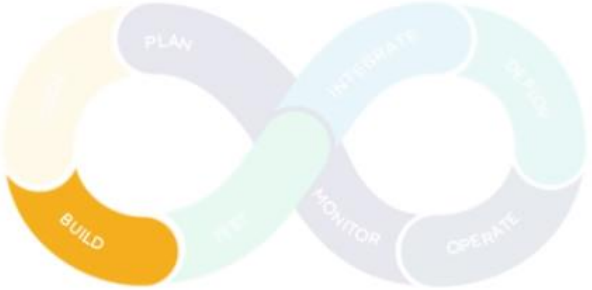
CODE PHASE



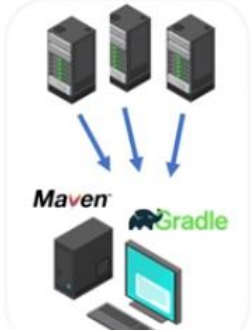
Programmers then design and code the application and use tools like **Git** to store application code

DevOps Phases

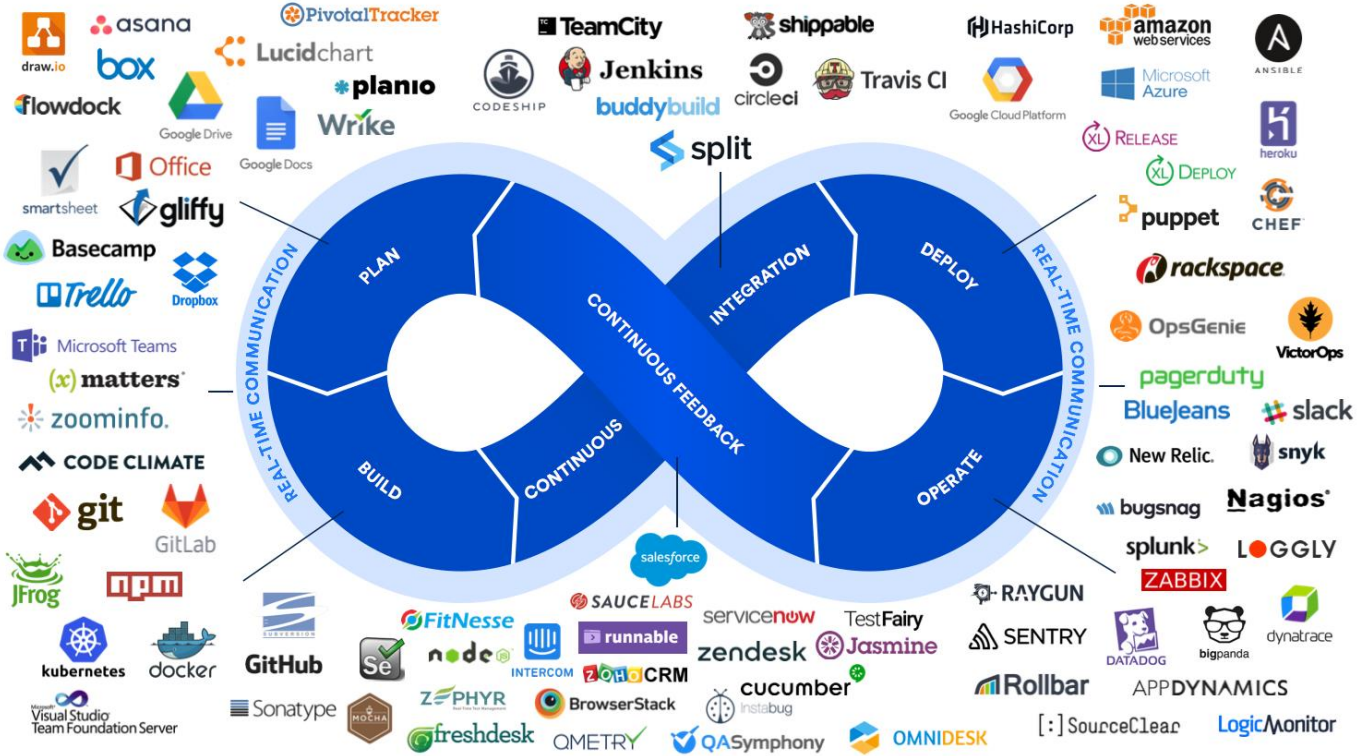
BUILD PHASE



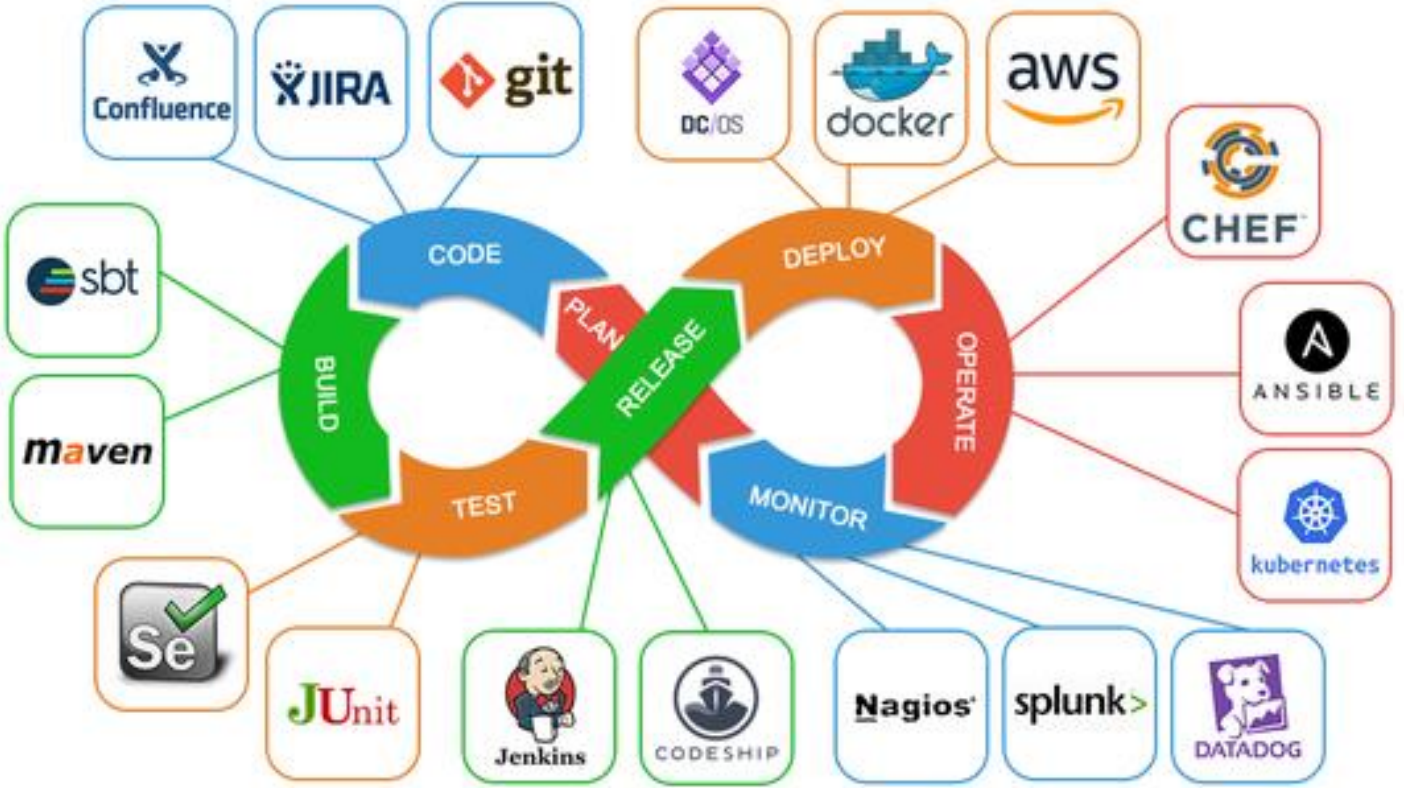
Build tools like Maven and Gradle, take code from different repositories and combine them to build the complete application



DevOps Phases

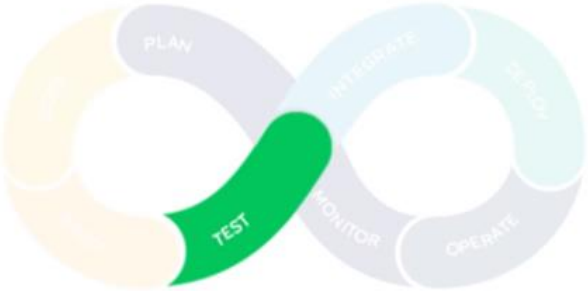


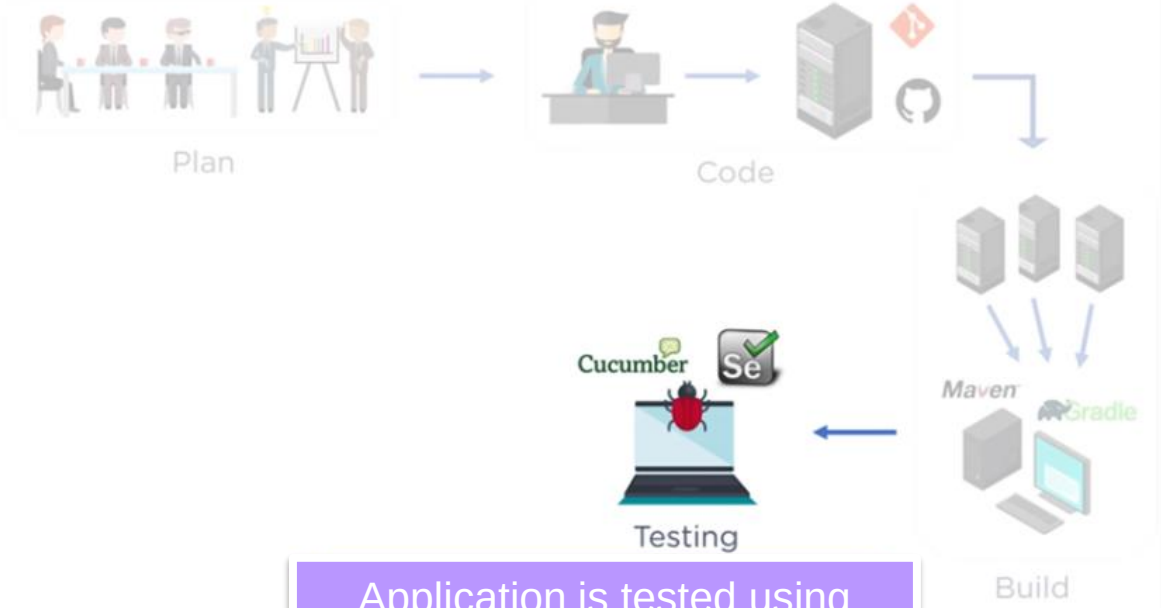
DevOps Phases



DevOps Phases

TEST PHASE

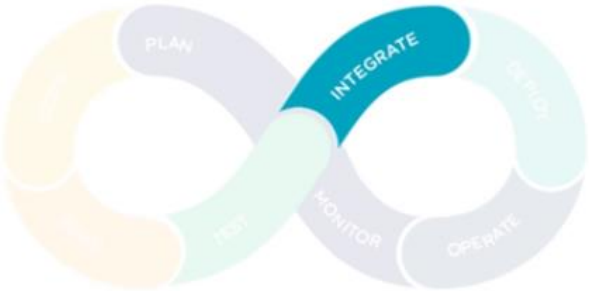


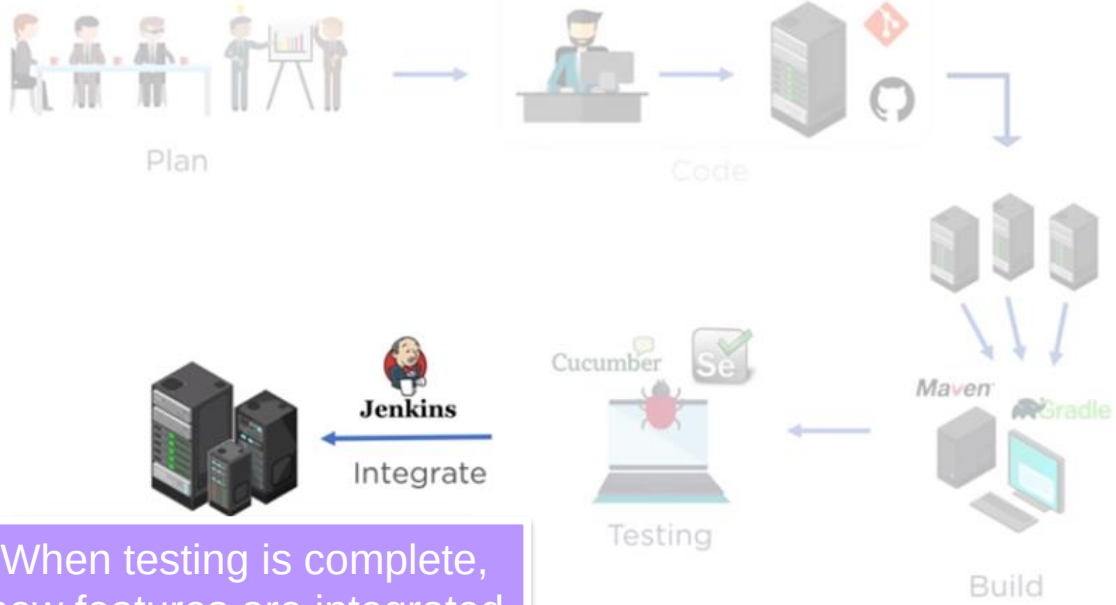


Application is tested using automation testing tools like Selenium and Junit to ensure software quality

DevOps Phases

INTEGRATE PHASE

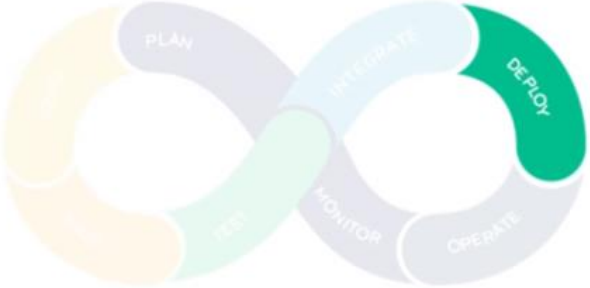


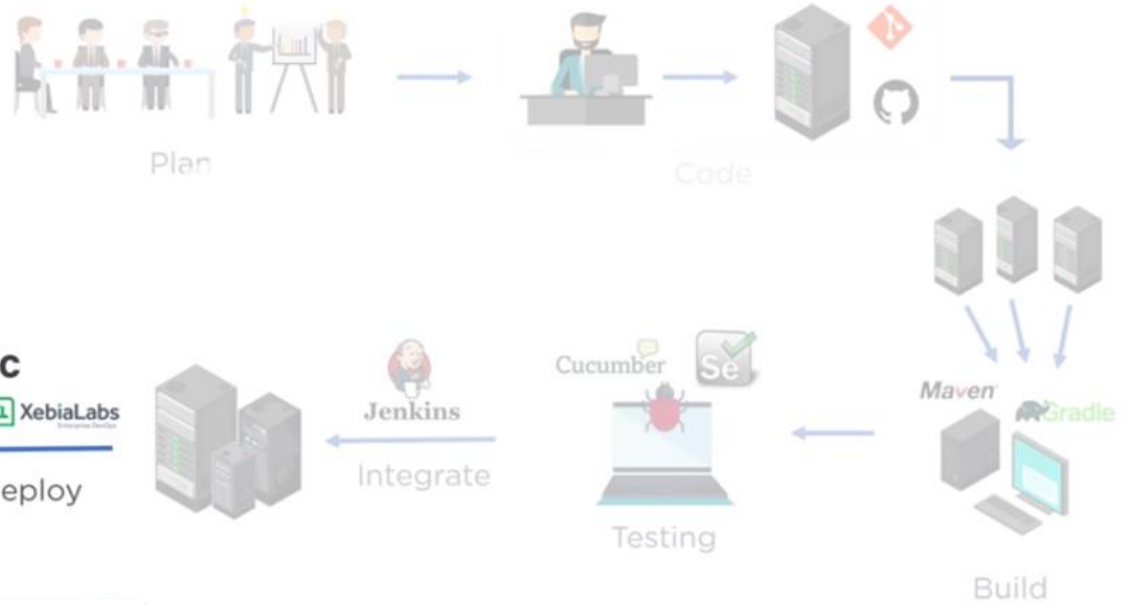


When testing is complete, new features are integrated automatically to the already existing codebase

DevOps Phases

DEPLOY PHASE



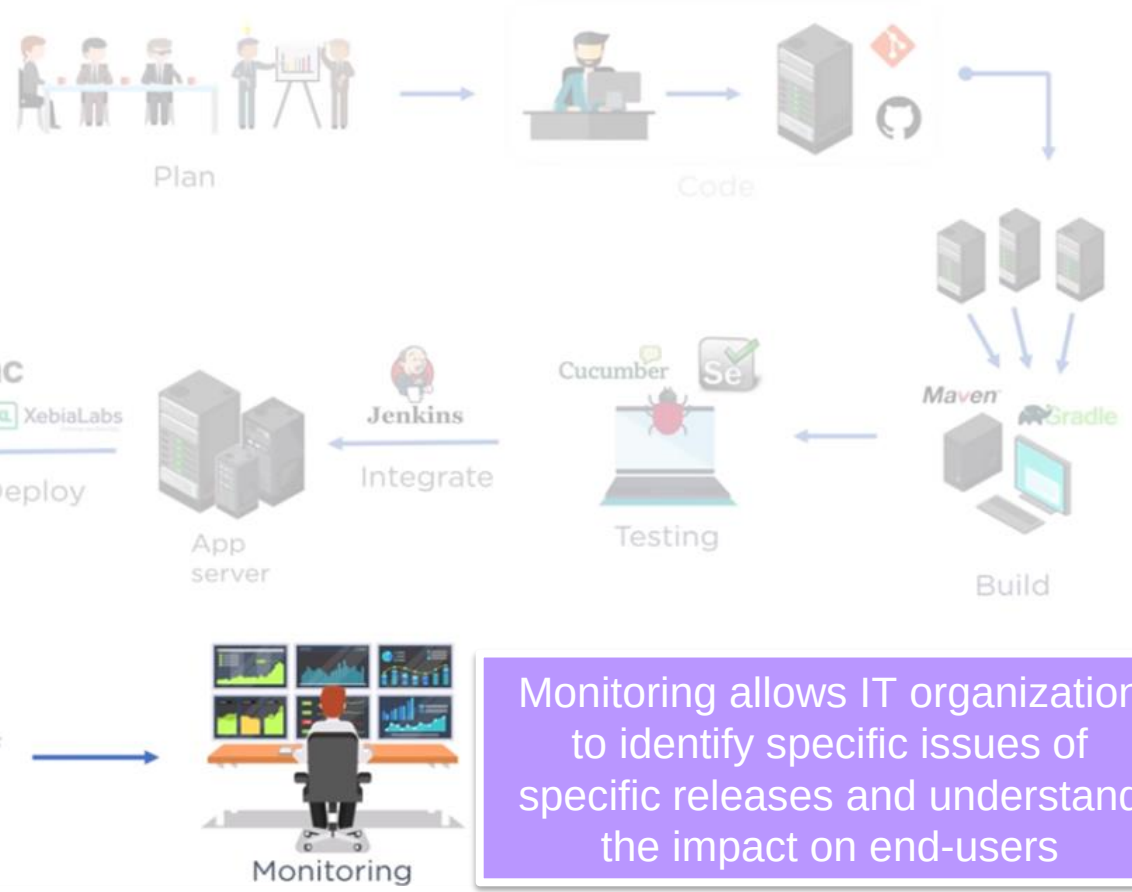


Application is packaged after release and deployed from development server to production server

DevOps Phases

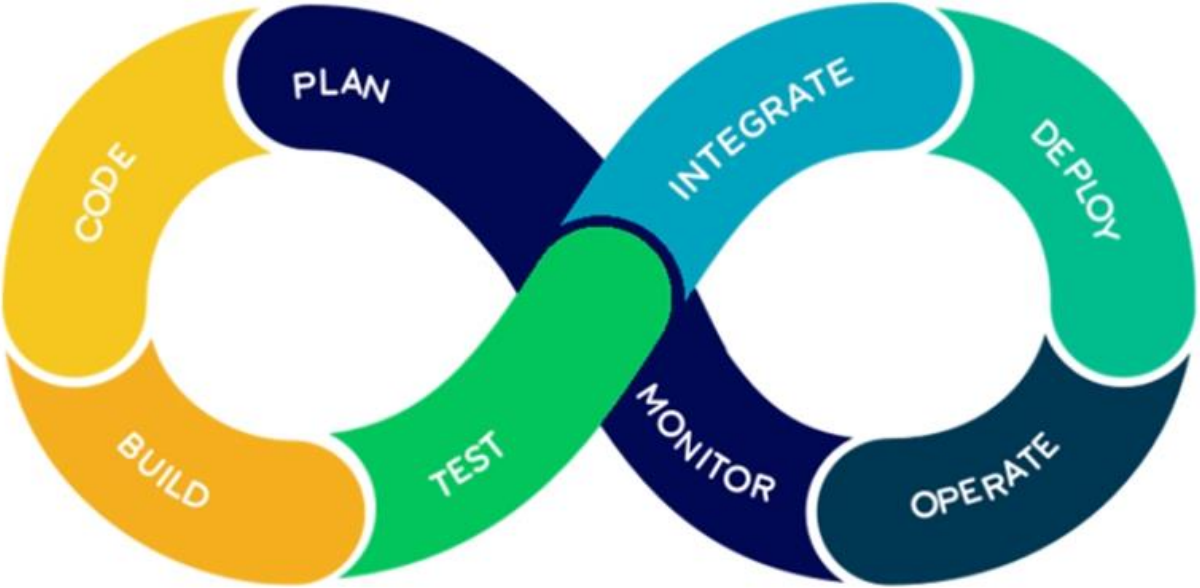
Once the software is deployed, the operations team perform activities such as configuring servers and provisioning them with the required resources

DevOps Phases



Monitoring allows IT organization to identify specific issues of specific releases and understand the impact on end-users

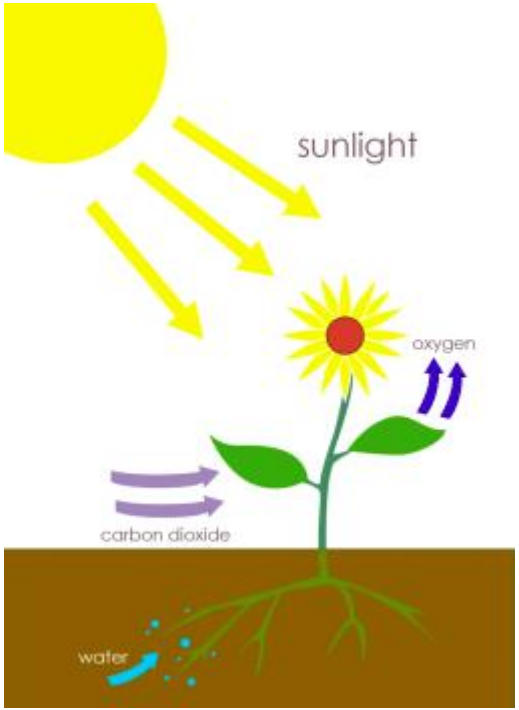
DevOps Phases (Summary)




Kahoot!

3

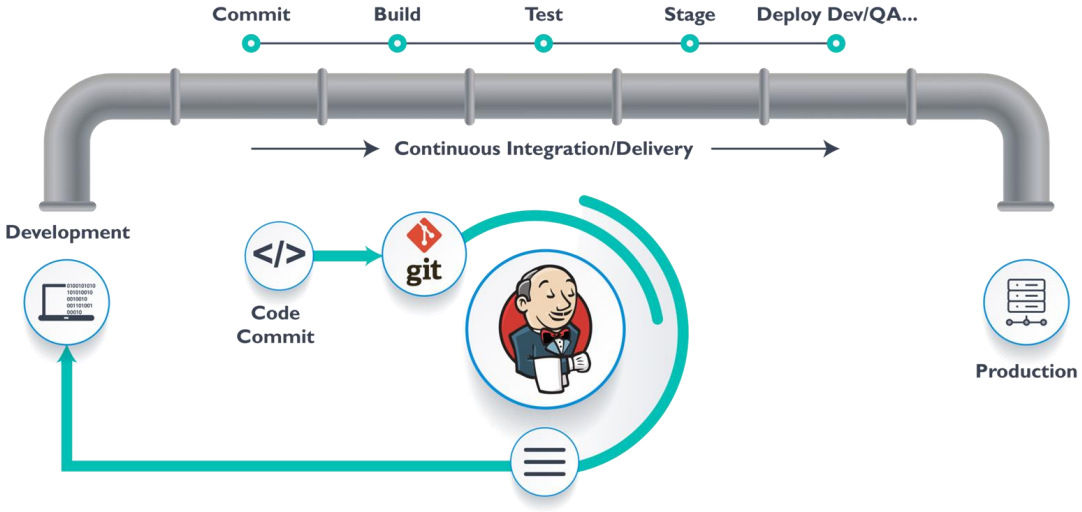
DevOps Processes



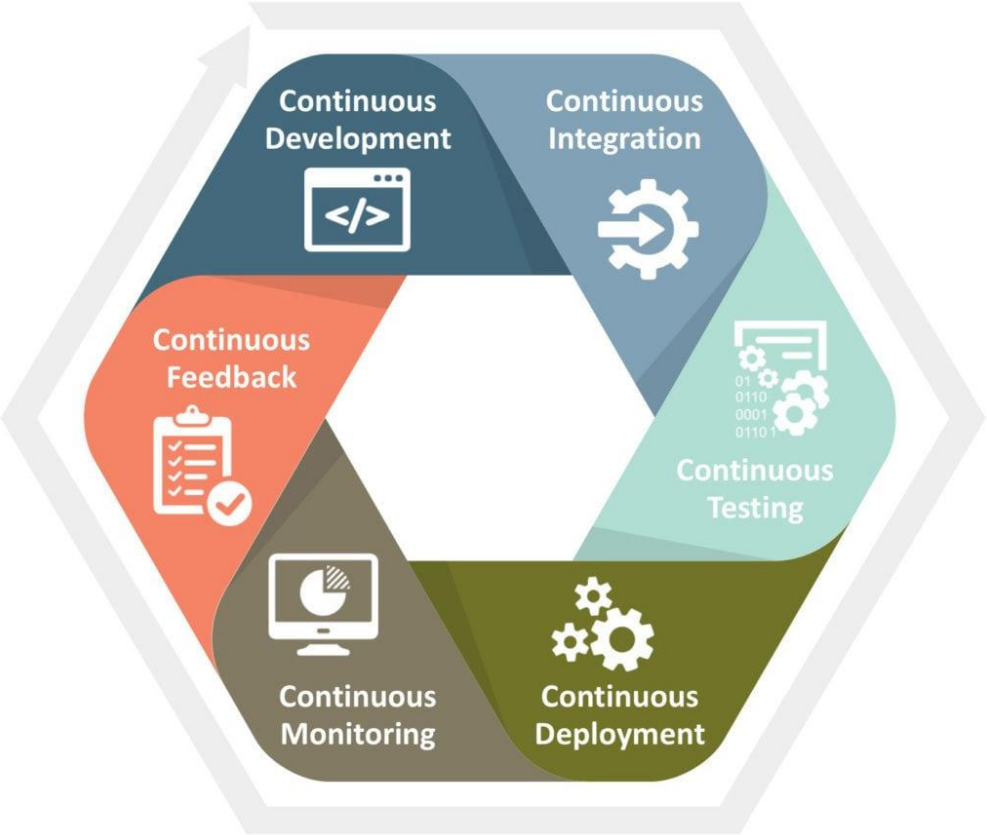
DevOps Processes

Pipelines;

- A **Pipeline** is a **chain** of **tasks** that can be **automated**.
- Integration tools use pipelines to perform tasks repetitively and continuously
- Pipelines keep work flowing forward in our DevOps system



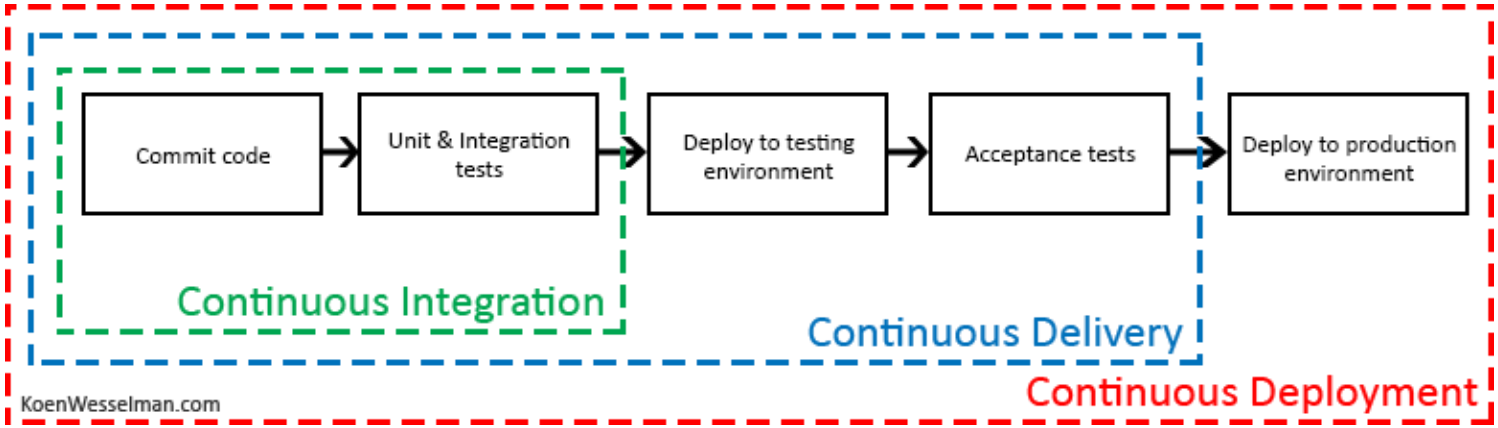
DevOps Processes



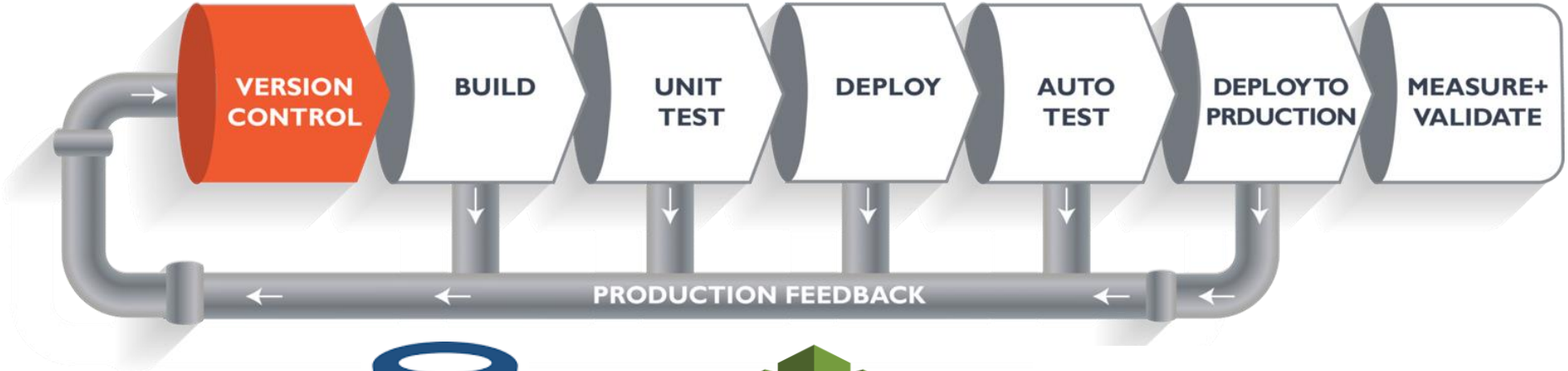
- A standardized set of environments
- Decreasing the failure rate of new releases
- Shortening lead-time between versions

DevOps Processes

Automating an Integrated DevOps System



Introduction to DevOps



GitHub

Bitbucket
Atlassian

Codecommit
AWS

Gitlab
Gitlab

Github

- **GitHub** is a code hosting platform for version control and collaboration. It lets you and others work together on projects from anywhere.

Bitbucket Atlassian

- **Bitbucket** is a Git-based source code repository hosting service owned by Atlassian. Bitbucket offers both commercial plans and free accounts with an unlimited number of private repositories.

Bitbucket

Atlassian

AWS Codecommit

- **AWS CodeCommit** is a fully-managed source control service that hosts secure Git-based repositories. It makes it easy for teams to collaborate on code in a secure and highly scalable ecosystem.
- **CodeCommit** eliminates the need to operate your own source control system or worry about scaling its infrastructure.

AWS

Codecommit

Gitlab

- **Similar** to **GitHub**, **GitLab** is a repository manager which lets teams collaborate on code.

Gitlab
Gitlab

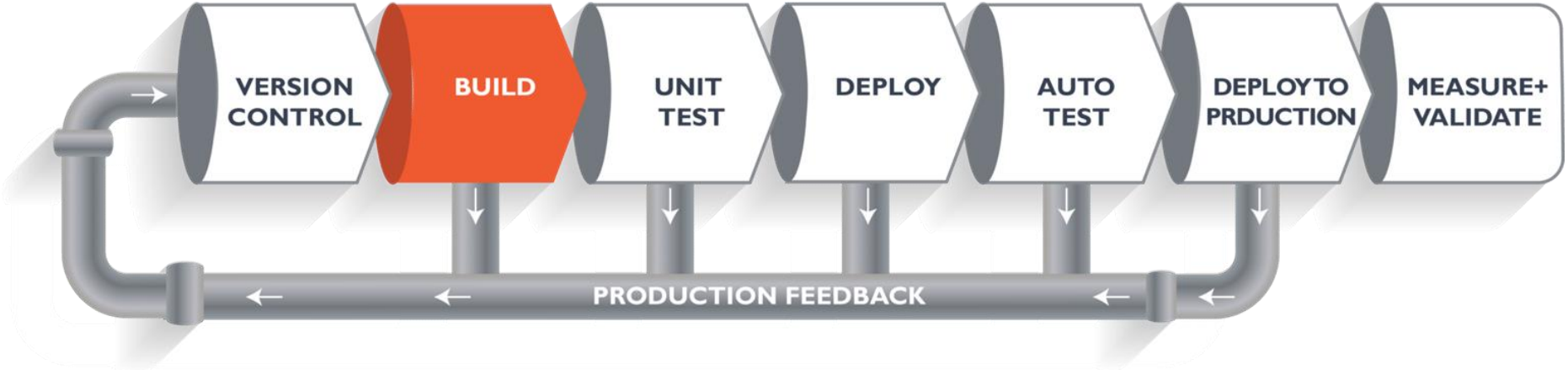
Version Control Comparision

FEATURES	GITHUB	GITLAB	BITBUCKET
open-sourced	no	yes	no
# of private repositories	unlimited	unlimited	unlimited
# of contributors	3	unlimited	unlimited
continuous integration	yes	yes	yes
continuous delivery	yes	yes	yes
integration with Jira	yes	yes	yes

Introduction to DevOps

What is Continuous Integration

Jenkins



Maven

npm

nuget

BASH
THE BOURNE-AGAIN SHELL

Xcode

Gradle

<APACHE ANT>

CMake

CLAR
WAY TO REINVENT YOURSELF

Introduction to DevOps

Maven ?

- **Maven** is a powerful project management tool that is based on POM (project object model).
- It is **used** for projects build, dependency and documentation.

Introduction to DevOps

Npm ?

- **npm** is the package manager for the Node JavaScript platform.
- Most commonly, it is **used** to publish, discover, install, and develop node programs.

Introduction to DevOps

Nuget ?

- **NuGet** provides the tools developers need for creating, publishing, and consuming packages

- Most importantly, **NuGet** maintains a reference list of packages used in a project and the ability to restore and update those packages from that list.

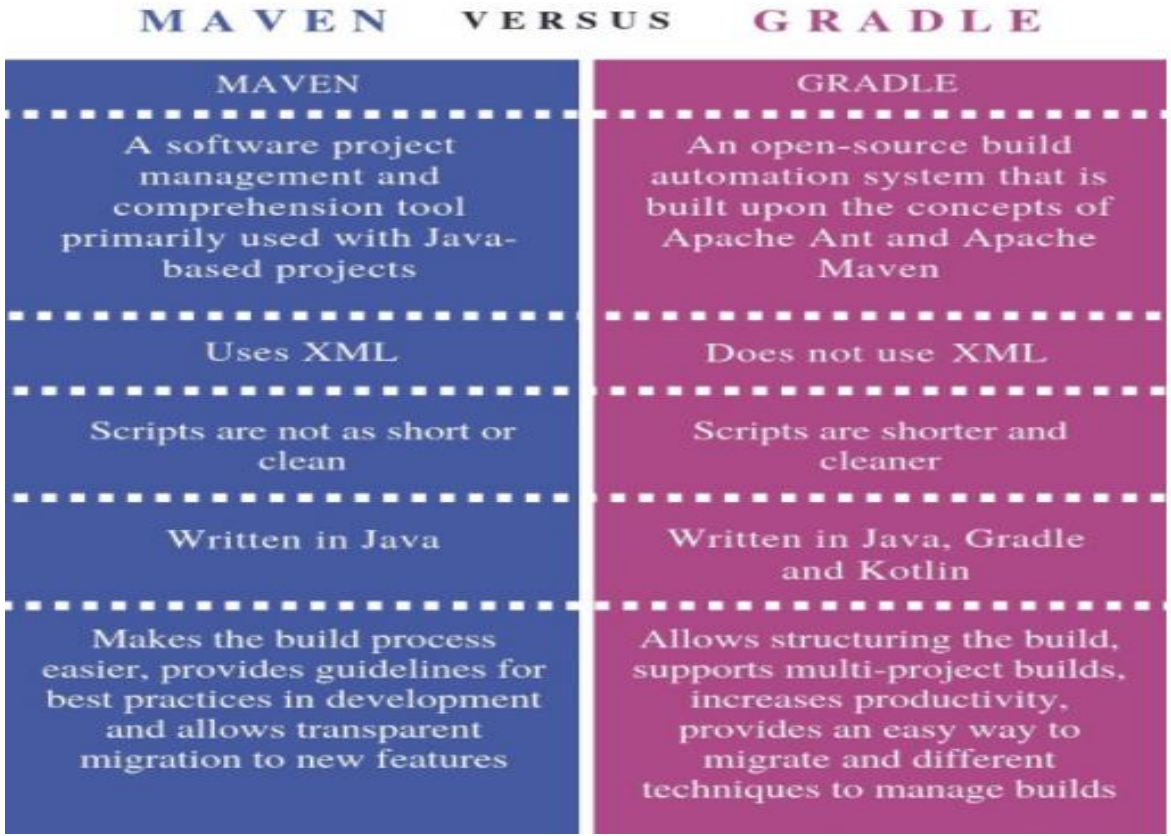
Introduction to DevOps

Gradle ?

- **Gradle** is a build automation tool known for its flexibility to build software
- The building process includes compiling, linking, and packaging the code.

Introduction to DevOps

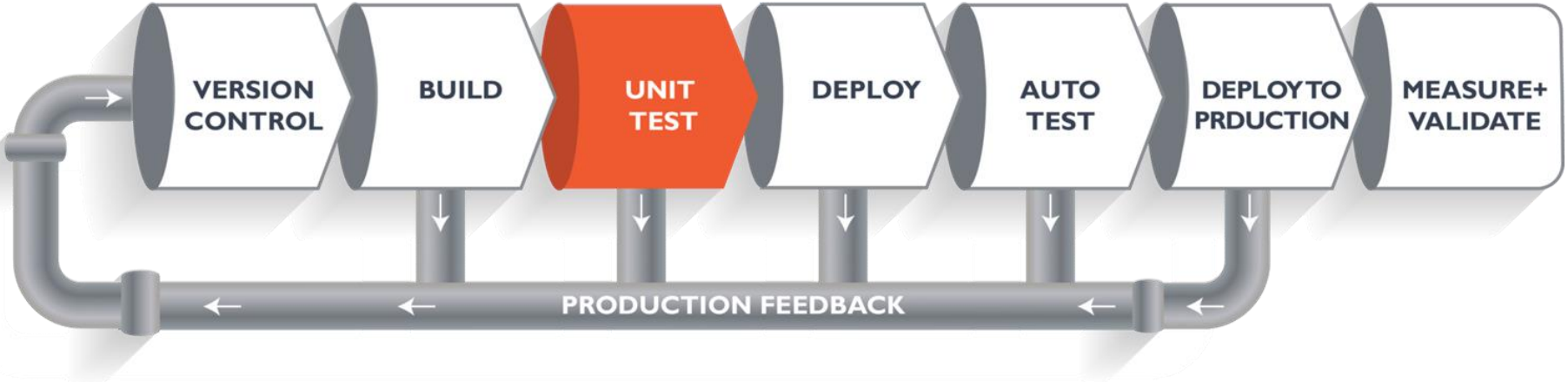
Build Tool Comparision ?



Introduction to DevOps

What is Continuous Integration

Jenkins



JUnit

JACOCO Java Code Coverage

sonarqube

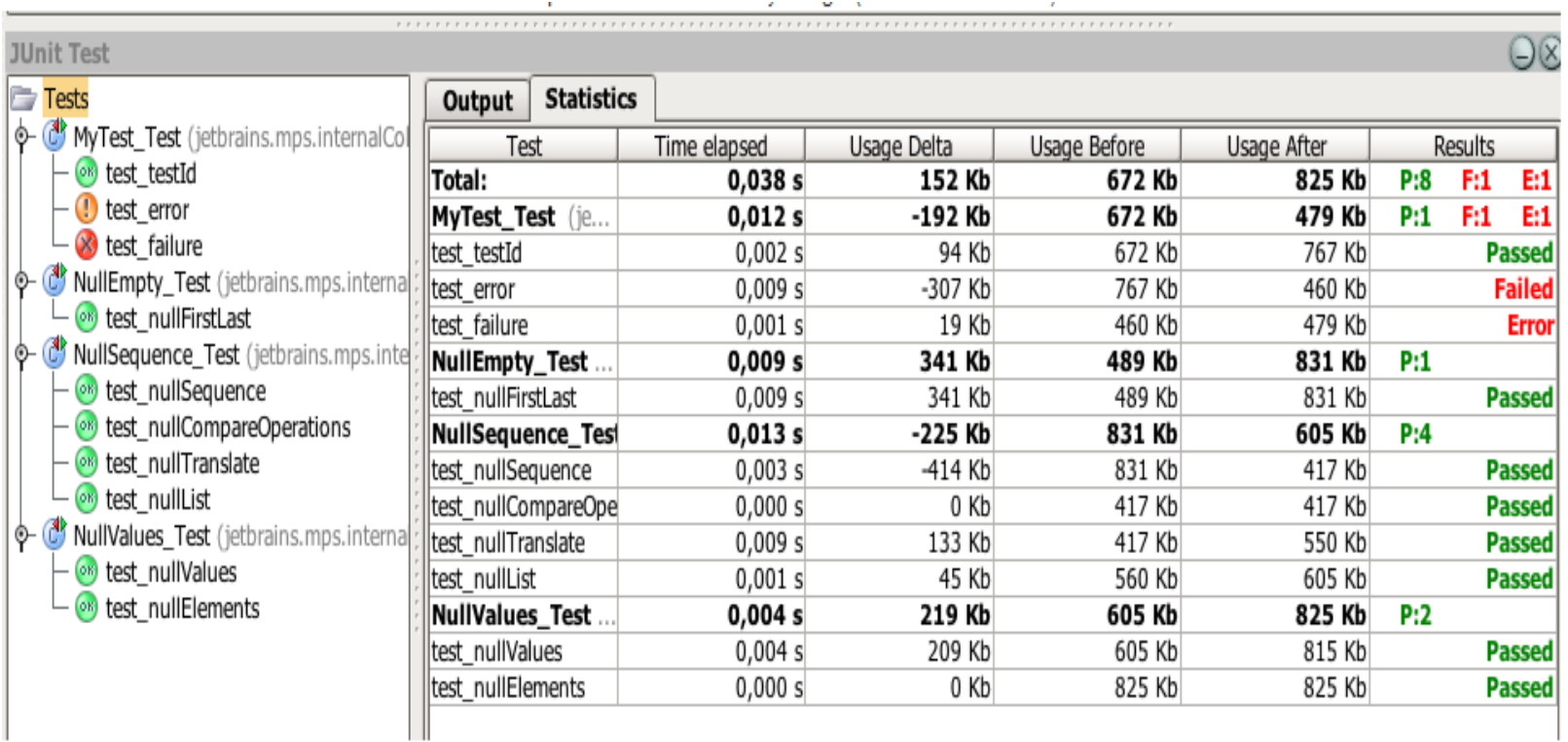
Introduction to DevOps

What is JUnit ?

- JUnit is a unit testing framework for Java programming language.
- JUnit has been important in the development of test-driven development, and is one of a family of unit testing frameworks collectively known as xUnit, that originated with JUnit.

Introduction to DevOps

What is JUnit ?



Test	Time elapsed	Usage Delta	Usage Before	Usage After	Results
Total:	**0,038 s**	**152 Kb**	**672 Kb**	**825 Kb**	**P:8 F:1 E:1**
MyTest_Test (je...	**0,012 s**	**-192 Kb**	**672 Kb**	**479 Kb**	**P:1 F:1 E:1**
test_testId	0,002 s	94 Kb	672 Kb	767 Kb	Passed
test_error	0,009 s	-307 Kb	767 Kb	460 Kb	Failed
test_failure	0,001 s	19 Kb	460 Kb	479 Kb	Error
NullEmpty_Test ...	**0,009 s**	**341 Kb**	**489 Kb**	**831 Kb**	**P:1**
test_nullFirstLast	0,009 s	341 Kb	489 Kb	831 Kb	Passed
NullSequence_Test	**0,013 s**	**-225 Kb**	**831 Kb**	**605 Kb**	**P:4**
test_nullSequence	0,003 s	-414 Kb	831 Kb	417 Kb	Passed
test_nullCompareOpe	0,000 s	0 Kb	417 Kb	417 Kb	Passed
test_nullTranslate	0,009 s	133 Kb	417 Kb	550 Kb	Passed
test_nullList	0,001 s	45 Kb	560 Kb	605 Kb	Passed
NullValues_Test ...	**0,004 s**	**219 Kb**	**605 Kb**	**825 Kb**	**P:2**
test_nullValues	0,004 s	209 Kb	605 Kb	815 Kb	Passed
test_nullElements	0,000 s	0 Kb	825 Kb	825 Kb	Passed

Introduction to DevOps

What is Jococo ?

- **JaCoCo** is an open source toolkit for measuring code coverage in a code base and reporting it through visual reports

- Code coverage is a software metric used to measure how many lines of our code are executed during automated tests.

Introduction to DevOps

What is Jococo ?

code-coverage-maven-jacoco

Element	Missed Instructions	Cov.	Missed Branches	Cov.	Missed	Cxty	Missed	Lines
com.asimio.demo		37%		n/a	1	2	2	3
com.asimio.demo.rest		100%		n/a	0	2	0	5
com.asimio.demo.service		100%		n/a	0	2	0	2
Total	5 of 37	86%	0 of 0	n/a	1	6	2	10

Introduction to DevOps

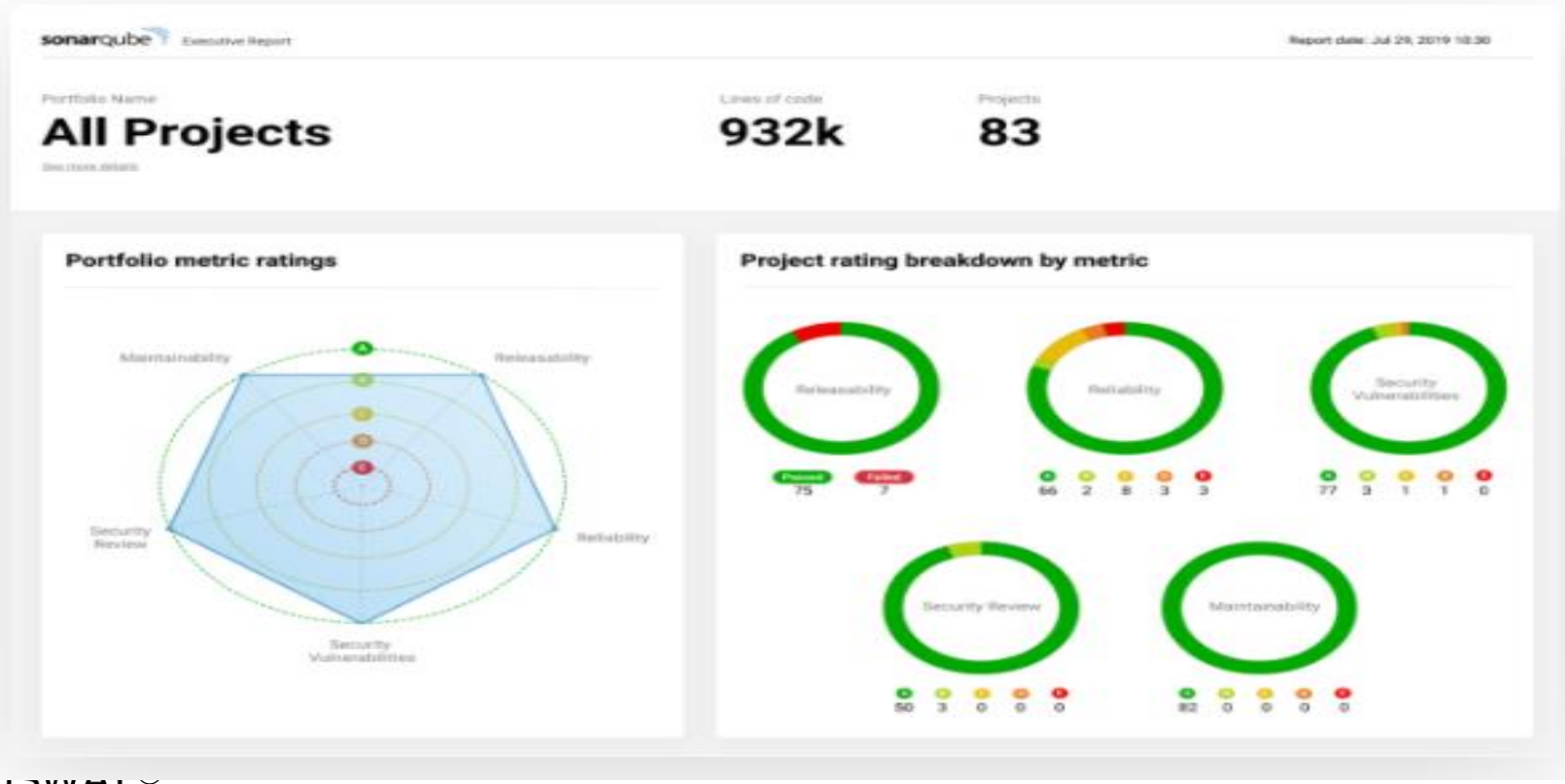
What is sonarqube?

- **SonarQube** is an open-source platform developed by SonarSource for continuous inspection of code quality.

- Sonar **does** static code analysis, which provides a detailed report of bugs, code smells, vulnerabilities, code duplications.

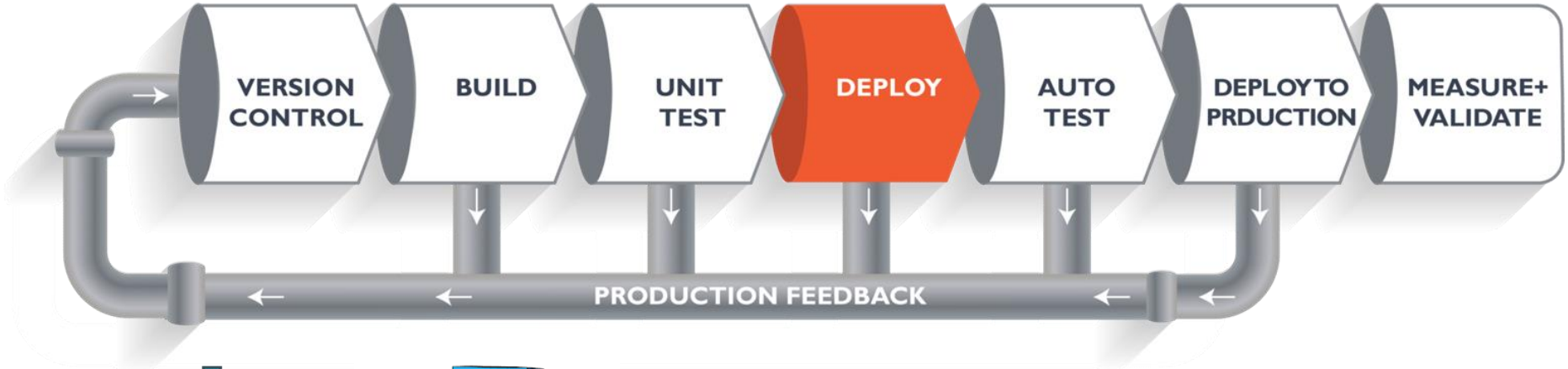
Introduction to DevOps

What is sonarqube?



Introduction to DevOps

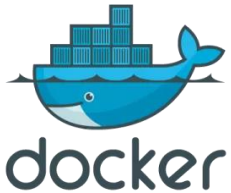
What is Continuous Integration

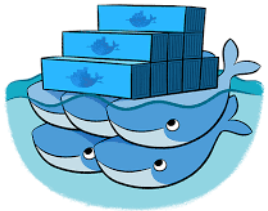


Introduction to DevOps

What is Docker ?

- **Docker** is an open platform for developing, shipping, and running applications.
- **Docker** enables you to separate your applications from your infrastructure so you can deliver software quickly.





Introduction to DevOps

What is Kubernetes ?

- **Kubernetes**, or k8s, is an open source platform that automates Linux container operations

- In other **words**, you can cluster together groups of hosts running Linux containers, and **Kubernetes** helps you easily and efficiently manage those clusters.

Introduction to DevOps

What is Ansible ?

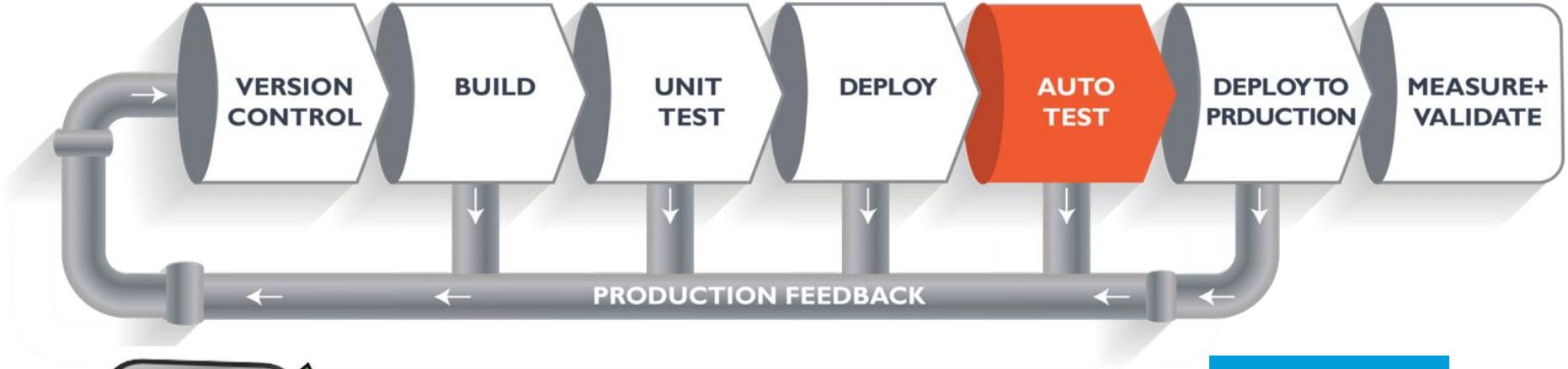
- Ansible is a popular IT automation engine that automates tasks that are either cumbersome or repetitive or complex like configuration management, cloud provisioning, software deployment, and intra-service orchestration.

- Ansible is used for the multi-tier deployments and it models all of IT infrastructure into one deployment instead of handling each one separately.

Introduction to DevOps

What is Continuous Integration

Jenkins



Protractor
end to end testing for AngularJS

cypress.io

Visual Studio
Coded UI

Introduction to DevOps

What is Selenium ?

- **Selenium** is an open-source **tool** that is **used for** automating the tests carried out on web browsers (Web applications are tested using any web browser).

Introduction to DevOps

What is Protractor ?

- Protractor is an end-to-end test framework for Angular and AngularJS applications.
- Protractor runs tests against your application running in a real browser, interacting with it as a user would.

Introduction to DevOps

What is cypress.io ?

- **Cypress** is a next-generation front-end testing **tool** built for the modern web.
- **Cypress** lets you test anything that runs in a browser.

Introduction to DevOps

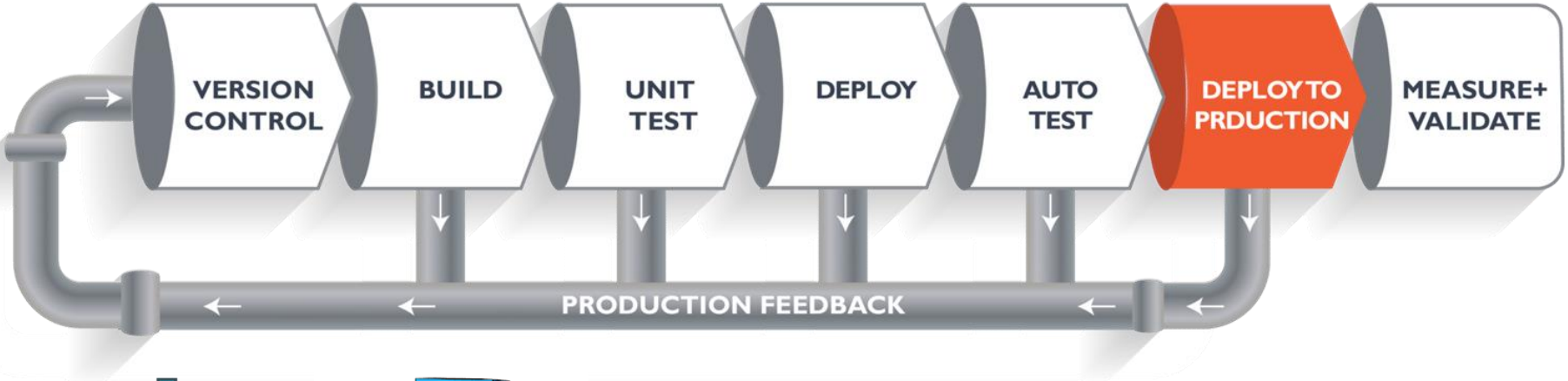
What is VisualStudio ?

- **Coded UI Test (CUIT)** is an automated test that drives applications through its user interface (UI).
- It checks the functionality of the whole application, including the user interface. It is also used to automate an existing manual test.

Introduction to DevOps

Continuous Delivery/Deployment

Jenkins



docker

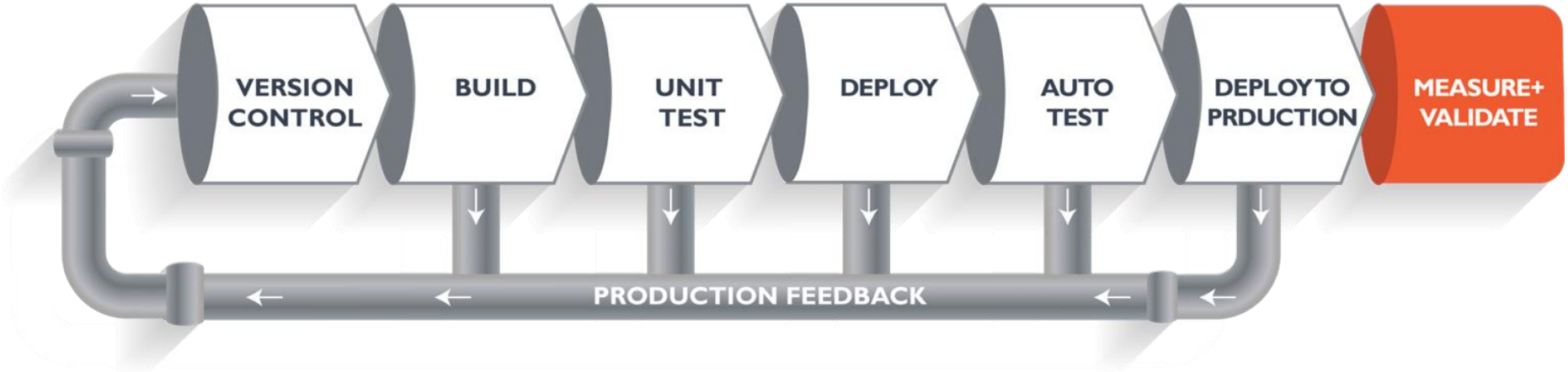
kubernetes

ANSIBLE

Introduction to DevOps

Continuous Delivery/Deployment ?

Jenkins



Grafana

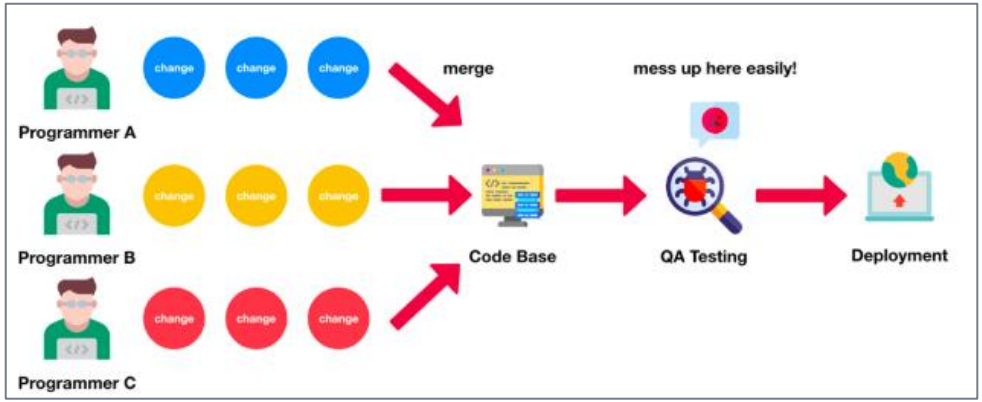
Nagios®

Prometheus

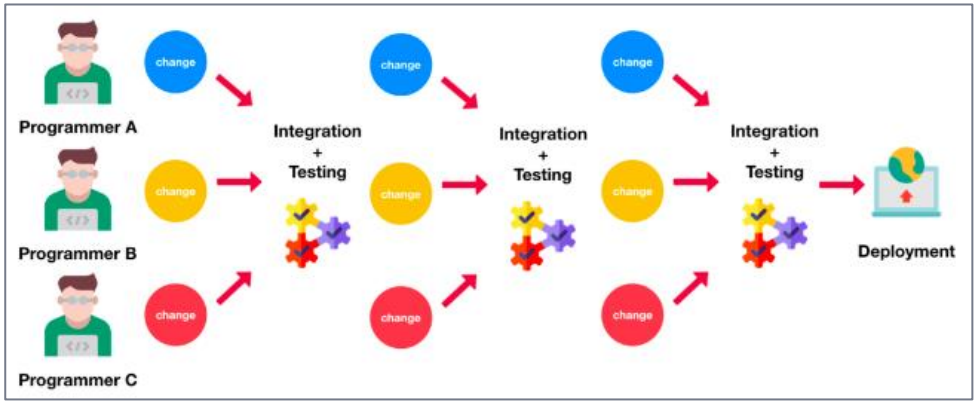
ATLASSIAN Opsgenie

DevOps Processes

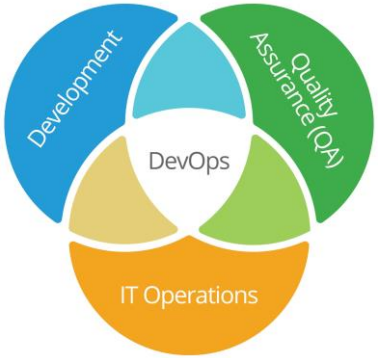
Traditional way

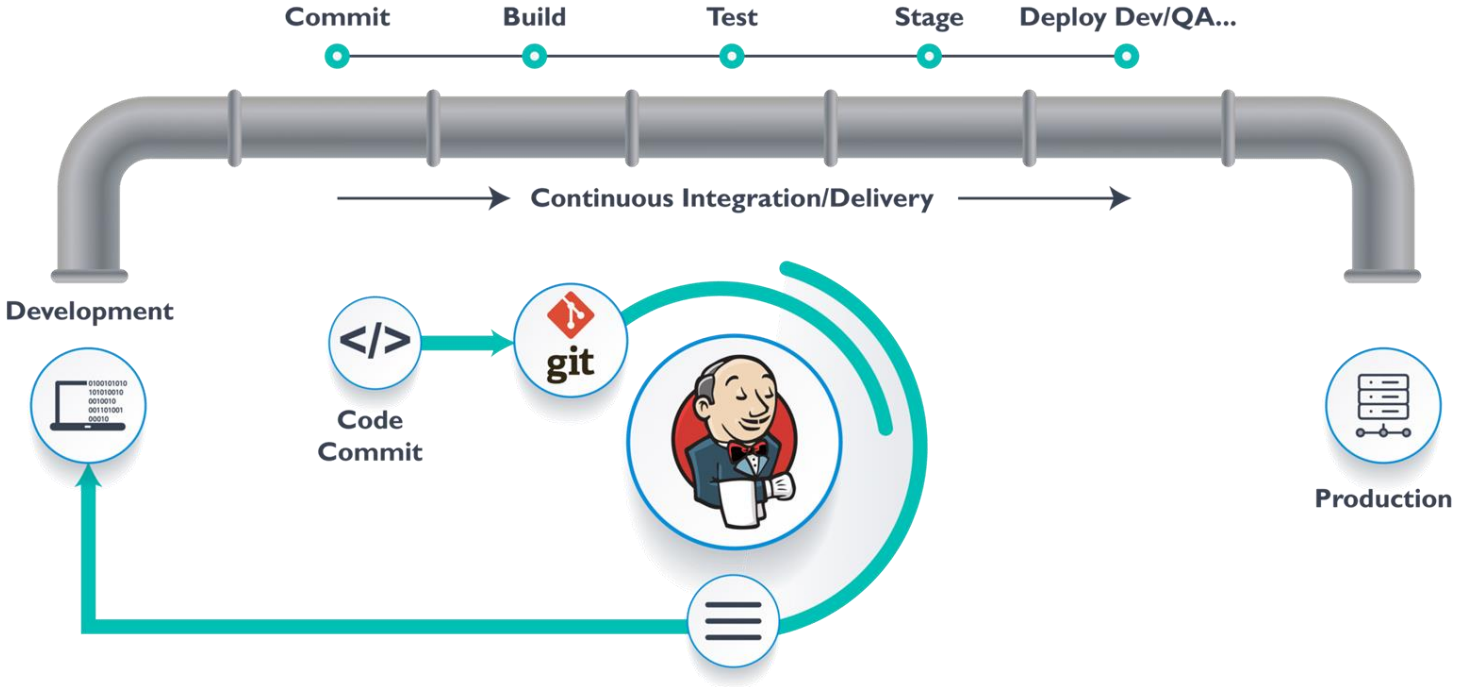


With CI &CD



DevOps Processes (Summary)





4

Advantages

Advantages

Time taken to create and deliver software is reduced

Complexity of maintaining an application is reduced

Improved collaboration between developers and operations team

Continuous integration and delivery ensure faster time to market

5 Disadvantages

Disadvantages

Budget

Lack of culture

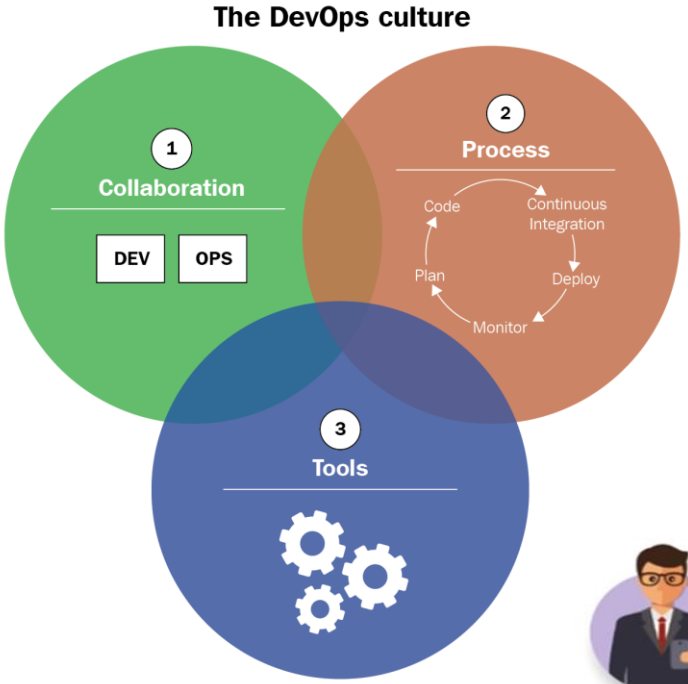
Lack of skill

AFTER (in-class session)

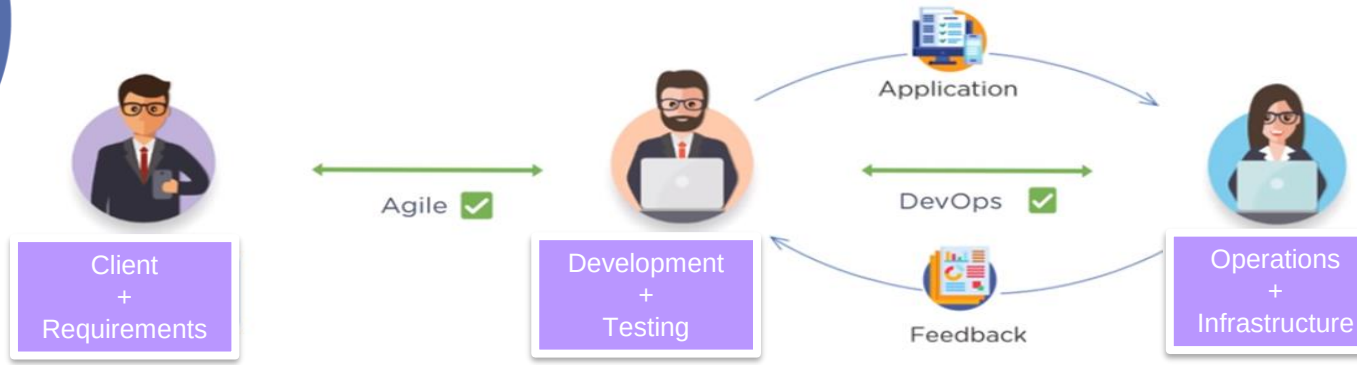
What do you know about DevOps.

(Please write shortly on PEAR DECK slide)

Summary (DevOps)



DevOps Engineer




Kahoot!

THANKS!

Any questions?