Microservice CI/CD Pipeline

CLARUSWAY
WAY TO REINVENT YOURSELF

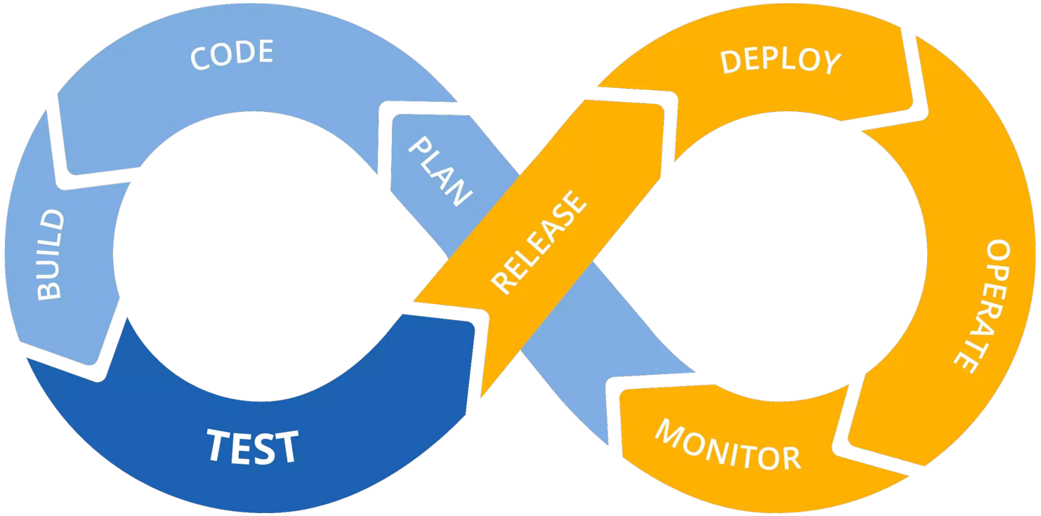
Table of Contents

1

What is DevOps?

CLARUSWAY
WAY TO REINVENT YOURSELF

What is DevOps?

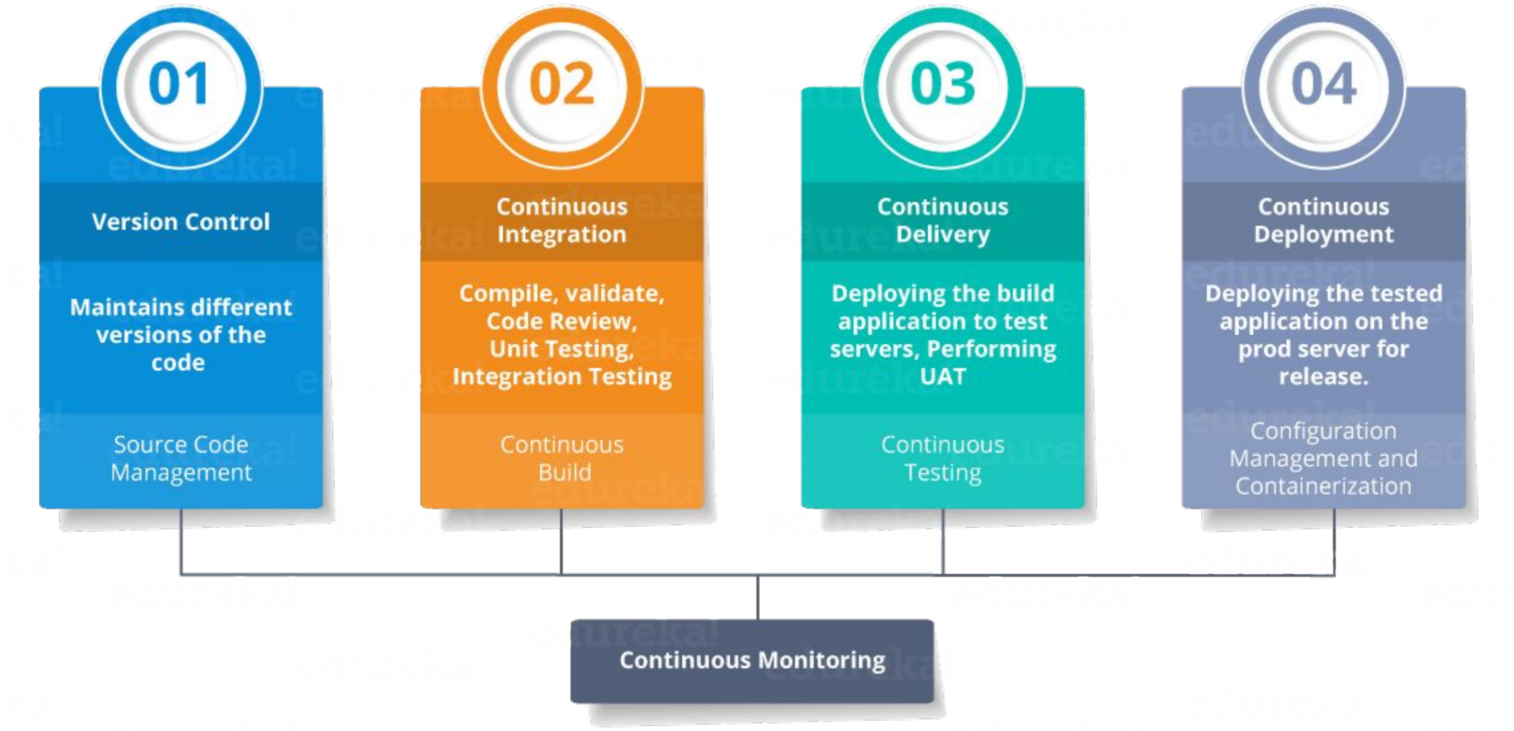


DevOps is a software development approach which involves:

- ➢ continuous development,
- ➢ continuous testing,
- ➢ continuous integration,
- ➢ continuous deployment
- ➢ continuous monitoring

of the software throughout its development lifecycle

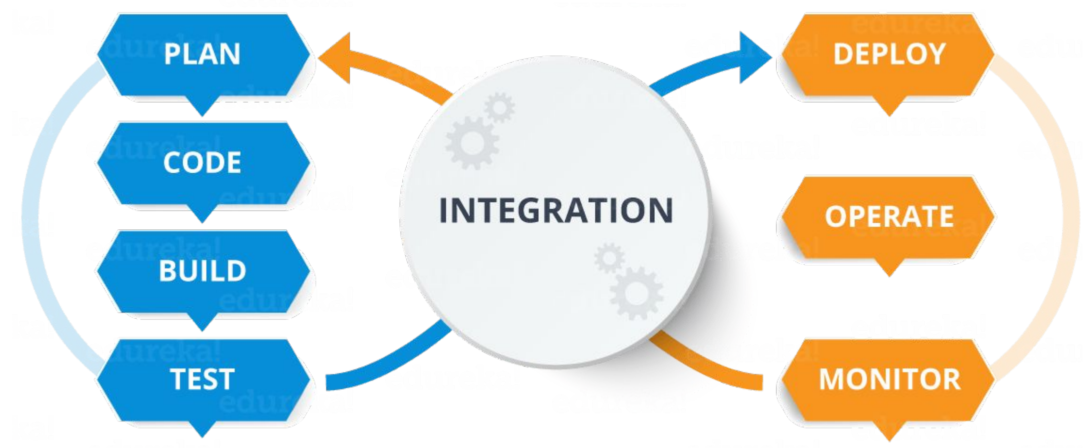
What is DevOps?


01
Version Control
Maintains different versions of the code
Source Code Management
02
Continuous Integration
Compile, validate, Code Review, Unit Testing, Integration Testing
Continuous Build
03
Continuous Delivery
Deploying the build application to test servers, Performing UAT
Continuous Testing
04
Continuous Deployment
Deploying the tested application on the prod server for release.
Configuration Management and Containerization
Continuous Monitoring

2

What is Continuous Integration?

What is Continuous Integration?

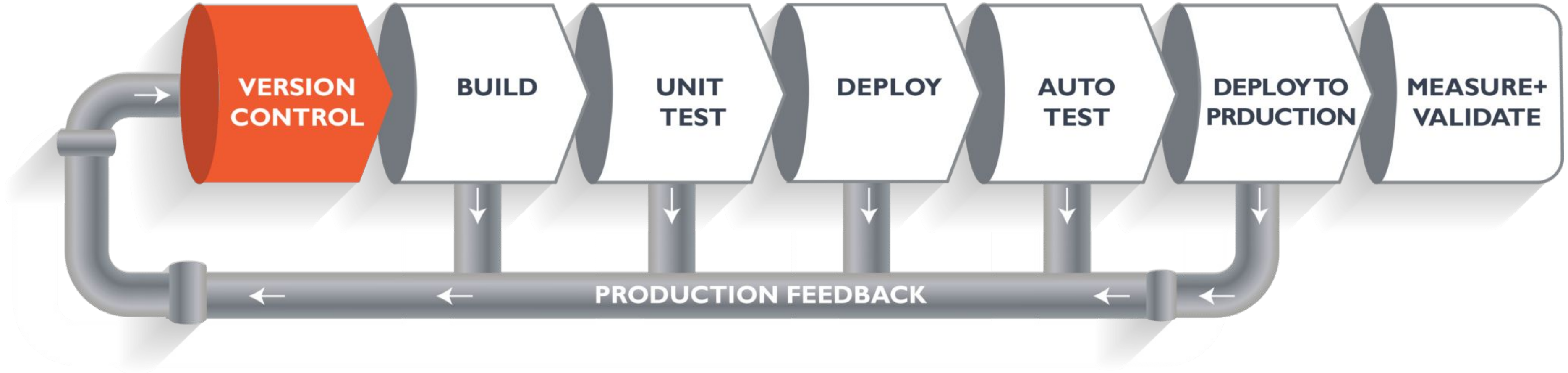


Continuous integration is a software development method where members of the team can integrate their work at least once a day. In this method, every integration is checked by an automated build to search the error.

With CI vs Without CI

Development without CI	**Development with CI**
Lots of Bugs	Fewer bugs
Infrequent and slow releases	Regular working releases
Difficult integration	Easy and Effective Integration
Late bug finding(days,weeks)	Early bug finding(minutes,hours)
Issue raised are harder to fix	Find and fix problems faster and more efficiently.
Poor project visibility	Better project visibility

What is Continuous Integration?



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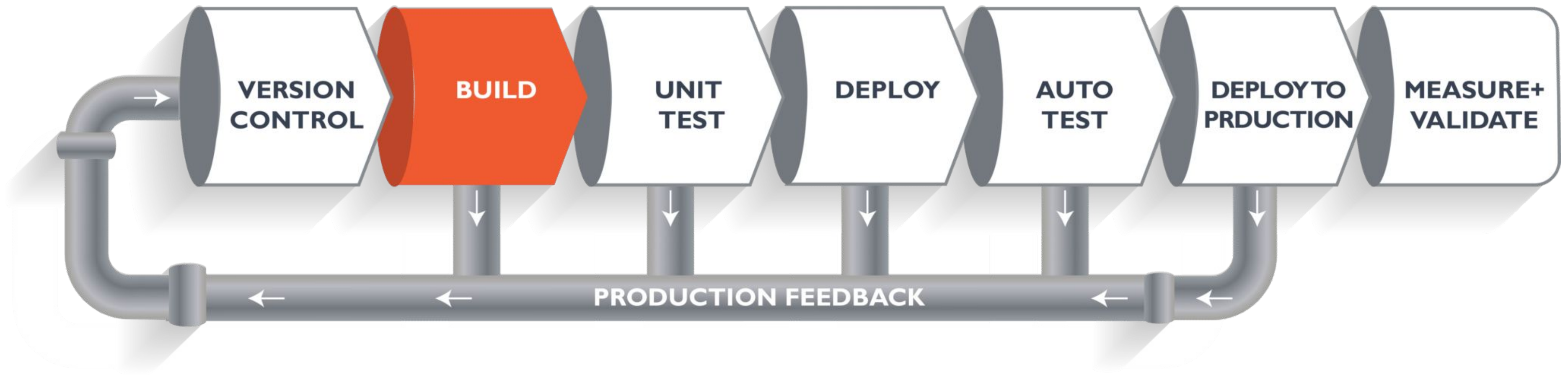

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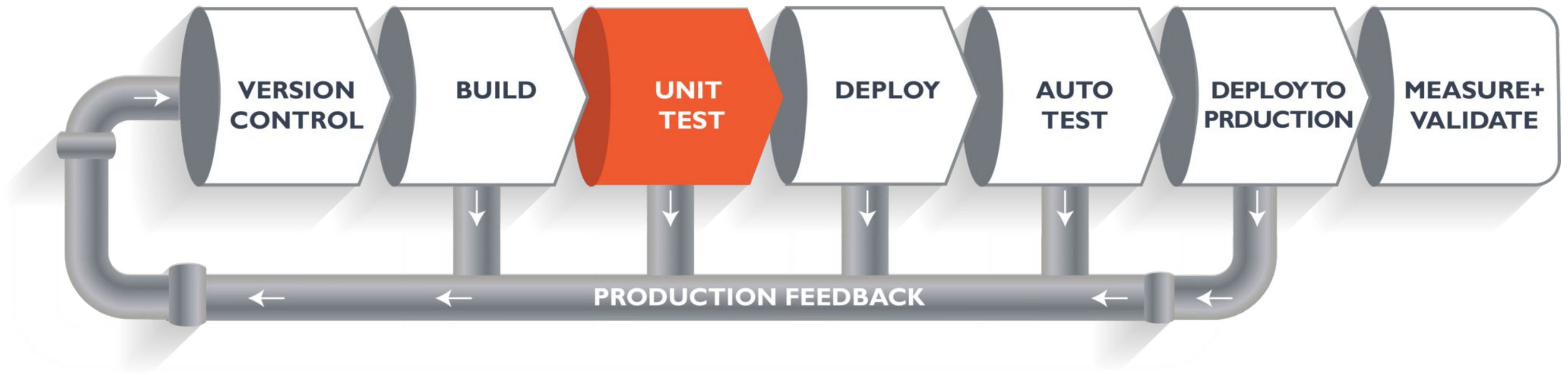

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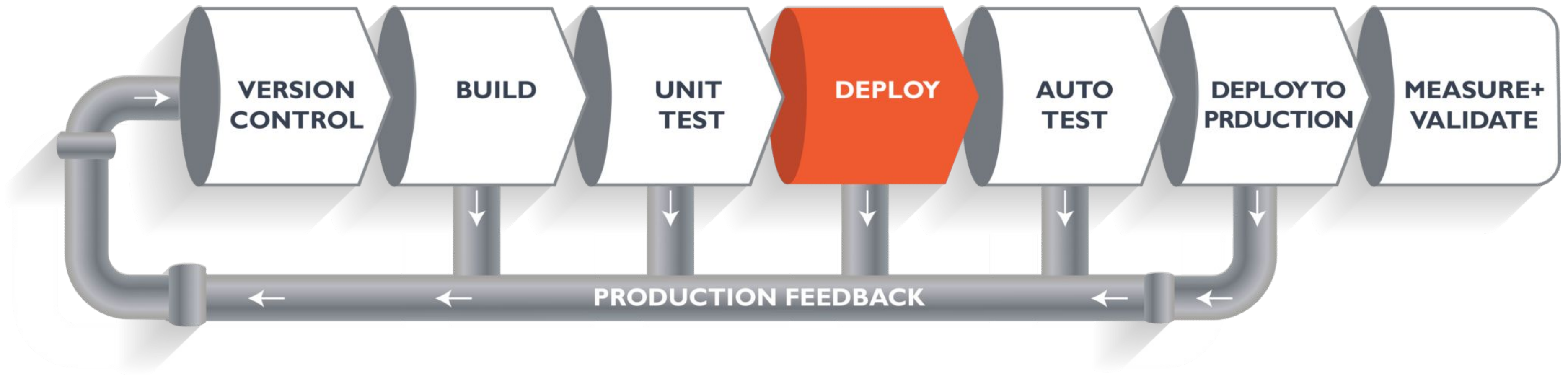

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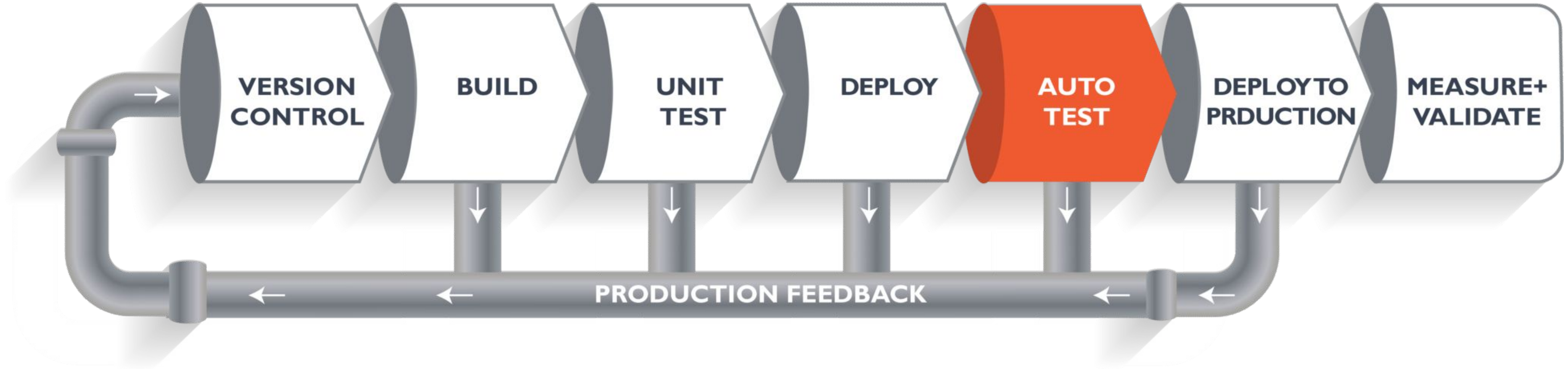


User Acceptance Tests

Functional Tests

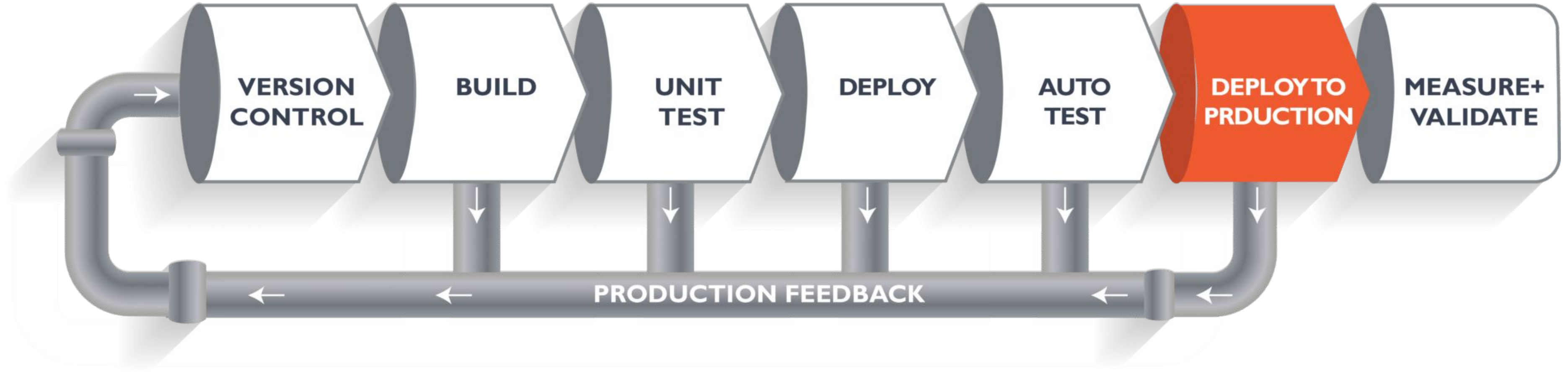
Load Tests

Security Tests

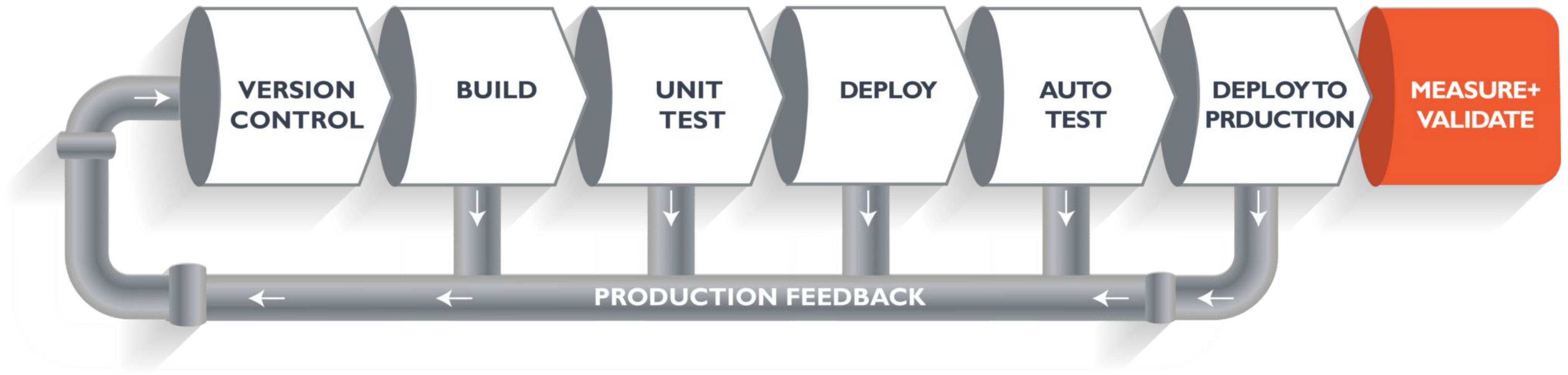
3

What is Continuous Delivery/Deployment?

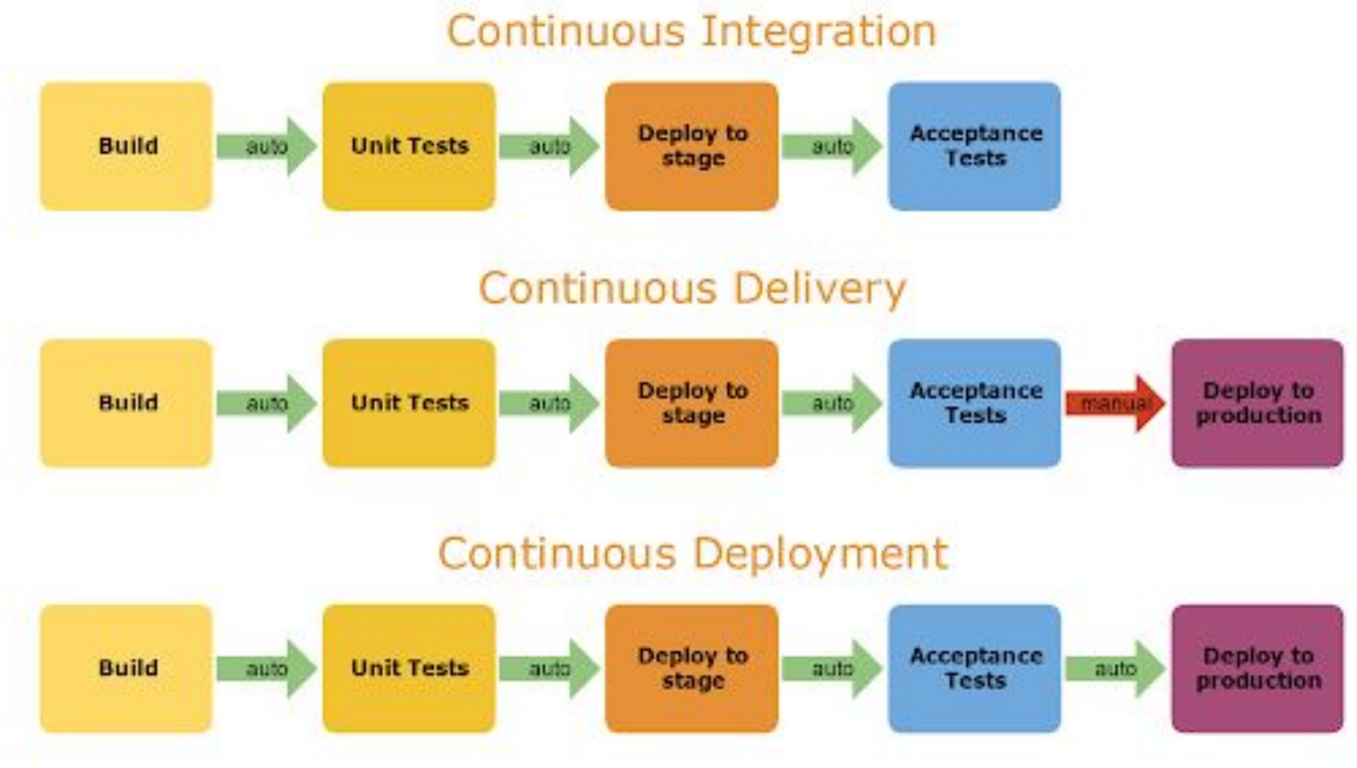
What is Continuous Delivery/Deployment?



What is Continuous Delivery/Deployment?

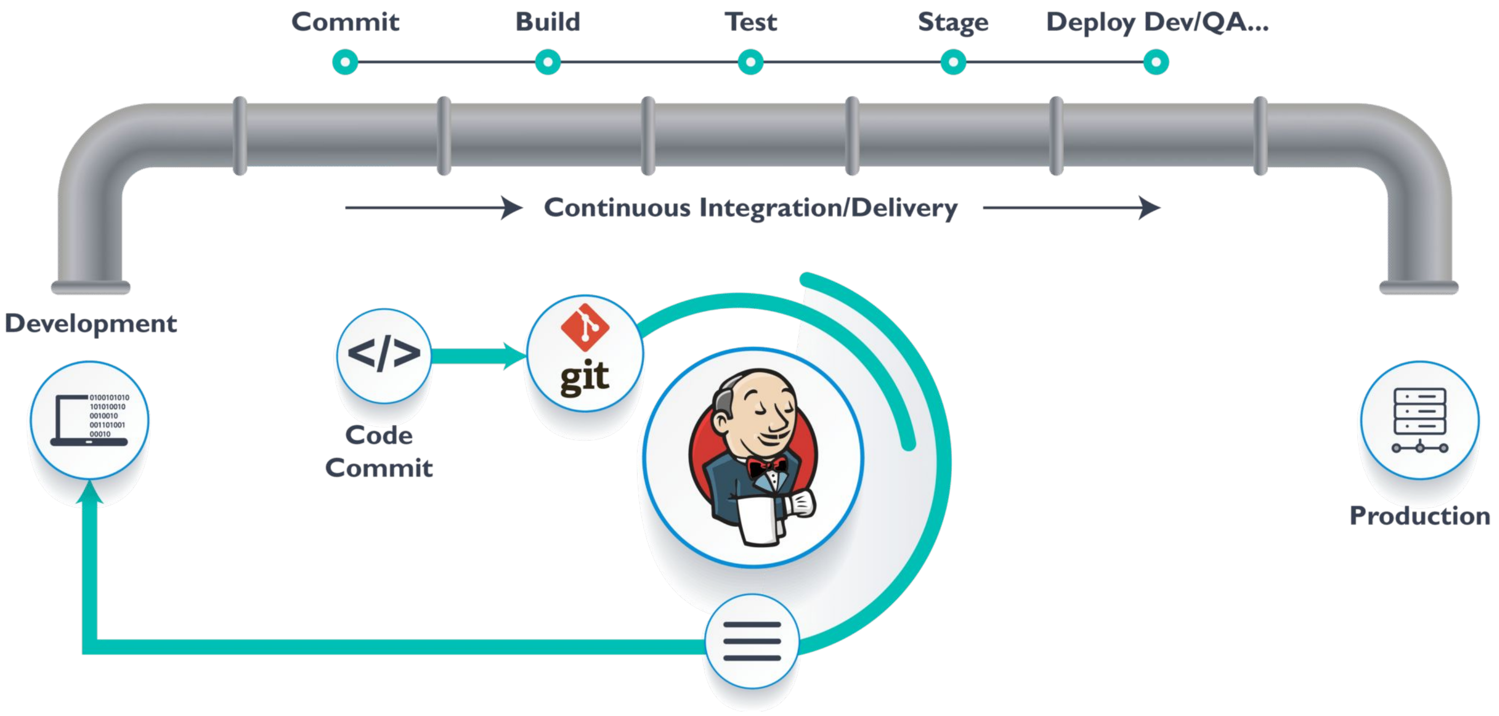


Continuous Delivery vs Continuous Deployment



4 DevOps Setup

Continuous Integration Server



Continuous Integration Server

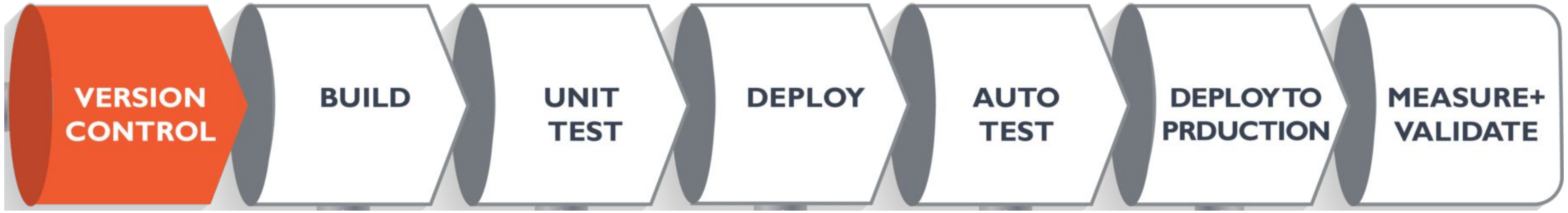
Jenkins

Gitlab

Teamcity

circleci

Version Control Stage



1. Select repository host
2. Repository strategy single vs multi
3. Branching strategy
4. User roles and rights
5. User groups
6. Pull Request policy

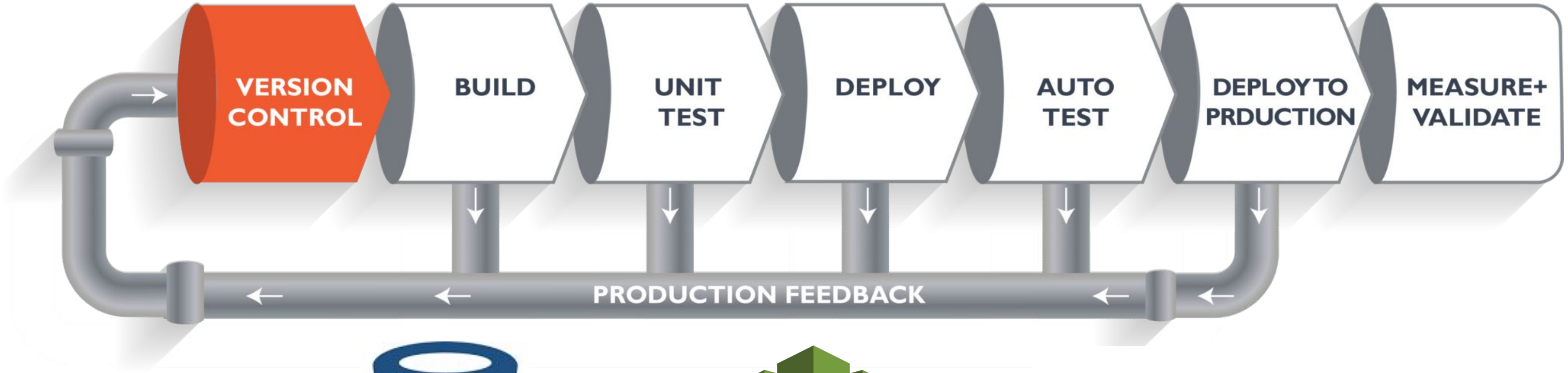
- How to setup and manage repos on ….
- How to create branch(s) and manage rights
- What is gitflow?(dev,master,feature/XXX...)
- How to manage users,groups,roles
- PR policies?

CodeCommit

AWS Tasks
- CodeCommit repository configuration

Version Control Stage

EC2
CodeCommit



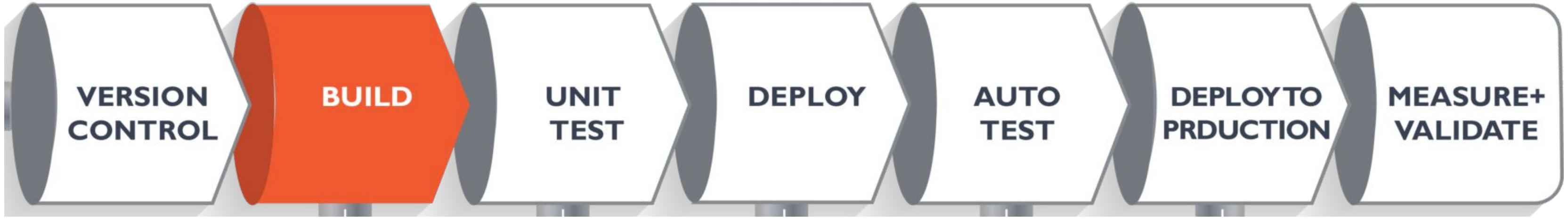
GitHub

Bitbucket
Atlassian

Codecommit
AWS

Gitlab
Gitlab

Build Stage



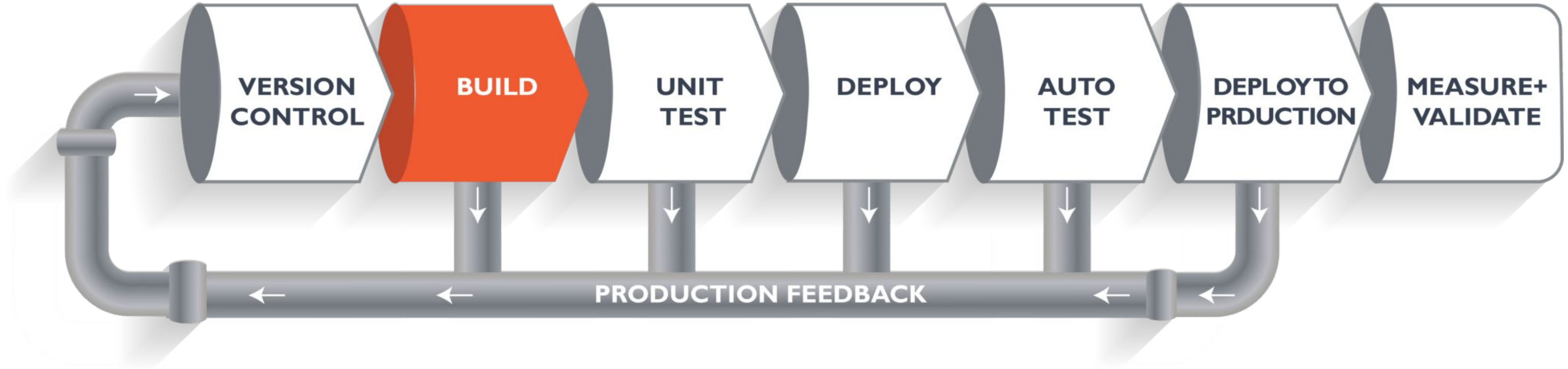
1. Local development setup for developers
   a. Which IDE?
   b. Which build tool?package manager?
2. Public/private package dependencies? Module structure?
3. Preparing local build scripts
4. CI server installation and configuration
5. Docker registry setup
6. Preparing build agents/env
   a. Docker images/AMI(s)
7. CI server build configurations
   a. Pipeline(s)
   b. Build scripts

EC2
CodeCommit,CodeBuild
ECR
ECS(Elastic Container Service)

- Preparing build instance AMI(s)
- CI server EC2 integration
- CodeBuild configuration
- ECR registry setup, CI Server integration
- ECS configuration to run build containers

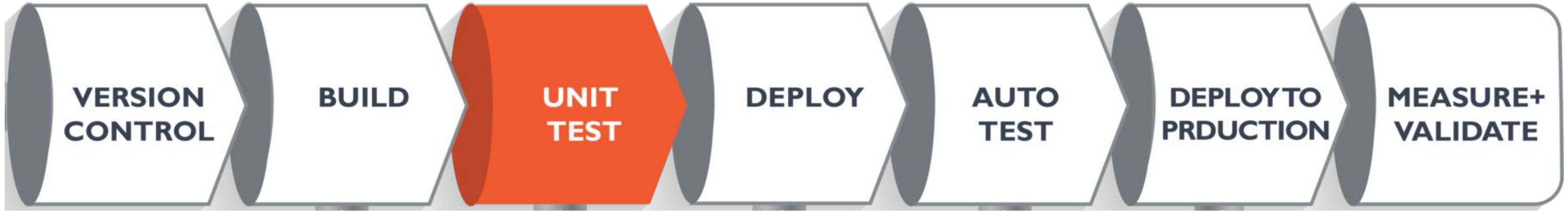
Build Stage

EC2
CodeCommit,CodeBuild
ECS(Elastic Container Service)



Maven Gradle npm APACHE ANT nuget CMake BASH THE BOURNE-AGAIN SHELL Xcode

Unit Test Stage



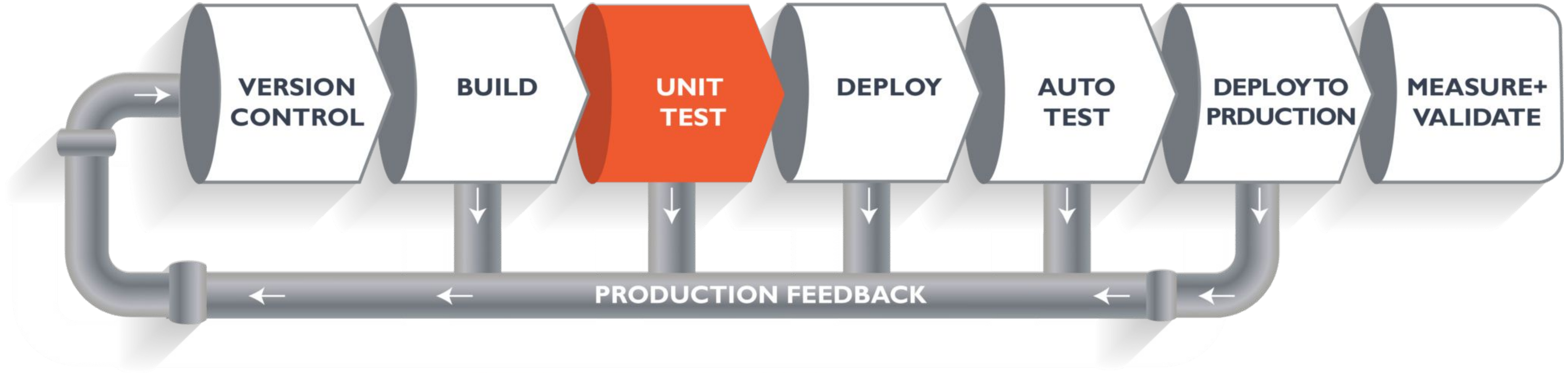
1. Choose UT framework implementation unit tests(Engineering)
2. Choose IT framework and implement Integration tests(Engineering)
3. Choose and setup static code analysis tool
4. Updating build scripts to run UT(s)
5. Updating build scripts to run Integration tests
6. Update repository configuration based on testing requirements
7. Choose code coverage tool
8. Update build configurations to generate code coverage reports
9. Define code coverage policies for code acceptance

EC2
CodeCommit,CodeBuild
ECS(Elastic Container Service)

- Update CodeBuild pipeline
- Update build scripts

Unit Test Stage

EC2
CodeCommit,CodeBuild
ECS(Elastic Container Service)

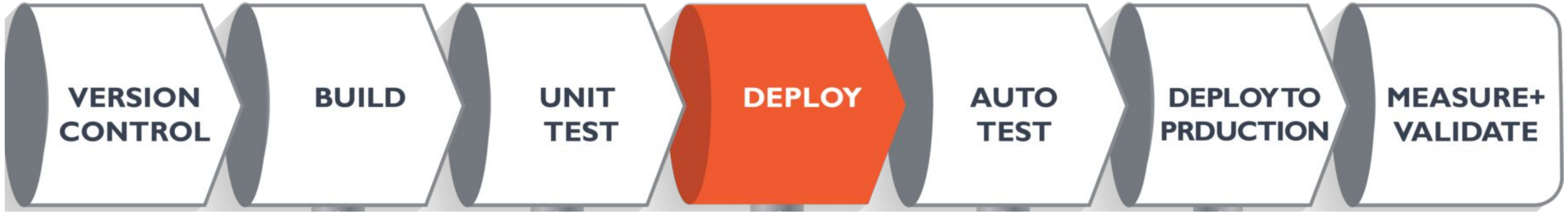


JUnit

JACOCO
Java Code Coverage

sonarqube

Deploy Stage



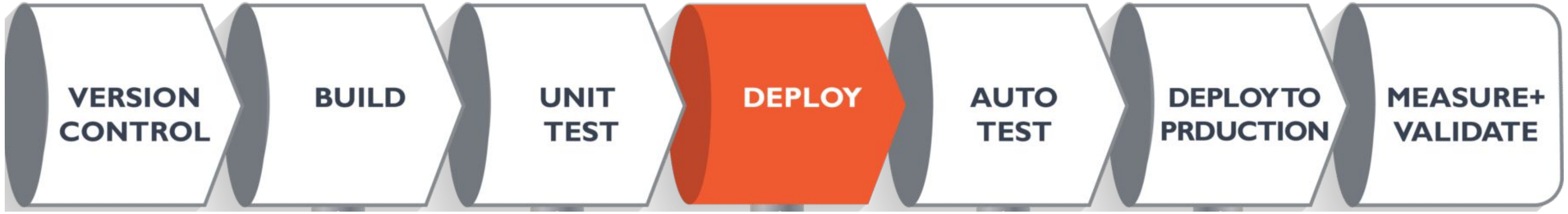
DEPLOYMENT PREP

1. Setup docker registry
2. Setup artifactory server(Nexus,JFrog)
3. Prepare provisioning(Cloudformation,Terraform) templates for qa,staging infrastructure
4. Docker orchestrator setup(swarm OR kubernetes) for dev,qa and staging
   a. Networking
   b. Storage

EC2
CodeCommit,CodeBuild, CodeDeploy
ECS(Elastic Container Service)
ECR,S3,RDS,DynamoDB
Cloudformation,Beanstalk
ELB, AutoScaling

- Cloudformation Templates
- ECR setup
- ECS setup
- EKS configuration
- Beanstalk configuration

Deploy Stage



DEPLOYMENT
1. Update CI pipeline configurations
2. Prepare Dockerfile(s)
3. Prepare Ansible scripts
4. Update build scripts to build docker images,AMI(s)
5. Prepare dev,qa and staging deployment scripts
   a. Push to registry
   b. Automated provisioning & deployment of each env

EC2
CodeCommit,CodeBuild, CodeDeploy
ECS(Elastic Container Service)
ECR,S3,RDS,DynamoDB
Cloudformation,Beanstalk
ELB, AutoScaling

- Update CodeDeploy
- Update ECR&ECS
- Configure AMI creation process
- Create/Update Cloudformation templates
- Automate Cloudformation stack create/update/delete

Deploy Stage

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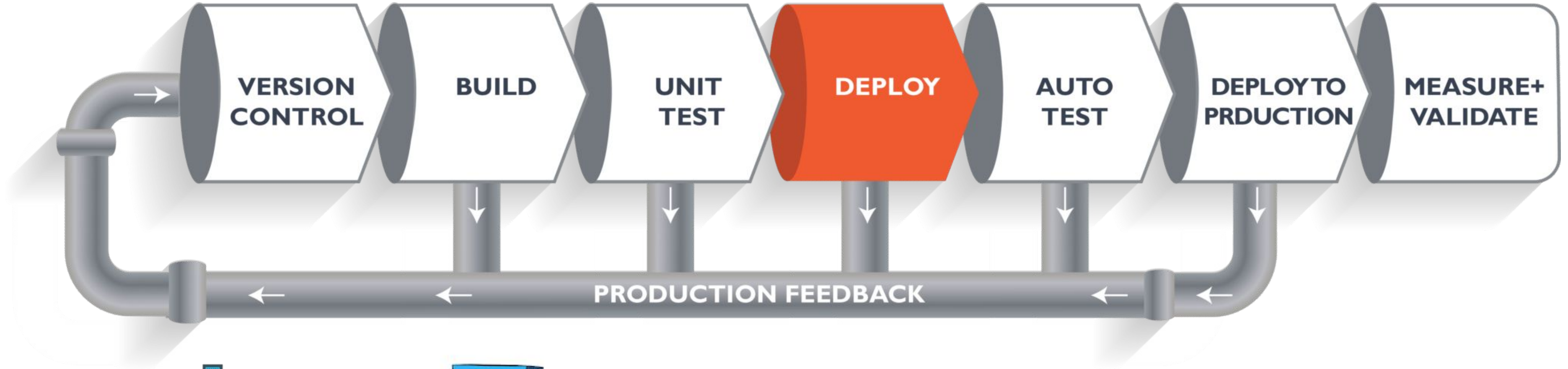
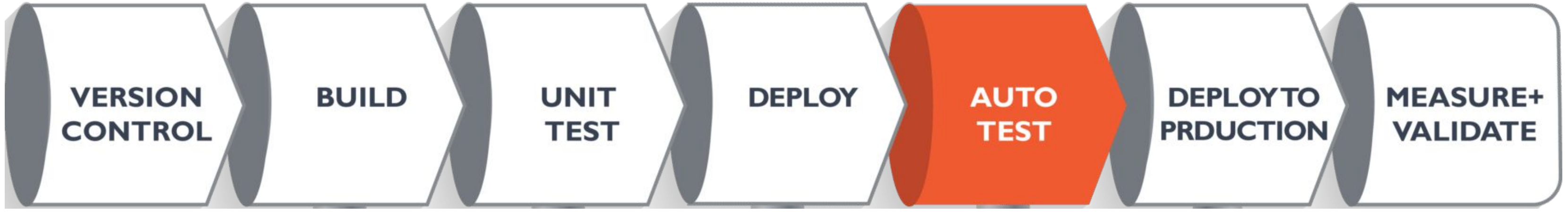


Auto Test Stage



1. Implementation of test suites(FT,UAT,...)(Eng)
2. Update project configuration to use related test framework
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EC2
CodeCommit,CodeBuild, CodeDeploy
ECS(Elastic Container Service)
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- Update CodeBuild pipeline
- Create/Update Cloudformation templates

Protractor end to end testing for AngularJS cypress.io Visual Studio Coded UI

Auto Test Stage

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ECS(Elastic Container Service)
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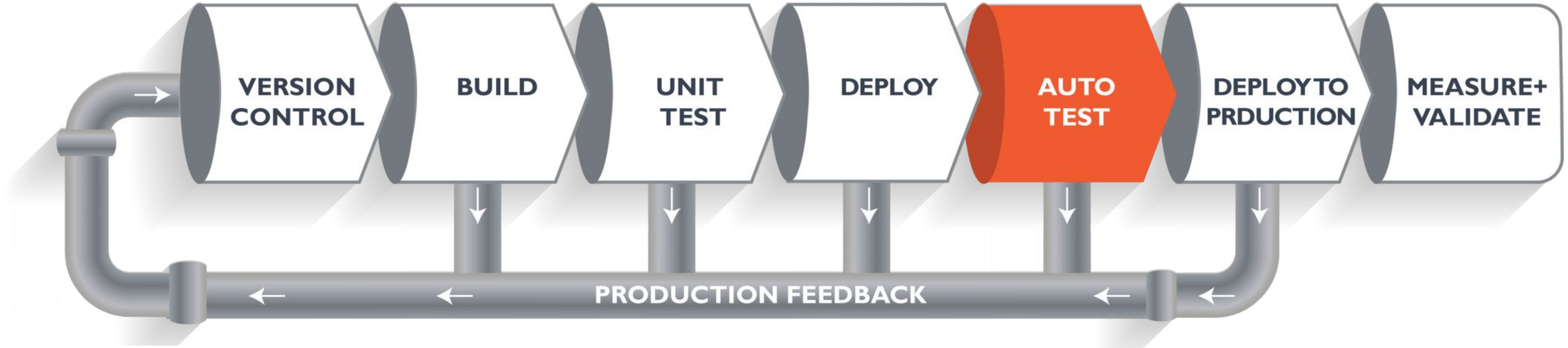
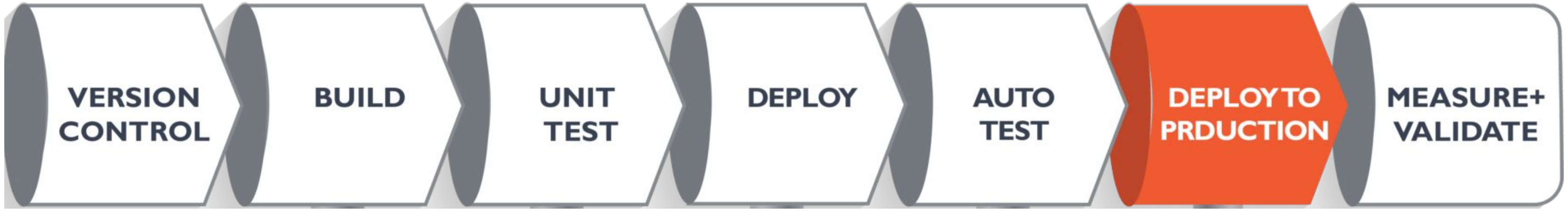


Protractor
end to end testing for AngularJS

cypress.io

Visual Studio
Coded UI

Deploy to Production



1. Create production env docker deployment scripts
2. Create docker templates for orchestrator
3. Update docker registry for production
4. Prepare deployment process monitoring setup
5. Update CI Pipeline for manual/automated deployment

EC2
CodeCommit,CodeBuild, CodeDeploy
ECS(Elastic Container Service)
ECR,S3,RDS,DynamoDB
Cloudformation,Beanstalk
ELB, AutoScaling
Cloudfront,Route53

- Update CodeBuild pipeline
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- Create/update ECS
- Create update EKS

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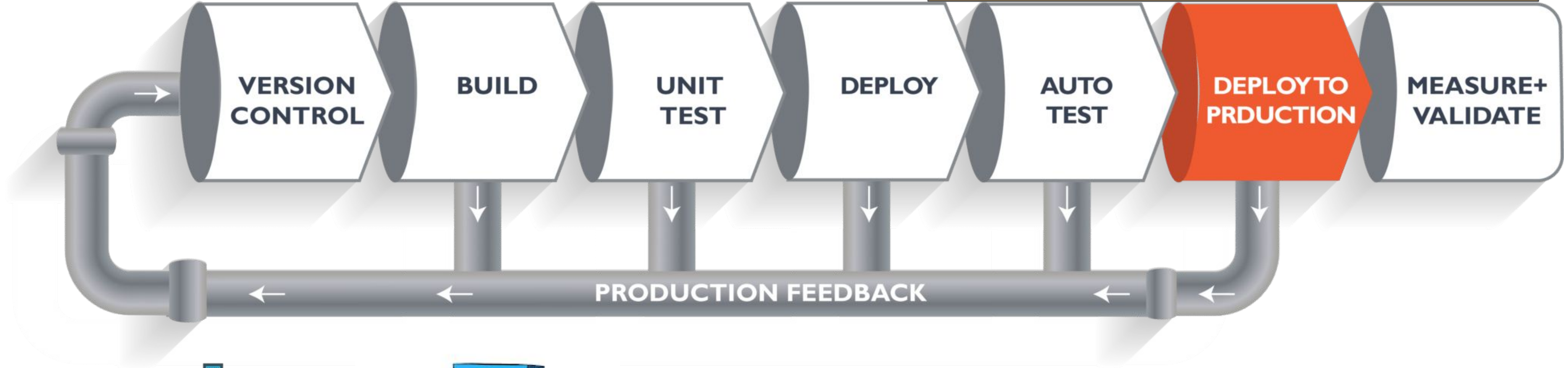
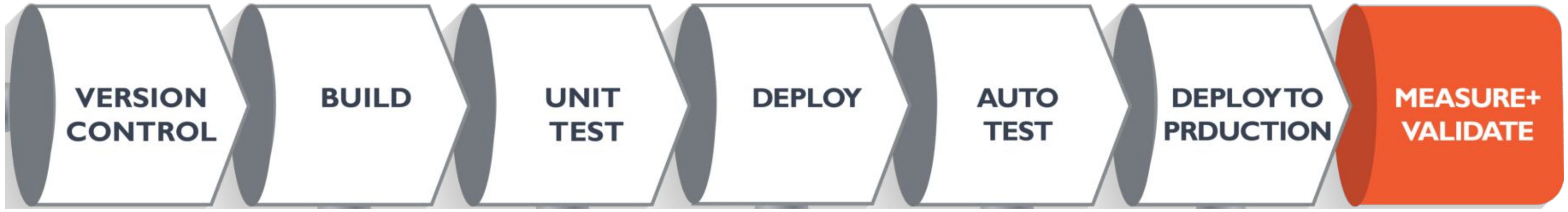


Measure + Validate



1. Setup Prometheus to collect data from prod env
2. Setup Grafana to collect data from Prometheus and other resources
3. Automate monitoring system deployment
4. Update CI/CD pipeline configuration for monitoring
5. Automate monitoring system updates linked to automated deployment
6. Create/update alarms

Cloudwatch
SNS
SQS
SES

- Update CodeBuild pipeline
- Create/Update Cloudformation templates
- Create/update Beanstalk
- Create/update ECS
- Create update EKS

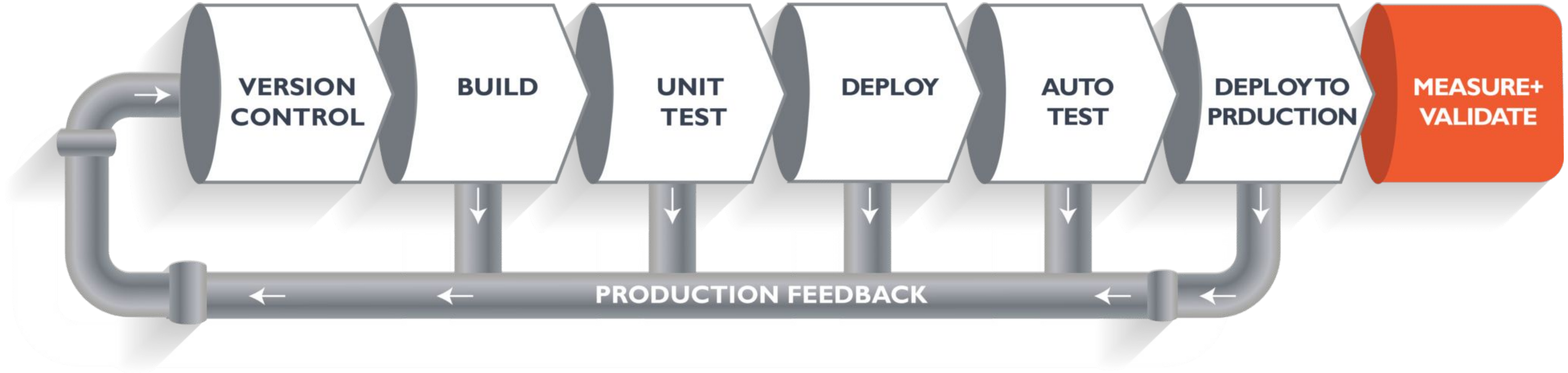
Grafana

ATLASSIAN Opsgenie

Prometheus

Measure + Validate

Cloudwatch
SNS
SQS
SES



Grafana Nagios® Prometheus ATLASSIAN Opsgenie

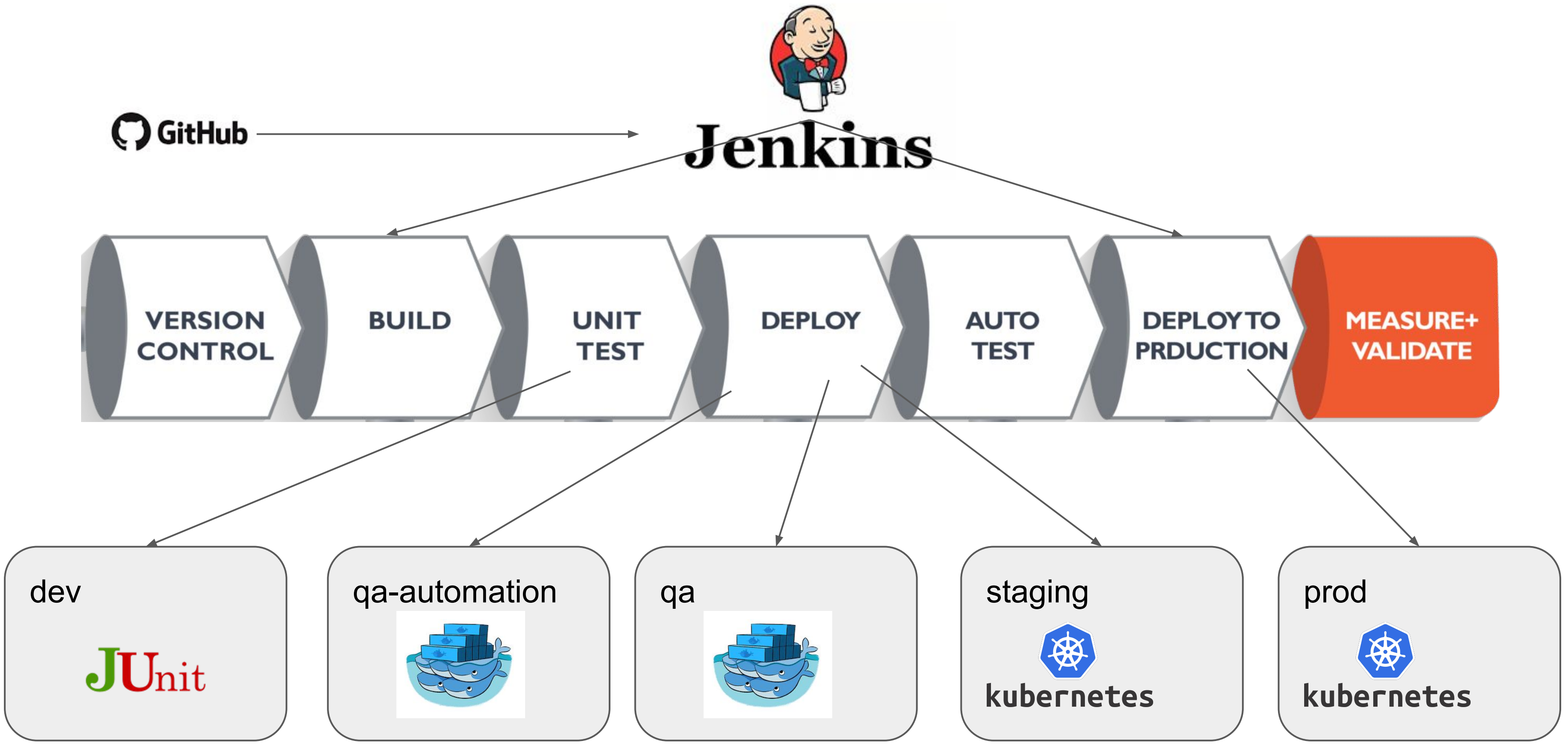
Collaborating with Git

Centralized Flow

- Create repositories
- Master branch
- Develop branch
- Release branch(s)
- Bugfix/feature branch(es)
- Pull Requests

5 Microservice Petclinic Project

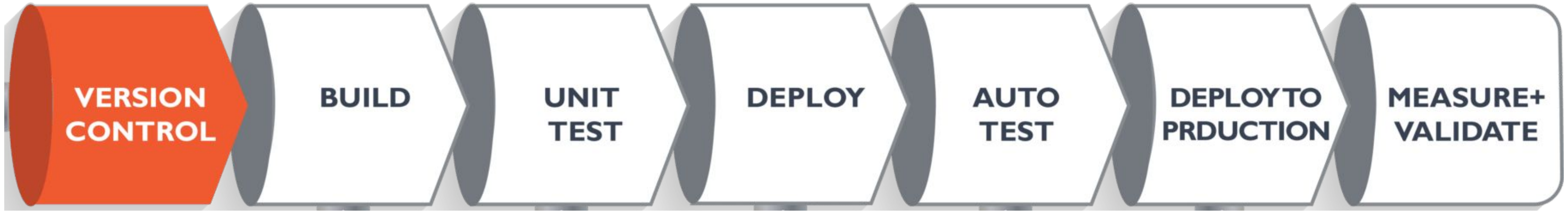
Development Diagram



Pipelines to be Configured

Name	**Branch**	**Trigger**	**Environment / Test Type**	**Tools**
petclinic-ci-job	dev feature** bugfix**	**Webhook** on each commit	Unit Test	jenkins, maven, git, github, jacoco
petclinic-nightly	dev	**Cronjob** every night 11.59pm	Functional Tests	jenkins, git, github, docker, docker-compose, docker swarm, ansible, maven, selenium with python, bash scripting, aws cli / ecr / cloudformation
petclinic-weekly	release	**Cronjob** every sunday 11.59pm	Manual QA	jenkins, git, github, docker, docker-compose, docker swarm, ansible, maven, bash scripting, aws cli / ecr / cloudformation
petclinic-staging	release	**Cronjob** every sunday 11.59pm	Staging Env.	jenkins, git, github, docker, rancher, kubernetes, maven, bash scripting, aws cli / ecr / cloudformation
petclinic-prod	master	**Webhook** on each commit	Production Env.	jenkins, git, github, docker, rancher, kubernetes, maven, bash scripting, aws cli / ecr / cloudformation

Version Control Stage



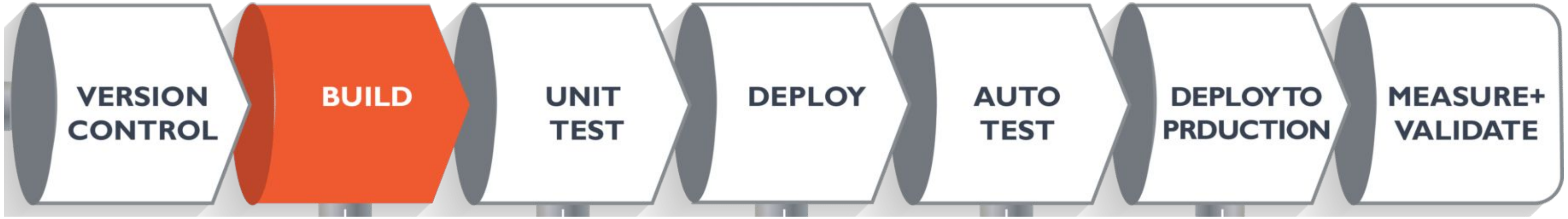
1. Select repository host
2. Repository strategy single vs multi
3. Branching strategy
4. User roles and rights
5. User groups
6. Pull Request policy

- How to setup and manage repos on ….
- How to create branch(s) and manage rights
- What is gitflow?(dev,master,feature/XXX...)
- How to manage users,groups,roles
- PR policies?

GitHub

- Set up repository
- Create base branch(s)
  - master
  - dev
  - release

Build Stage



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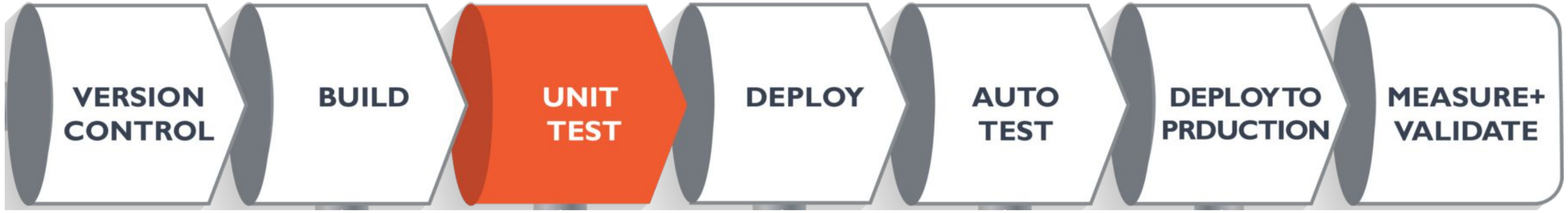
7. CI server build configurations
   a. Pipeline(s)
   b. Build scripts

- Configure maven
- Prepare local build scripts for developers
- Prepare Docker files
- Setup Jenkins server
- Configure Jenkins project
- Configure Jenkins pipelines
- Prepare Docker registry

Unit Test Stage



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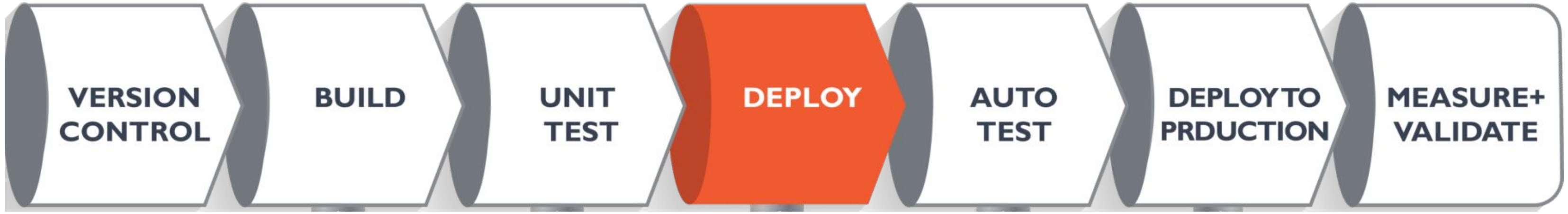
6. Update repository configuration based on testing requirements
7. Choose code coverage tool
8. Update build configurations to generate code coverage reports
9. Define code coverage policies for code acceptance

- Update build scripts to run UT(s)
- Update build scripts to generate code coverage reports
- Jenkins pipeline configuration for UT(s)

Deploy Stage



DEPLOYMENT PREP

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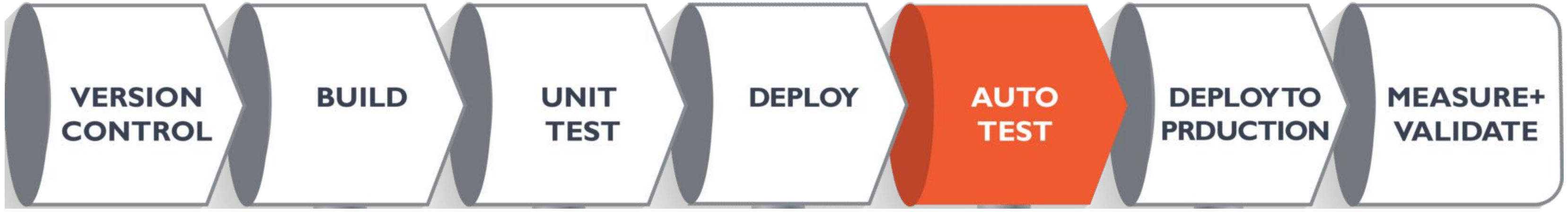
4. Docker orchestrator setup(swarm OR kubernetes) for dev,qa and staging
   a. Networking
   b. Storage

- Cloudformation & Ansible for swarm cluster deployment automation
- Set up docker swarm cluster for qa-automation env
- Set up docker swarm cluster for qa env
- Docker deployment files (docker-compose.yml,...)
- Jenkins pipeline for deployment automation

Auto Test Stage



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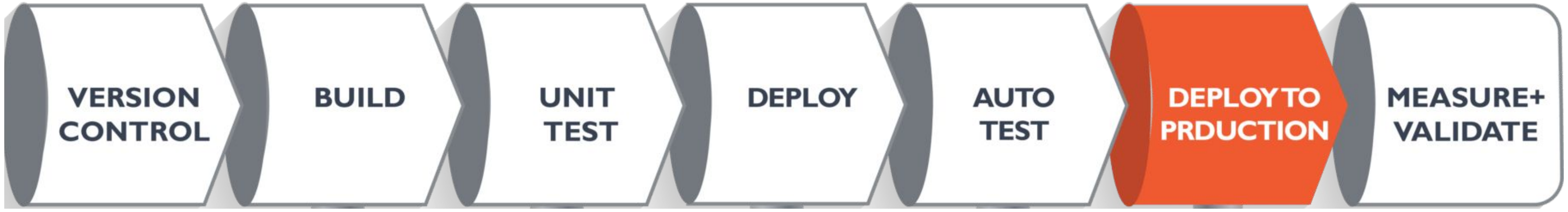
Deploy to Production Stage



1. Create production env docker deployment scripts
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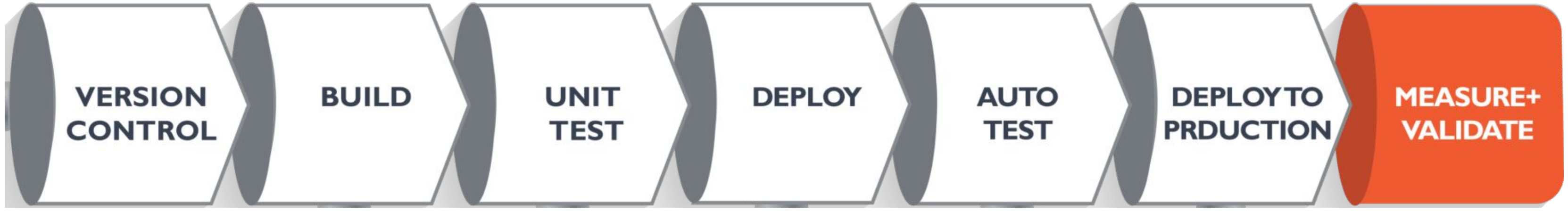
3. Update docker registry for production
4. Prepare deployment process monitoring setup
5. Update CI Pipeline for manual/automated deployment

- Automate k8 cluster deployment Cloudformation & Ansible
- Set up prod k8 cluster
- Jenkins pipeline for prod deployment

docker kubernetes RANCHER

Measure + Validate



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3. Automate monitoring system deployment
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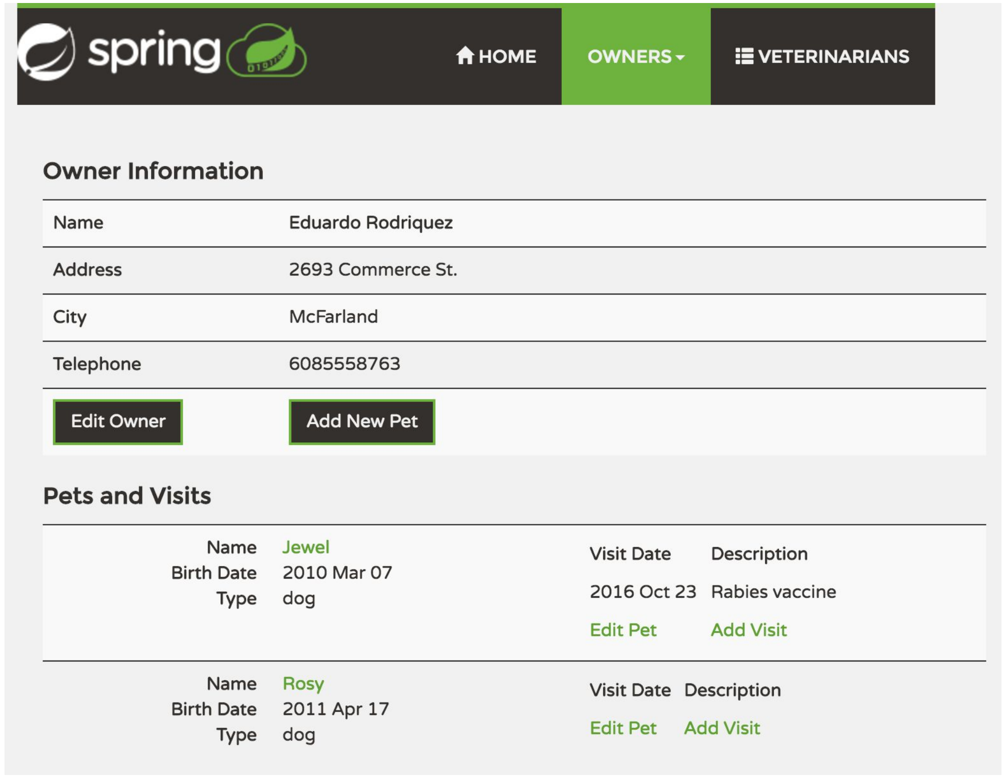
- Automate monitoring system deployment Cloudformation & Ansible
- Setup Prometheus to collect data from prod env
- Setup Grafana to collect data from Prometheus and other resources

Prometheus

Grafana

Application Demo



Owner Information

Name	Eduardo Rodriquez
Address	2693 Commerce St.
City	McFarland
Telephone	6085558763

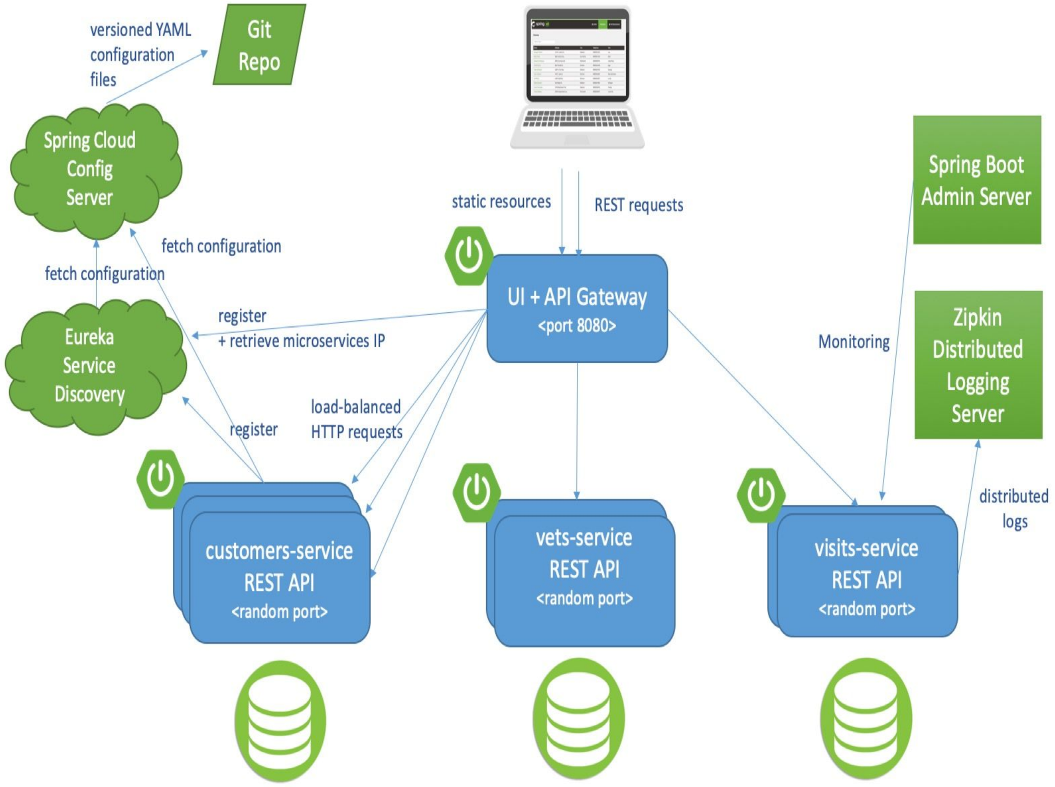
Pets and Visits

		Visit Date	Description
Name	Jewel	2016 Oct 23	Rabies vaccine
Birth Date	2010 Mar 07	Edit Pet	Add Visit
Type	dog		

		Visit Date	Description
Name	Rosy	Edit Pet	Add Visit
Birth Date	2011 Apr 17		
Type	dog		

Let’s see the Demo

Deployment Diagram


versioned YAML configuration files
Git Repo
Spring Cloud Config Server
fetch configuration
fetch configuration
static resources
REST requests
Spring Boot Admin Server
UI + API Gateway <port 8080>
register + retrieve microservices IP
Eureka Service Discovery
Monitoring
Zipkin Distributed Logging Server
load-balanced HTTP requests
register
distributed logs
customers-service REST API <random port>
vets-service REST API <random port>
visits-service REST API <random port>