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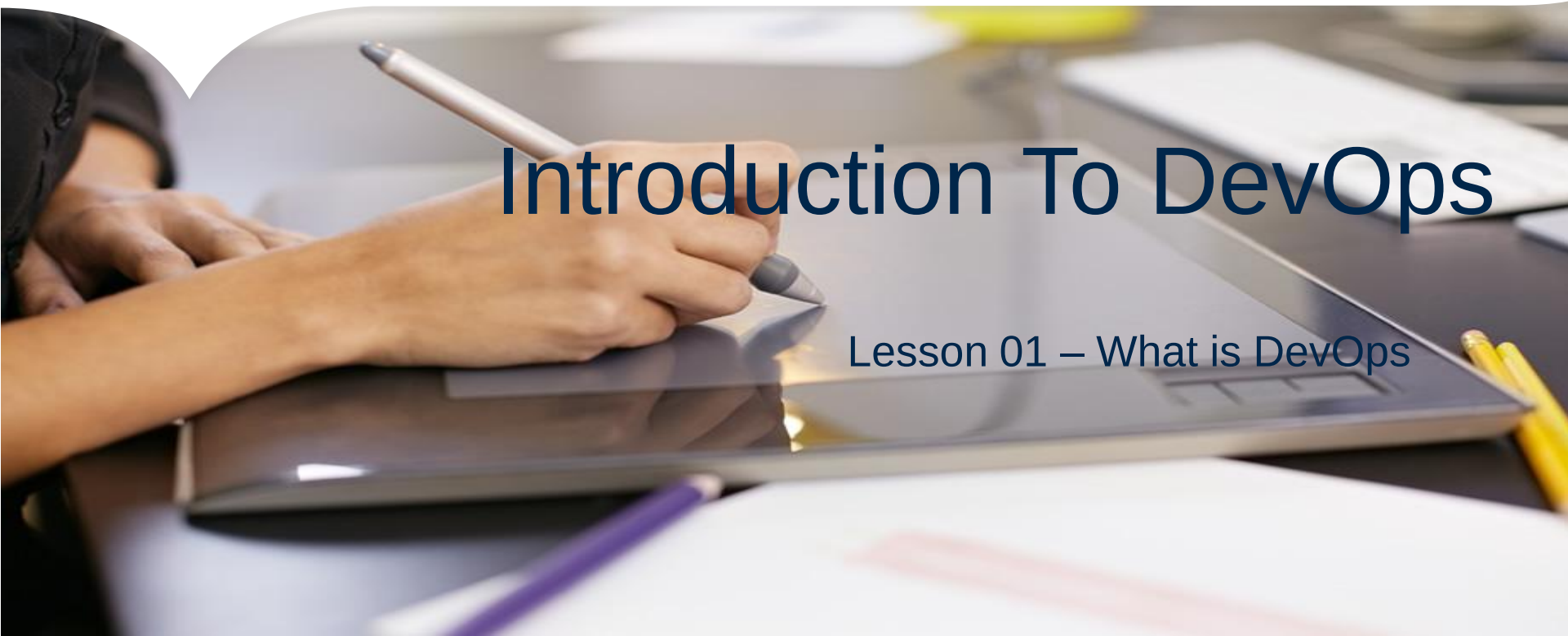


Introduction To DevOps

Lesson 01 – What is DevOps

Lesson Objectives

- DevOps – the business need
- What is DevOps?
- How does DevOps Work?
- DevOps Practices
  - Source Code Management
  - Automated testing
  - Containerization
  - Continuous integration
  - Configuration Management
  - Automated Monitoring
  - Continuous Deployment and Release Management

DevOps – the business need

The Developer

- New Products
- New Features
- Security Update
- Bug Fixes

- Old Code
- Pending Code
- New Products
- New features

Time to Market

Dependency Error

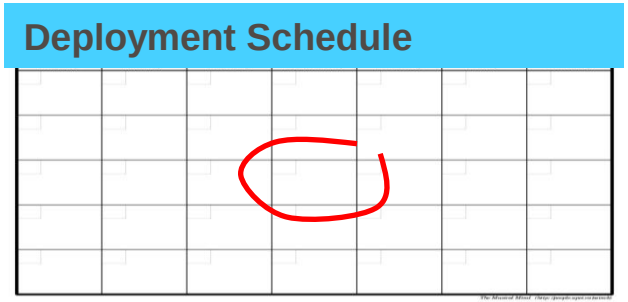
DevOps – the business need

The Developer

As a developer I have always dabbled lightly in operations. I always wanted to focus on making my code great and let an operations team worry about setting up the production infrastructure.

DevOps – the business need

The Operations team



DevOps – the business need

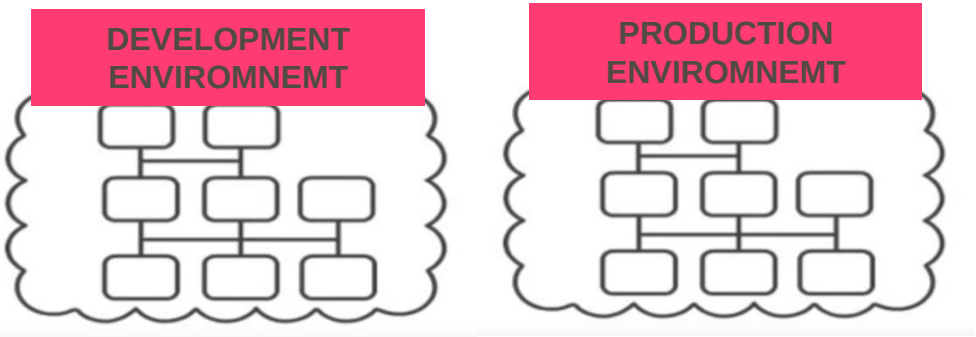
The Operations team

I am responsible for maintaining 99% uptime. I think of servers and new code deployment mostly introduces bugs which I need to fix to ensure availability. These developers are pushing their work to me.

New Code

DevOps – the business need

- ✓ Worked Better together
- ✓ Thought more alike
- ✓ Broke down silos
- ✓ Shared responsibilities?



What is DevOps?

The Definition:

- ✓ **“ a software development method that stresses communication, collaboration & integration between software developers and IT professionals.” - wikipedia**
- ✓ **“DevOps is simply operations working together with engineers to get things done faster in an automated and repeatable way.”**

C.A.L.M.S.
C – Culture
A – Automation
L – Lean
M – Measurement
S – Sharing

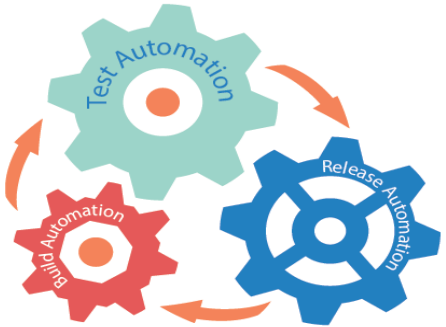
What is DevOps?

DevOps is also characterized by operations staff making use many of the same techniques as developers for their systems work.

What is DevOps?

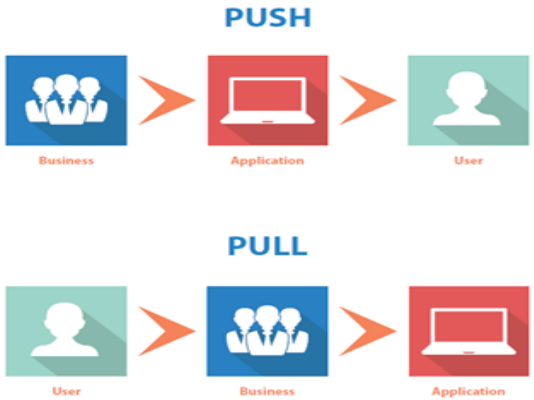
Automation - Optimizing the Entire Pipeline

- ✓ The best way to quicken processes across the pipeline is to automate them.
- ✓ Build automation can be approached using Continuous Integration (CI) tools like Jenkins.
- ✓ Test automation requires frameworks like Selenium and Appium.
- ✓ And release automation, which is still maturing, can be handled with tools like Automic.
- ✓ DevOps is about optimizing processes across the entire pi



PUSH vs PULL

- ✓ The Lean approach to building apps involves a pull system where customers define what you should focus on, how fast you should go, and what you should ship, as opposed to the traditional top-down model of building applications.



What DevOps is Not?

- **It's Not NoOps :**
  DevOps is not that Developers take over Ops!

- **It's Not (Just) Tools:**
  DevOps is also not simply implementing a set of tools.

- **It's Not (Just) Culture**
  DevOps consists of items at all the levels

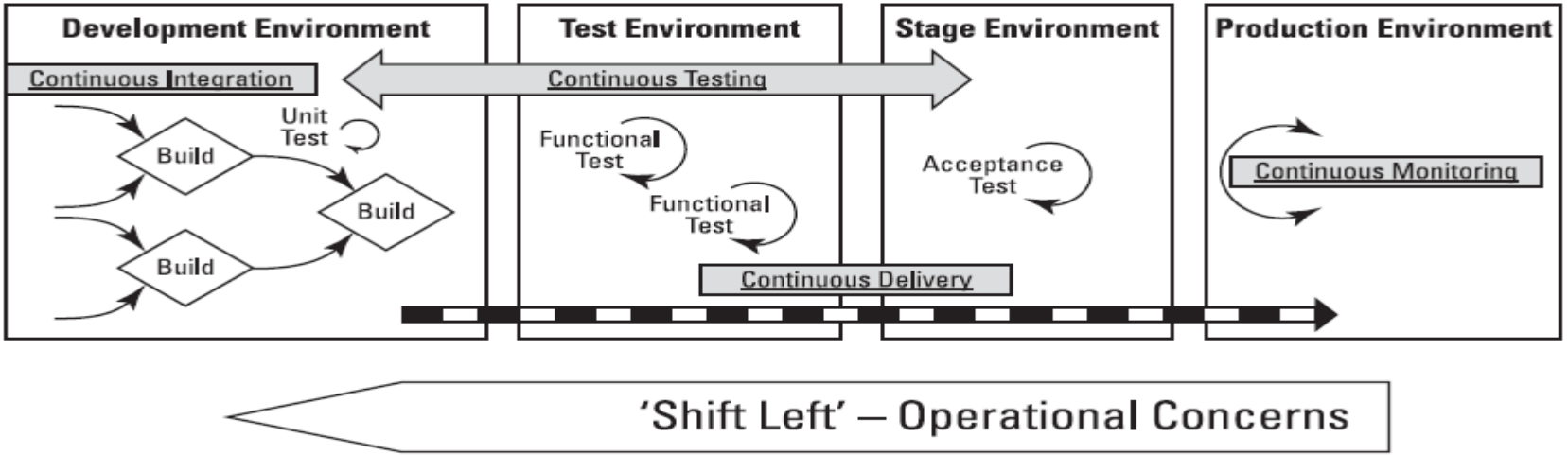
- **It's Not (Just) Devs and Ops**
  What about security people! And network admins!

- **It's Not Everything**
  It is part of an overall, hopefully collaborative and agile corporate culture, but DevOps is specifically about how operations plugs into that

How does DevOps Work?

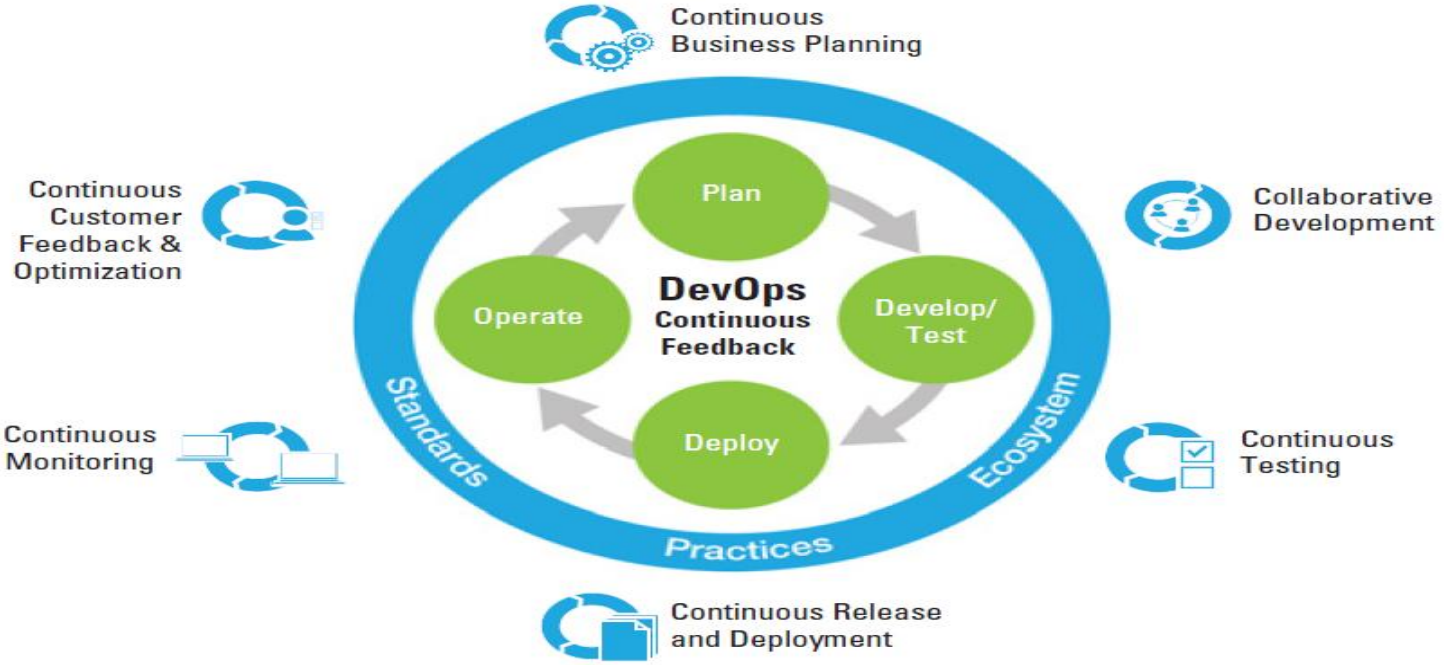
- **The 4 principles:**

  ✓ Develop and test against production-like systems
  ✓ Deploy with repeatable, reliable processes
  ✓ Monitor and validate operational quality
  ✓ Amplify feedback loops

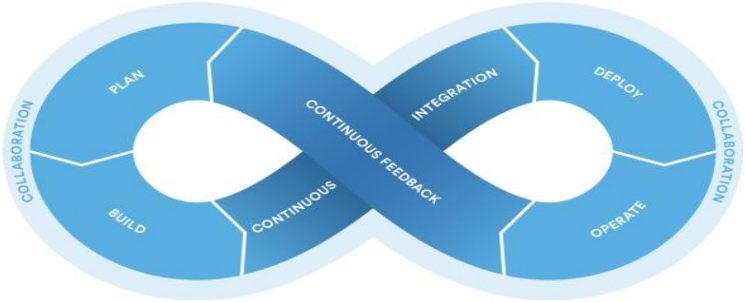


How does DevOps Work?

The Reference Architecture:



How does DevOps Work?



The Reference Architecture:

- **Plan:**
  Focuses on establishing business goals and adjusting them based on customer feedback: continuous business planning .

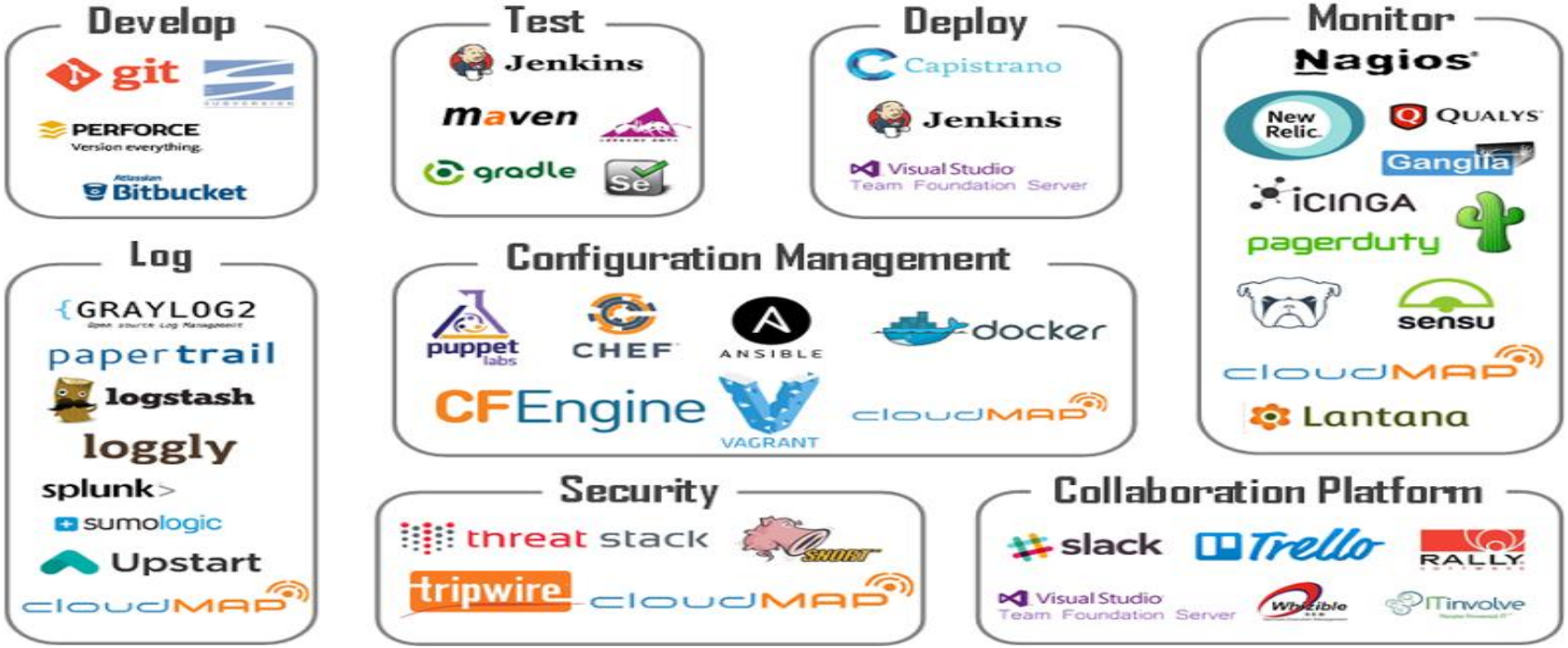
- **Develop/Test:**
  Forms the core of development and quality assurance (QA) capabilities. It involves two practices - collaborative development and continuous testing.

- **Deploy**
  Continuous release and deployment take the concept of continuous integration to the next step

- **Operate**
  It involves two practices - continuous monitoring and continuous customer feedback.

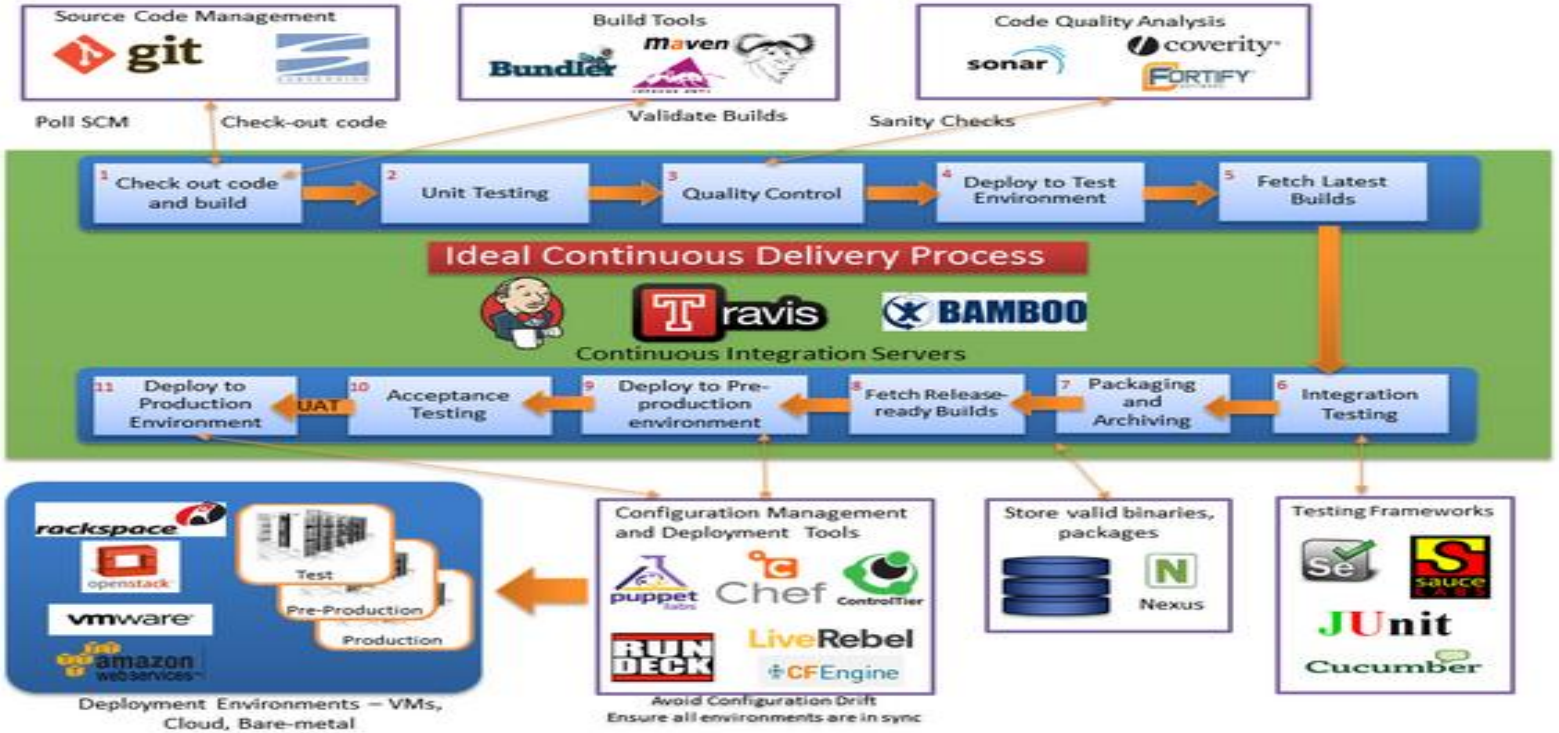
How does DevOps Work?

No tool will magically make the team DevOps.



How does DevOps Work?

The Continuous Delivery Pipeline



DevOps Practices

- Source Code Management
- Automated testing
- Containerization
- Continuous integration
- Configuration Management
- Automated Monitoring

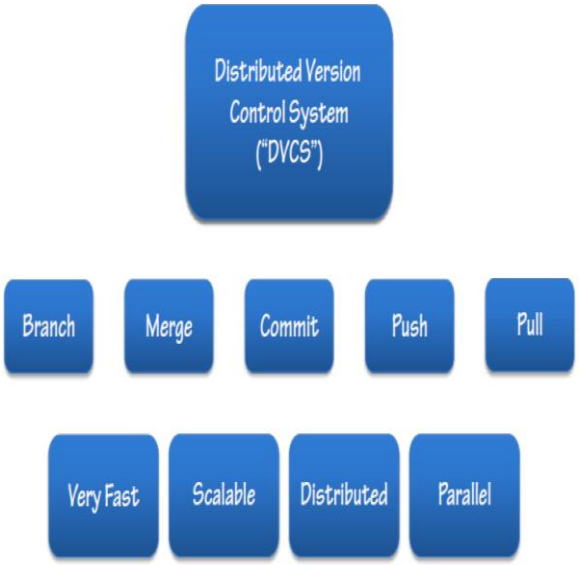
Source Code Management

- Continually merges source code updates from all developers on a team into a shared mainline.
- A source code manager (SCM) is a software tool used by teams of programmers to manage source code.
- SCMs are used to track revisions in software.
- Each revision is given a timestamp and includes the name of the person who is responsible for the change.
- Various revisions may be compared, stored, and merged with other revisions.

Example : GIT

GIT

https://git-scm.com/



GIT

Distributed Version Control using GIT

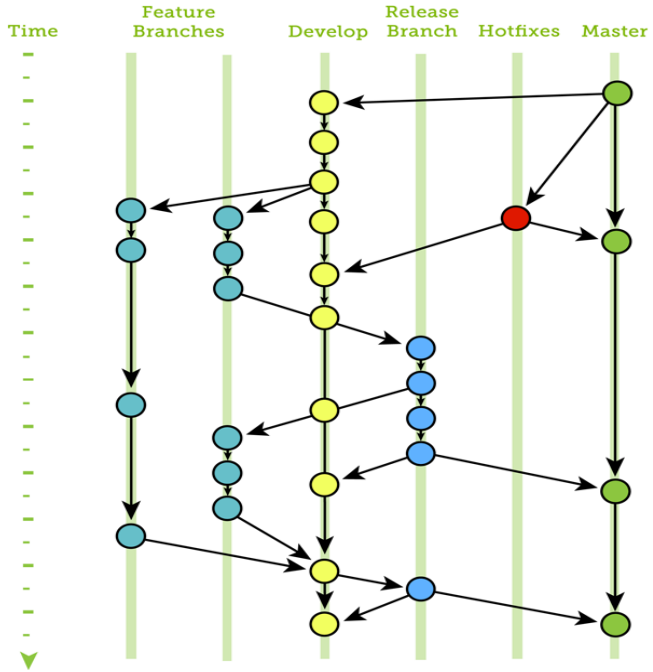
- Git is a distributed version control system.
- A distributed version control system does not necessarily have a central server which stores the data.

- The user can copy an existing repository. This copying process is typically called cloning

- Git allows the user to synchronize the local repository with other (remote) repositories.

- Users with sufficient authorization can push changes from their local repository to remote repositories.

- They can also fetch or pullchanges from other repositories to their local Git repository.

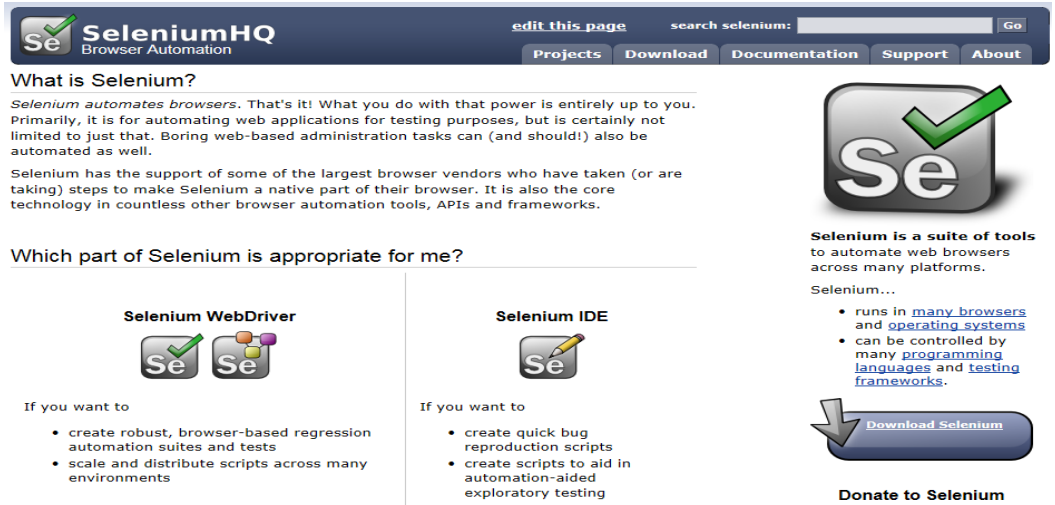


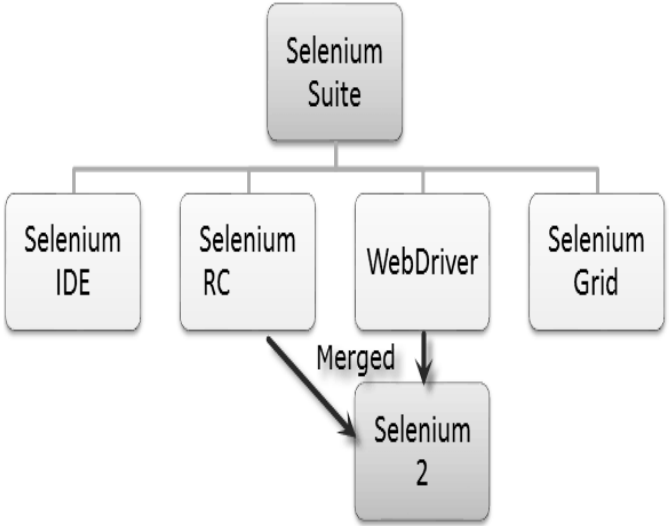
Automated Testing

- The objective of automated testing is to simplify as much of the testing effort as possible with a minimum set of scripts.
- Automated testing tools are capable of executing repeatable tests, reporting outcomes, and comparing results with faster feedback to the team.
- Automated tests perform precisely the same operation each time they are executed, thereby eliminating human errors – and can be run repeatedly, at any time of day.
- Includes testing for each environment in the pipeline
  - Dev. Environment
    - Unit, Sanity Testing
  - CI Environment
    - Incremental Integration Testing
  - QA Environment
    - Functional , Usability Testing
  - Compatibility Testing

Selenium

http://docs.seleniumhq.org/

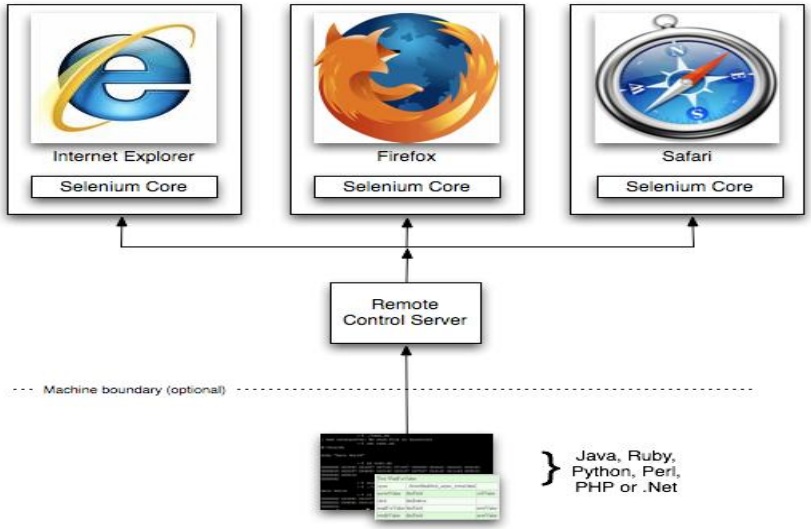




Selenium

Overview of Selenium IDE

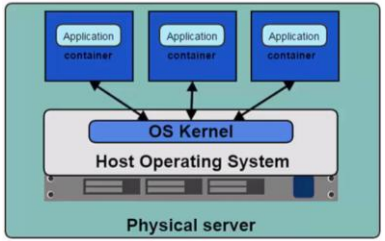
- Allows you to record, play back, edit, and debug tests in browser.
- Generate scripts from recorded user actions in most of the popular languages like Java, C#, Perl, Ruby etc.
- Run them using Selenium Web Driver.
- Allows the user to pick from a list of assertions and verifications for the selected location

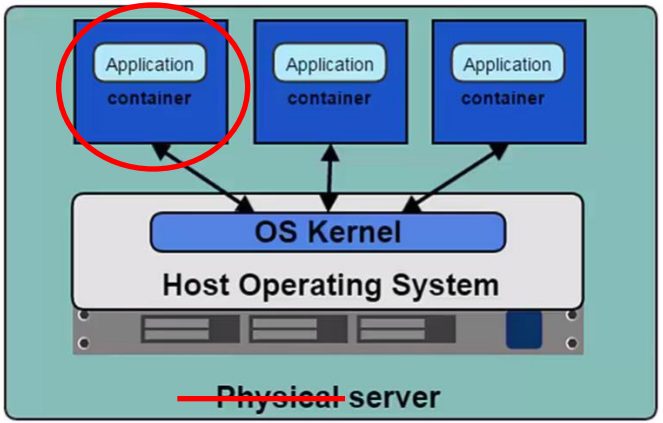


- Selenium Remote Control (RC) is a test tool that allows you to write automated web application UI tests in any programming language against any HTTP website using any mainstream JavaScript-enabled browser.

Containerization

- Before:
  - monolithic applications
  - long development cycles
  - slowly scaling up
- Now:
  - decoupled services
  - fast, iterative improvements
  - quickly scaling out
- Deployment becomes very complex
  - Many different stacks.
  - Many different targets.

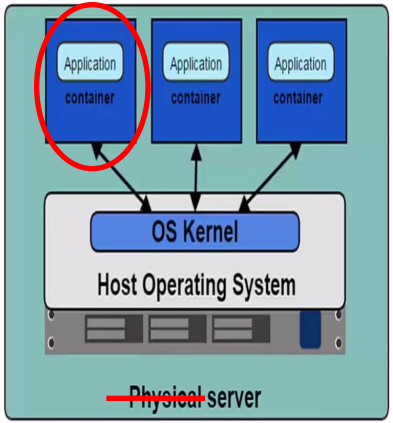


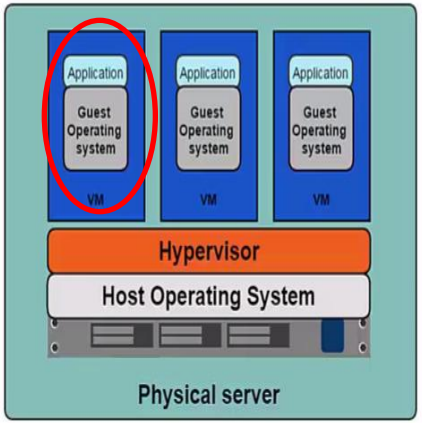


Containerization

Containers vs VMs

- Containers are more lightweight
- No need to install guest OS
- Less CPU, RAM, storage space required
- More containers per machine than VMs
- Greater portability



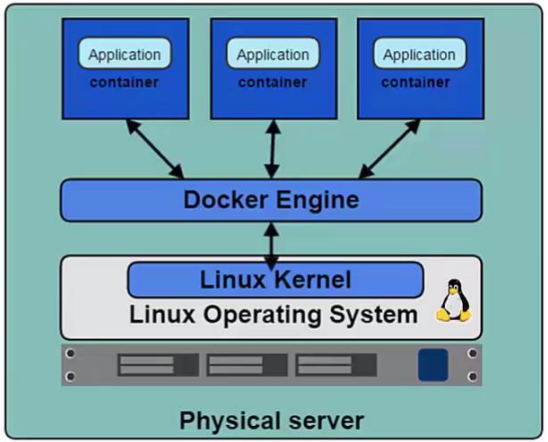


Docker

- The initial container engine is now known as "Docker Engine."
  - Other tools have been added:
  - Docker Compose (formerly "Fig")
  - Docker Machine
  - Docker Swarm
  - Kitematic (acquisition)
  - Tutum (recent acquisition)

Docker and the Linux Kernel

- **Docker Engine** is the program that enables containers to be built, shipped and run.
- Docker Engine uses Linux Kernel namespaces and control groups
- Namespaces give us the isolated workspace



Continuous Integration (CI)

- Continually merges source code updates from all developers on a team into a shared mainline.

- Prevents a developer's local copy of a software project from drifting too far afield as new code is added by others, avoiding catastrophic merge conflicts.

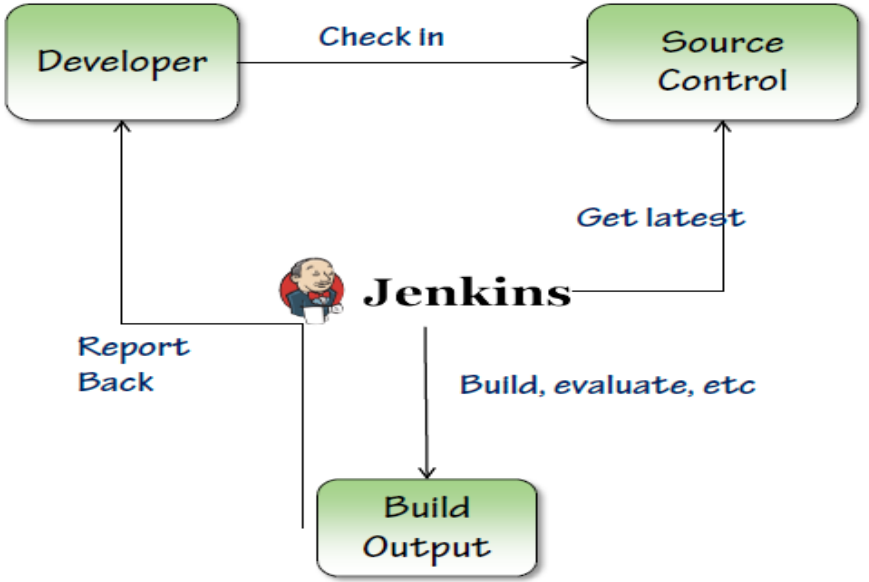
- CI involves a centralized server that continually pulls in all new source code changes as developers commit them and builds the software application from scratch, notifying the team of any failures in the process.

- If a failure is seen, the development team is expected to refocus and fix the build before making any additional code changes.

Example : Jenkins / Bamboo / Go

Jenkins

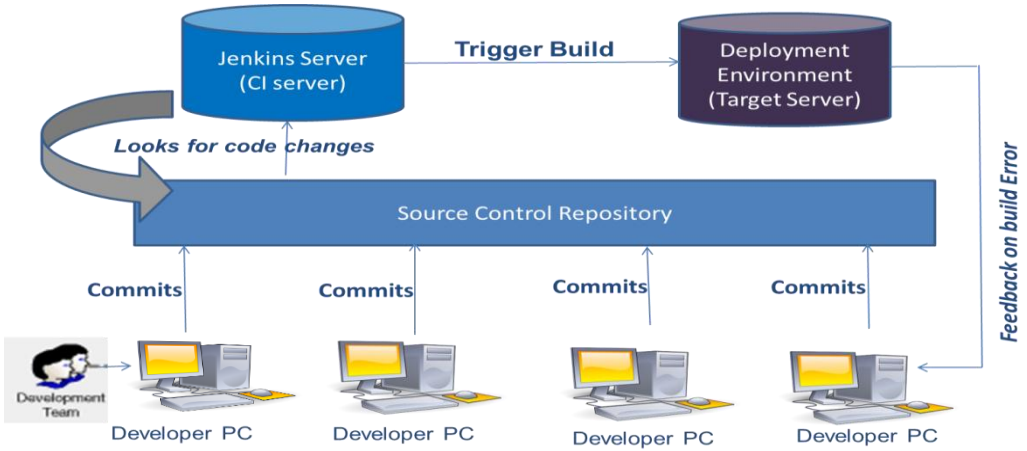
https://jenkins.io



Jenkins

Open Source CI Tool:

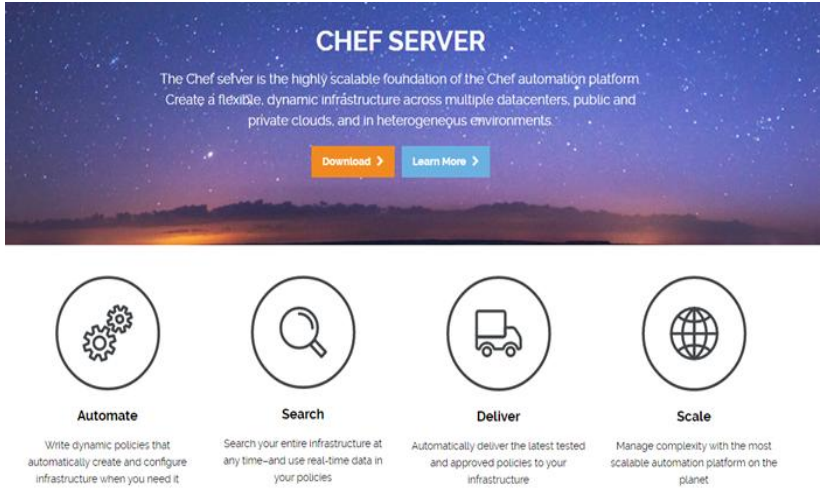
- Jenkins is an open source continuous integration tool written in java developed by Kohsuke Kawaguchi.
- Monitors the change in the source control systems like SVN, CVS, etc.
- Builds the application using various build tools like ANT, MAVEN, etc.
- Provides a fresh build whenever there is a change in the source control system
- Sends messages on the status of the build through Email, SMS, etc.



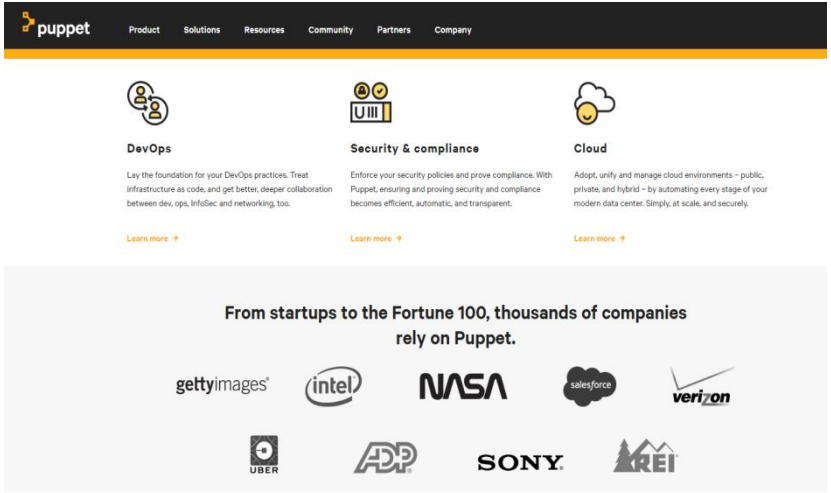
- Can support software releases, documentation, monitoring, and a number of use case secondary to continuous integration

Configuration Management Tool – Chef and Puppet

https://www.chef.io/chef/

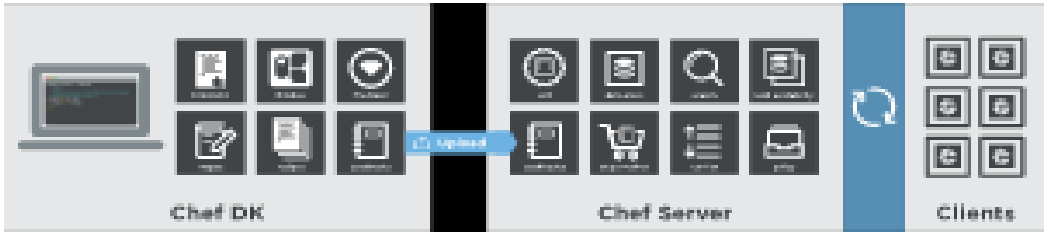


https://puppet.com



Chef

- Express your infrastructure policy – how your software is delivered and maintained on your servers – as code.
- The normal Chef workflow involves managing servers remotely from your workstation.
- A Chef resource describes some piece of infrastructure, such as a file, a template, or a package.
- A Chef recipe is a file that groups related resources, such as everything needed to configure a web server, database server, or a load balancer.



1. Install IIS

Let's install IIS. From your `~\chef-repo` directory, add this recipe to a file named `webserver.rb`.

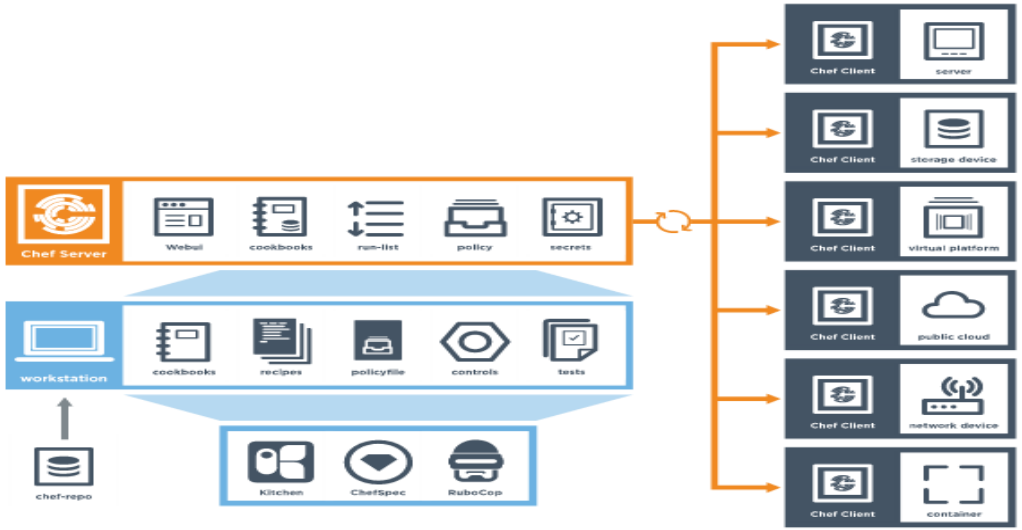
Editor: ~\chef-repo\webserver.rb

```
1  powershell_script 'Install IIS' do
2    code 'Add-WindowsFeature Web-Server'
3    guard_interpreter :powershell_script
4    not_if "(Get-WindowsFeature -Name Web-Server).Installed"
5  end
```

Chef

Relationships between the various elements of Chef :

- Includes the nodes, the server, and the workstation.
- These elements work together to provide the chef-client the information and instruction that it needs so that it can do its job.




workstation


node


Chef Client


Chef Server


Chef Supermarket


cookbook

Puppet

- Lets you define the desired state of your infrastructure and what you want it to do.
- Puppet automatically enforces that desired state and remediates any unexpected changes.
- Deploy faster, with greater reliability, because one no longer have to map out and manually deploy every step
- **Capabilities:**
  - Orchestration
  - Automated provisioning
  - Configuration automation
  - Visualization & reporting
  - Code management
  - Node management
  - Role-based access control

Deliver faster with a proven DevOps platform

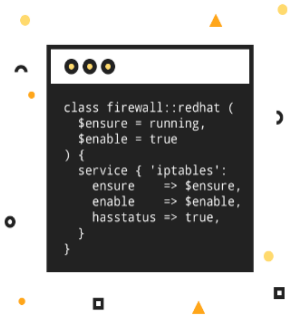
Automation — the foundation for many DevOps practices — helps you move faster without sacrificing stability or security. Now is the time to take advantage of automation and proven DevOps practices to drive your team — and your deployments — forward.

Puppet Enterprise lets you deliver technology changes faster, release better software, and do it all more frequently with confidence.

Download the DevOps Resource Kit

Lay the foundation for DevOps practices

Puppet Enterprise manages infrastructure as code, providing the foundation for DevOps practices such as versioning, automated testing and continuous delivery. You deploy changes with confidence and recover more quickly from failures, freeing your team to be more agile and responsive to business needs.



Automated Monitoring

- In DevOps, automation monitoring often takes the spotlight
- There are many products that promote monitoring.
- Monitoring predates DevOps, and has evolved as well.
- In DevOps we can write infrastructure as code, automating integration and testing, and deploying everything in the cloud.
- The pace of development has increased,so has the customer feedback loop and deployment tooling.
- As a result there is more to monitor, so where we use DevOps-style tooling to automate integration, testing, provisioning, and deployment, we need to use DevOps-style tooling to monitor our builds, resources, and performance.

Automated Monitoring tools

Automation monitoring includes ….

- Monitoring development milestones
- Monitoring vulnerabilities
- Deployment monitoring
- Application log monitoring
- Server health monitoring
- Activity Monitoring

Nagios

Nagios Core is open source software licensed under the GNU GPL V2 and it provides …

- Monitoring of network services

(SMTP, POP3, HTTP, NNTP, ICMP, SNMP, FTP, SSH)

- Monitoring of host resources

(processor load, disk usage, system logs)

- Monitoring of any hardware

(like probes for temperature, alarms, etc.)

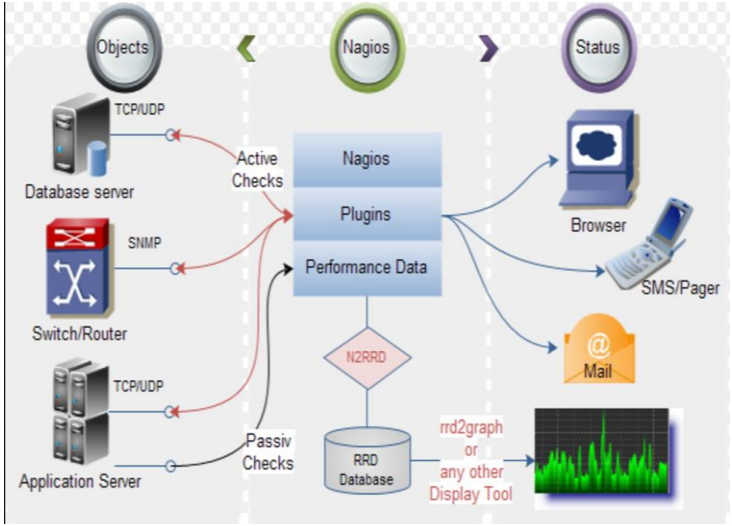
- Monitoring via remotely run scripts

(via Nagios Remote Plugin Executor)

- Remote monitoring

(supported through SSH or SSL encrypted tunnels)

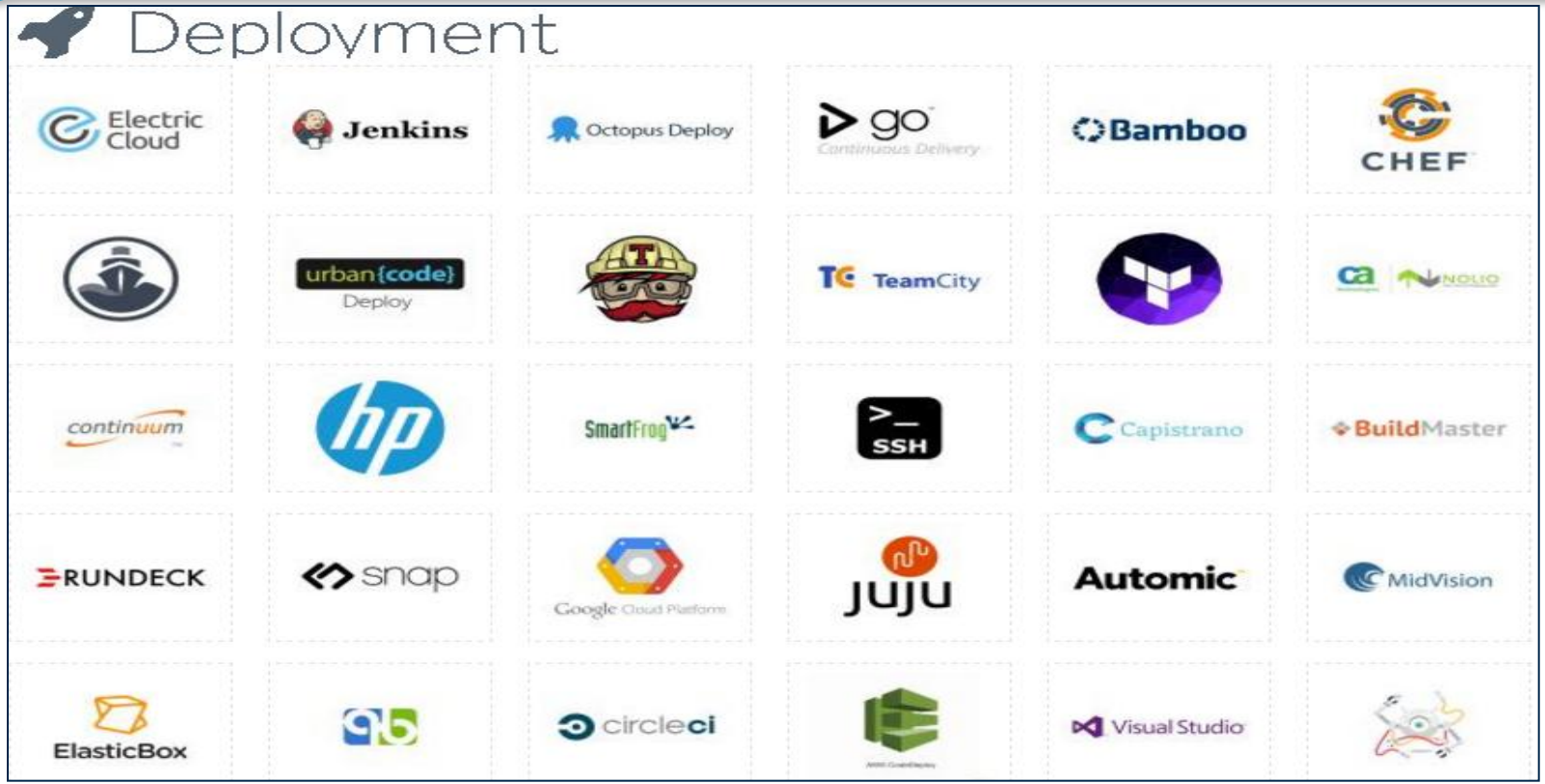
- And many more monitoring features.



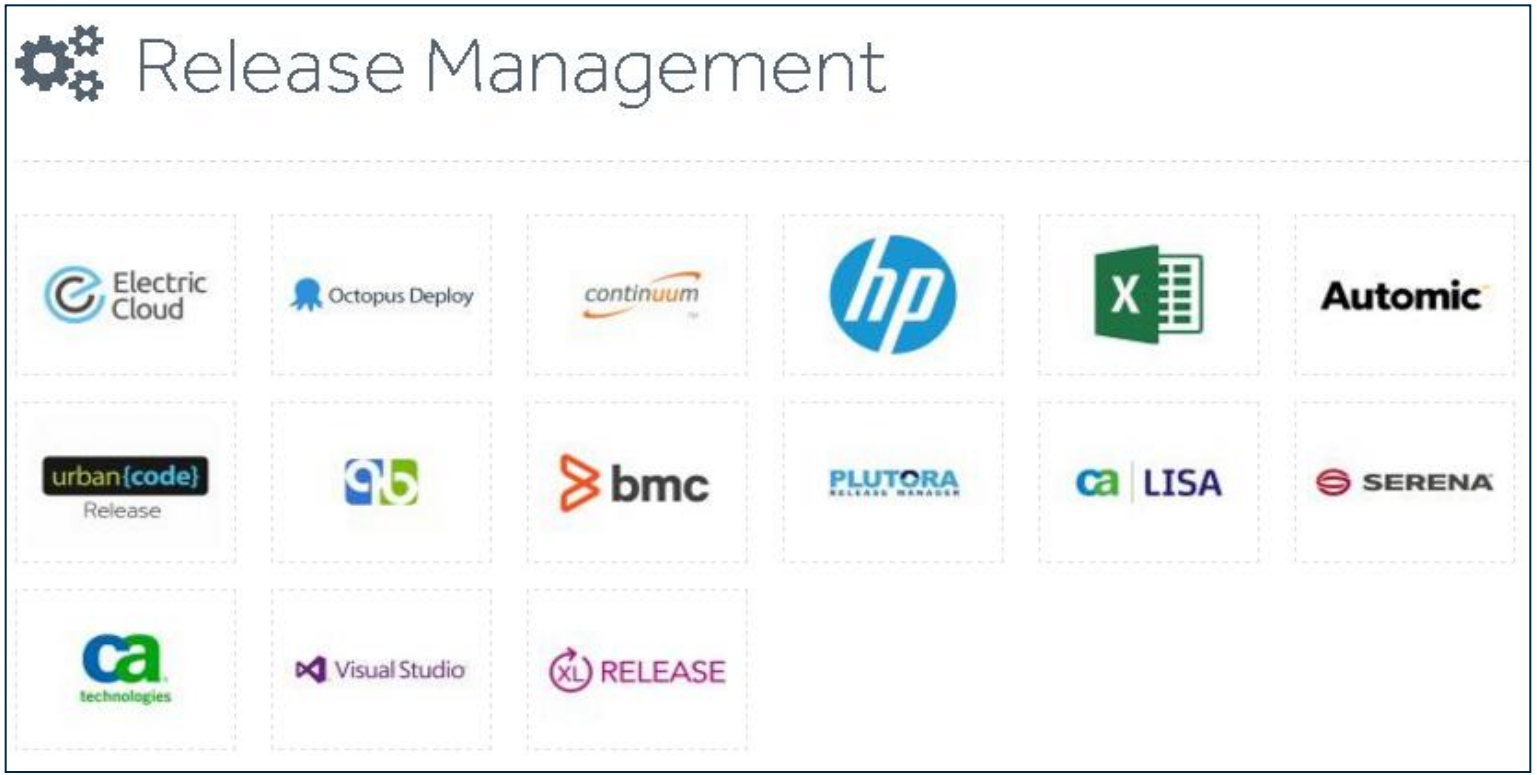
Continuous Deployment and Release Management

- Continuous deployment and release management raise the concept of continuous integration to the next level enabling creation of the delivery pipeline .
- This pipeline automates continuous deployment of software to QA environment, then to production in an efficient manner.
- Continuous release and deployment makes it possible to release new features to customers and users at the earliest possible..
- Correct selection of tooling and processes make up the core of DevOps to facilitate continuous integration, continuous release, and continuous deployment.

Deployment Automation Tools



Release Management Tools



Lesson Summary

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