Reza Yazdani

Maktab 64

Introduction to

DevOps

What is DevOps?

The DevOps is a combination of two words:

- one is software **Development**, and second is **Operations**.

This allows a single team to handle the entire application lifecycle, from **development** to **testing**, **deployment**, and **operations**.

DevOps helps you to reduce the disconnection between software developers, quality assurance (QA) engineers, and system administrators.

DevOps promotes collaboration between Development and Operations team to deploy code to production faster in an automated & repeatable way.

DevOps helps to increase organization speed to deliver applications and services. It also allows organizations to serve their customers better and compete more strongly in the market.

Why DevOps?

Before going further, we need to understand why we need the DevOps over the other methods.

- The operation and development team worked in complete isolation.
- After the design-build, the testing and deployment are performed respectively. That's why they consumed more time than actual build cycles.
- Without the use of DevOps, the team members are spending a large amount of time on designing, testing, and deploying instead of building the project.
- Manual code deployment leads to human errors in production.
- Coding and operation teams have their separate timelines and are not in synch, causing further delays.

DevOps Advantages

- is an excellent approach for quick development and deployment of applications.
- It responds faster to the market changes to improve business growth.
- escalate business profit by decreasing software delivery time and transportation costs.
- clears the descriptive process, which gives clarity on product development and delivery.
- It improves customer experience and satisfaction.
- simplifies collaboration and places all tools in the cloud for customers to access.
- means collective responsibility, which leads to better team engagement and productivity.

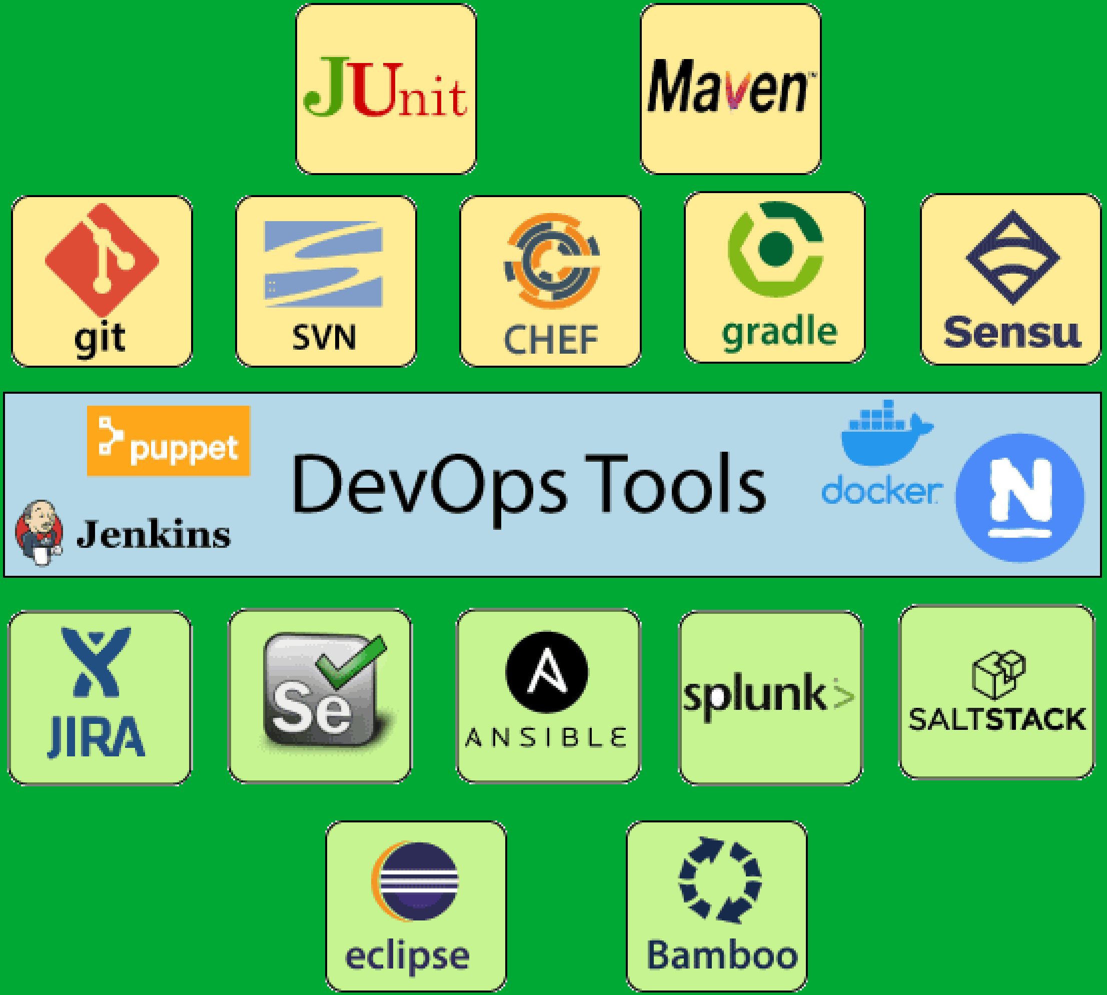
DevOps Disadvantages

- DevOps professional or expert's developers are less available.
- Developing with DevOps is so expensive.
- Adopting new DevOps technology into the industries is hard to manage in short time.
- Lack of DevOps knowledge can be a problem in the continuous integration of automation projects.

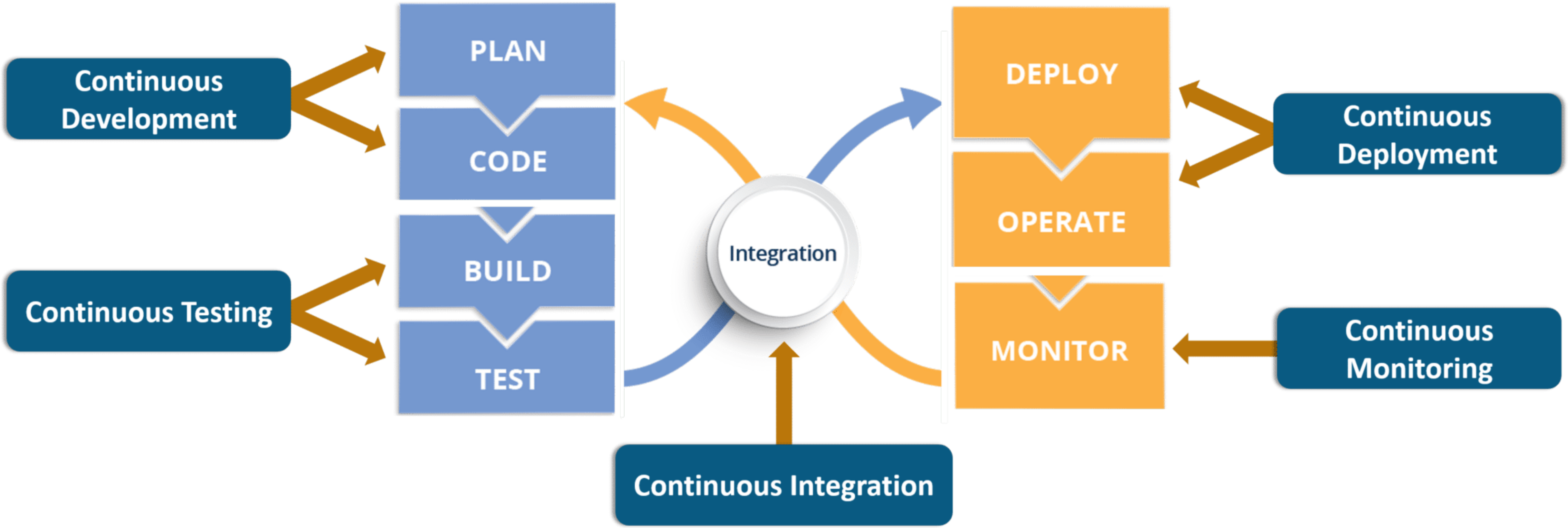
Prerequisite ...

What do you think ...

DevOps Tools



DevOps Phases



DevOps Tools

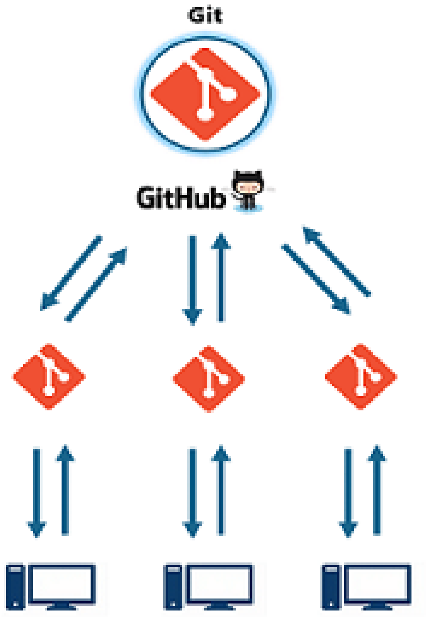
Some most popular DevOps tools such as:

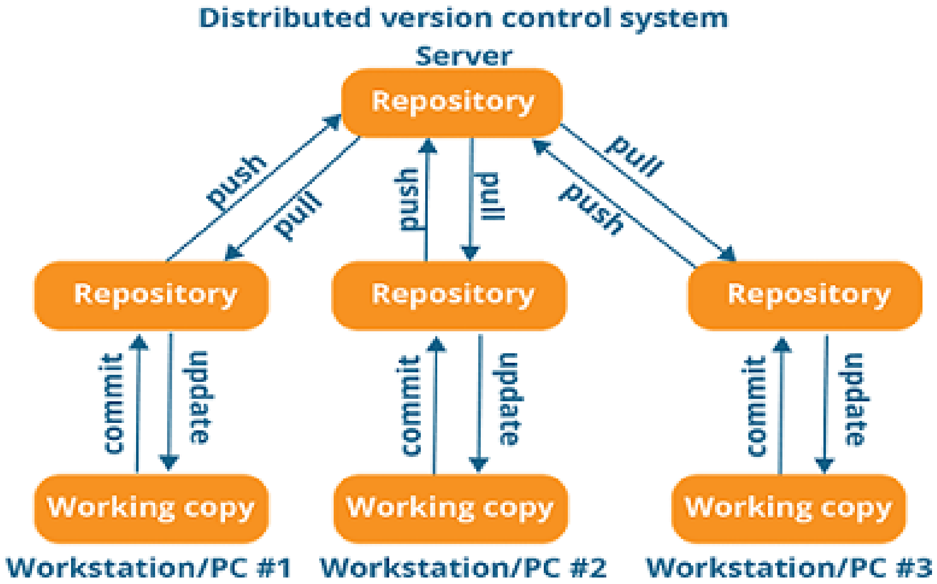
- Continuous Development : **Git**
- Continuous Integration (**CI**) : **Jenkins**, **Travis**
- Continuous Testing : **Jenkins**, **Selenium**
- Continuous Deployment (**CD**) : **Puppet**, **Ansible**, **Docker**
- Continuous Monitoring : **Splunk**

Development + integration + Testing + Deployment + Monitoring = **DevOps**

Git

Git plays a crucial role when it comes to managing the code that the collaborators contribute to the shared repository.
This code is then pulled for performing continuous integration to create a build and test it on the test server and eventually deploy it on the production.





Git

Git enables the communication between the development and the operations team.

When you are working on a large project with a huge number of collaborators, it becomes very critical to have communication between the collaborators while making changes in the project.

Commit messages in Git play a vital role in communicating among the team.

The bits and pieces that we all deploy lie in the Git. To be successful in DevOps, you need to have all of the communication in Version Control.

What is github ...

What is gitlab ...

Git - GitHub

GitHub: GitHub is a repository hosting service tool that features collaboration and access control. It is a platform for programmers to fix bugs together and host open-source projects.
GitHub is designed for the developers and to help them track their changes into a project through the repository.

Following are some features of GitHub:

- Specifies milestone and labels to the projects.
- Comparison view between branches is allowed.
- GitHub Pages allows us to publish and host websites within GitHub.
- Syntax highlight feature.
- It allows third-party API integrations for bug tracking and cloud hosting.

Git - GitLab

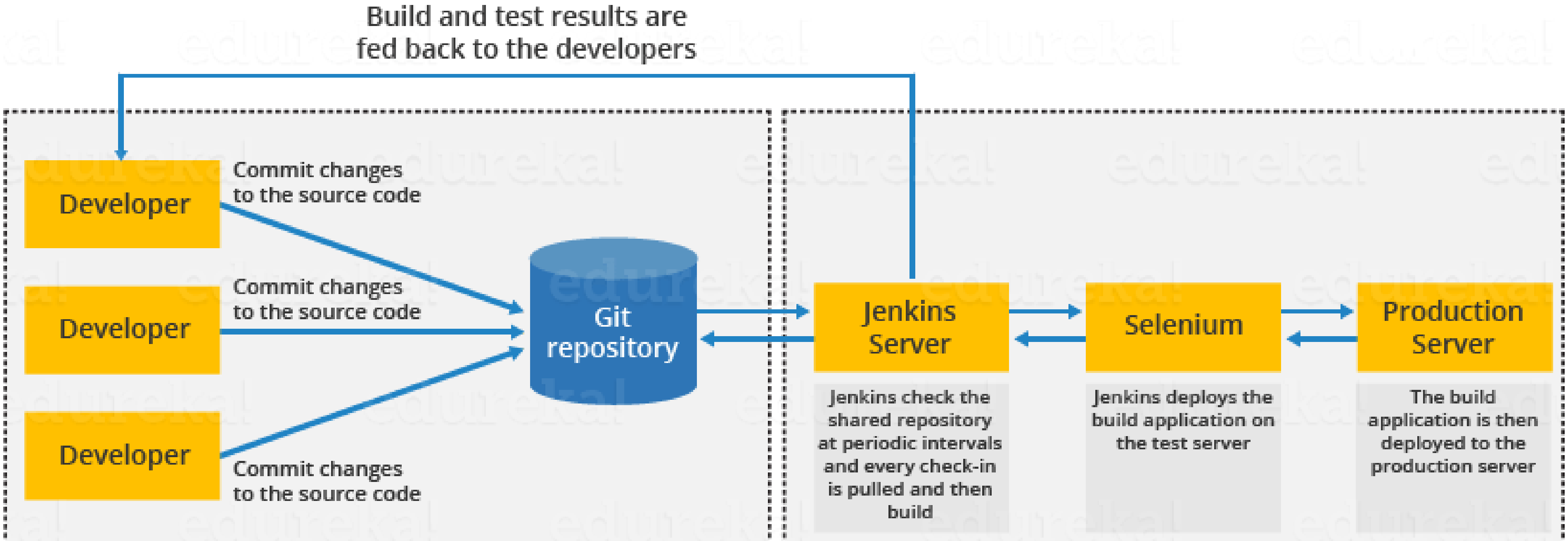
GitLab: GitLab is a repository hosting manager tool that is developed by GitLab Inc and is used for the software development process.
It provides a variety of management by which we can streamline our collaborative workflow for completing the software development lifecycle.
It also allows us to import the repository from Google Code, Bitbucket, etc.

Following are some features of GitLab:

- Open-source community edition repository management platform.
- Easy Maintaining of repository on a **server**.
- Offers tools like Group Milestones, Time Tracking and Issue Tracker, etc. for effective development.
- More Spontaneous User interface and authentication features.
- User Permission and Branch protection are enhanced.

Jenkins

Open-source automation tool that is written in Java with plugins built for **C**ontinuous **I**ntegration purposes. Jenkins builds and tests your software continuously making it easier for developers to integrate changes to the project, and making it easier for users to obtain a fresh build. It also allows continuous delivery of your software by integrating with a large number of testing and deployment technologies.



Build and test results are fed back to the developers
Developer
Commit changes to the source code
Developer
Commit changes to the source code
Developer
Commit changes to the source code
Git repository
Jenkins Server
Selenium
Production Server
Jenkins check the shared repository at periodic intervals and every check-in is pulled and then build
Jenkins deploys the build application on the test server
The build application is then deployed to the production server

Jenkins

With Jenkins, organizations can fasten the software development process through automation. Jenkins integrates development life-cycle processes such as build, document, test, package, stage, deploy, static analysis and much more.

Jenkins achieves **C**ontinuous **I**ntegration with the use of plugins.
Plugins allow the integration of Various DevOps stages.

If you want to integrate a particular tool, you just need to **install the plugins** for that tool. There are numerous plugins in Jenkins such as **Git**, **Maven 2** project, **Amazon EC2**, **HTML publisher**, etc.

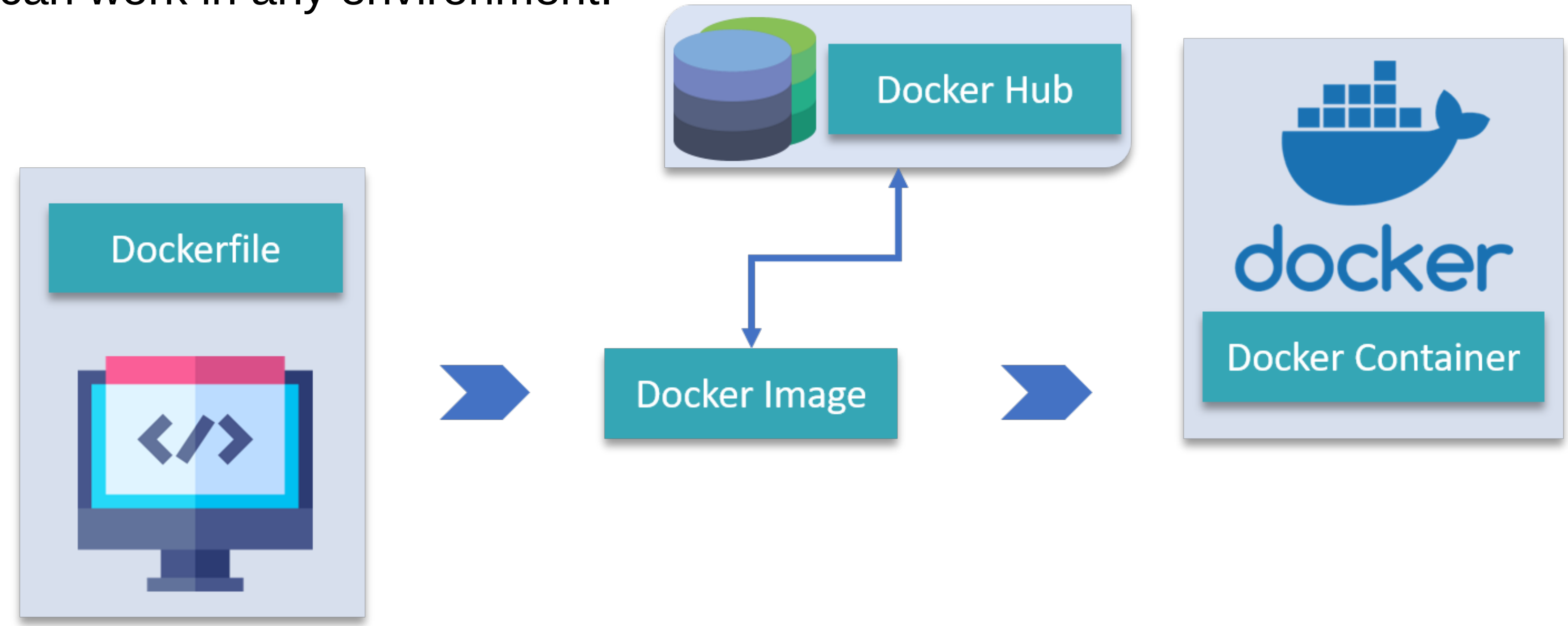
Selenium

Selenium is an open-source tool that is used for the purpose of **automating the tests** carried out on web browsers. Open-source simply means that you do not need to pay anything for the licensing cost and this is a major advantage over other testing tools. Other reasons behind Selenium’s ever-growing popularity are as follows:

- The test scripts can be written in any of these programming languages such as Java, **Python**, C#, PHP, Ruby, Perl & .Net
- You can carry out the tests in any of these OS such as Windows, Mac or Linux
- Also, you can carry out the tests using any browser such as Mozilla Firefox, Internet Explorer, Google Chrome, Safari or Opera

Docker

Docker is a platform that packages an application and all its dependencies together in the form of containers. This containerization aspect of Docker assures you that the application can work in any environment.



Docker

As you can see in the diagram, each and every application runs on separate containers and has its own set of dependencies & libraries.
This makes sure that each application is independent of other applications, giving developers surety that they can build applications that will not interfere with one another.

So a developer can build a container that can have different applications installed on it and give it to the QA team. Then the QA team would only need to run the container to replicate the developer’s environment.

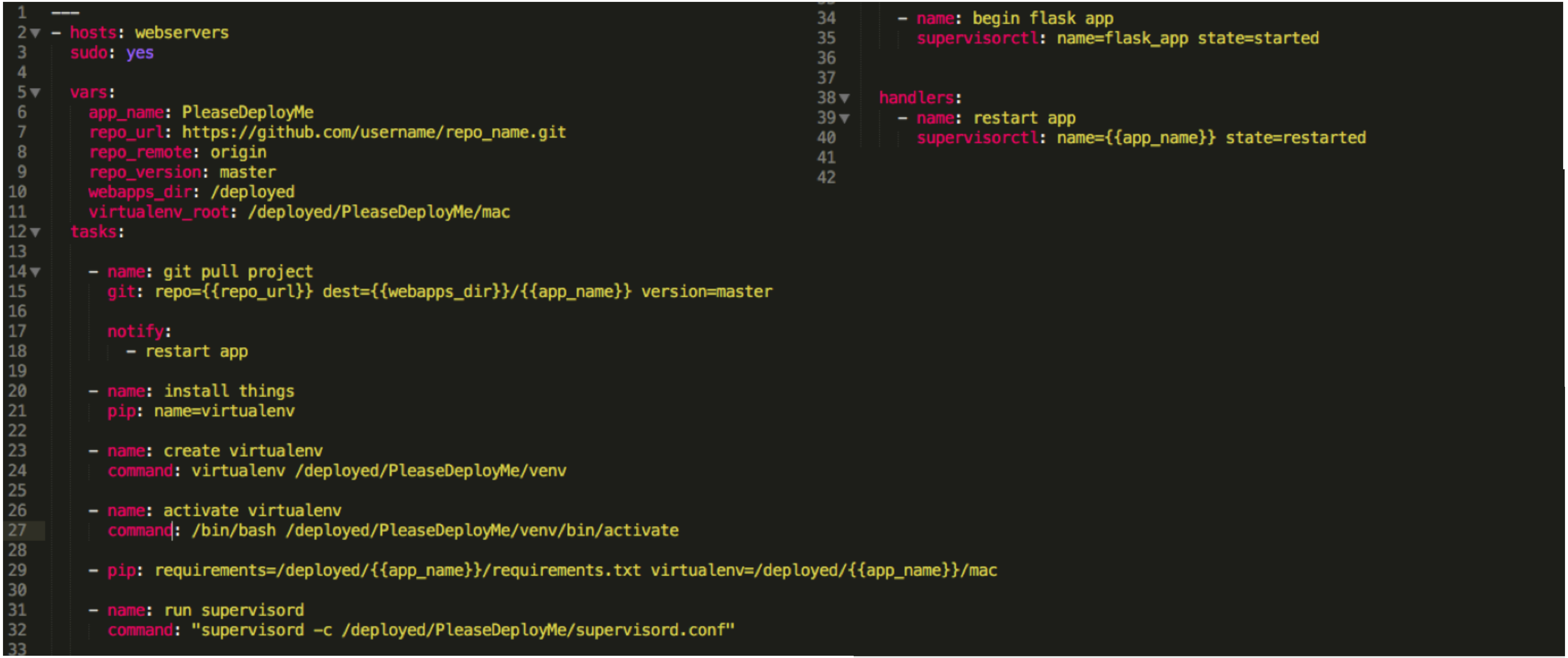
Ansible

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. There are no agents and no custom security architecture is required to be used in the Ansible architecture. The deployment is simple plain English like language that is used in Ansible called YAML which stands for “YAML Ain’t Markup Language.”

Example :

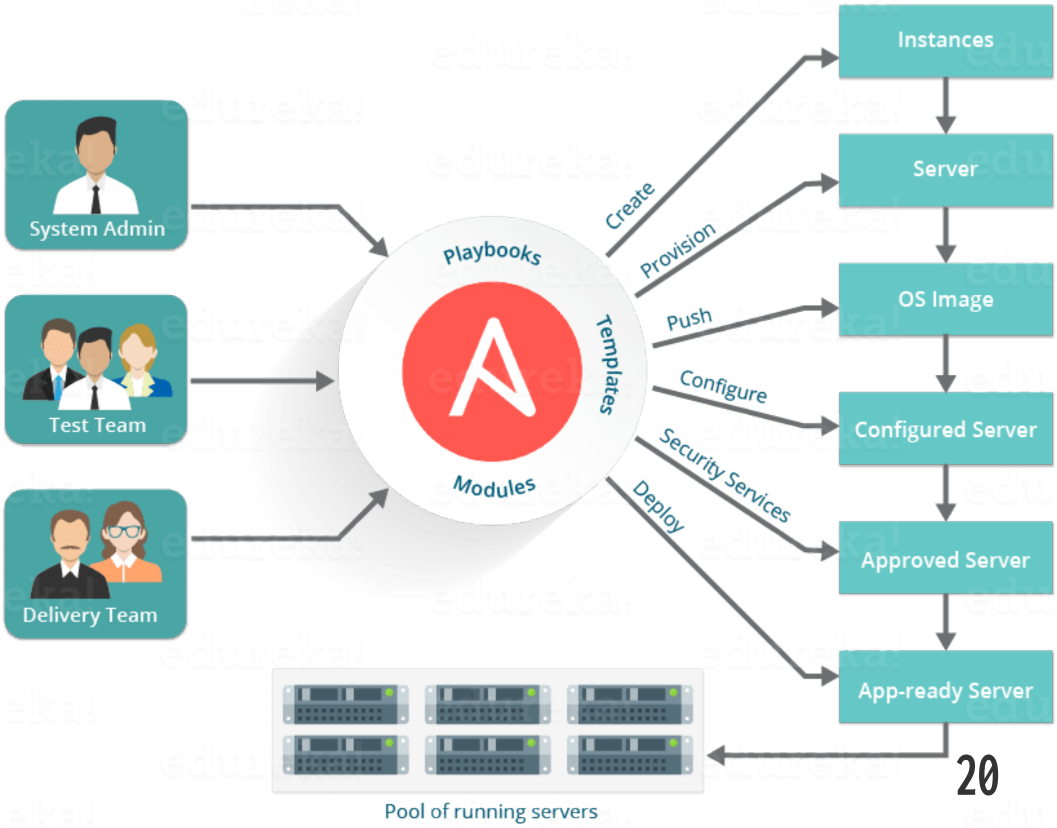
Ansible



```
---
- hosts: webservers
  sudo: yes

  vars:
    app_name: PleaseDeployMe
    repo_url: https://github.com/username/repo_name.git
    repo_remote: origin
    repo_version: master
    webapps_dir: /deployed
    virtualenv_root: /deployed/PleaseDeployMe/mac
  tasks:

    - name: git pull project
      git: repo={{repo_url}} dest={{webapps_dir}}/{{app_name}} version=master

      notify:
        - restart app

    - name: install things
      pip: name=virtualenv

    - name: create virtualenv
      command: virtualenv /deployed/PleaseDeployMe/venv

    - name: activate virtualenv
      command: /bin/bash /deployed/PleaseDeployMe/venv/bin/activate

    - pip: requirements=/deployed/{{app_name}}/requirements.txt virtualenv=/deployed/{{app_name}}/mac

    - name: run supervisord
      command: "supervisord -c /deployed/PleaseDeployMe/supervisord.conf"

    - name: begin flask app
      supervisorctl: name=flask_app state=started


  handlers:
    - name: restart app
      supervisorctl: name={{app_name}} state=restarted
```

Ansible

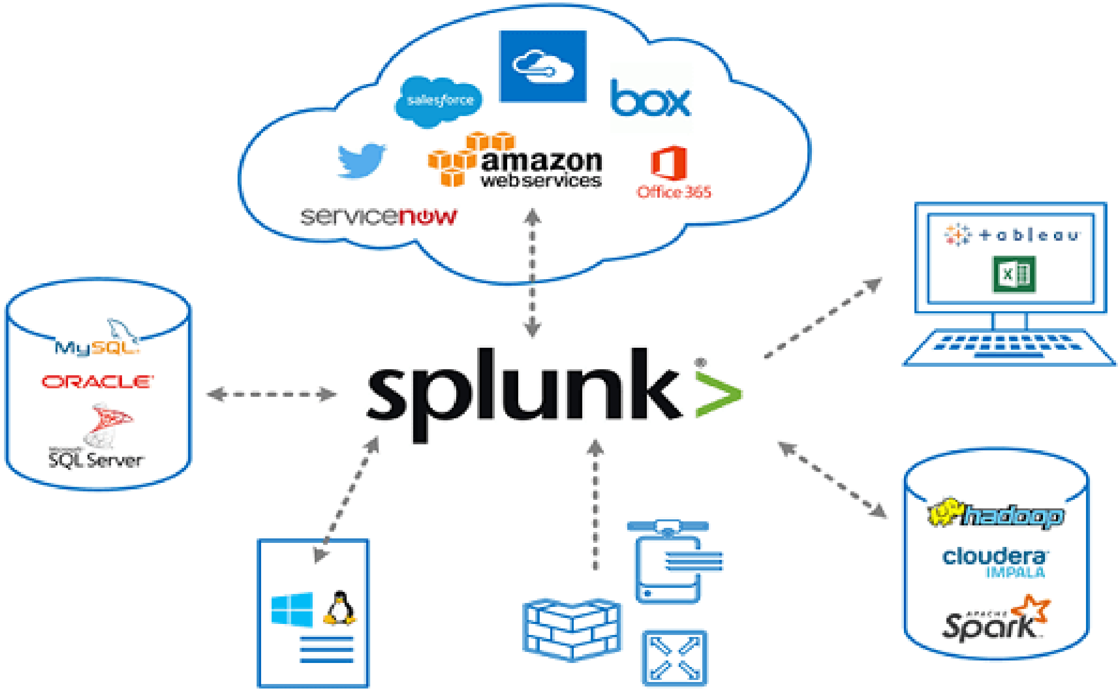
To work with Ansible is very easy it pushes out small programs called “Ansible Modules” to your nodes to connect. It can deploy and connect using the SSH agent to execute the modules and then removes it when finished. There are no servers, daemons or databases required these modules can reside anywhere in the machines. You need to work with any text editor or terminal programs and along with a version control system to manage the changes in the content. Ansible has over **750** modules built into it.



Splunk

Splunk is a software platform widely used for **monitoring**, **searching**, **analyzing** and visualizing the machine-generated data in real time. It performs capturing, indexing, and correlating the real time data in a searchable container and produces graphs, alerts, dashboards and visualizations.

Splunk provides easy to access data over the whole organization for easy diagnostics and solutions to various business problems.



Splunk

Some of the benefits of using Splunk are:

- Offers enhanced GUI and real-time visibility in a dashboard
- It reduces troubleshooting and resolving time by offering instant results.
- It is a **best-suited tool for root cause analysis**.
- Splunk allows you to generate graphs, alerts, and dashboards.
- You can easily search and investigate specific results using Splunk.
- It allows you to troubleshoot any condition of failure for improved performance.
- Helps you to monitor any business metrics and make an informed decision.
- Splunk allows you to incorporate **Artificial Intelligence** into your data strategy.
- Summarizing and collecting valuable information from different logs
- Splunk allows you to accept any data type like .csv, json, log formats, etc.
- Offers most **powerful search analysis**, and visualization capabilities to empower users of all types.
- Allows you to create a central repository for searching Splunk data from various sources.