

Monday, November 10, 2025 10:13 AM

30% theoretical class and 70% class.

SDLC

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Software Development LifecYcle.

Agile:

Right Coding.

Devops is all about using tool chain to deliver your application faster.

We need to avoid wastage in the coding.

WGT: wlmart global tech. there most of application get deployed in azure.,

GCP: for data analytical purpose.

All the production app will be deployed in GCP.

Retrospective

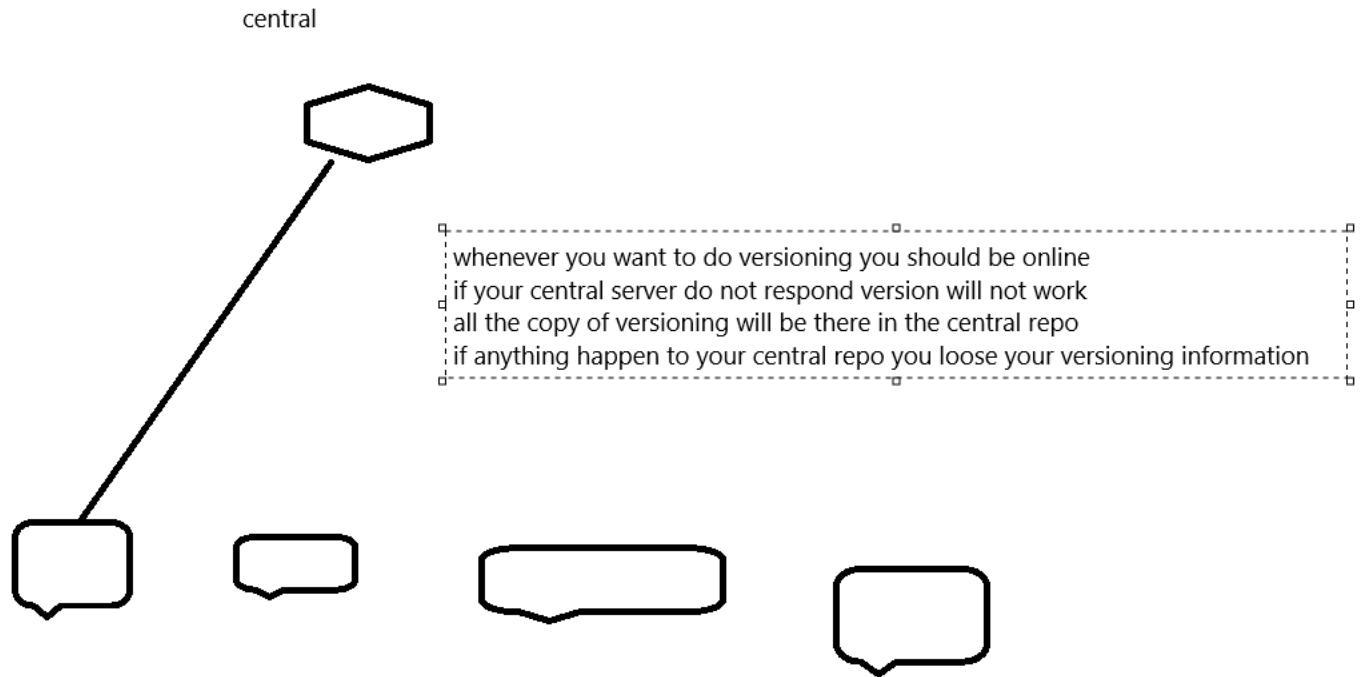
1. Failure should be taken on priority
2. Annymous loop is always importaint
3. Wasteage

Jenkins gitlab gitops azuredevops

SCM

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Source Code Management will help manage your code efficiently.
Centralized Version Control System SVN
What is the Drawback of centralized version control system.



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DVCS

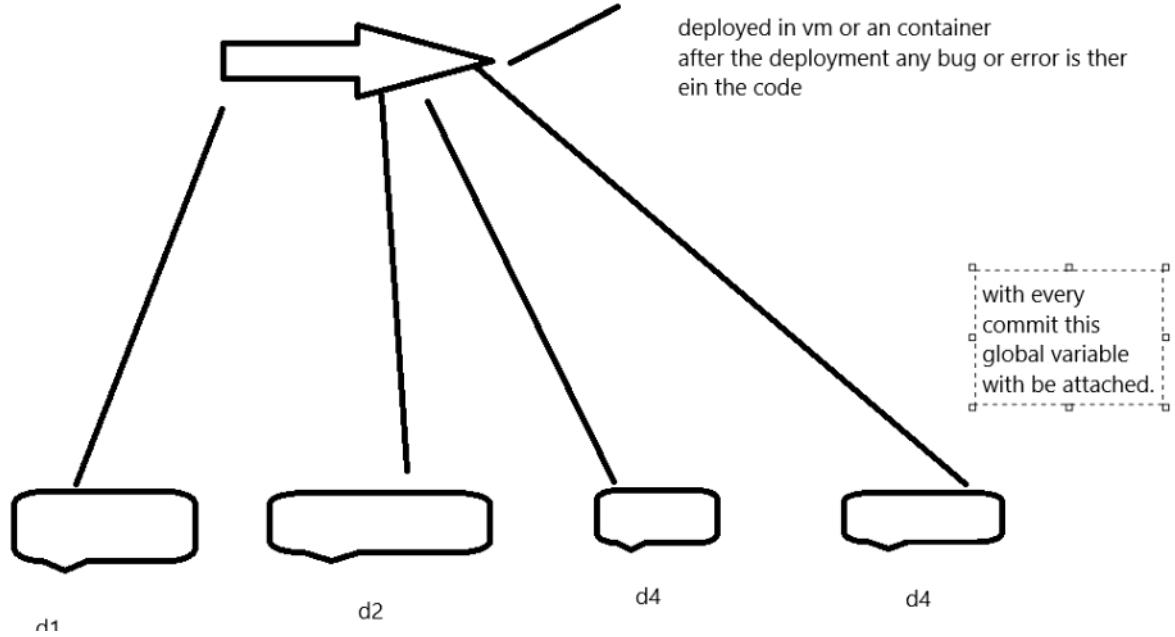
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Distributed version control system.

Versioning lies with you. Which simply mean that power of version is there in your system offline.
When you want to push your code then only you need versioning.

We will setup the global variables in git

This setting is stored in .gitconfig in home directory

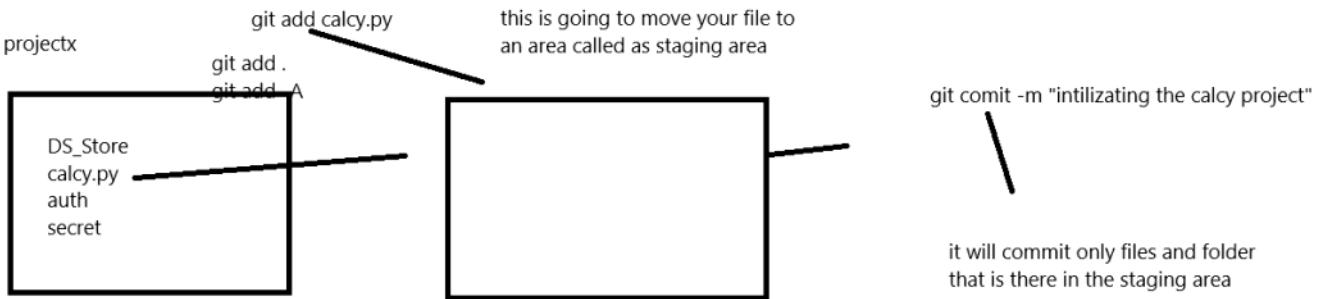


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Git project

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Lets learn about git workflow



git init

which will create a .git folder and manage your versioning
this folder are also called as git working directory

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Git diff command

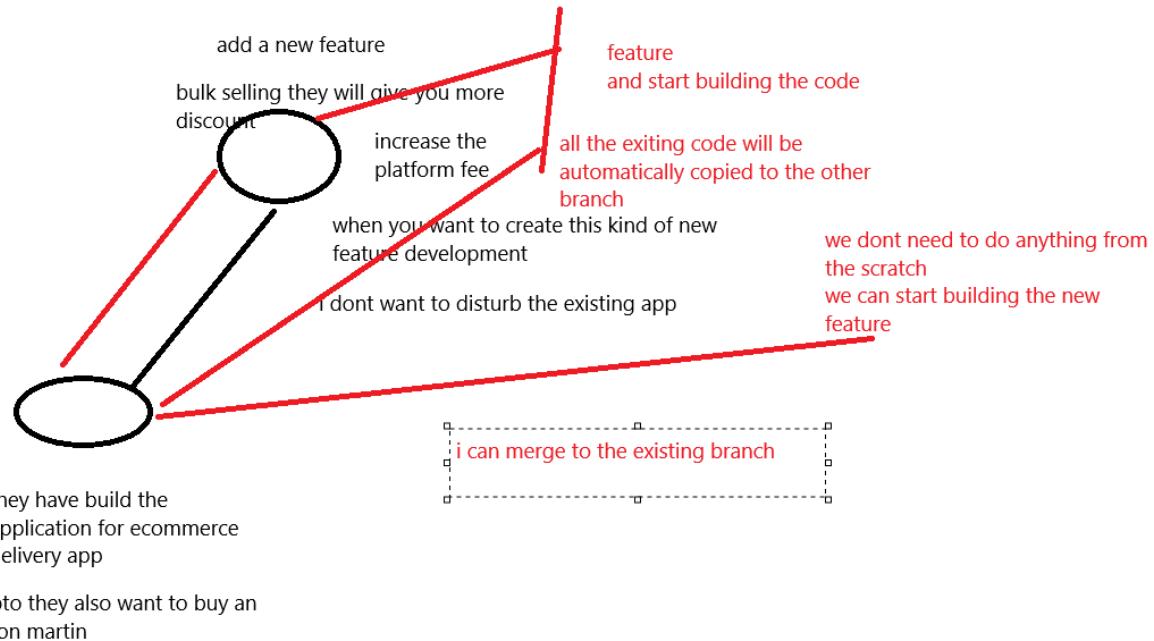
Which will compare your changes with the previous change

Branching in git

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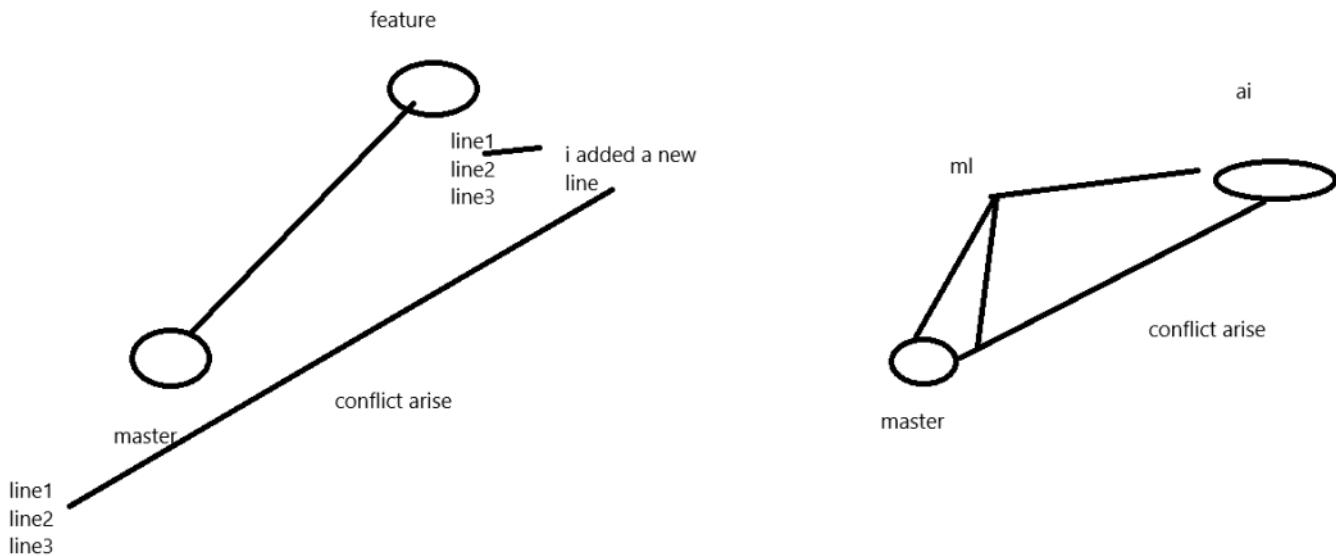
Branches in git. It is a way to modify your code without disturbing the present code.

ecommerce



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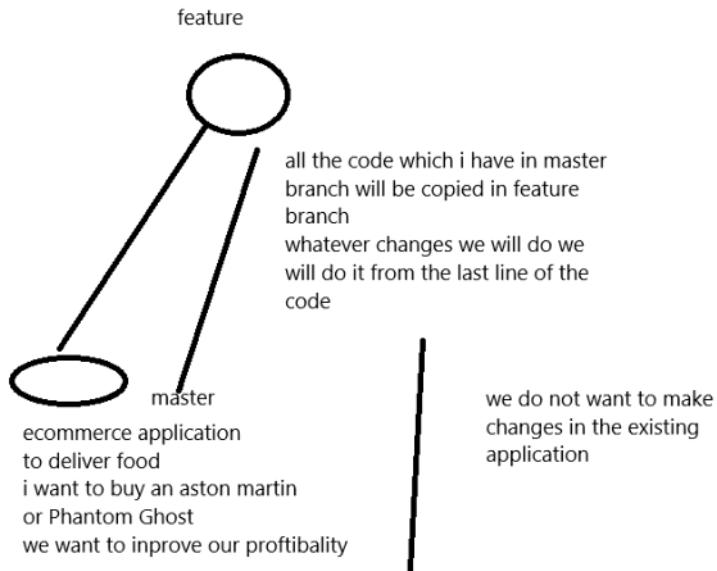
how the conflict happen in branch



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To avoid the conflict

1. Never modify the existing code
2. The way you have extend the branching functionality the same way you need to go back and merge



□

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team start building the code-upload in jenkins-direct deployment in prod



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How to avoid wastage in the application?

Git hub

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Git and github/azurerepo/bitbucket/gitlab

I want to deploy my application in azure cloud.

\organziation has create a secure template it contains some terraform code which will provision the server nsg networking storage.

CICD

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Why amazon is success in there application.

Black Friday sale

The main purpose if CI is to build an quality software.

Daily the changes we have done it should be uploaded in a repo and automated build and testing need to be done.

Recap

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Yesterday we learned about git the DVCS

Git workflow

Git init - this will initialize your working directory

Git add . - will move your file from working till staging area

Git commit -m "this will move your file from staging area to an committed area"

we also learned about GitHub which is kind of a central repo. Where we upload the code for collaboration

To authenticate in GitHub we used key pair based authentication

We uploaded the public key

We learned about git branching

multiple developer to do the changes or adding new feature
without disturbing the running project
later once we complete the feature we can simply merge it



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Strategy for git branching

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1. You should always have long lived branched with specified roles: main/master production ready code
2. Develop: for integrating feature
3. Feature: for individual feature development
4. Release: preparing release
5. Hotfix: for urgent production fixes

To manage this branches we always used cicd pipeline.

Jenkins setup

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1. We will setup the jenkins server
2. We created a linux machine
3. Inside the machine we install java
4. Install jenkins
5. Systemctl status jenkins

Next we will setup the jenkins server using a browser

By default jenkins run on port 8080 so in azure we need to open this port 8080

#then copy the public ip of the machine and paste in the browser with port 8080

And unlock jenkins server and install the required plugin

When we upload our code in github it will always ask for yes

Job

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We will see two different type of job

1. Declarative pipeline free style pipeline
2. Scripted pipeline

When we do build always a build file will be created

Artifact jar file

It keep on taking space in your system

Before my pipeline get started I want to pass some parameter

Boolean a true false value

Choice parameter

We are building an search engine kind of app.

Or for requirement purpose we are trying to build an chatgpt function

API call

Google API

Throttling: sometimes we push the code multiple times multiple build can be started first build to the second

Build periodically I put a scheduled every 15 min it is going to build it

Build periodically I put a times of 15 min. every 15 it will check your source code there is changes or not if it is going to build it

Poll SCM: every 15 min it will check your SCM if there is any changes then only it is going to build or skip.

Git web hook

Free style project or declarative pipeline we don't use now as it is too heavy

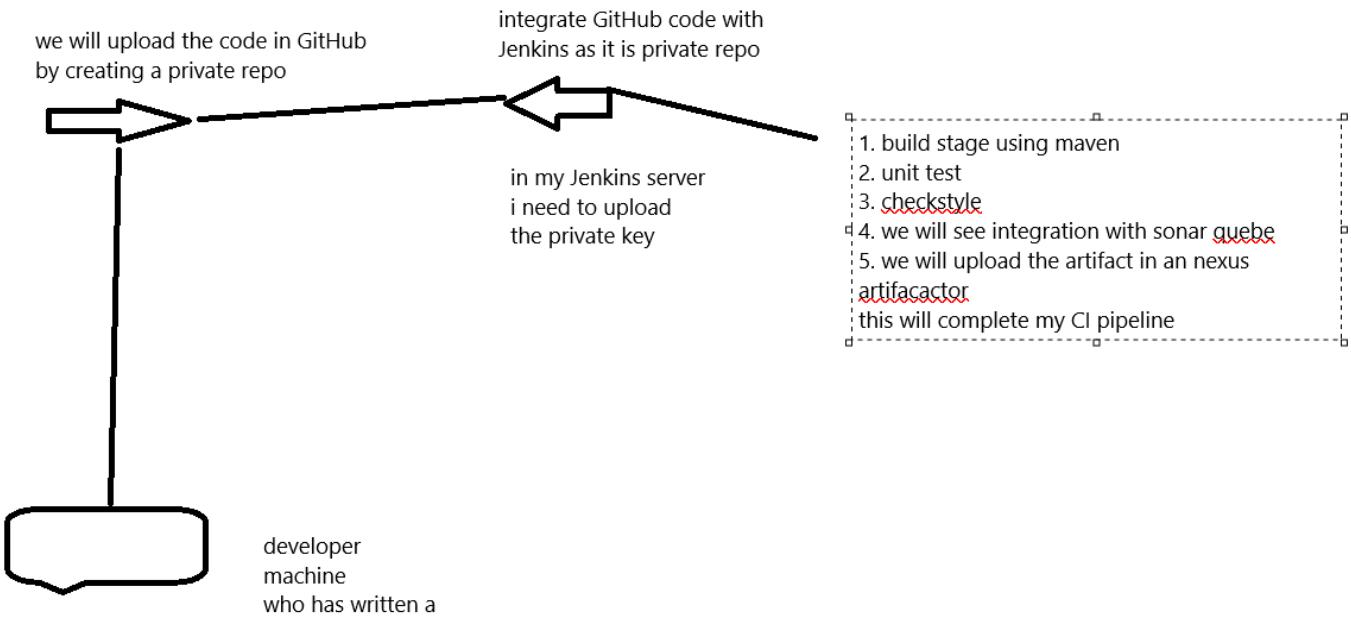
If the Jenkins server gets restarted we will start the pipeline from the scratch

Scripted pipeline

Scripted line

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It is running using script which means it is faster. Command line is always fast
Scripted pipeline run using groovy.
We use something called as pipeline generator using the same I can run my pipeline.



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Sonarqube

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What is sonar qube.

It is mainly used to do static code analysis

Unit test junit xunit

Code quality check you use different tools

Code smell you use different.

How to integrate sonar qube with jenkins

No need to install sonar I'll install it as a docker container.

Nexus

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Finally we will see how to integrate our pipeline with nexus.

And upload our artifact

Jfrog

Or I can say it is an object storage.

Once you build your application a jar file or msi file got created.

If I store the same in an hdd or ssd which will do read write operation. And someone do execution.

So amazon s3 azure blob storage nexus jfrog they give something called as object. A read only storage
The file will be stored as an archival. Read only. If you want to make changes you need to download the
file and upload again.

We need a DR.

Storage object storage

We upload file in a storage with the same name multiple times.

Object storage will store the same file with same name with timestamp

The file will not be overwritten.

99.9999999999% redundancy in data.

Let me setup the nexus

Recap

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Yester we build an CI pipeline.

When we are building this ci pipeline we have created different stages.

1. First stage is to integrate our code with github. Build our code and upload it in version control system using key pair based authentication.
2. Second stage where I want to create an CI pipeline
3. To create this ci pipeline we created an pipeline project stages and different stages
4. Build it

Unit test checkstyle testing

Next we integrate our ci pipeline with sonar qube

Then we upload our artifact in nexus artifactory.

Second time when we make changes in the code

Docker

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What you know about containers?

I want to build my application as per cloud native foundation.

If I build the app. It should work on aws azure gcp on prem. It should take the capability of the cloud service provider

2x2x2X2

the app should be deployed in two different region on premises-2 different data center in the cloud 2 different region in the cloud

region azure cloud. due to which there operation around the world got affected. we have started creating a new deployment model where the same application will be deployed in gcp cloud also.



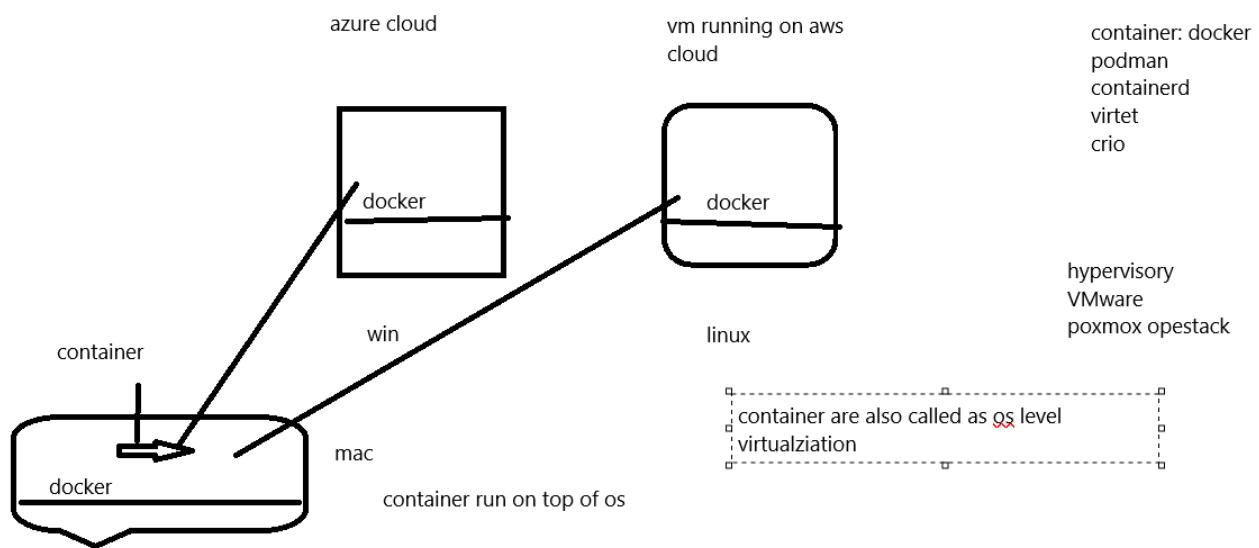
whenever we create an app which is going to be deployed in cloud

build there code container



terraform we do auto deployed

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When you are running your vm on top of physical hardware it is also called virtualization tier1
When you are running container on top of vm tier 2 virtualization

Docker installation

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We will create an ubuntu machine and install docker on top of it.

Docker installation is different in different os. Windows it is different linux different flavour it will be different

But the command line we use it will be always same in any os.

Devops

Only installation in os is different

Operation will be 100% same in any os.

Today you are learning docker in linux

Windows same command

#lets install docker in our ubuntu machine

We install docker in an ubuntu machine.

All this down the line they are using go or python

They have their own syntax based language and quite simple.

Kantara2. amazon prime. Hindi

Korean drama series

Container

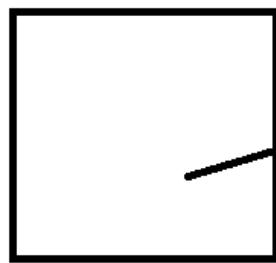
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```
root@docker-vm:~# docker container run --publish 80:80 --detach nginx
#docker container run will always create a new container for you
Nginx: it is the name of the image
Unable to find image 'nginx:latest' locally #means this image is not available in your local system
latest: Pulling from library/nginx #it goes to hub.docker.com and download the image
320b0949be89: Pull complete
9def903993e4: Pull complete
d7ecded7702a: Pull complete
52bc359bcd7: Pull complete
266626526d42: Pull complete
e2f8e296d9df: Pull complete
d921c57c6a81: Pull complete
Digest: sha256:1beed3ca46acebe9d3fb62e9067f03d05d5bfa97a00f30938a0a3580563272ad
Status: Downloaded newer image for nginx:latest
672fbe56d10c0a8926ff5b974c88a1f22debea38ba69658bdc4c1902574cdee4 #once download complete
it will spin up your container
#this command will show all the running container
root@docker-vm:~# docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS
NAMES
672fbe56d10c nginx "/docker-entrypoint...." 5 seconds ago Up 4 seconds 0.0.0.0:80->80/tcp,
[::]:80->80/tcp affectionate_feistel
root@docker-vm:~# curl localhost
```

It is called as might hub.

to make it runnable

i have created an app using
go lang
or python
nodejs
react js



server with os
on top of this server i want to
run my go lang app
go lang runtime
python
nodejs

1. destroy the vm and install the runtime.
2. inside this vm if i try to run go lang and python
app together
3. dependency issue

Namespace and cgroup

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By default to do the isolation container are running as process id.

Process id are always unique

All this process id are run using cgroup and namespace

With every single process they will attach cpu ram storage and networking

Lets try to understand the detach process

Container vs vm : it is just and process

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Top :

End task is the native command in windows

Kill is the native command in linux

Systemctl stop mysqld

Docker stop will stop the container in a gracefull maner

Mysql

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I will create a mysql database with environment variables

Login inside the db .

We will also see the persistent volume

By default any container you create there volumes are ephemeral

I delete the container the storage will be deleted

But in case of database the storage should not be deleted

Networking in docker

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--publish 80:80
--publish 81:80

Vlan
Port triggering.

Docker images

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How to build your custom images.

What are the different way to build custom image.

We will see how to build our custom images.

Like we need to have an application.

spring-hello project folder



dockerfile

inside docker file the instruction need to be
given in capital letter

```
FROM eclipse-temurin:17-jre-ubi10-minimal
WORKDIR /app
MAINTAINER john cena<john@gmail.com>
VOLUME /tmp
#this expose is related to your application port number
EXPOSE 8080
ARG JAR_FILE=target/spring-boot-2-hello-world-1.0.2-
SNAPSHOT.jar
COPY ${JAR_FILE} helloworld.jar
ENTRYPOINT ["java","-jar","helloworld.jar"]
```

OpenJDK image

it will create a directory in
your OpenJDK container

volume tmp

expose 8080 : this is the application port when you run
your application internally it will run on this port number
COPY will always required src and destination
src is your local machine destination inside your container

ENTRYPOINT ["java" "-jar nameoffile]
ENTRYPOINY python app.py

docker build -t tag helloapp .

docker build will look for the dockerfile inside your current directory

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Recap

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Containers?

Container use os level virtualization. Sometimes it is also called as tier 2 virtualization.

Build your application deploy anywhere.

Os level virtualziation so it will work anywhere

How do container do isolation of the resource and application level isolation.

Using namespace and control group.

Using a process id it will create the contianer and it will allocate resources to the container.

We learn about converting an application into an container based image.

We created a file called as docker file.

Inside the docker file we provide instruction.

FROM

There are two ways you can use which will generate this docker file automatically.

FROM baseimage

COPY /var/www/html/app.jar /app.jar

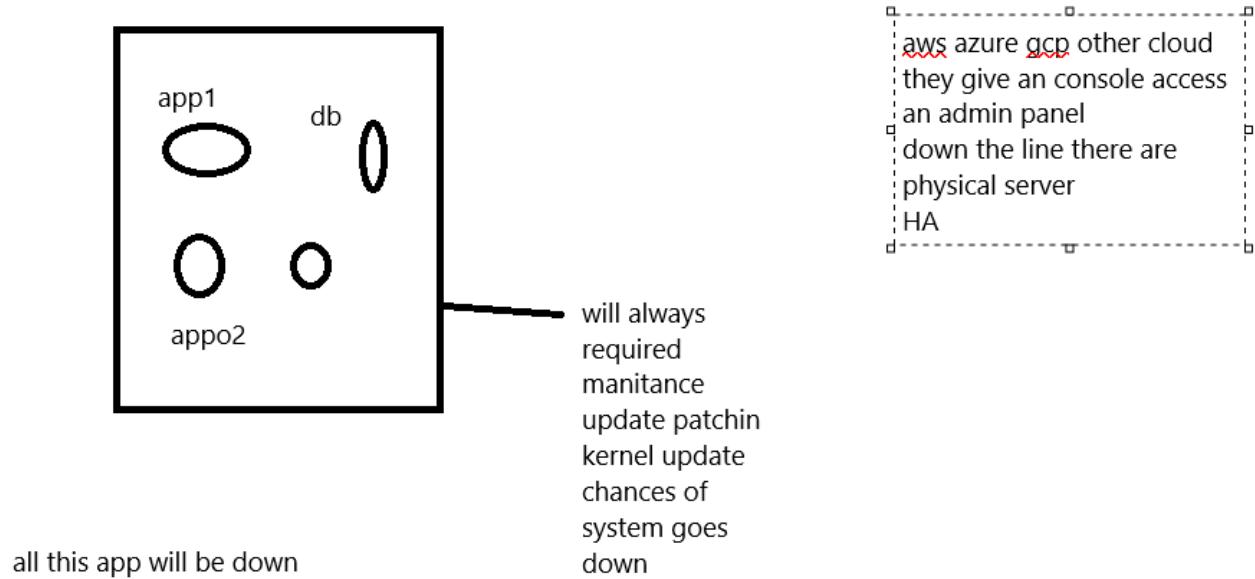
EXPOSE 8080

ENTRYPOINT java -jar app.jar

Python app.py

Kubernetes

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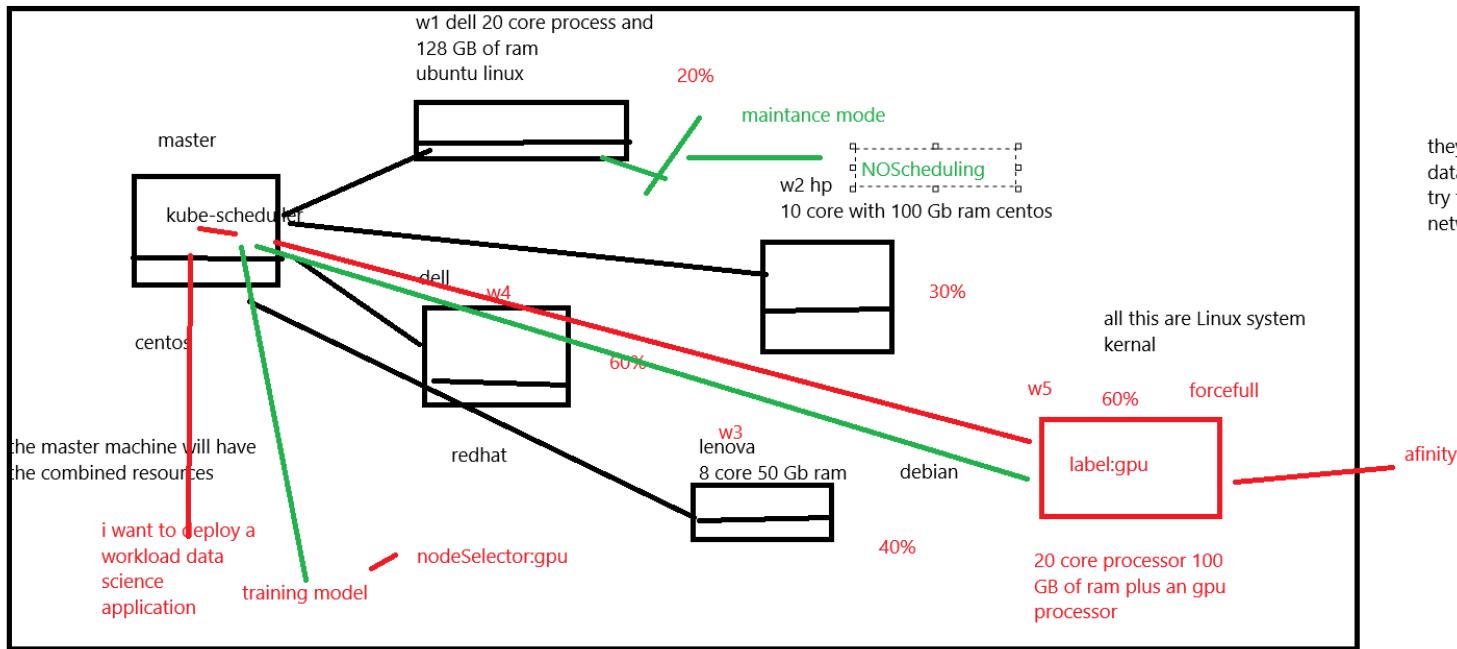
Kubeapi

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To communicate with your windows machine we use rdp
To communicate with your linux machine we use ssh
But to communicate with k8s we strictly use api call.
Api call are secure way to communicate only the desired resource is available.
I want to upload a file in youtube or any social networking.
All the communication to api happen using curl open ssl

Inside your k8s cluster we want to run an container based image.
Image is in tar format you cannot do an api call to tar format.

Specialized api pod api



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It will download the image in the cluster.
It will convert that image into a container.

Demo

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We will create a kubernetes cluster with master and worker node.

Fully managed cluster aks eks gke

The master component will not be visible it will be available to be managed by the cloud service.

They will create three master do load balancing

We are going to learn about unmanaged k8s cluster

We will create two vm of ubuntu 1. k8s master

K8s node

Kubectl get

Kubectl describe

Kubectl delete

Pod

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It is an api used to interact with your k8s cluster. This is an minimal api used to deploy your workload in k8s cluster

Workload is your container image

K8s do not understand an image as the communication happen inside your cluster using something called as kube api server

Using the pod manifest file it will convert your container image into an runnable container inside your k8s cluster

Afer k8s 1.22 version they stop supporting docker ee

#there are other container engine

Crio

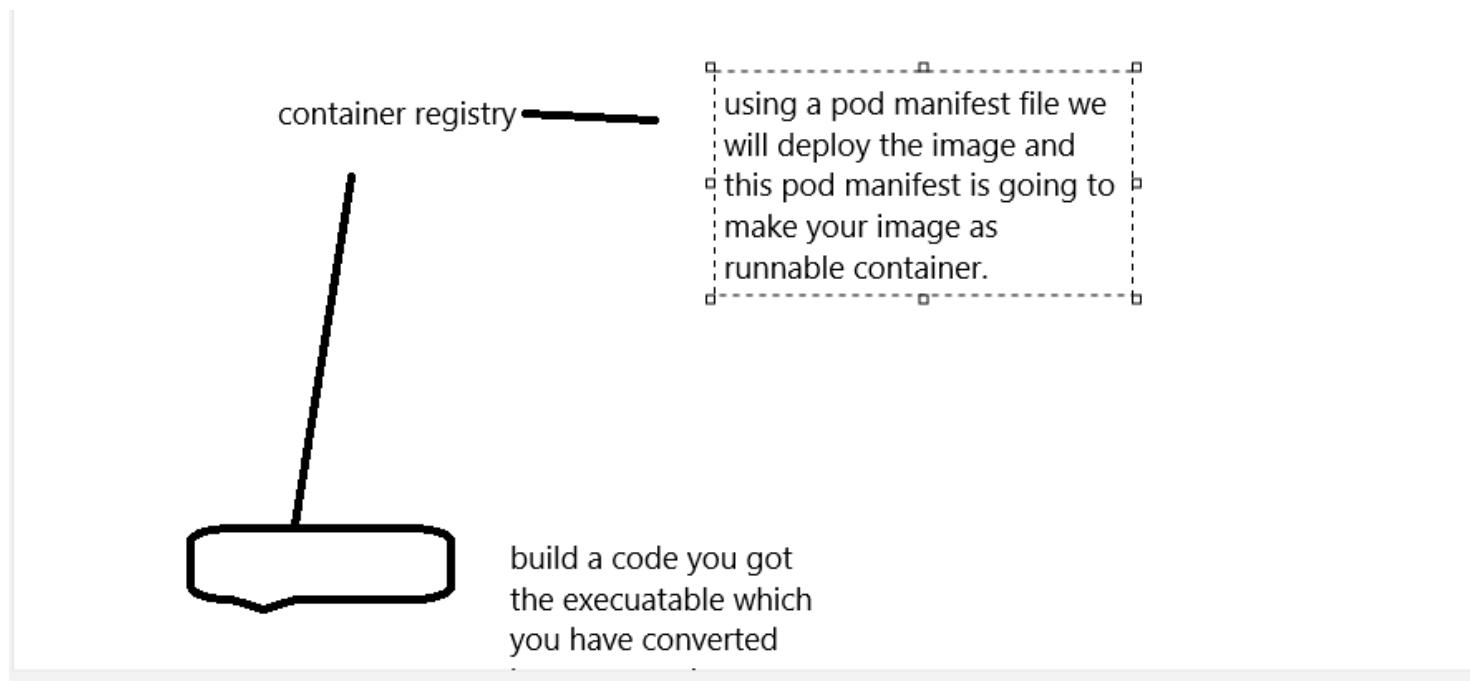
There make there container engine as an open source not the command line

So a new command line has been created by this crio engine

cricctl

Lets deploy our workload in k8s

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Image registry
Gitlab
Jenkins
Azure devops

Lets create our first workload

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Inside your k8s cluster
I need to keep one thing handy
The image ready
Keep where the image is located

All the manifest file inside your k8s cluster are being created using languages like yaml or json.
Yaml. How to do indentation in yaml
Exactly two spaces
How good you people are writing an yaml

Demo

1. We have an image already available to us.
2. We need to create a pod.yml file and add my image and deploy it.

Deployment

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To make your environment HA to make your pod HA

We need something called as replicaset in k8s a clone or copy. Of the same object.

Pod do not have the replica functionality

Replicaset

You write a manifest for pod and you write an manifest for replicaset and link it is quite difficult

From k8s 1.44 version they integrate

Deployment=pod+replicaset

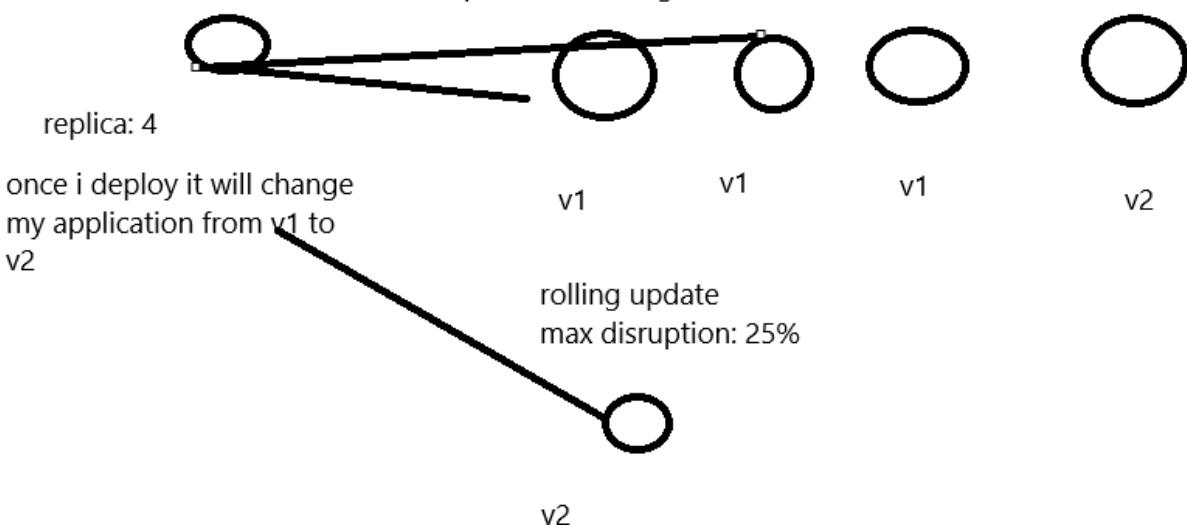
It provides an declarative updated for pods and replicaset

You describe a desired state in deployment and the deployment controller changes the actual state to the desired state at a controlled rate

Use case

1. Create a deployment to rollout replicaset the same pod can be replicated multiple times.
2. Declare the new state of the pod

v2 check the health of the pod it is running or not



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Rollback

Replica set: we can do manual scaling and autoscaling

Recap

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We learn about k8s architecture.

Master node and worker node

Component of master node and worker node.

All the component is k8s run using containers.

Crictl ps

We learn about pod in k8s.

It help you deploy your container image inside your k8s cluster using a manifest file

We learn about deployment in k8s

Deployment=replicaset+pod

Means it will create replica of the pod

Which can help to update the pod. If the pod got down it will start a new one.

Deployment

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With deployment we have benefit of rolling update

Service

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Deployment create pod inside your k8s cluster

But this pod need networking.

1. Fromntend react mysql the communication will be internal ClusterIP
2. If you want to expose your application using an node machine we use NodePort
3. Load Balancer: but this will be supported by only fully managed k8s cluster. AKS EKS GKE
4. We create deployment I want to expose the deployment outside my k8s cluster

We need to see that svc is distributing traffic to multiple pod

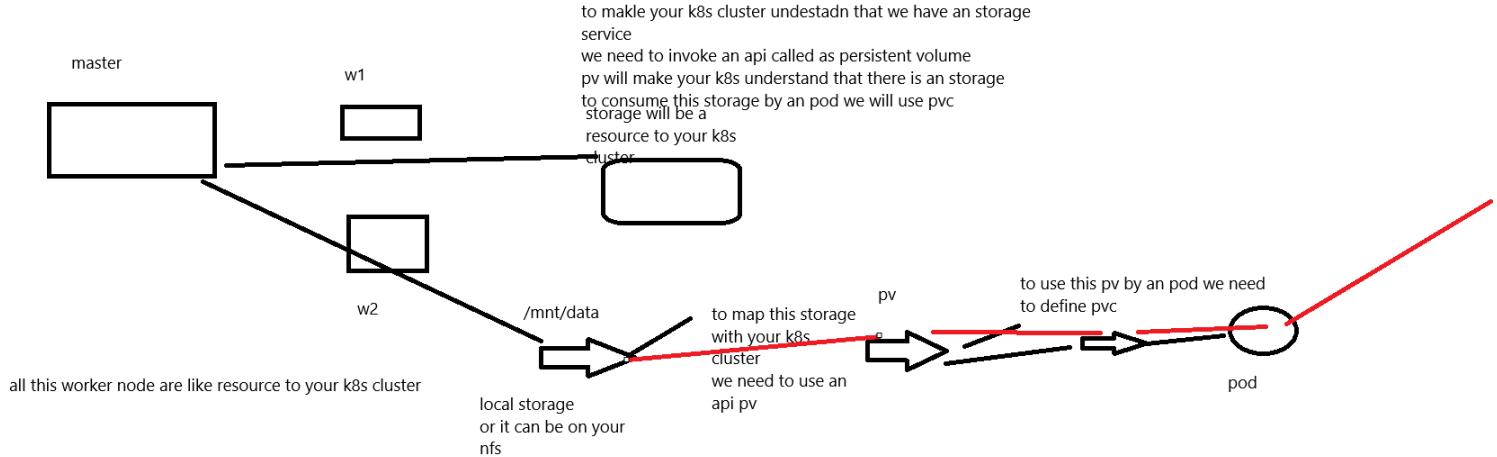
Kubernetes Project

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Pv and pvc

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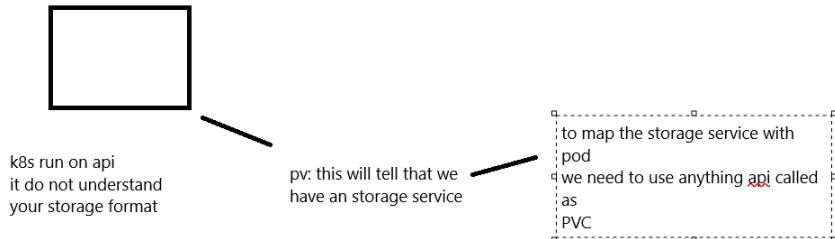
#kubernetes we do api call
When we talk about storage they do not understand this api call.
Windows zfs linux ext3
So I need to make my k8s cluster understand that there is storage



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Inside your k8s cluster all the application use a storage which is ephemeral in nature. If you delete the pod storage will be deleted
But I am deploying an db I always need persistent volume

k8s cluster



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SIIS soft provisioning if I am using 3 GB max we can go upto 5GB
5GB to a virtual Hard Provisioning 5 GB
5GB soft provisioning allocate 5 Gb to the vm-2 Gb of data but it can expand upto 5GB

Secret

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To login inside the database we need to pass on secret

Namespace in k8s

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They are like creating virtual cluster in k8s

default Active 27h #while creating a resource if you do not provide any namespace it will go inside default namespace

kube-node-lease Active 27h #it contains the pod related to node machine

kube-public Active 27h: this is the namespaces used to deploy your resource which available across your k8s cluster

kube-system Active 27h: all the system related pod are deployed int his name space

You can created dev test staging environment

You are working on multiple project you can create namespace for that project.

Using the namespace

Dev namespace I want to allocate quota.

#you are running an crm application salesforce

#this sales force is used by multiple organtion

Org1 login they will have access to there pod only

Role Based Access Control

Inside your k8s cluster all the pod can communicate with each other freely. We can create network policy

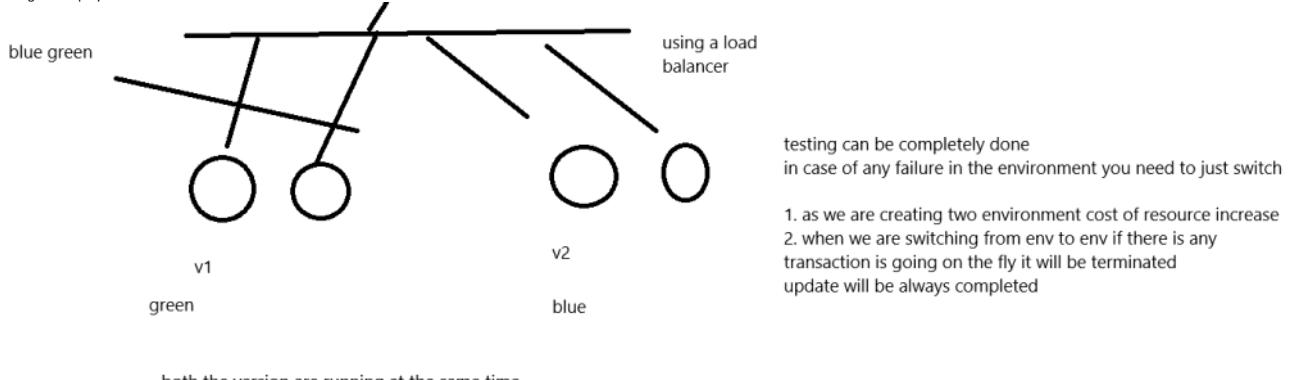
Ingress routing

Egree routing

Deployment strategy

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Blue green deployment



testing can be completely done
in case of any failure in the environment you need to just switch

1. as we are creating two environment cost of resource increase
2. when we are switching from env to env if there is any transaction is going on the fly it will be terminated
update will be always completed

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Helm chart is an package manager in k8s

Helm chart

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CRM

Makemytrip want an CRM package

Where there

20 different deployment

20 different service

10 pvc

10 pv

15 secret

Apply all this files one by one

Helm is an package manager in kubernetes

helm install vault hashicorp/vault

Helm uninstall vault

Statefulset