DevOps

What is devops?
Development and Operation….
SDLC: software development life cycle.
Mass production.
Quality
Quality of software is very important.
Automation
1. Planning and requirement gathering
2. Design
3. Development
4. Testing
5. Deployment and maintenance.
    So that I can build an quality software.

    Waterfall model.
    Customer will always get an finished product. No changes.

    Now a days this will not work.
    We need an model where as per the customer requirement we need to make changes in the app.
    We move to a methodology agile as per the customer requirement we are making changes in the app.
    This new feature should work

    Agile specific to development side.

    Operation are being left.
    When you make changes in your application mutliple times it need to be deployed multiple times.
    Cloud
    When you need it you can create the resource when you don't need it you can destry it in second.

    You spent day an night in building the app.
    You can deploy your app immediately.

    Devops
    1 person can manage the development and operation
    A single app require a team dev operation

    It consist of tools which we are going to used to do faster deployment with quality of the application.

Devops

1. Culture
2. Using of tools chain.
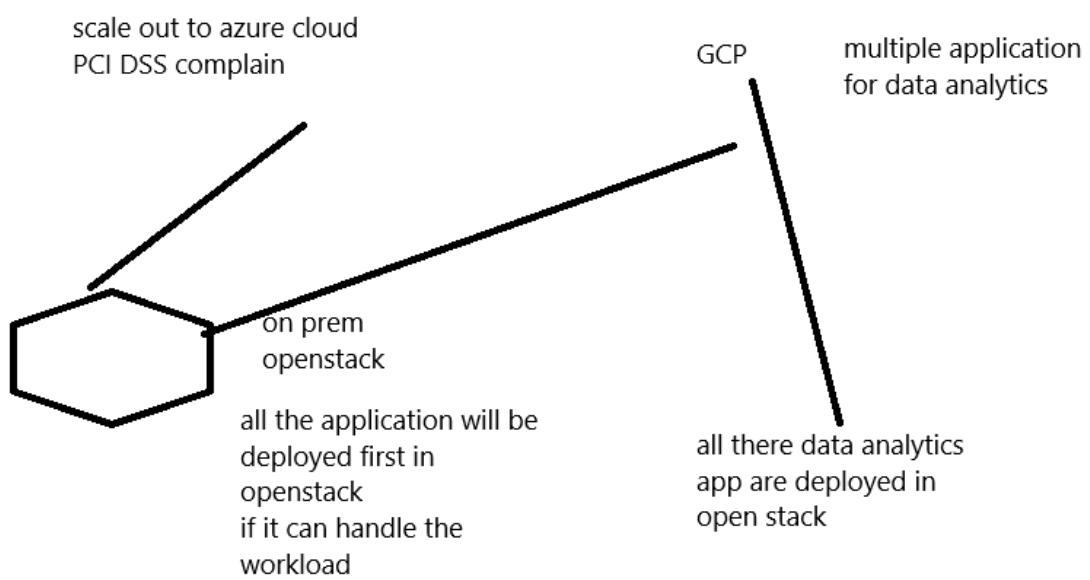
Developer
Start working on new project. You will always deploy the project in cloud. Aws cloud. Adas2 with a new feature if you driving your car suddenly you feel slipy the car will automatically start breaking.
Suddenly aws cloud goes down in midnight.
Eu usa law
Multi cloud

Walmart.

scale out to azure cloud
PCI DSS complain

GCP   multiple application
for data analytics

on prem
openstack

all the application will be
deployed first in
openstack
if it can handle the
workload

all there data analytics
app are deployed in
open stack

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SCM

Why you need an SCM?
There are two type of scm
Centralized distributed.
You need to connected all the time with your central server.
A tool to manage my code offline.
Git full power of versioning offline.
When you want to collaborate that time only you need to be online.

What is the need of a version control system from operation
Shell script
Python script
Terraform
Ansible
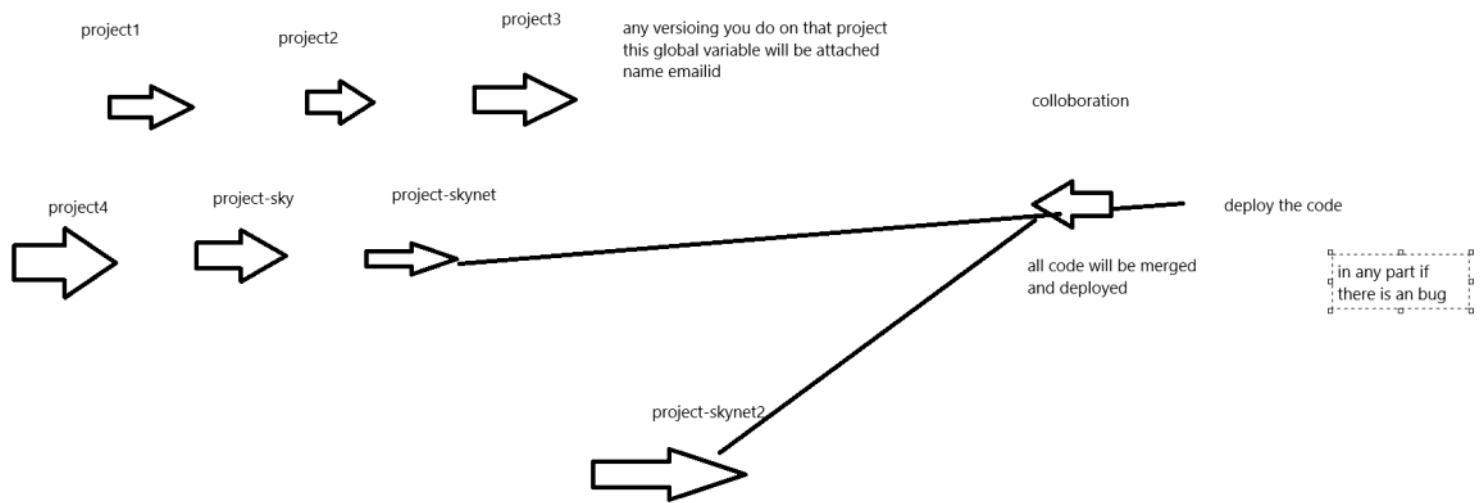
1. How to manage your code using git
2. Branching in git.

We will do an hands on approach

Git global varaibles

project1

project2

project3

any versioing you do on that project
this global variable will be attached
name emailid

colloboration

project4

project-sky

project-skynet

deploy the code

all code will be merged
and deployed

in any part if
there is an bug

project-skynet2
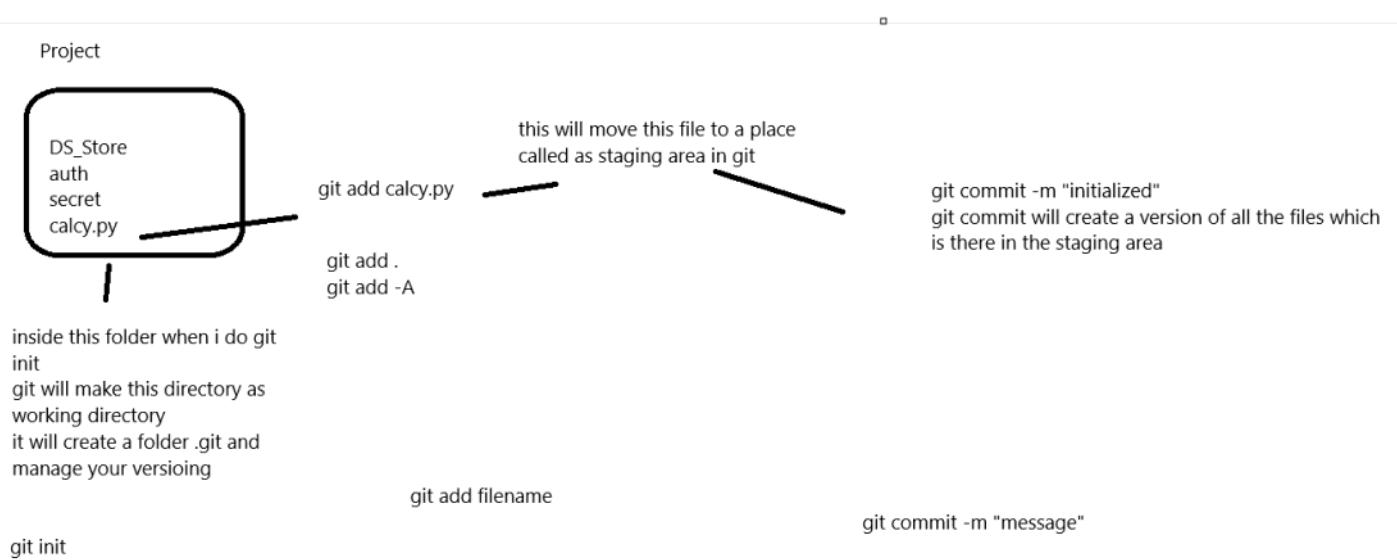
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We will create an folder add some file inside it

Git workflow

Project

DS_Store
auth
secret
calcy.py

git add calcy.py

this will move this file to a place
called as staging area in git

git commit -m "initialized"
git commit will create a version of all the files which
is there in the staging area

git add .
git add -A

inside this folder when i do git
init
git will make this directory as
working directory
it will create a folder .git and
manage your versioing

git add filename

git commit -m "message"

git init

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Create a search bar
Day 1 you have create the search bar for your application.
Day2: what it need to search

Github

Whatever changes you have done it is done in your workstation or local machine.

I want to colloborate my code with other or I want to store it in a remote repo.

Git and github
Git is always locally
Github you can storing your code to a remote repo

recap

What is DevOps?
Version control system
Distributed version
We learn about git workflow
Git init git add git commit
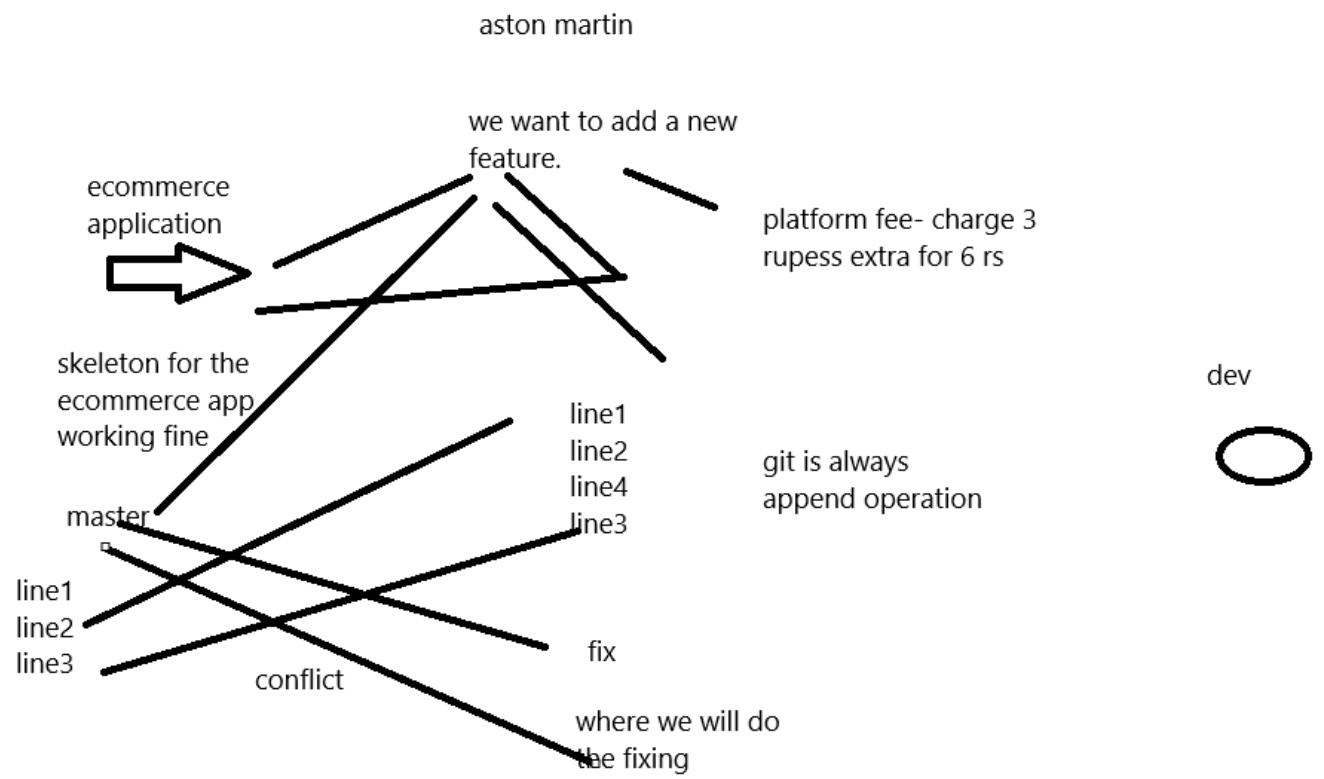
Git branching

aston martin

we want to add a new feature.

ecommerce application

platform fee- charge 3 rupess extra for 6 rs

skeleton for the ecommerce app working fine

dev

line1
line2
line4
line3

git is always append operation

master

line1
line2
line3

conflict

fix

where we will do the fixing

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Infra

Branching in git

to create a dev test staging and prod
environment.
IAC
terraform or CFT
you have created a well written
template
dev test stagin
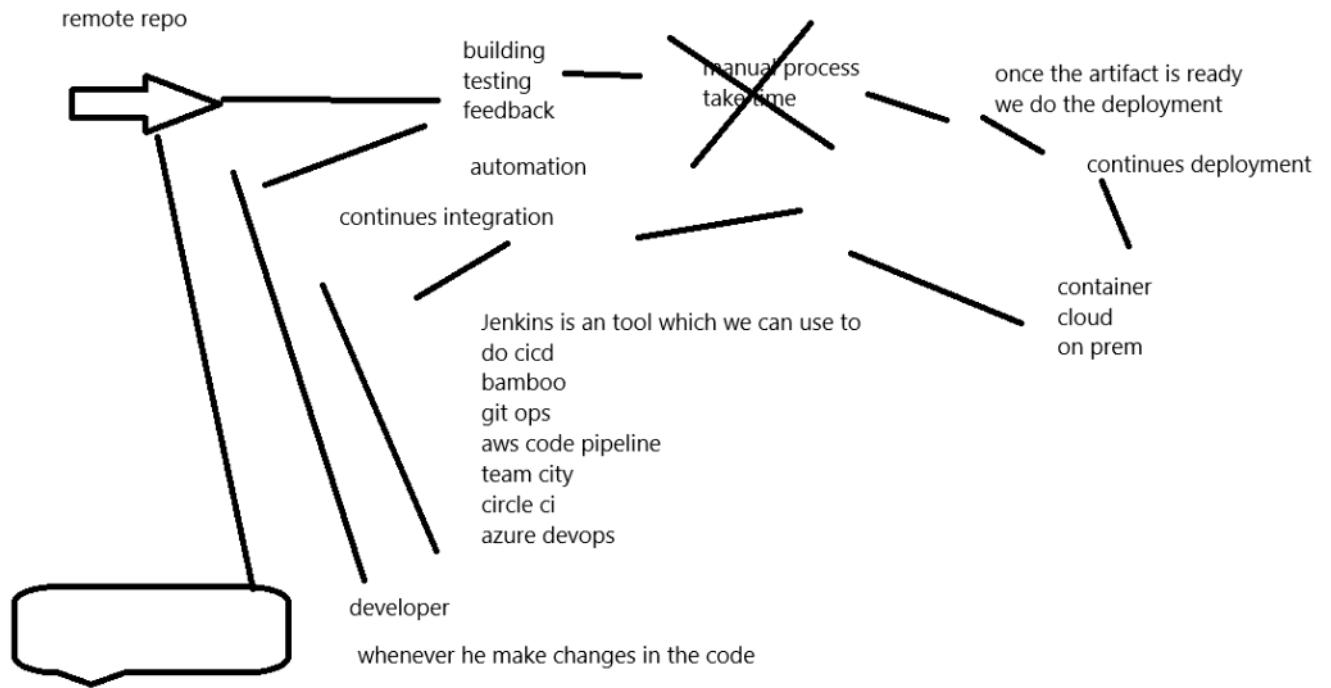
1. Demo on branching and mergin
2. Create a merge conflict

jenkins

Jenkins is an CICD tools
Which used to build quality application.

remote repo

building
testing
feedback

manual process
take time

once the artifact is ready
we do the deployment

continues deployment

automation

continues integration

Jenkins is an tool which we can use to
do cicd
bamboo
git ops
aws code pipeline
team city
circle ci
azure devops

container
cloud
on prem

developer

whenever he make changes in the code

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Azure devops

Azure boards
Azure repo
Azure pipeline
Azure artifactory
Azure test
Deployment you have azure cloud

Demo

1. We will setup the jenkins server
2. Clone one of my code
3. Upload the code in your github
4. Create a scripted pipeline in jenkins

Jenkins pipeline

1. We will clone an maven project
2. I will remove all the refrence to my git and reinstalized the project.
3. Generate the ssh key
4. Upload the ssh key in the github
5. Create a new repo and put the refrence to the repo in the project folder
6. And push the code to the github
7. Jenkins we will start building our piepline

In jenkins we are going to create an scripted pipeline

Discard old build

Artifact created which consume some spaces

I push my code multiple time together

Suppose I install an plugin or upgrade my jenkins server

Restart the jenkins server

Triggers : how the pipeline will start

Cron tab

Build peridically: if there is an change in code or not it is going to run your job

Poll scm: every 15 min it si going to look into your source code management check if there is a change in code or not if there is change it will build otherwise skip it

Jenkins pipeline : you need to write it in json format

Gitops

Azuredevops

Gitlab they required yaml syntax two spaces

Pipeline {

Containers

What is containers?
In cloud they will give you multiple tools to migrate but there is no portability.
You want an app to be build on a platform where you need to migrate easily.
Why we want to deploy our application in multi cloud.
Recently amazon is down. Snapchat. Deploy there app in multi cloud to avoid failure.

Azure goes down
Cloudflare CDN
Walmart retail store in usa people life depend on this retail store.
Whenever we deploy our application for ha we are deploying it in multiple cloud
2x2x2
Will be deployed in two different 1. on premises openstack 2. app goes to azure
Inside the cloud they are deploying it in two different zone region
Inside the region they are ensuring it get deployed in two different az data center
HA
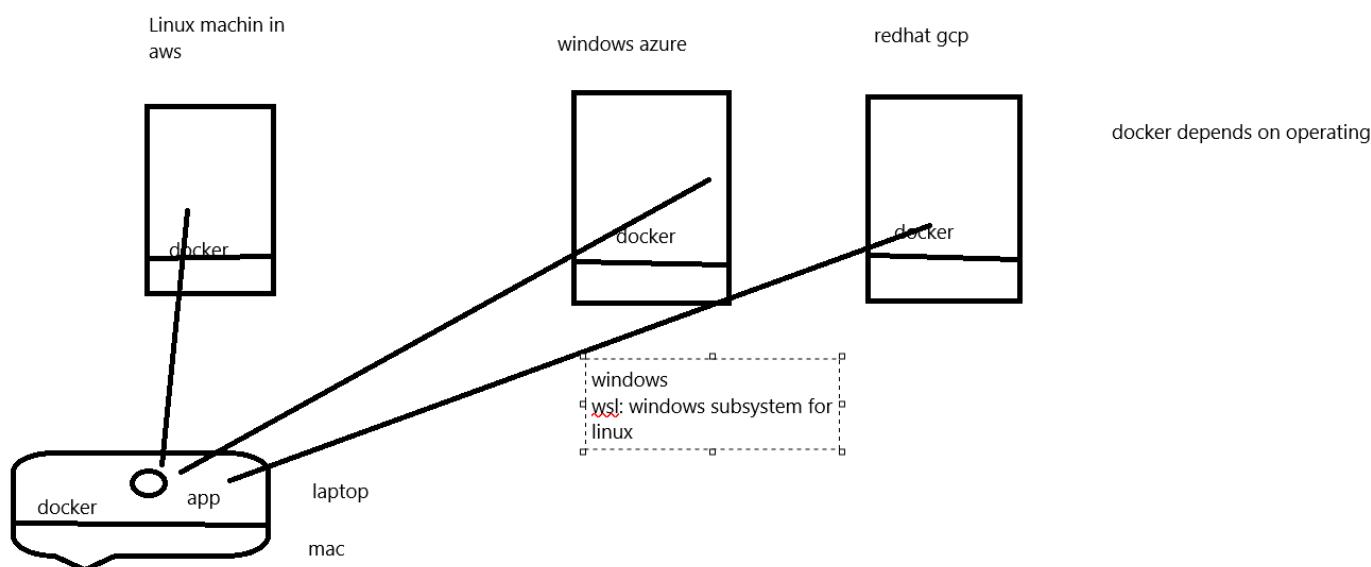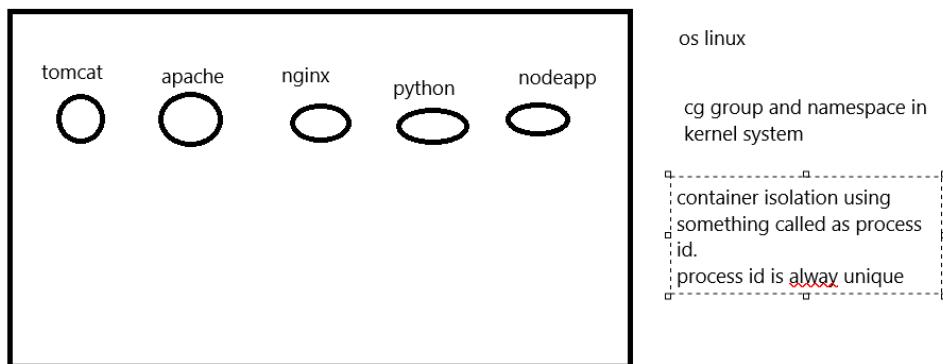
But the problem is every cloud has its own hyper v kvm hyper
Withought making any changes we can easily deploy the app.

Container become the suitable option.
How container can help you to deploy your app in multi cloud

Linux machin in aws

windows azure

redhat gcp

docker depends on operating

docker

docker

docker

windows
wsl: windows subsystem for linux

docker   app   laptop

mac

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tomcat   apache   nginx   python   nodeapp

os linux

cg group and namespace in kernel system

container isolation using something called as process id.
process id is alway unique

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Docker installation
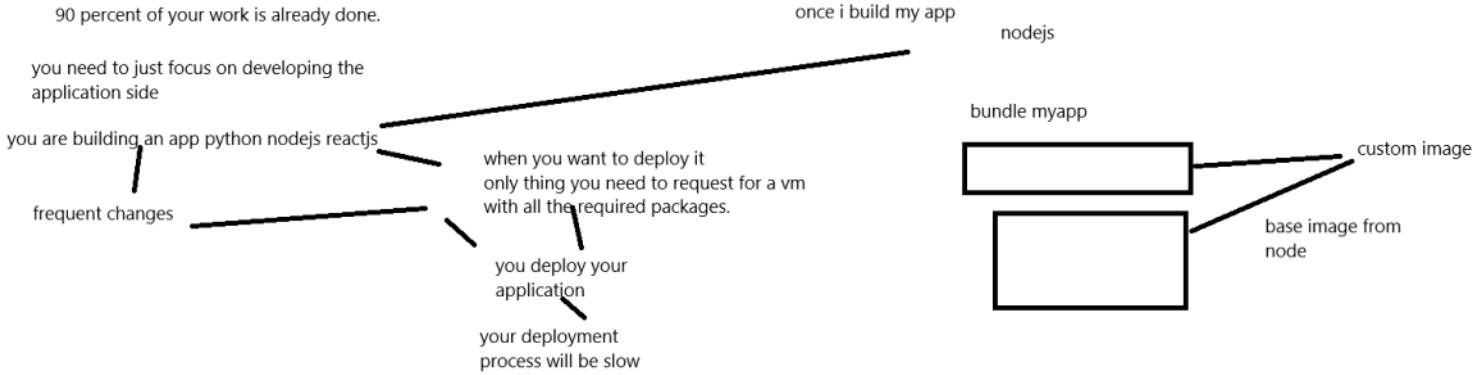
Only docker installation is quite different on different os
Rest working with docker is same

Docker demo

We will install docker and start working with containers.

```
[root@ip-172-31-97-195 ~]$ docker container run --detach --publish 80:80 nginx #is the name of the
image
#docker container run will always create a new container for you
Unable to find image 'nginx:latest' locally #local repo the image is not available
latest: Pulling from library/nginx #start pulling from library
119d43eec815: Pull complete
57f0dd1befe2: Pull complete
eaf8753feae0: Pull complete
700146c8ad64: Pull complete
d989100b8a84: Pull complete
500799c30424: Pull complete
10b68cfefee1: Pull complete
785250c9bf9e: Download complete
e2dd2dbe6277: Download complete
Digest: sha256:c881927c4077710ac4b1da63b83aa163937fb47457950c267d92f7e4dedf4aec #create an
container for you
Status: Downloaded newer image for nginx:latest
6dfadb227f99160a9e54686437c700835c771a20d945df4e1b188612b83b6d84
[root@ip-172-31-97-195 ~]$ docker ps #this command will show the running container
```

90 percent of your work is already done.

you need to just focus on developing the application side

you are building an app python nodejs reactjs

frequent changes

once i build my app

nodejs

bundle myapp

custom image

base image from node

when you want to deploy it only thing you need to request for a vm with all the required packages.

you deploy your application

your deployment process will be slow

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```
CONTAINER ID  IMAGE   COMMAND          CREATED      STATUS        PORTS
NAMES
6dfadb227f99  nginx   "/docker-entrypoint...."  3 seconds ago  Up 2 seconds  0.0.0.0:80->80/tcp,
[::]:80->80/tcp   romantic_feistel
[root@ip-172-31-97-195 ~]$
```

Real time scenario

I have personal file photos
Where do you store those personal file an photos
Sometimes this file get leak
You getting junk request

Inside your contianer you need to always create an end to end solutione.
If you application then only containerized it.

-- detach

Container are running as process
By default container are running as a process --detach will make that container run as background process.
It will run as foreground process
Lets see the container are running as process id or not

Lets create an mysql container and check the logs and volumes

By default when you create a docker container the volumes are in epehrmal stage
If you delete your contianer the volume get deleted
But sometime we required persistent volume.
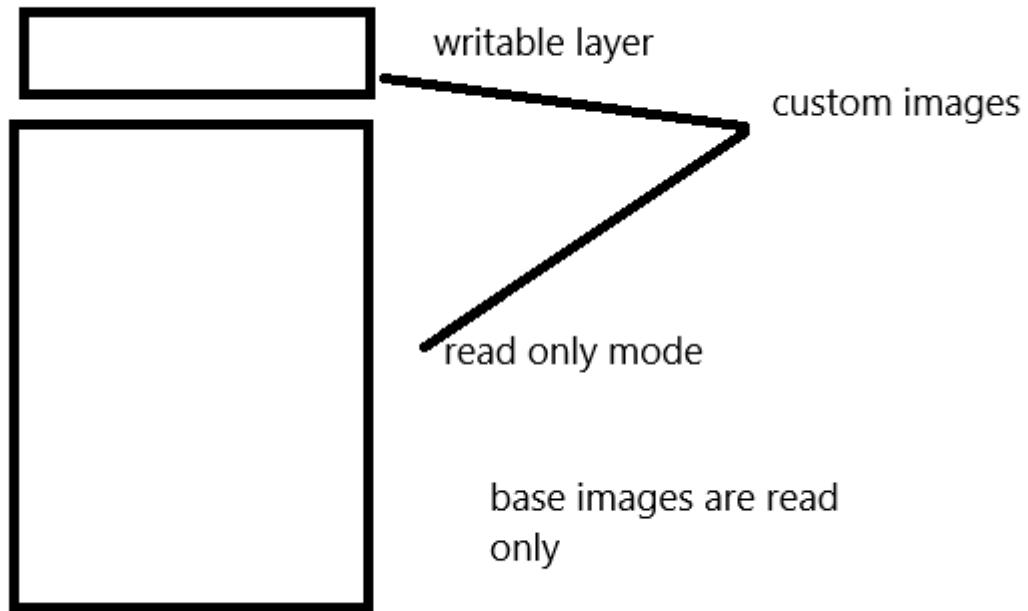
1. We will create a mysql container map it with a storage account.
2. Login inside mysql container create a database and we will see the mount point and the database will be created as a folder in your local machine
3. Exit the container
4. Delete the container
5. We will re create a a new mysql container with new version
6. Again login inside the contianer it should mount to the same volume

Custom images

By default all the images are in read only mode

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There are multiple ways to build it
1. First one using a docker file
2. Plugin availbale in maven which you can use it to build your custom images
3. heroku
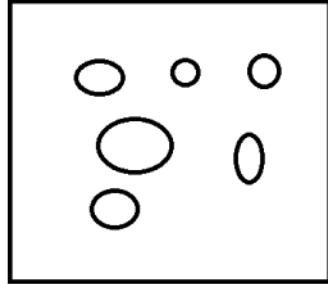
Container orchestrator
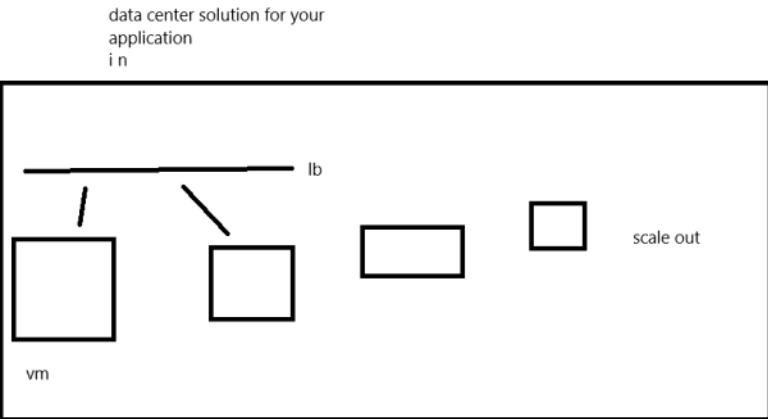
Container orchestration

In your cicd pipeline when you want to deploy your application. We always used to deploy in a vm or a bare metal physical server.
We can run one single application.
To run multiple app we container it and running using process id.

data center solution for your
application
i n

this vm always required
update patching
this time we will have
multiple app downtime

lb

vm

scale out
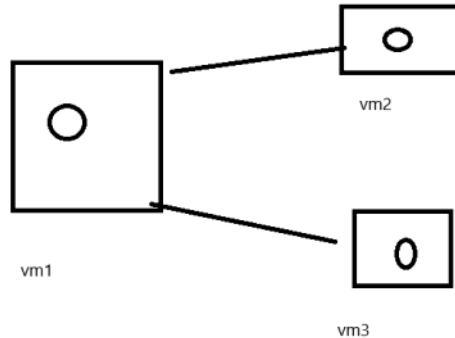
i need a data center
solution for my container
based application

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vm2

vm1

vm3

Kubernetes
is an data center
solution for your
container based
application.

scale out your container
based app
ha

They should go deep dive on k8s
Stable
Networking: subnettting incoming and outgoing routing works cloud
storage

Microservice

Monolothical architecture: everything is tightly integrated together. Banking system. Transcation to encyrption approval. They have to take a downtime.
Where as ecommerce appliczAtion they are micro service.

Landing is an service
Payment gw
Logitcs
Inventory
Dispatch
  1. You can use any language to build it
  2. Your code size will be reduces
  3. You can easily rectify the same
  4. Inventory service
Container run time
Docker engine. Contianerd
Pod man
Crio

How to communicate with your k8s cluster
How do we communicate with windows vm: RDP
How do we communicate with linux vm: ssh
We get full access to the server
What is api based communication only the required information is avaialbe
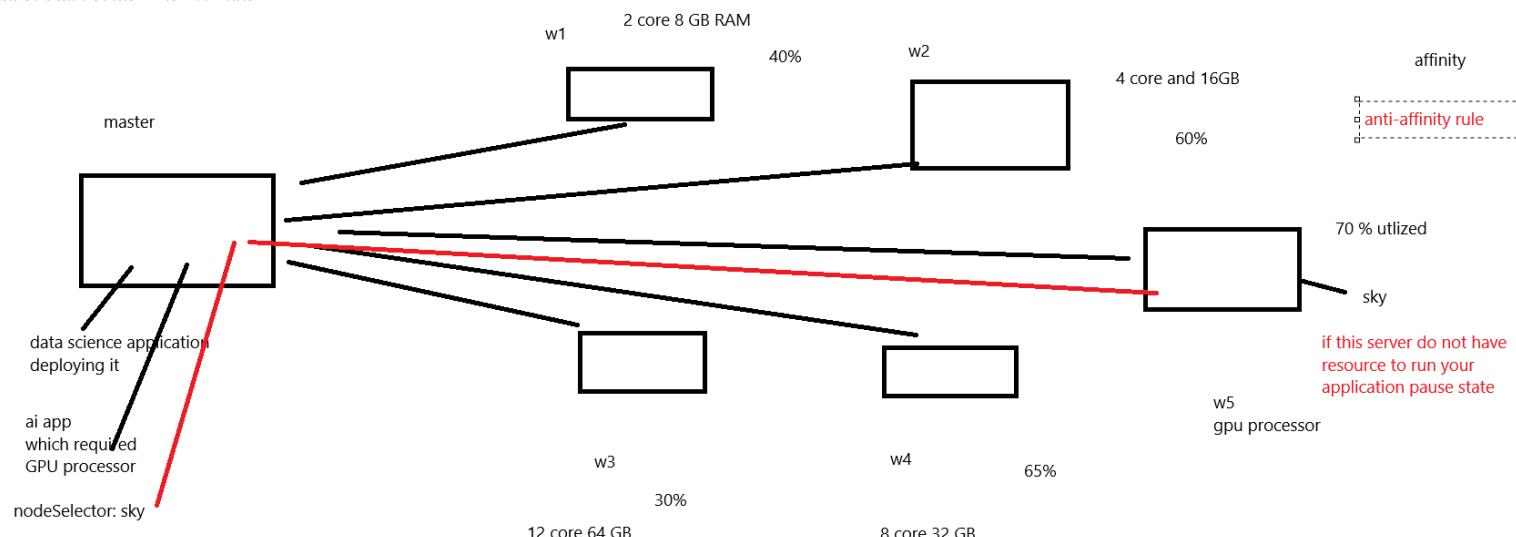
Currently I am running k8s 1.34 server
There is an new version of k8s release 1.35
Before you upgrade your k8s cluster you need to take the back of etcd. Then only upgrade your cluster
Restore the etcd the cluster will be in blank state

2 core 8 GB RAM

w1

40%

w2

4 core and 16GB

affinity

60%

anti-affinity rule

master

70 % utlized

data science application
deploying it

sky

ai app
which required
GPU processor

if this server do not have
resource to run your
application pause state

w5
gpu processor

nodeSelector: sky

w3

w4

65%

30%

12 core 64 GB

8 core 32 GB

Kube-proxy

All the communcation in your k8s cluster will be done by kubeproxy
1. Front end logic db contianer on an internal network : clusterIP
2. Using a node machine NodePort
3. Lb
4. gateway

Pod

What is pod in k8s?
Inside your k8s cluster all the communication will happen using api server http request get put
But ultimately we are going to run a container inside your k8s cluster.
But the source of your contianer is image which is in tar format
Pod api will help you to convert your container image into an runnable object inside your k8s cluster.

K8s cluster

1. We will setup an k8s cluster
2. And we will create pod and deployment in k8s and expose our pod using node port in k8s
3. Namespace

Docker 2017 they sold themselves to miranthis
There are differnet tools avaialbe to do the same activity
Crictl
Ctr

Kubectl get object
Kubectl describe
Kubectl delete
Kubectl apply -f

Workload in k8s

This is an single cluster
All of us has login inside the cluster
How we can bifurcate the workload inside your k8s cluster
Project-sky
Every one has individual role
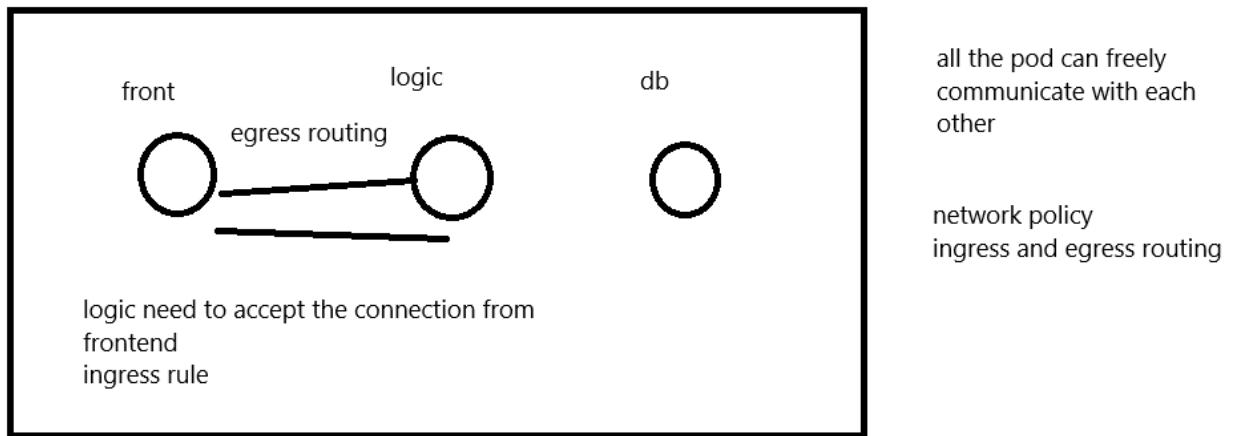
Inside my k8s cluster I want to create a dev test staging

We need to create something called as namespace
1. Using namespace you can allocate quota cpu ram storage quota
2. RBAC: Role based access control also in the name space read only

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3. Network policy using the namespace

Namespace

We will create a namespace
NAME   STATUS   AGE
default   Active   51m : when you create a pod and do not provide a namespace it will always goes to
defaulk
kube-node-lease   Active   51m : all the pod related to node
kube-public   Active   51m
kube-system   Active   51m: all the system related pod will be inside this namespace
[root@ip-172-31-98-106 ~]$

Pod

But to create a pod inside your k8s you need to write it in yaml format
Sytax based where I can generte the yaml syntax

When we deploy our workload in k8s we always want that it should be ha
If I delete the pod also it should come back

Deployment

Deployment is combination of two different api
Pod+replicaset will be controlled by replicacontroller which will ensure that your pod is running all the time if you delete it also