Docker

* Container tools
  + lxc, Docker,containerd etc.
* Docker Engine Installion
  + Manual deployment of Docker CE on Ubuntu
  + Automate deployment with help of Vagrant
* Basic introduction to Docker Engine
  + Different between Desktop and Server
  + version check
  + default locations
  + commands execution
* Docker architecture
  + Docker daemon
  + Docker client
  + Docker registry
  + Docker objects
  + images
  + containers
  + networking
  + Services
* Underlying technologies of Docker
  + namespaces like pid,net,ipc,mnt,uts
  + cgroup
  + UFS (Union File System)
  + Container format like libcontainer, BSD jails etc.,
* Images and container management
  + docker image registries (like Docker Hub, JFrog, ECR, ACR etc.,)
  + docker image pull/push
  + container creation
  + Sample application deployment like web server
  + Basic things that to be considered while working with images and containers
* Docker networking
* Docker Engine network types
  + host
  + bridge
  + null
  + overlay
* Docker storage
  + Basic understanding of emphemeral and persistent storage
  + Types of volume mounts
  + Bind mount
  + Volume mount
  + tempfs mount
* Backup and restore of Images, containers, and Docker/Application data
* Building custom images
  + Dockerfile parameters
  + Develop custom image through Dockerfile
  + Convert container into Image
  + How to store Images in Container registries
* Registry management
  + Docker Hub
  + Gitlab registry
  + Local registry
* Docker compose and Docker swarm
  + Building compose file for orchestration of application deployment
  + Docker machine management
  + Deployment and understanding of Docker Swarm cluster
  + Difference between docker swarm and kubernetes
* Task
  + Deployment of application like nginx, mariadb and jenkins
  + Deploy wordpress as webserver and database for storage using Dockercompose
  + Deployment and understanding of Docker Swarm cluster
  + Deploy Node.js application with custom Dockerfile
* JSON and YAML core concepts
* what is JSON?
* how to write a JSON file and validate for testing?
* what is YAML?
* how to write YAML files and validate for testing?

### Kubernetes Deep Dive

* kubernetes components and responsibility controller nodes
  + kube-apiserver
  + kube-control-manager/cloud-control-manager
  + kube-schduler
  + calico,flannel(deprecated from 1.18),wavenet etc
  + coreDNS
  + etcd key-value pair storage
  + kubelet
  + kube-proxy
  + Docker Engine/containerd/cri-o etc
* kubelet
* kube-proxy
* Docker Engine/containerd/cri-o etc.
* Deployment of kubernets cluster using Minikube or Kubeadm
* Three nodes (1 for controller and 2 for compute nodes)
* POD object creation using single container and multi-container
  + Understanding common networking and common storage in POD (shared namespaces)
  + Sample application deployment using nginx for single container in POD
  + Multi-container deployment, one for webapplication and second for data pull
  + POD creation with initContainer advantages for pre-request
  + static POD deployment
  + Deploying application from Private repository
  + resource allocation like CPU and MEMORY
* ReplicationController object (RC)
  + When to use replication controller?
  + Disadvantages of deploying application with single POD
  + When to use replication controller?
  + Understanding template and selector parameters
* Replica Set object (RS)
  + Difference between Replication Controller and Replica Set
  + Advantages of adding match Labels
  + when to use replica Set?
* Deployment object (deploy)
  + Advantages of Deployment over POD, RC and RS
  + Sample application deployment like Jenkins, nginx and capture the advantages over other objects
  + Scaleout and Scale in for Deployment
  + Deployment Strategies like Rolling Update and Recreate difference
  + Rollout, Rollback and Rollout History of deployment
* Daemon set object (DS)
  + DaemonSet usecases over deployment object
  + Advantages of using monitoring tools to deploy through DaemonSet object
* StatefulSet object (sts)
  + Difference between stateful and stateless applications
  + StatefulSet application deployment advantages
  + Scaleout and Scalein for Deployment
* volumes
  + Empheimeral and persistent storage differences
  + Different types of volume plugins like emptyDir, hostPath, NFS etc.,
  + Do's and Dont's of using volumes for application deployment
* PersistentVolume, PersistantVolumeClaim and StorageClass (PV and PVC)
  + Advanatages of using PV over volume plugins for data dependent applications
  + Static and Dynamic PV creation
  + PVC assignment in POD, Deployment, Daemonset, StatefulSet objects
  + StargaeClass creation for Dynamic provision
* Services (svc)
  + Exposing application running on different object through service
  + Understanding difference between ClusterIP, NodePort, Load Balancing,
  + When to use these different types of services?
* secrets and configmap (secret, cm)
  + How to pass sensitive data through secret like certs, password, token etc.,
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  + Using secret in POD object through env and volumes
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* Ingress (ing)
  + Access application deployed with the cluster through IngressController
  + Deploying Nginx IngressController
  + Ingress rules creation secured and non-secure communication
* Horizontal POD AutoScalling (HPA)
  + HPA deployent to test auto scalling
  + Deployment of metric server to achieve HPA
* Scheduling and probes
  + Different types of scheduling like nodename, nodeSelector, podAffinity, podAntiAffinity, nodeAffinity
  + Advantages of using liveness, readiness and startup probes to verify application availability
* Jobs and CronJobs
  + Jobs responsibility
* Networking Rules
  + How to use flannel for POD networking and Calico for network security
  + network policy
* Authetication and authorization
  + authetication
  + user, group and serviceaccount (token), certs
  + kubeconfig entries and access multiple cluster through kubernetes config file
  + autherization
  + Role Back Access Control (RBAC), ABAC, Node, Webhook
  + Role, RoleBinding, ClusterRole, ClusterRoleBinding
* Dashboard
  + deployment of kubernetes dashboard and creating kubernetes object through dashboard
  + How to authenticate to dashboard through token and kubeconfig
* Task
  + wordpress and database application deployment
  + Jenkins deployment with data persistent after upgrading/downgradeg
  + Backup and restore of etcd service data using cronjob
  + kubernetes upgrade from one version to another (1.20.1 to 1.20.2)
  + maintaince task using taint and toleration
  + Automate application deployment with the help of GitOps and ArgoCD
* Addon.,
* Helm charts
  + what is chart and maifest?
  + helm architecture and components
  + helm configuration and repo setup
* helm application deployment
  + Deploy nginx web application with custom values
  + Rollout and Rollback application using helm cli
  + test applications deployed through Helm using #helm test
* helm custom chart development
  + helm default directory structure
  + how to call data from Chart.yaml and values.yaml file to templates
* Deploy monitoring tools using custom helm charts
  + EFK deployment (ElasticSearch Fluentd and Kibana
  + Installation using helm chart
  + Configuration and log search in Kibana Dashboard
* Prometheus and Grafana
  + Installation using helm chart
  + Configuration and fetching logs
  + Grafana dashboard configuration /
  + use precreated dashboard
* GitOps Tool
  + ArgoCD
  + Installation
* ArgoCD deployment on kubernetes cluster
* Integrating GitHub with ArgoCD for Continues Deployment