**COURSE: Kubernetes Advanced Topics’ Training**

|  |
| --- |
|  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Pre-Requisites   |  | | --- | | * Knowledge of Linux Basic Command is Must * Knowledge of Docker Architecture & Containers are must * Knowledge of Networking Technology Specially Subnet-mask * Knowledge of Vi Editor is must * AWS accounts (This training will be 80% hands-on. So that might cost some billings in respective AWS account as EKS & dependent services are paid in AWS)   Course Outline | | **DAY 1: Kubernetes in Detail** | | • What is Kubernetes  • Difference between different Container Orchestraters  • Setting up Kubernetes Cluster  • Introduction to Kubernetes Master  • kube-apiserver  • etcd key-value store  • kube-scheduler  • kube-controller-manager  • cloud-controller-manager  • Components of Cloud Controller Manager - Node Controller, Volume Controller,  Route Controller, Service Controller  • What is a Node?  • Introduction to Node Components of Kubernetes  • kubelet, kube-proxy & kubectl  • kubectl basic commands  • What are YAML files? | | • Introduction to Pods  • Why do we need a Pod?  • Pod Lifecycle  • Working with Pods to manage multiple containers  • Pod Preset  • Name, Namespaces, Labels & selectors, Annotations  • Replicaset & Replication Controllers  • Deployments  • Rollback Deployments  • Canary Deployments  • Blue Green Deployments  • Deployment Controller  • Scaling out a deployment using replicas  • What is a Service?  • ClusterIP, NodePort & Load Balancer  • Create different types of services  • Add ha-proxy to configuration file as proxy to expose the application  • Expose the service outside the cluster using ha-proxy for your pods & deployments  • Update the image of the application and again repeating deployments & expose  • Delete the services created  **DAY 2: Kubernetes Advanced Topics**  • Storage Class  • Persistent Volumes & Persistent Volumes Claims  • Horizontal & Vertical Scaling  • StatefulSets  • Daemon Sets  • Config Maps  • Jobs  • Namespaces  • Taints & Tolerations  • Kubernetes Liveness & Readiness Prob  • Resource Usage Monitoring  • Autoscaling  • Affinity / Anti-Affinity  • Interpod Affinity and Anti-affinity  • Kubernetes Security  • Kubernetes Cluster Networking  • Understand Layer 2 networking, Layer 3 networking  • Understand Overlay network, VXLAN, Encapsulation, Mesh Network  • Comparing Kubernetes CNI Providers: Flannel, Calico, Canal, and Weave  • Kubernetes Zero Downtimes  • Stateful & Stateless applications  • Kubernetes Dashboards  **DAY 3: Elastic Kubernetes Service (EKS) & Istio**  **EKS:**  • Introduction to Kubernetes in AWS  • Amazon EKS  • Amazon ECR  • Create an IAM User with Admin Permissions  • Launch an EC2 Instance and Configure the Command Line Tools  • Provision an EKS Cluster  • Create a Deployment on Your EKS Cluster  • Test the High Availability Features of Your EKS Cluster  • Integration with Elastic Load Balancing TO expose and handle load of your  applications from/to the internet  • Integration with Auto Scaling Groups TO scale your infrastructure as needed  • Ingetration with CloudTrail TO Logging of all user and API activities  • Integration with Cloudwach to Monitoring and Control Plane logs  • Detailed IAM use for Authentication, Authorization, and permissions  • VPC Network Isolations, Security Groups, Network Access Control Lists (ACLs)  **Istio:**  • Istio Concepts  • What Is Istio and What Can It Do?  • Overview of Istio Components  • How Istio Does Its Job  • Istio in Kubernetes  • Deploying an Application  • Istio Routing  • Istio Policies  • Istio Logging  • Install Istio in Kubernetes and Deploy the bookinfo Application  • Verify That Routing Rules Are Working by Configuring the Application to Route to  `v1` Then `v2` of the `reviews` Backend Service  Introduction Envoy- The data plane  Deep Dive into Envoy  Kiali Deeper Dive  Kiali Dynamic Traffic Routing  Using Jaeger UI  Introducing Canaries  Canaries With ReplicasElegant Canaries and Stagerd Releases  Fault Injection  Troubleshooting Pilot Problems  Circuit Breaking  • Configure the Forwarder, Install Nginx, and Access the Grafana Dashboard  **DAY 4: Helm, Chart Museum, Tekton & Jenkins X**  **Helm, Chart Museum:**   * Helm package manager installation and configuration * Charts and Hooks * Custom Helm chart development * Create and work with Helm chart repositories * Helm architecture and interaction with Kubernetes RBAC * Helm Provenance and Integrity * Search and find charts from Helm hub and repo * Chart Dependency Management * ChartMuseum installation and configuration * Repository hosting options * Add Chart to Chartmuseum repository * Maintain Chart version * Maintain multiple Charts * Chart push plugin * Maintain github as repository * Add Charts to github repository   **TekTon & Jenkins X:**   * TekTon overview * TekTon pipeline in Kubernetes Cluster * How TekTon pipeline works * Tekton Pipelines in Cloud Native * Create PipelineResource * Create a Task resource * Create a TaskRun resource * Pipeline Authentication * Configuring an ImagePullSecrets for the service * Execute a PipelineRun resource * What is Jenkins X * Jenkins X Serverless Architecture * Jenkins X - automated CI+CD for Kubernetes * Provision your Kubernetes Cluster * Install the Jenkins X CLI * Install Jenkins X on your cluster * Create Custom Build Packs for Jenkins X   **DAY 5: Velero, Calico, Cert Manager, External-DNS, Clair, OWASP ZAP**  **Velero:**   * What is Valero * Backup and Restore EKS using Velero * How to migrate your Kubernetes cluster resources and persistent volumes. * On-demand and scheduled backups. * Create S3 Bucket and IAM Role for Velero * Install Velero * Deploy Test Application * Backup and Restore * Cleanup   **Calico:**   * Kubernetes Networking with Calico * Install and configure Calico. * Understand how Calico differs from traditional overlay networks. * Understand how Calico combines internet routing protocols with consensus-based data stores. * Use Calico to create a container networking solution for Kubernetes   clusters.   * Use Calico to provide network policy for Kubernetes.   **Cert Manager**, **Clair, External-DNS, OWASP ZAP:**   * What is Cert Manager * Cert-manager in a native Kubernetes certificate management controller * Installation & Configuration of Cert-Manager * Issuing Certificates with cert-manager * Clair Introduction & DevSecOps * Container Security with the help of Clair * How Clair Works * Clair and Kubernetes * External-DNS introduction * External-DNS Usage * Expose Kubernetes Service with External DNS and Route53 on EKS * Overview of OWASP ZAP * Vulnerability Analysis with the help of OWASP ZAP * OWASP ZAP usage on a host using Kubernetes as the platform * Create a Job that deploys a pod that will scan the Kubernetes host for any vulnerabilities.   **Q & A session**  **Assessment of the training** | |  |