Lab 2 Advanced Networking Techniques in Kubernetes

Lab Description:
In this lab, you will gain hands-on experience with advanced networking techniques in Kubernetes, including ingress controllers, network policies, and service mesh using Istio. You will learn how to configure and manage these features to control traffic routing, enforce security policies, and enhance observability within a Kubernetes cluster.

Lab Steps:
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Step 1: Install and Configure Ingress Controller

Install an Ingress Controller such as Nginx Ingress or Traefik in your Kubernetes cluster.
Configure the Ingress Controller to handle incoming HTTP/HTTPS traffic and route it to the appropriate services.

Step 2: Create and Configure Network Policies

Create network policies to control the traffic flow between different pods and namespaces.
Define ingress and egress rules to allow or deny specific traffic based on IP addresses, ports, or labels.

Step 3: Deploy and Configure Istio Service Mesh

Install Istio in your Kubernetes cluster using the official Istio installation guide.
Configure Istio to enable automatic sidecar injection and establish a mesh of service proxies.

Step 4: Implement Traffic Routing and Load Balancing with Istio

Create VirtualServices and DestinationRules to control traffic routing and load balancing within the Istio service mesh.
Test the routing rules and observe how traffic is distributed across different versions or subsets of services.

Step 5: Apply Security Policies with Istio

Define and apply Istio AuthorizationPolicies to enforce access control and secure communication between services.
Test the security policies to ensure that only authorized traffic is allowed between services.

Step 6: Enhance Observability with Istio

Enable Istio observability features such as distributed tracing with Jaeger and metrics collection with Prometheus.

Use the Istio control plane to monitor and analyze the traffic flow, latency, and error rates within the service mesh.

Lab Conclusion:
In this lab, you explored advanced networking techniques in Kubernetes, including ingress controllers, network policies, and service mesh using Istio. You learned how to configure and manage these features to control traffic routing, enforce security policies, and enhance observability within a Kubernetes cluster. By leveraging these advanced networking capabilities, you can improve the performance, security, and observability of your applications deployed in Kubernetes environments.