CloudOps

Container Chaining in Kubernetes Using Tungsten Fabric

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v 1.5

Agenda

1) Introduction to Service Chaining
2) Motivation for Service Chaining in Kubernetes
3) Challenges with Service Chaining in Kubernetes
4) Demo

Acknowledgement

This demo is part of the work done by by Fayaz Akhtar as part of his GSoC Project 2019 for the TF Kubernetes Guide

Introduction to Service Chaining

Service Chaining

- The ability to link different Network services in a virtual “chain” which describes the flow of packets

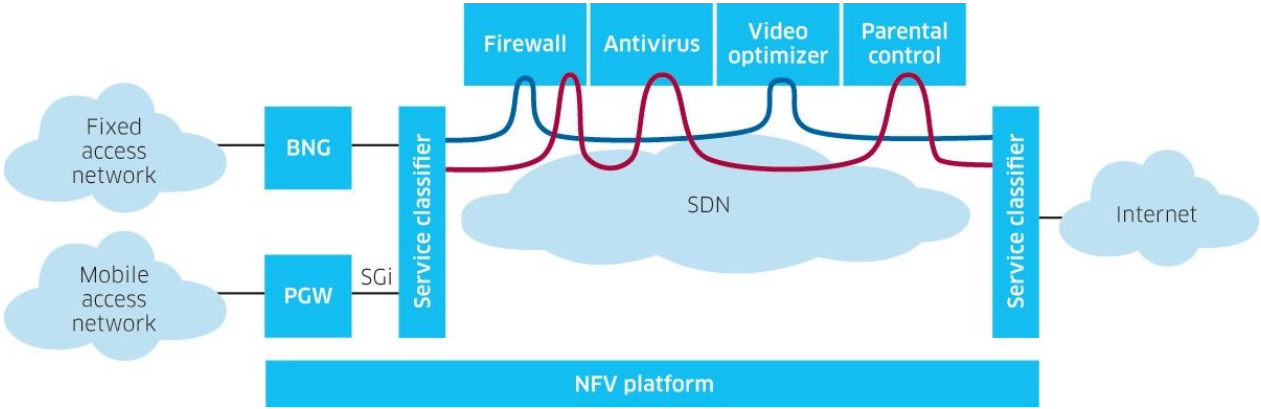


Image Credits: https://www.sdxcentral.com/networking/virtualization/definitions/what-is-network-service-chaining/

Service Chaining

- Application centric flow instead of network centric flow
- Optimal use of network and underlying services
- Packet inspection, Traffic optimization, Protocol Translation

Motivation for Service Chaining in Kubernetes

Service Chaining in Kubernetes

- Edge computing
- Low overhead compared to service mesh
- Integration with external resources

Challenges

Challenge 1: Multiple Networks

- Kubernetes has a flat network model where there is a single network for all the pods in all the namespaces. Network isolation happens via `NetworkPolicy` at L3+
- TF has a CRD which adds the ability to create pods with multiple networks via an annotation

Challenge 2: Default Routing

- With Service Chaining, TF sets the routes correctly in order for the chain to work but the routes are not propagated to the containers
- We use an init container to correctly set the routes.

Challenge 3: Static IPs

- Kubernetes pods are ephemeral but “Service” in the chain needs to be persistent
- If the service pod dies and a new one comes up, it could be assigned a different IP address
- There are open issues in K8S to address this but solutions are CNI specific

Challenge 4: Native Support from TF

- Current Process is very manual. Everything has to be done from the UI
- Possible collaboration with Network Service Mesh project to make this standard and automated

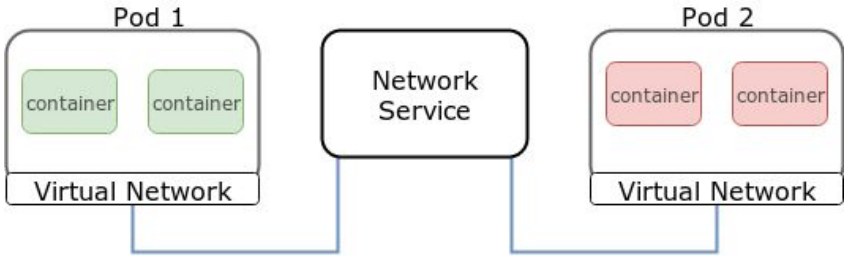
Bonus Challenge: TF Deployment

- Very difficult to deploy Tungsten Fabric in Kubernetes
- Official tools not stable and paths keep chaining
- Long term running TF deployments tend to start failing
- Shoutout to Will for his automation that made this demo happen (https://github.com/cloudops/tf-demo)

Demo

Demo

- Two pods in two different networks
- Pods initially cannot communicate with each other
- We add an “In-Network” service pod which acts as our service chain
- We show the pods can now communicate with each other via the service pod



Questions?