A Web based Service Function Chaining Platform for Realtime Adaptive Networking

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Abstract

Service identification, path characterization, traffic steering and dynamic resource allocation remain the major challenges to make contarinerization a service-centric solution for supporting new applications. In this project, we propose to demonstrate an orchestration and traffic steering platform that allows users to setup their service function chains (SFCs) dynamically in a Kubernetes environment. Focusing on streaming traffic flows, these services are deployed as containerized applications. The SFCs connecting these applications are deployed using Network Service Mesh (NSM) protocol within different Kubernetes domains. User requests are translated into application and network intent which are consequently implemented as SFCs.

Goals

At this iteration of the project, we aim to show case a proof of concept that will illustrate a mechanism by which the user will be able to deploy network function chains using a web interface-based orchestration. More specifically,

1. One cluster, many servers: connecting multiple servers under one cluster for distribution of workload.
2. Traffic flow: streaming traffic flow services will be identified across the service path that will be critical to the data transfer application and deployed using Service Function Chaining. Application intent containers will be deployed on the distributed server, whereas Network intent will be translated as configuration changes on the NEs.
3. User Interface (UI): an SFC orchestration UI connecting frontend to backend allowing clients to choose services that are deployed on the cluster dynamically.
4. Resource monitoring: provide an overview of the cluster resource before and after deploying the SFCs

At this introductory stage we develop an end-to-end video streaming service on the edge-cloud network using an SFC aware overlay network built using Kubernetes and NSM. Users will interact with a UI to choose service functions. These requests will be translated into application and network intent. The former will generate a request to deploy application pods distributed on multiple servers. The latter will stitch multiple pods together to have a SFC for the application.
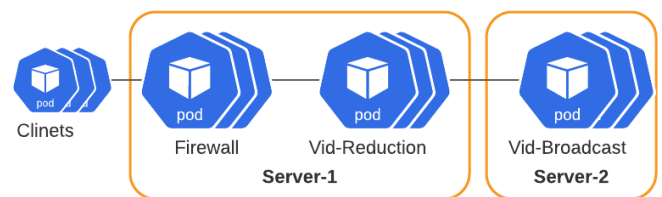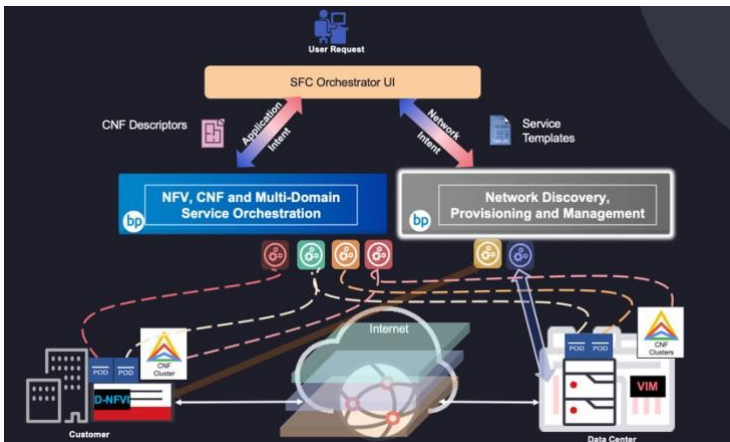

Fig. 1. Kubernetes multidomain SFC cluster topology

Resources

At the current phase, we will use Network Service Mesh to render SFC services to our application pods. CENI testbed in Ottawa will be used for this proposal.

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