OPEN SOURCE NETWORKING DAYS

Networking challenge in Container based NFV and our solution

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Agenda

- Why container and Kubernetes
- What Challenges for NFV service
- Knitter solution
From Monolith to Microservice Architecture

A monolithic application puts all its functionality into a single process...

... and scales by replicating the monolith on multiple servers

A microservices architecture puts each element of functionality into a separate service...

... and scales by distributing these services across servers, replicating as needed.
Container vs VM

- **Lighter**: Smaller Image and memory consume
- **Faster**: Quick deployment and Startup
- **Agiler**: Easy Ship, install and migration
why Kubernetes?

Kubernetes Manages Containers at 69% of Organizations Surveyed

Source: The New Stack Analysis of Cloud Native Computing Foundation survey conducted in Fall 2017. Q. Your organization manages containers with... (check all that apply)? n=763.

source: https://thenewstack.io/data-says-kubernetes-deployment-patterns/
What Kubernetes offer?

- service deploy and discovery
- container scheduling base resource
- Automated scaling and Failure self-heal
- stateful service
- container storage, PV/PVC
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Challenges: Network Isolation/SLA

K8S network:
- Single network plane.

Challenge scenarios:
- NFV service needs multiple network
- multiple tenant
- Multiple Physical Networks:
  - Isolation
  - QoS
Challenges: Service Registration and Discovery

K8S service mechanism:
- `kubeproxy` can only balance the data flow of eth0.
- `Kubeproxy` route to backend POD by using `iptables`.

Challenges Scenarios:
- `kubeproxy` relay on kernel `Iptables`, NFV service need more High performance mechanism.
Challenges: enhanced datapath

K8S+flannel mechanism:
- use docker0 to transfer data.

Challenge Scenarios:
- enhanced container datapath:
  - DVS
  - SRIOV
  - DPDK
**Challenges: fixed Container IP**

K8S+flannel mechanism:
- each node has a subnet IP pool, different node has different pool.
- when each pod create, POD's IP is allocated Dynamicly from node IP pools.

**Challenge Scenarios:**
- stateful service (stateful POD) need stable pod name, storage, IP address. when stateful POD recreated in another node, it hard to keep IP unchanged.
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PaaS over IaaS(underlay): based on Neutron Network of OpenStack
PaaS over Baremetal: based on knitter solution
Layered network structure

- application network
- IaaS network
- physical network
Serivce Solution

- default network use native K8S kube-proxy service Mechanism.
- additional network use self-defined load balance Mechanism.
- **underlay network:**
  - ZTE OpenStack (TECS)
  - 3rd IaaS
  - baremetal

- **POD network interface**
  - SRIOV
  - OVS/DVS
  - DPDK
Q&A