Project Kuryr

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What are the problems?

- Reinventing networking abstractions
- Changing and vendor specific solutions
  - Flannel
  - Weave
  - SocketPlane
- Overlay² for VM nested containers
  - Performance, latency, SLA, management penalties
New Solutions For Containers Networking
Nested Containers Overlay²
Kuryr Mission
Neutron as the production ready networking abstraction containers need!
Kuryr Solution

- Neutron as the production ready network abstraction containers need
  - Map container networking abstractions to the Neutron API
  - Allow consumers to choose vendor keeping one high quality API free of vendor lock-in
- Bring your container and VM networking together under one API
- Implement all the common code for Neutron vendors allowing them to get to container networking by just having a binding script
Kuryr Solution

- Implement a common base for Neutron vendors that support VM nested containers
  - Avoid double encapsulation
  - Manage each container port as a Neutron entity
  - Planned support for OVN, MidoNet, Dragonflow and Calico

- Leverage Neutron advanced networking
  - LBaaS, FWaaS, VPNaaS
  - Security Groups / NAT
Kuryr In OpenStack – Bare metal

Compute Node

Controller Node

Kuryr Service

Neutron agents (Optional)

docker

Neutron Server
Kuryr In OpenStack – Nested deployment

Compute Node

Controller Node

VM

Kuryr Service

Neutron agents (Optional)

docker

Kuryr

Neutron Server
Kuryr Project Overview

- Open source
- Part of OpenStack Neutron's big stadium
- Brings the Neutron networking model as a provider for the Docker CNM
- Aims to support different Container Orchestration Engines
  - E.g. Kubernetes, Mesos, Docker Swarm
- Weekly IRC meetings
- Working together with OpenStack community
  - Neutron, Magnum, Kolla
Kuryr Project Overview

- Multiple companies working on it

Contribution by companies:

- 52%: Midokura
- 21%: Huawei
- 6%: IBM
- 6%: *independent
- 5%: Imaginea Technologies Inc.
- 5%: VMware
- 5%: Persistent Systems
- 5%: Mirantis
- 5%: Comcast
- Others
Kuryr Libnetwork Remote Driver

- Keeping up to date with the changing libnetwork remote driver API
- Maps Docker's CNM operations into a Neutron API usage
- Any Neutron plugin can use it (for example OVS)
Kuryr Generic VIF Binding

- Container Namespace
- vEth Pair
- Datapath
- vEth Pair
- OVS Bridge Port
- Midonet Port
- Linux Bridge Port
- Any Neutron Plugin Port Type

Only at Binding
Kuryr Generic VIF Binding Layer

- Binds the container networking namespace to the networking infra
- Common part (container side)
  - IPAM
  - vEth creation
- Executable based vendor-specific part
  - Choice based on Neutron port type
  - Free implementation language
  - Root context
Deployment

- Package based
- Container based with Kolla
  - Vendors must generate their downstream container with the necessary agents and plugin
  - Quick and easy deployment (Ansible based)
VM Nested Containers

- Leverage the same Neutron solution for tenant containers networking
  - Neutron features
  - Easier management
  - Same “implementation”
  - Support containers networks and VM network isolation
  - Neutron plugins already support this: OVN, Midonet, Dragonflow

- Magnum
- Backend Implementations interoperability
Mixed OpenStack Environments – Nested Containers

Compute Node

VM

OVS / Midonet / Calico / Dragonflow

Lightweight Tagging Layer

docker
docker
docker

Neutron network 1
Neutron network 2
Neutron network 3
**Neutron Side**

- **Port Forwarding**
  - Can be used to implement Docker port-mapping
  - Save public IP space
- **Adding Tags to Resources**
  - Pre allocation of ports/networks
  - Mapping between Docker IDs to Neutron IDs
- **VLAN Trunk API (Nested Ports)**
  - Formal Neutron API to define nested containers ports
- **DNS Resolution for Port Names**
  - Leveraged for DNS service discovery
New Features for Containers

- Security Groups
- Subnet Pools
- NAT (SNAT / DNAT – Floating IP)
- Port Security (ARP Spoofing)
- QoS
- Quota Management
- Neutron pluggable IPAM
- Provide well-integrated COE Load balancing through Neutron
- FWaaS for Containers
- Many more as Neutron progress...
Kuryr Roadmap Plan

- **Liberty Release**
  - Kuryr specs in Neutron/Magnum communities
  - Neutron new features specs
  - Docker Libnetwork remote driver
  - Generic VIF binding layer
  - Configuration and authentication in Neutron and Docker
Kuryr Roadmap Plan

- **Mitaka Release**
  - Neutron IPAM for Docker
  - Containerized Neutron plugins and solutions with Kolla
  - Nested containers in VM’s, Magnum – Kuryr integration
  - Functional testing
  - Missing Neutron features
    - Port forwarding – port mapping for Docker
    - Neutron tags to resources – pre-allocating of network/ports/subnets
    - DNS resolution for port names – Docker DNS discovery
    - VLAN trunk API - used for nested containers
Kuryr Roadmap Plan

- N Release
  - Neutron advance services (LBaaS, FWaaS VPNaaS)
    - Kubernetes services to use Neutron LBaaS
  - Kubernetes networking model (K8s API)
Demo

http://ves.cat/mghP
Join Us! Be the Kuryr!

- **Project Launchpad**
  - [https://launchpad.net/kuryr](https://launchpad.net/kuryr)

- **Project Git Repository**
  - [https://github.com/openstack/kuryr](https://github.com/openstack/kuryr)

- **Weekly IRC Meeting**
  - [http://eavesdrop.openstack.org/#Kuryr_Project_Meeting](http://eavesdrop.openstack.org/#Kuryr_Project_Meeting)

- **IRC**
  - `#openstack-neutron` @ Freenode
Join Us! Be the Kuryr!

- **Mailing List**
  - openstack-dev@lists.openstack.org ([Neutron][Kuryr])

- **Trello Board**
  - https://trello.com/b/cbIAXrQ2/project-kuryr

- **Documentation**
  - http://docs.openstack.org/developer/kuryr

- **Getting Started Blog posts**