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Networking Model

KUBERNETES

Networking Model

- ❑ El modelo de red de kubernetes permite una gran consistencia a través de un amplio número de implementaciones de redes de redes
- ❑esto permite indicar cómo se relacionan los contenedores los pods y los servicios entre ellos
- ❑entre las características básicas de este modelo de red encontramos las siguientes :
  - ❑cada POD tiene su propia dirección IP
  - ❑los contenedores que hay dentro de un pozo comparten la misma dirección IP y se pueden comunicar entre ellos sin problemas
  - ❑un POD se puede comunicar con cualquier otro POD dentro del cluster utilizando el direccionamiento de IP de los PODs sin necesidad de usar NAT
  - ❑Podemos mantener un filtro para que los PODS solo se comuniquen con lo que nosotros deseemos

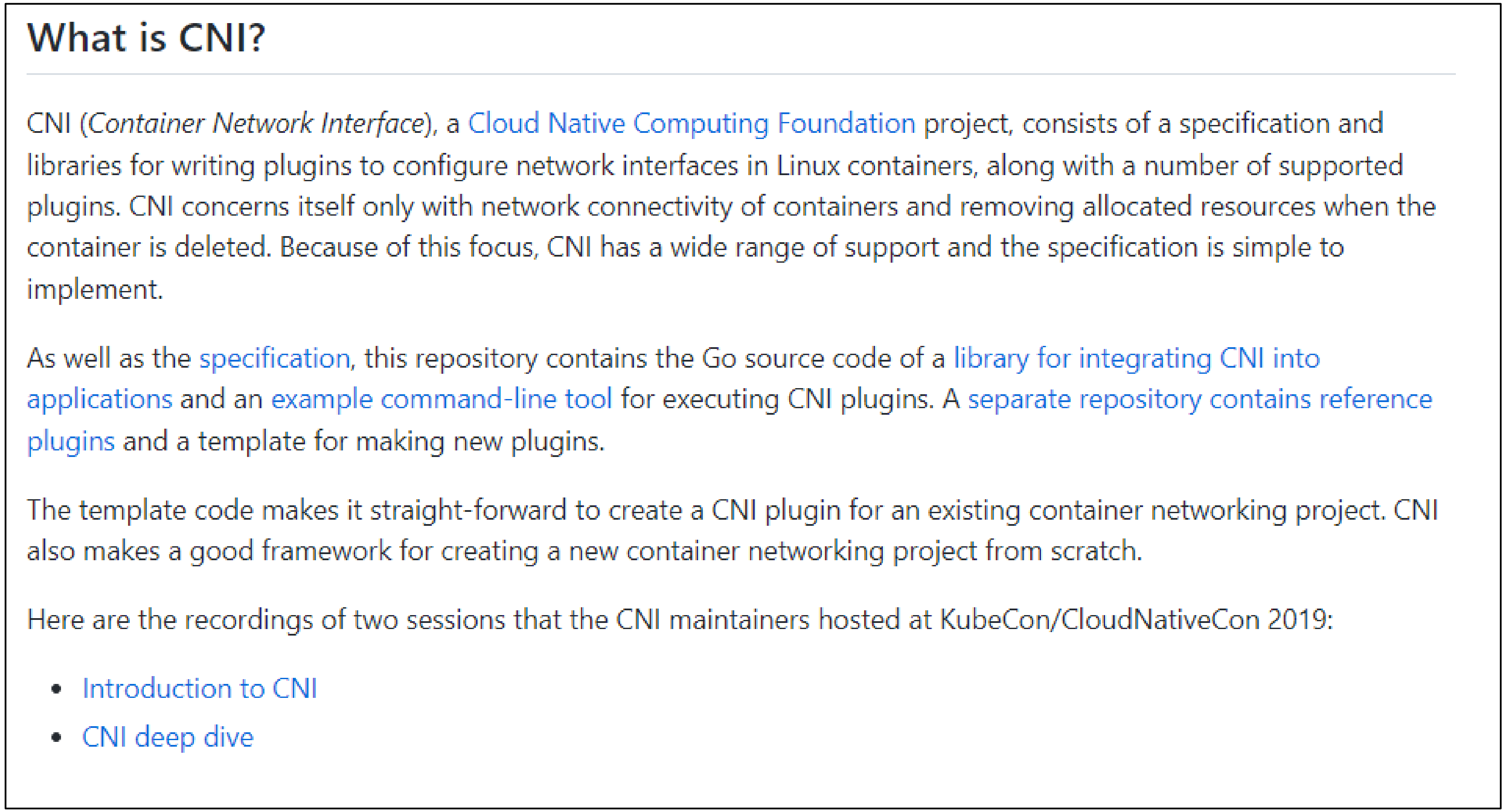
Networking Model

- Esto permite que cada POD pueda ser visto como si fuera una máquina virtual o real. Lo que hace fácil la migración de aplicaciones a un entorno de contenedores
- Para implementar la red dentro de kubernetes se utilizan plugins de distintos proveedores.
- Estos plugins se implementan mediante CNI (container Network interface) y se encarga el container runtime de cada nodo
- Hay muchos tipos de plugins CNI aunque podemos dividirlos en dos grandes grupos
  - **Network**: que permiten conectar los pods a la red
  - **IPAM**: responsables de direccionar las IP addresses

Networking Model

- ¿Que es CNI ?

https://github.com/containernetworking/cni



What is CNI?

CNI (*Container Network Interface*), a Cloud Native Computing Foundation project, consists of a specification and libraries for writing plugins to configure network interfaces in Linux containers, along with a number of supported plugins. CNI concerns itself only with network connectivity of containers and removing allocated resources when the container is deleted. Because of this focus, CNI has a wide range of support and the specification is simple to implement.

As well as the specification, this repository contains the Go source code of a library for integrating CNI into applications and an example command-line tool for executing CNI plugins. A separate repository contains reference plugins and a template for making new plugins.

The template code makes it straight-forward to create a CNI plugin for an existing container networking project. CNI also makes a good framework for creating a new container networking project from scratch.

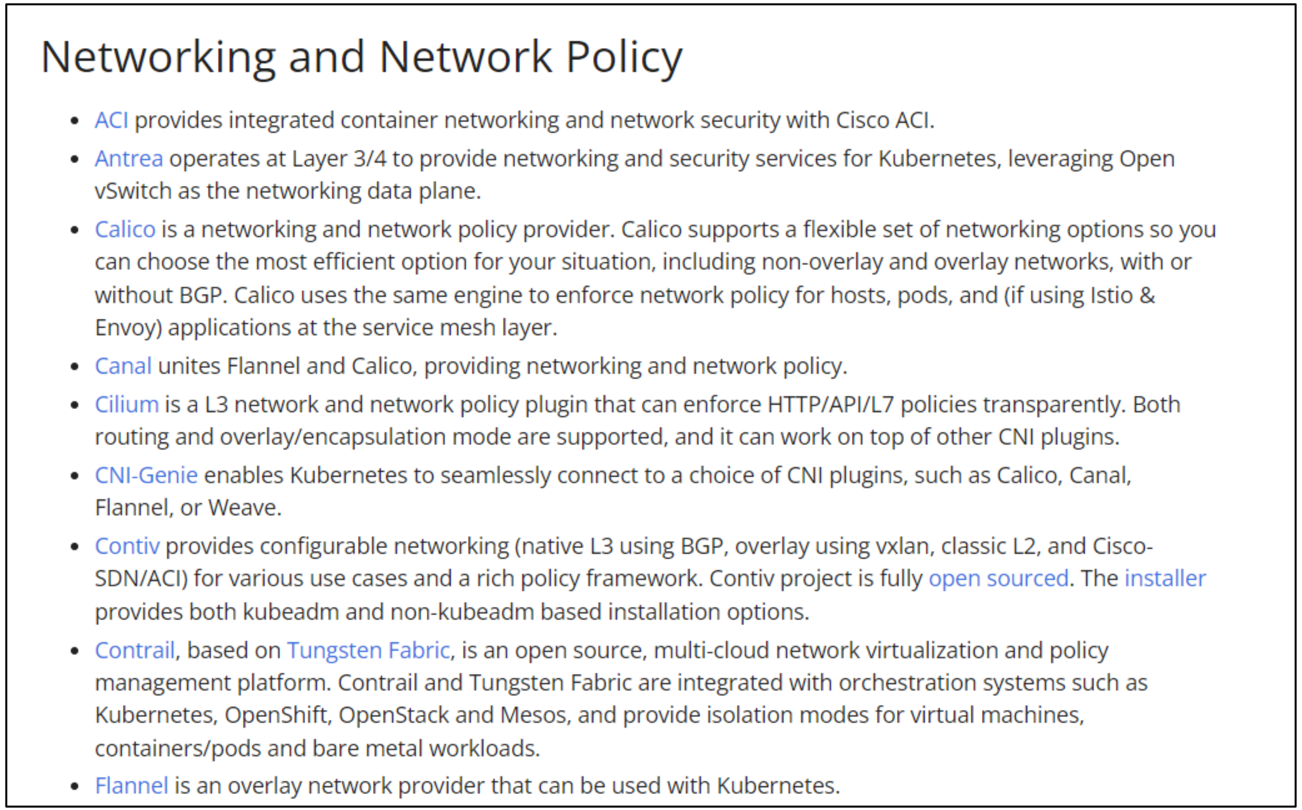
Here are the recordings of two sessions that the CNI maintainers hosted at KubeCon/CloudNativeCon 2019:

- Introduction to CNI
- CNI deep dive

Networking Model

- ❑ Hay múltiples plugins disponibles
- ❑ En esta página podemos ver el listado en el momento de hacer el curso

https://kubernetes.io/docs/concepts/cluster-administration/addons/#networking-and-network-policy



Networking and Network Policy

- ACI provides integrated container networking and network security with Cisco ACI.
- Antrea operates at Layer 3/4 to provide networking and security services for Kubernetes, leveraging Open vSwitch as the networking data plane.
- Calico is a networking and network policy provider. Calico supports a flexible set of networking options so you can choose the most efficient option for your situation, including non-overlay and overlay networks, with or without BGP. Calico uses the same engine to enforce network policy for hosts, pods, and (if using Istio & Envoy) applications at the service mesh layer.
- Canal unites Flannel and Calico, providing networking and network policy.
- Cilium is a L3 network and network policy plugin that can enforce HTTP/API/L7 policies transparently. Both routing and overlay/encapsulation mode are supported, and it can work on top of other CNI plugins.
- CNI-Genie enables Kubernetes to seamlessly connect to a choice of CNI plugins, such as Calico, Canal, Flannel, or Weave.
- Contiv provides configurable networking (native L3 using BGP, overlay using vxlan, classic L2, and Cisco-SDN/ACI) for various use cases and a rich policy framework. Contiv project is fully open sourced. The installer provides both kubeadm and non-kubeadm based installation options.
- Contrail, based on Tungsten Fabric, is an open source, multi-cloud network virtualization and policy management platform. Contrail and Tungsten Fabric are integrated with orchestration systems such as Kubernetes, OpenShift, OpenStack and Mesos, and provide isolation modes for virtual machines, containers/pods and bare metal workloads.
- Flannel is an overlay network provider that can be used with Kubernetes.

Networking Model

- Entre los plugins más utilizados en kubernetes tenemos los siguientes:
  - Flannel
  - Calico
  - Weave
  - Cilium

Networking Model

- ❑ Kubernetes DNS
  - ❑ Cada clúster de kubernetes proporciona un servicio DNS.
  - ❑ cualquier POD o servicio es localizable a través de este DNS.
  - ❑ Ejemplos:

Servicio: mi-servicio.mi-namespace.svc.cluster-domain.curso

Pod: pod-ip-address.mi-namespace.pod.cluster-domain.curso

- ❑ Este servicio de DNS se implementa normalmente como PODS