



Service Management

Exploring Options

Kevin Offemaria, Karely Rodriguez, John Ford

Agenda

- etcd demo
- Consul demo
- Traefik demo
- Q&A



Recap: etcd



- etcd is an open source distributed key-value store
- Developed by CoreOS and supported by the Cloud Native Computing Foundation (CNCF)
- Core component of Kubernetes
- Features that provide high availability, fault tolerance, strong consistency
- Raft Consensus algorithm

Demo: Invoking a WATCHER



```
koffemaria@ubu2204dsk: ~/cs6381-dist-sys
koffemaria@ubu2204dsk: ~
koffemaria@ubu2204dsk: ~
(env_3B) koffemaria@ubu2204dsk: ~/cs6381-dist-sys$ python etcd_api.py
2023-04-25 18:13:46,513 - EtcdClient - INFO - cluster id STATUS: '14841639668965178418'
2023-04-25 18:13:46,514 - EtcdClient - INFO - First MEMBER info : {'ID': '10276657743932975437', 'name': 'default', 'peerURLs': ['http://localhost:2380'], 'clientURLs': ['http://localhost:2379']}
2023-04-25 18:13:46,514 - EtcdClient - INFO - demo LEASE...
2023-04-25 18:13:46,515 - EtcdClient - INFO - LEASE id : 7587870180556262524
2023-04-25 18:13:46,516 - EtcdClient - INFO - LEASE ttl : 29
2023-04-25 18:13:46,517 - EtcdClient - INFO - LEASE refresh : 30
2023-04-25 18:13:46,518 - EtcdClient - INFO - Key PUT foo2 : True
2023-04-25 18:13:46,519 - EtcdClient - INFO - Key PUT foo3 : True
2023-04-25 18:13:46,520 - EtcdClient - INFO - LEASE Keys : [b'foo2', b'foo3']
2023-04-25 18:13:46,521 - EtcdClient - INFO - LEASE Revoke : True
2023-04-25 18:13:46,521 - EtcdClient - INFO - demo basic PUT/GET/DELETE keys...
2023-04-25 18:13:46,522 - EtcdClient - INFO - Key GET foox : []
2023-04-25 18:13:46,526 - EtcdClient - INFO - Key PUT foo : True
2023-04-25 18:13:46,527 - EtcdClient - INFO - Key GET foo : [b'bar']
2023-04-25 18:13:46,528 - EtcdClient - INFO - Key DELETE foo : True
2023-04-25 18:13:46,529 - EtcdClient - INFO - Key DELETE foo-unknown : False
2023-04-25 18:13:46,529 - EtcdClient - INFO - demo LOCK...
2023-04-25 18:13:46,532 - EtcdClient - INFO - acquire : True
2023-04-25 18:13:46,533 - EtcdClient - INFO - refresh : 10000
2023-04-25 18:13:46,534 - EtcdClient - INFO - is_acquired : True
2023-04-25 18:13:46,535 - EtcdClient - INFO - release : True
2023-04-25 18:13:46,536 - EtcdClient - INFO - is_acquired : False
2023-04-25 18:13:46,536 - EtcdClient - INFO - demo WATCH...
2023-04-25 18:13:46,537 - EtcdClient - INFO - Key PUT watch_key : True
2023-04-25 18:13:46,539 - EtcdClient - INFO - Key GET watch_key : [b'init_val']
2023-04-25 18:13:47,739 - EtcdClient - INFO - {'kv': {'key': b'watch_key', 'create_revision': '51', 'mod_revision': '180', 'version': '25', 'value': b'new_val'}}
2023-04-25 18:13:47,739 - EtcdClient - INFO - Watch count: 1

(env_3B) koffemaria@ubu2204dsk: ~/cs6381-dist-sys$ python watcher_etcd_api.py -w watch_key -ov
init_val -nv new_val
2023-04-25 18:13:47,737 - EtcdClient - INFO - cluster id STATUS: '14841639668965178418'
2023-04-25 18:13:47,738 - EtcdClient - INFO - First MEMBER info : {'ID': '10276657743932975437', 'name': 'default', 'peerURLs': ['http://localhost:2380'], 'clientURLs': ['http://localhost:2379']}
2023-04-25 18:13:47,738 - EtcdClient - INFO - demo WATCH...
2023-04-25 18:13:47,739 - EtcdClient - INFO - Key REPLACE watch_key : True
(env_3B) koffemaria@ubu2204dsk: ~/cs6381-dist-sys$ python watcher_etcd_api.py -w watch_key -ov
newer_val -nv even_newer_val
```

etcd vs Zookeeper



- How easy is it to install/configure?
 - Easy, but can be challenging on a M1 architecture machine.
- What does it do better?
 - Lease-based primitives - Automatic TTL-based key expiration
 - Multi-version concurrency control (MVCC)
 - Range queries for robust scaling
 - Backup and restore
- What does it do worse?
 - Third party libraries are not maintained regularly.

HashiCorp Consul



- HashiCorp Consul is a service networking platform that provides a service mesh, service discovery, configuration management, segmentation, and API gateway functionality across a distributed network infrastructure.
- Consul is platform agnostic
 - Support for K8, EKS, VMs, Lambda, Nomad, etc runtimes
 - Ability to run the control plane (maintains central registry / operational concerns) and data plane (handles communication) in different runtimes
- Consul increases resilience, security, and accelerates application deployment

Traefik



Traefik (pronounced *traffic*) is a modern HTTP reverse proxy and load balancer that makes deploying microservices easy.

It sits on top of other cluster technologies and leverages them to dynamically configure paths and load balancing to defined services.

Traefik Demo Tech Stack



kubernetes



K3S



MetalLB



traefik

Traefik Summary



- Great kubernetes-native proxy
- Solid integrations with both standard objects and CRDs
- Developing ecosystem
- SaaS offerings are a “wait-and-see”

Additional Information



Consul Pricing Models

- Free open source option
- 5 Tier pricing options
 - HCP Development \$0.027/hr (non-production)
 - HCP Standard \$0.069/hr
 - HCP Plus \$0.104/hr
 - HCP Premium custom
 - Enterprise custom



etcd Pricing Models

- <https://etcd.io/docs/v3.3/learning/why/>



Traefik Pricing Models

- Free open source option
- SaaS offering for enterprise
 - Free 30-day Trial
 - Contact for pricing quotes
 - ~\$20k per cluster annually

