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TalosOS

The OS Kubernetes Deserves

Who has experience with **Kubernetes**?

Who has experience with **TalosOS**?

Who is mainly here for the
FREE Beer and Food?

Linux

How I became a Talos fan

Pets

Pets VS Herd

VS

Siegfried Stumpfer

What is TalosOS?

- Immutable
- Atomic
- Minimal
- Ephemeral
- API-Driven Kubernetes First
- Hardened (Kernel Self Protection Project)
- Configured via YAML

TalosOS Setup

```
sigi@SigiPC:~$ talosctl gen secrets -o secrets.yaml
```

```
sigi@SigiPC:~$ talosctl gen config --with-secrets secrets.yaml test-cluster https://192.168.0.199:6443

generating PKI and tokens
Created /home/sigi/controlplane.yaml
Created /home/sigi/worker.yaml
```

```
sigi@SigiPC:~$   talosctl apply-config --insecure \
    --nodes 192.168.0.199 \
    --file controlplane.yaml
```

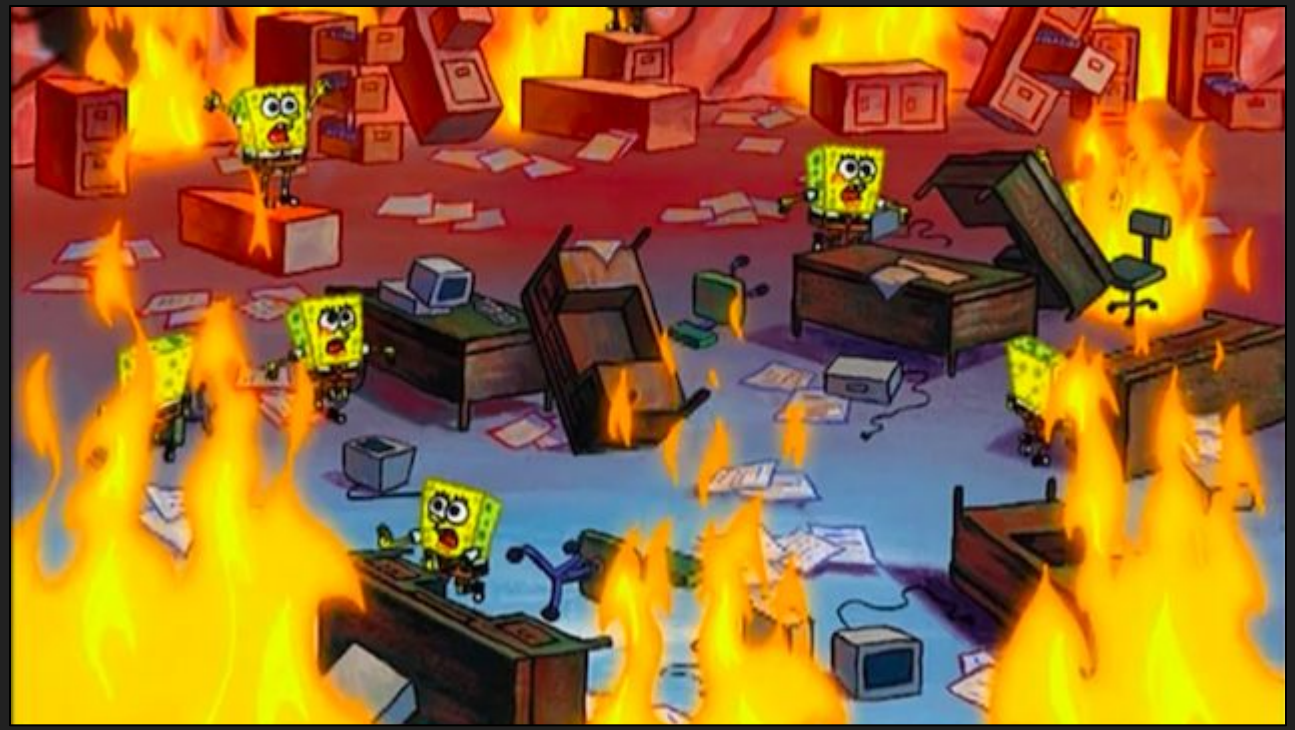
```
sigi@SigiPC:~$ talosctl bootstrap --nodes 192.168.0.199 --endpoints 192.168.0.199 \
  --talosconfig=./talosconfig
```

```
sigi@SigiPC:~$ talosctl kubeconfig --nodes 192.168.0.199 --endpoints 192.168.0.199 \
  --talosconfig=./talosconfig
```

Scenario

(Hypothetical)

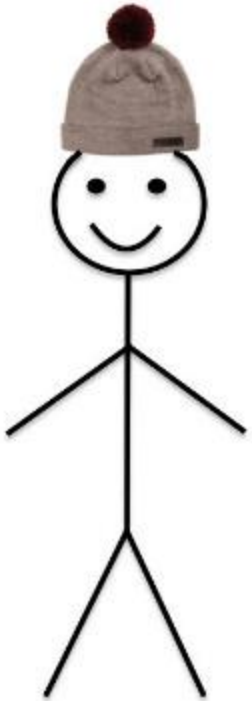
Current Team situation




This is Billy
imgflip.com

This is Billy

He is 19 years old



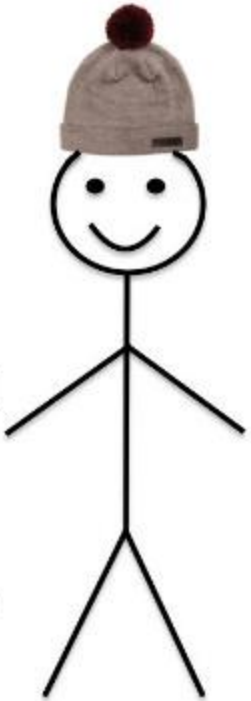

This is Billy
He is 19 years old
He has watched a 1 hour DevOps Tutorial
imgflip.com

This is Billy

He is 19 years old

He has watched a 1 hour DevOps Tutorial

And happens to be the Nephew of your CTO



Team Talos

Manages their Cluster with Talos

2

Team Two

Manages their Cluster with Ubuntu

Billy tries SSH

Billy tries to SSH - Team Two

2

- If password right => gets in
- RBAC

Billy tries to SSH - Team Talos

- There is no SSH installed

Setup Access to Talos - Gen Secrets

```
sigi@SigiPC:~$ talosctl gen secrets -o secrets.yaml
```

secrets.yaml

```yaml
cluster:
    id: GVrv6hR8nkAE1LAuDHqUNIgSumeYH8q2YcqoLoSVCWc=
    secret: rss0XB4vE4PhWNWF8/PBwnAcnHBY3CvYbJ5CIROyNb8=
secrets:
    bootstraptoken: jtno4k.8xoyk0cqo1pegzcu
    secretboxencryptionsecret: xZJJZdq72JLYMSEgJNnfjHZEO8ySXS48EDA6XrR+KOs=
trustdinfo:
    token: 0hz6da.oe0plobziq5nrfgq
certs: ...
```

Setup Access to Talos - Gen config

```
sigi@SigiPC:~$ talosctl gen config --with-secrets secrets.yaml test-cluster https://192.168.0.199:6443

generating PKI and tokens
Created /home/sigi/controlplane.yaml
Created /home/sigi/worker.yaml
```

talosconfig

```yaml
context: talos-prod
contexts:
    talos-prod:
        endpoints:
            - 192.168.0.199
        nodes:
            - 192.168.0.199
        ca: ...
        crt: ...
        key: ...
```

Monitor Output

Billy walks to Machine - Team Talos

```
talos-worker-1 (v1.9.3): uptime 406h49m57s, 2x3GHz, 3.8 GiB RAM, PROCS 22, CPU

UUID        02a26102-          TYPE        worker    HOST          talos-worker-1
cd3d-4540-aa2b-fc16e2c1c065    KUBERNETES  v1.32.1   IP            192.168.0.105/24
CLUSTER     talos-prod (4      KUBELET     √         GW            192.168.0.1
machines)                      Healthy               CONNECTIVITY  √ OK
SIDEROLINK  n/a                                      DNS           192.168.0.1
STAGE       √ Running                                NTP
── Logs ──────────────────────────────────────────────────────────────────────
lookup discovery.talos.dev on 127.0.0.53:53: no such host\"", "endpoint":
"discovery.talos.dev:443"}
user: warning: [2025-02-18T03:58:23.2577146Z]: [talos] hello failed
{"component": "controller-runtime", "controller":
"cluster.DiscoveryServiceController", "error": "rpc error: code = Unavailable
desc = connection error: desc = \"transport: Error while dialing: dial tcp:
lookup discovery.talos.dev on 127.0.0.53:53: no such host\"", "endpoint":
"discovery.talos.dev:443"}
user: warning: [2025-02-18T03:58:25.5510776Z]: [talos] hello failed
{"component": "controller-runtime", "controller":
"cluster.DiscoveryServiceController", "error": "rpc error: code = Unavailable
desc = connection error: desc = \"transport: Error while dialing: dial tcp
```

Billy walks to Machine - Team Two

2

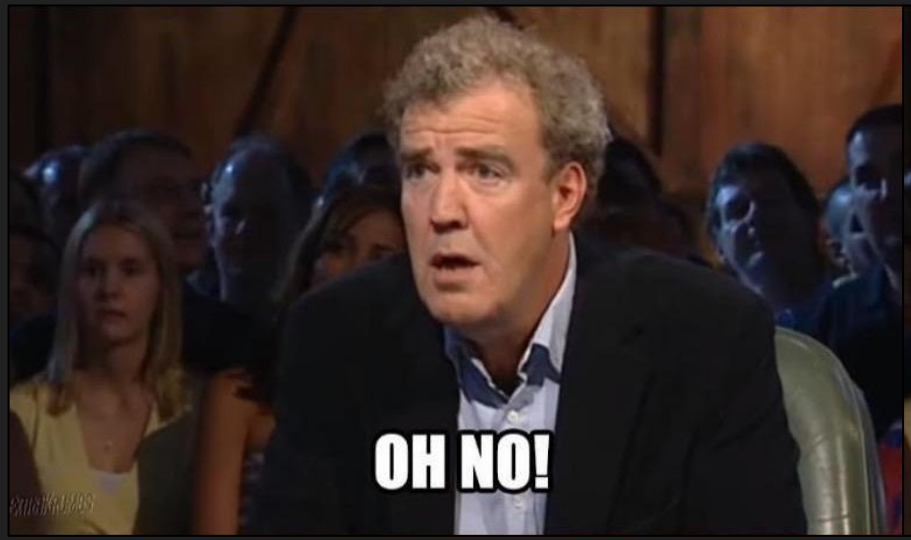
```
9 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

1 additional security update can be applied with ESM Apps.
Learn more about enabling ESM Apps service at https://ubuntu.com/esm


Last login: Sun Feb 16 13:03:08 2025 from 192.168.0.143
user@dockervm:~$
```

Destroy a Node

Billy destroys node - Team Talos



Reset Talos Nodes

```
sigi@SigiPC:~$ talosctl gen config --with-secrets secrets.yaml test-cluster https://192.168.0.199:6443

generating PKI and tokens
Created /home/sigi/controlplane.yaml
Created /home/sigi/worker.yaml
```

```
sigi@SigiPC:~$ talosctl reset -n 192.168.0.199
```

```
sigi@SigiPC:~$ talosctl -n 192.168.0.199 apply-config -f worker.yaml
```

worker.yaml

```yaml
version: v1alpha1
debug: false
persist: true
machine:
    type: worker
    token: 0hz6da.oe0plobziq5nrfgq
    ca:
        crt: ...
        key: ""
    certSANs: []
    kubelet:
        image: ghcr.io/siderolabs/kubelet:v1.32.1
        defaultRuntimeSeccompProfileEnabled: true
        disableManifestsDirectory: true
    network: {}
    install:
        disk: /dev/sda
        image: ghcr.io/siderolabs/installer:v1.9.3
        wipe: false
    registries: {}
    features:
        rbac: true
        stableHostname: true
        apidCheckExtKeyUsage: true
        diskQuotaSupport: true
        kubePrism:
            enabled: true
            port: 7445
        hostDNS:
            enabled: true
            forwardKubeDNSToHost: true
...
```

worker.yaml

```yaml
...

cluster:
    id: GVrv6hR8nkAE1LAuDHqUNIgSumeYH8q2YcqoLoSVCWc=
    secret: rss0XB4vE4PhWNWF8/PBwnAcnHBY3CvYbJ5CIROyNb8=
    controlPlane:
        endpoint: https://192.168.0.199:6443
    clusterName: test-cluster
    network:
        dnsDomain: cluster.local
        podSubnets:
            - 10.244.0.0/16
        serviceSubnets:
            - 10.96.0.0/12
    token: jtno4k.8xoyk0cqo1pegzcu
    ca:
        crt: ...
        key: ""
    discovery:
        enabled: true
        registries:
            kubernetes:
                disabled: true
            service: {}
```

Billy destroys node - Team Two

2

Upgrades an OS

(and corrupts it)

Billy upgrades System - Team Talos

- A/B Rollout
- Atomic Failure
- Logs of what failures occurred

Billy upgrades System - Team Two

2

- Partially Applied updates
- Pray to god you have backup Snapshots
- Manual Intervention or complex systems needed

This is Dimitry

Dimitry attempts Hack - Team Talos

1. /sbin/init => custom Init instead of Systemd
2. /bin/containerd => Container Runtime (also CRI-O support)
3. /bin/runc => What runs Containerd
4. /sbin/modprobe => configuring Kernel Modules
5. /sbin/lvm => Linux logical Volumes
6. /sbin/dmsetup => more complex Disk situations
7. /sbin/udevd => manage kernel Messages
8. /sbin/mkfs.xfs => create xfs file system
9. /sbin/xfs_repair => repair xfs file systems
10. /sbin/xtables-legacy-multi => System linked to iptables and ip6tables

Dimitry attempts Hack - Team Two

2

- What ever you have installed is attackable
- No limits to attack surface

But you could….

Downsides

- Only and only kubernetes
- Most benefits gone in hybrid clusters
- No shell or SSH => different philosophy
- Able to be used insecure (non-default)
- Only recent ISCSI support

Demo

Talos Cluster

- Siegfried Stumpfer
- **Work:** Software Engineer / SRE @Cloudflight
- **Interests:** All things Tech, Gardening, Reading
- Municipal council member

Thank you! Questions?