
bcs
The
Chartered
Institute
for IT


heptio

Hello !

- I’m Dan !
- Senior Field Engineer at Heptio VMware
- Ex:
  - Heptio
  - Docker
  - Hewlett-Packard Enterprise
  - SkyBet
  - European Space Agency
  - …
- Still a maintainer and contributor to various Docker and Moby projects (mainly GO, but I sometimes write C (if need be))
- @thebsdbox – for random nonsense


heptio

-
-
-
-

Where did Docker come from?

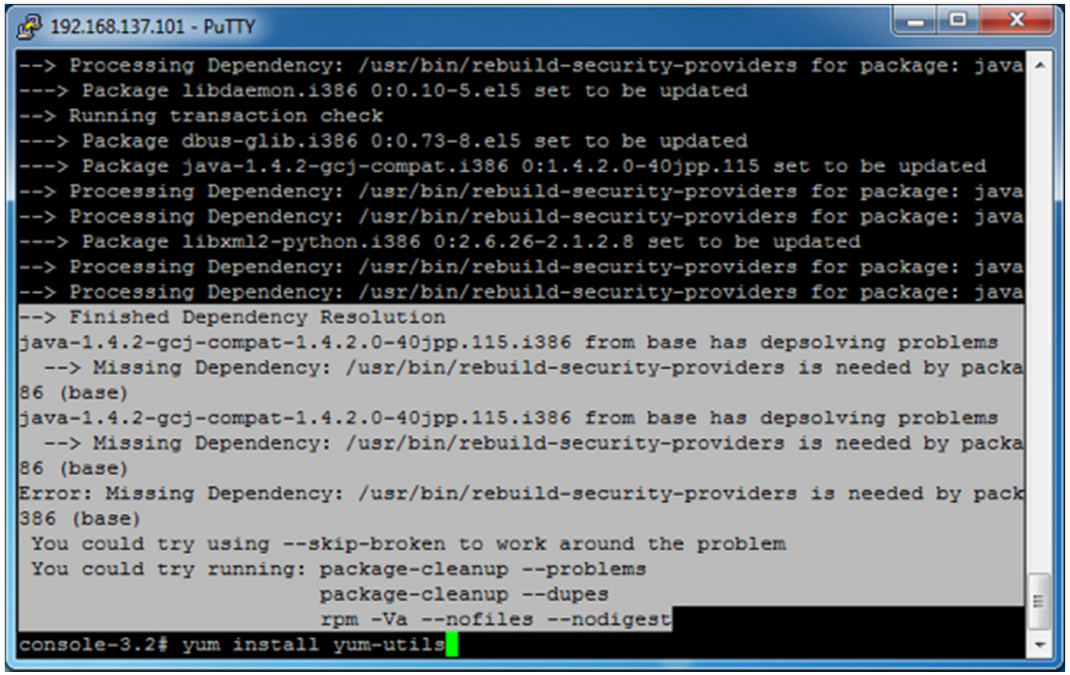
heptio

In the beginning ...

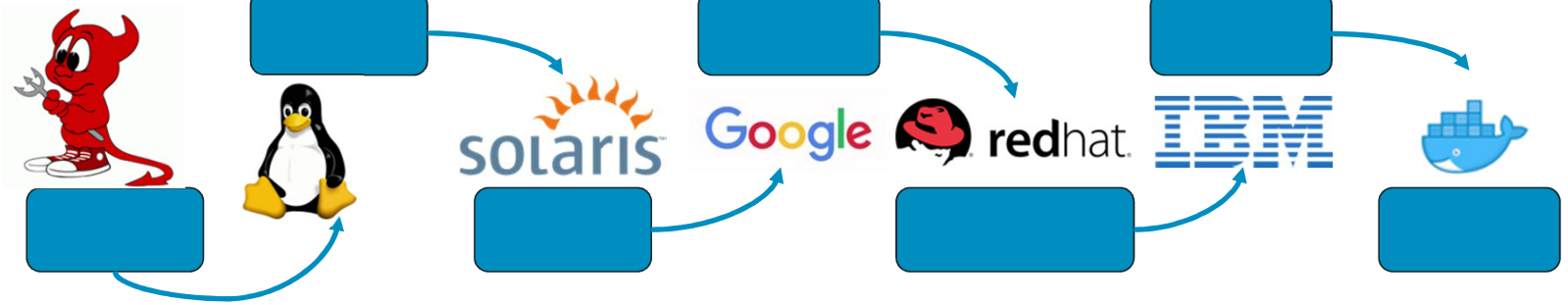
Where did Docker come from?

heptio

Things broke a lot ...

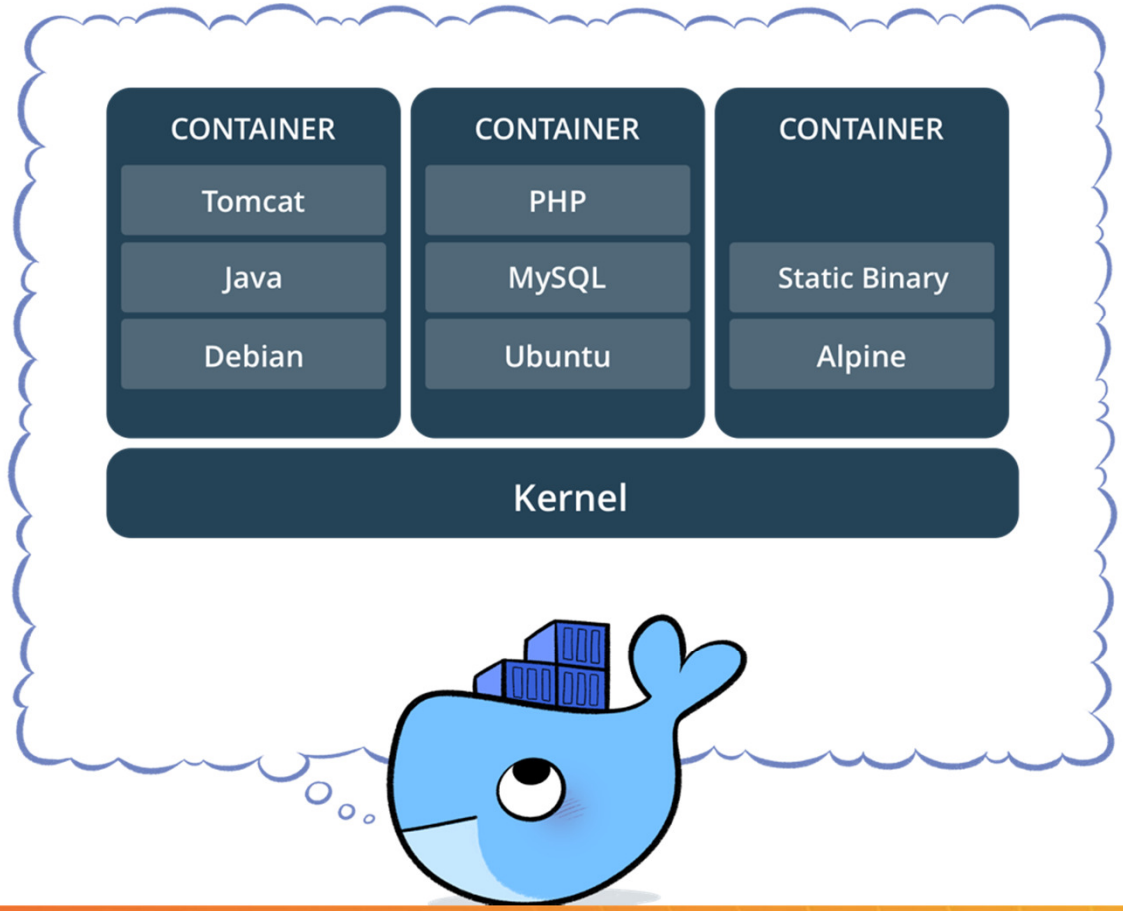


Where did Docker come from?



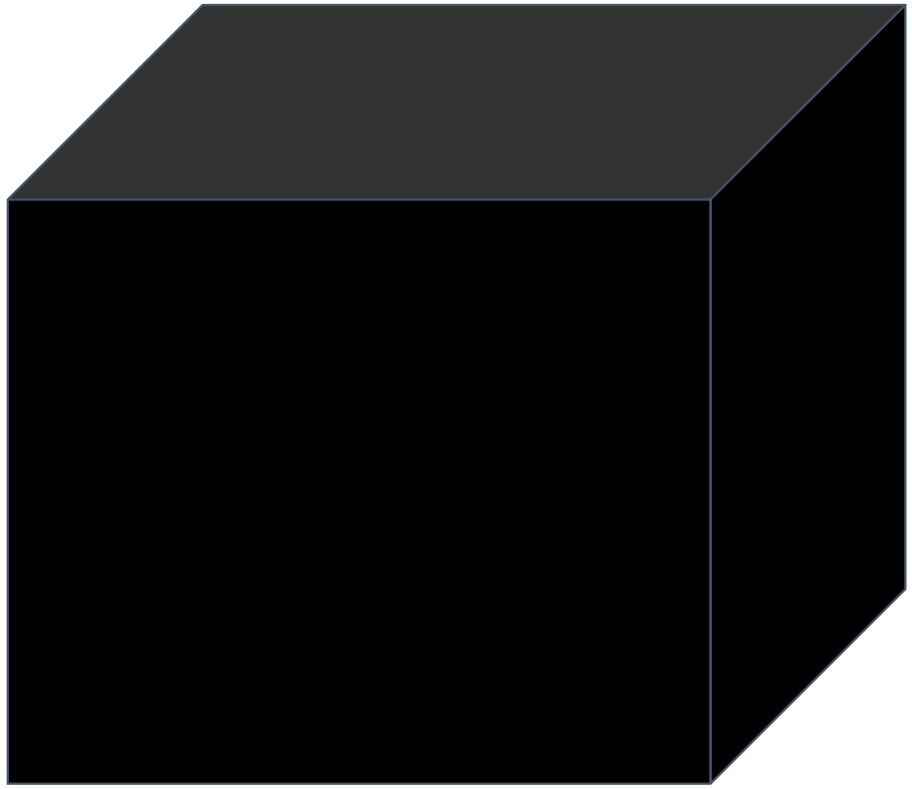
Docker under the hood

heptio

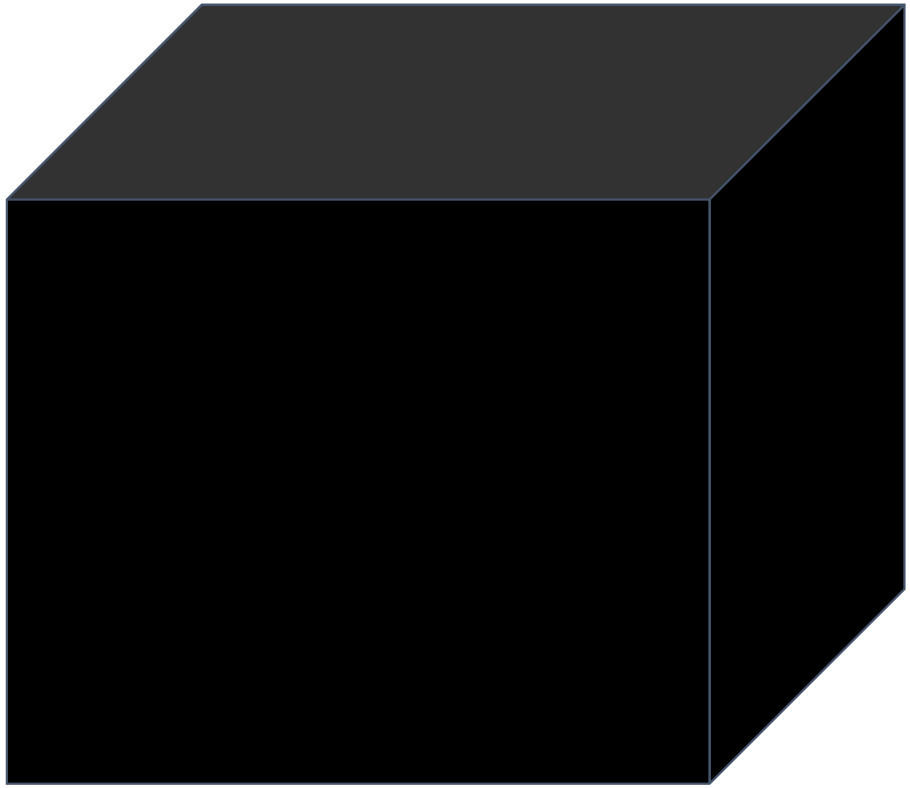


Docker Installation

- ! "
  - apt-get install -y docker
  - yum install -y docker
- #
-
- $% & ’%$(& ’%$)



Docker Components



`Docker CLI`

`dockerd`

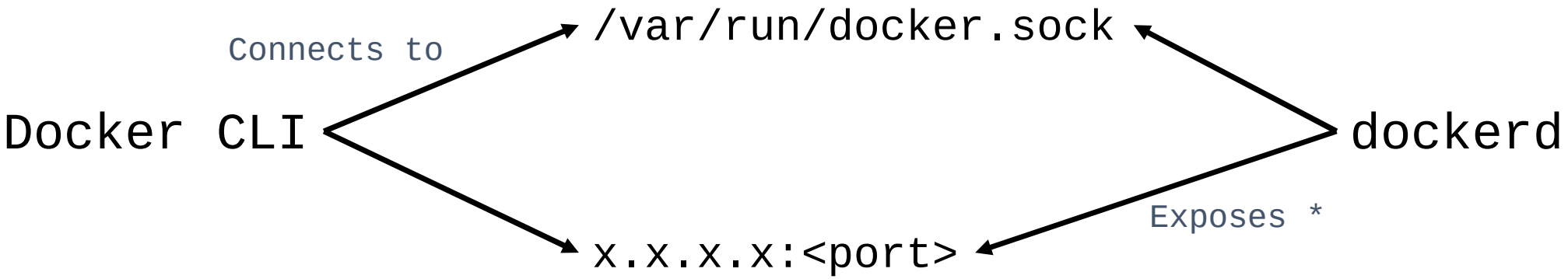
`containerd`

`runc`

Docker Command Line Interface

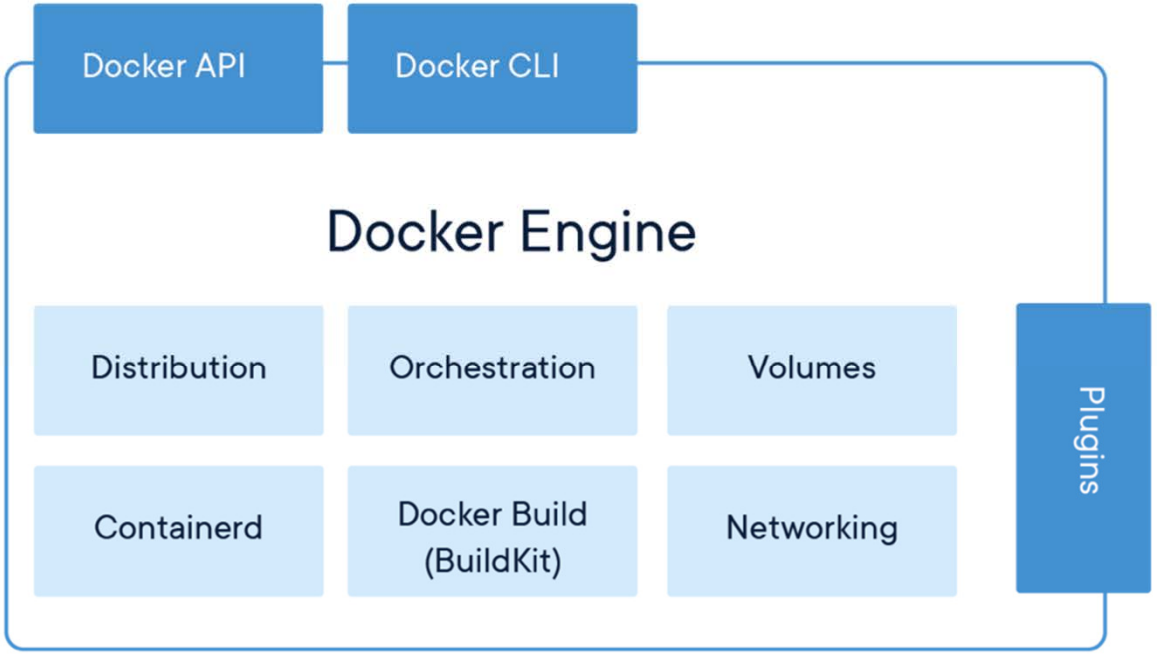
- docker build $! !
- docker run
- docker logs - !
- docker ps #-a
- docker images
- docker rm . docker rmi /
- docker tag
- docker login 0
- docker push/pull 1! (
- docker inspect ! 1 $ $2

Docker Command Line Interface



* Configured in /etc/docker/json

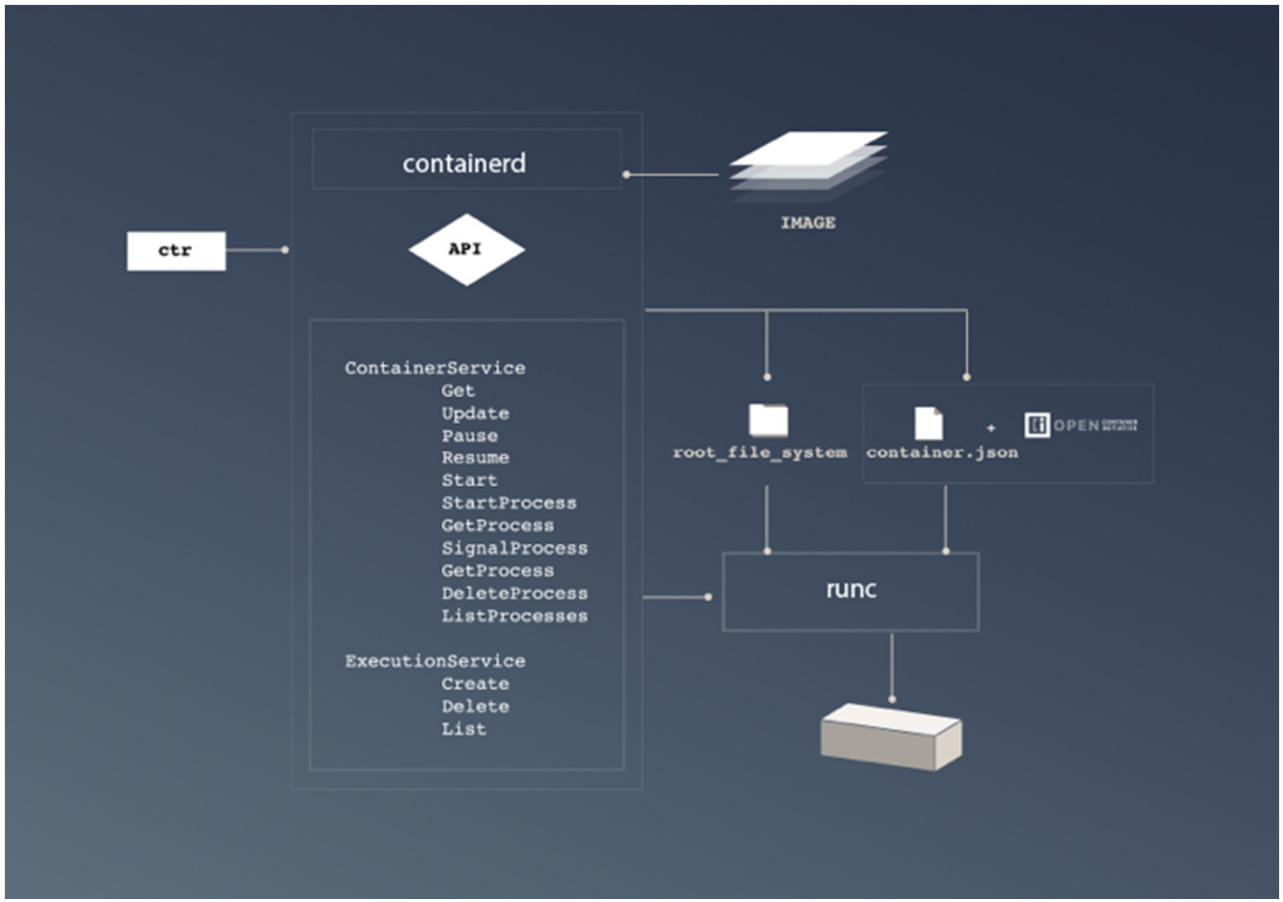
Docker Daemon



- ’ 3 3 -
  !
  - * - !
  - ’ !
    ! !
  - * "$!
    4
  - $!

containerd

- + ! ! 0 /
  -
  - * ! 1
  - ' ! 5 *
  - -
  -

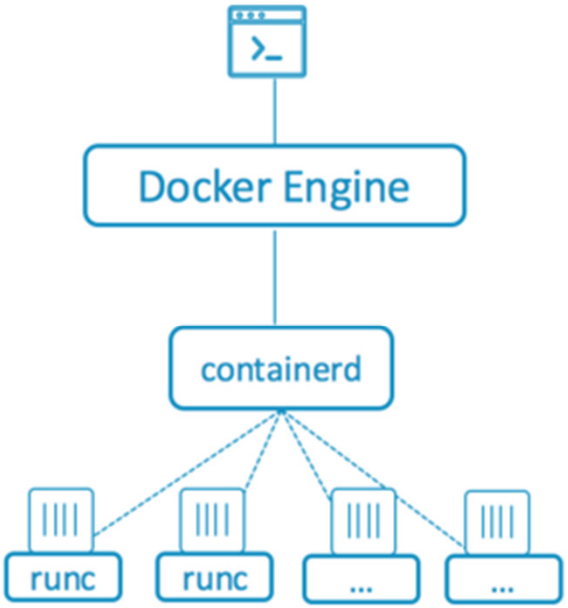


runc (or any OCI specific runtime)

heptio

- -
- * 5 * $!
- *
  6 ! 3
-) #
  !

All tied together



Same Docker UI and commands

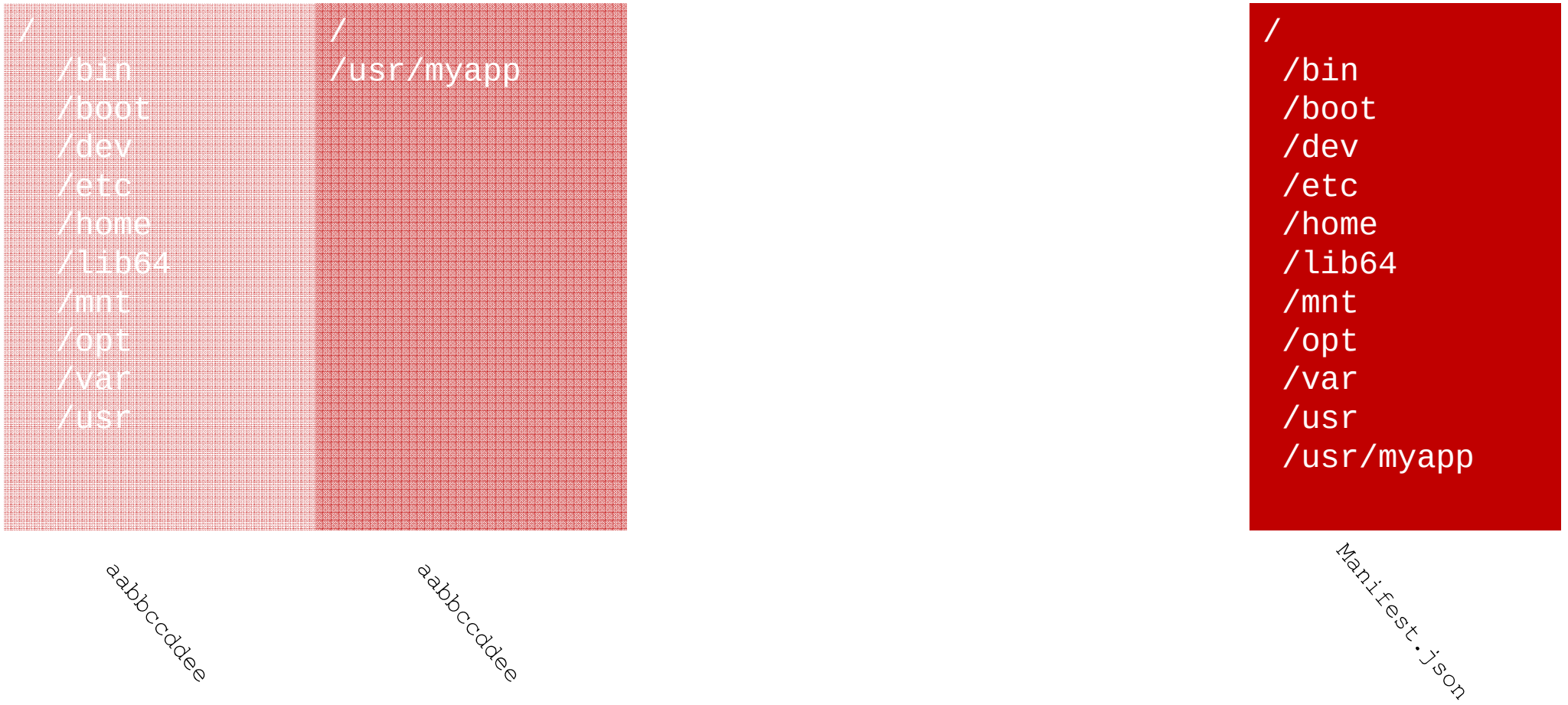
User interacts with the Docker Engine

Engine communicates with containerd

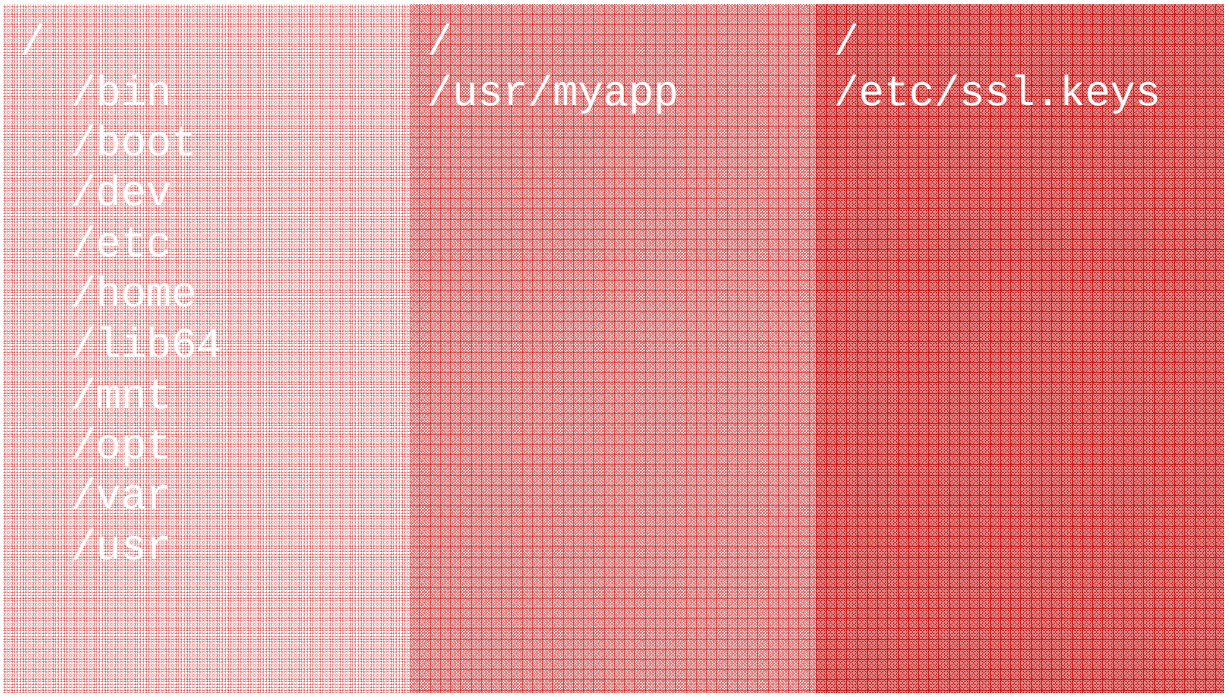
containerd spins up runc or other OCI compliant runtime to run containers

Docker Image

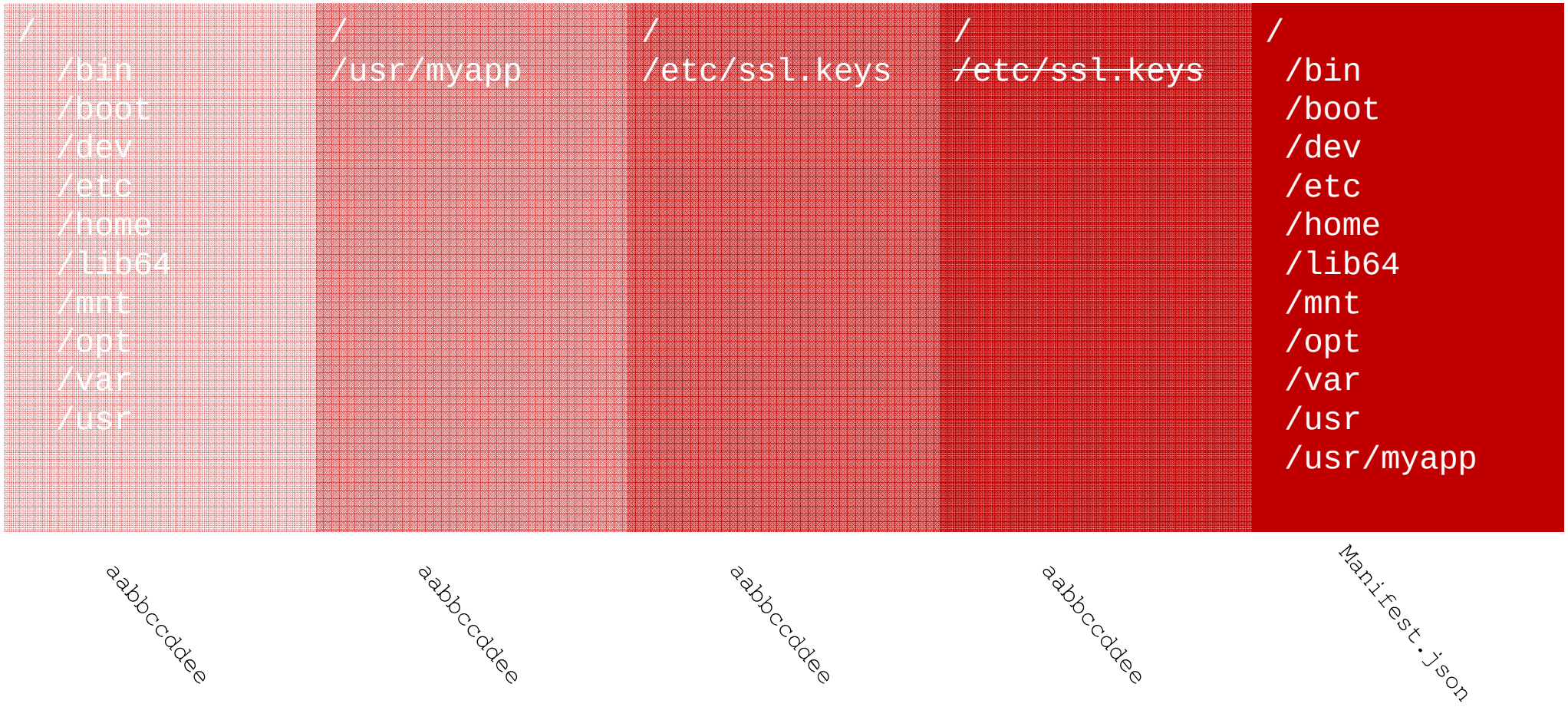
Docker Image



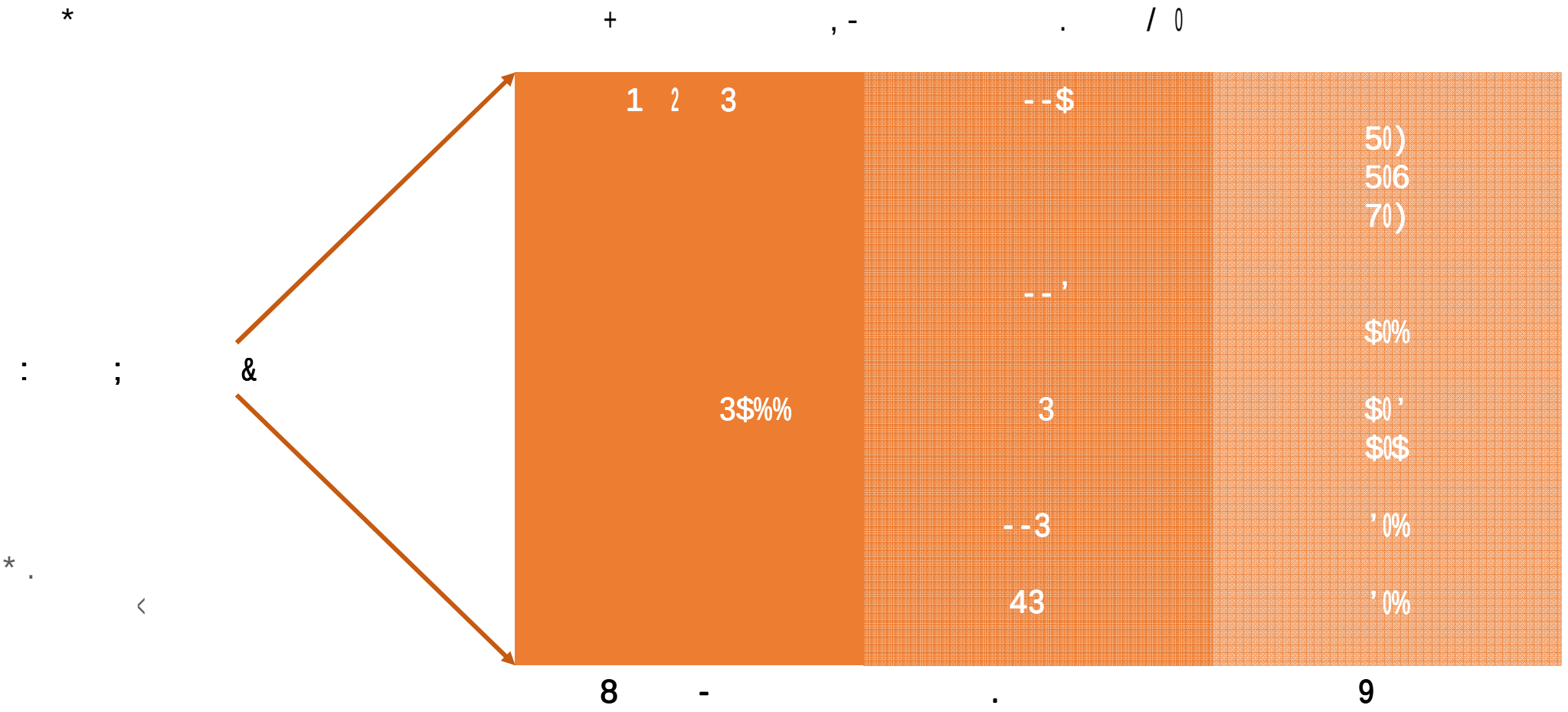
Docker Image



Docker Image



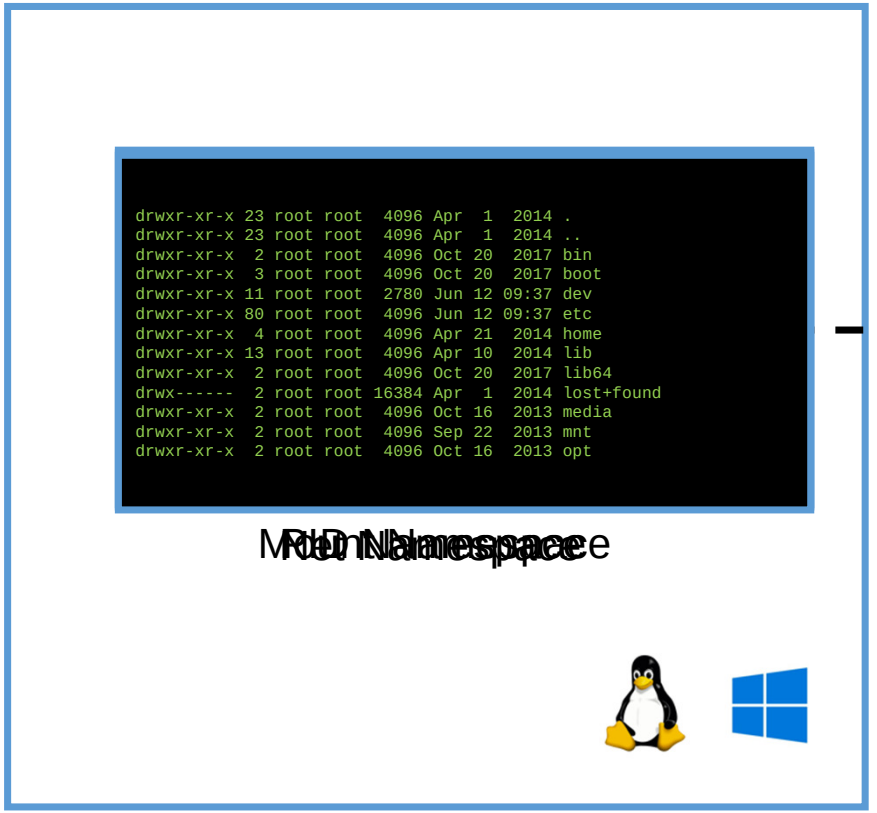
Container Registry



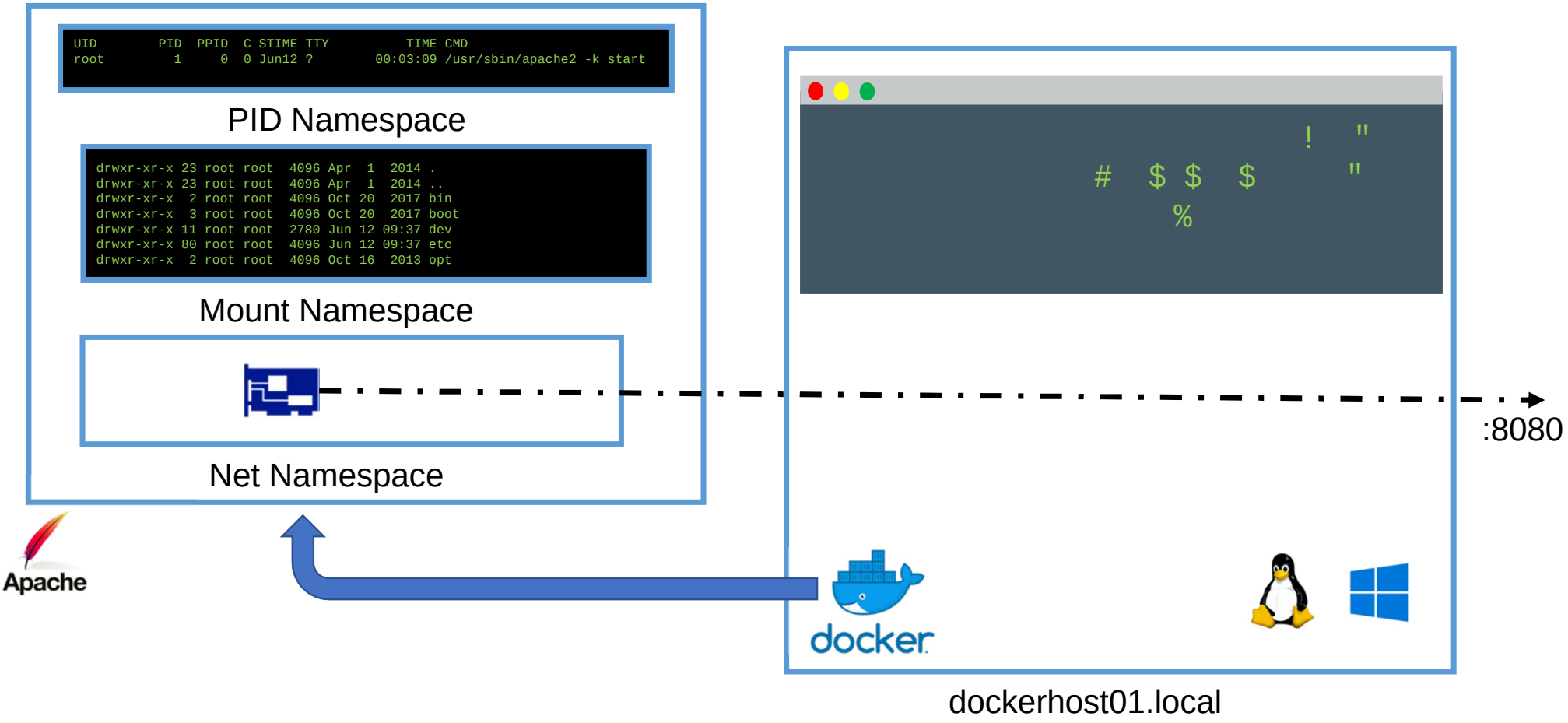
Pulling an image from a Registry

What happens if no tag is specified?

What is a container?



What is a container?

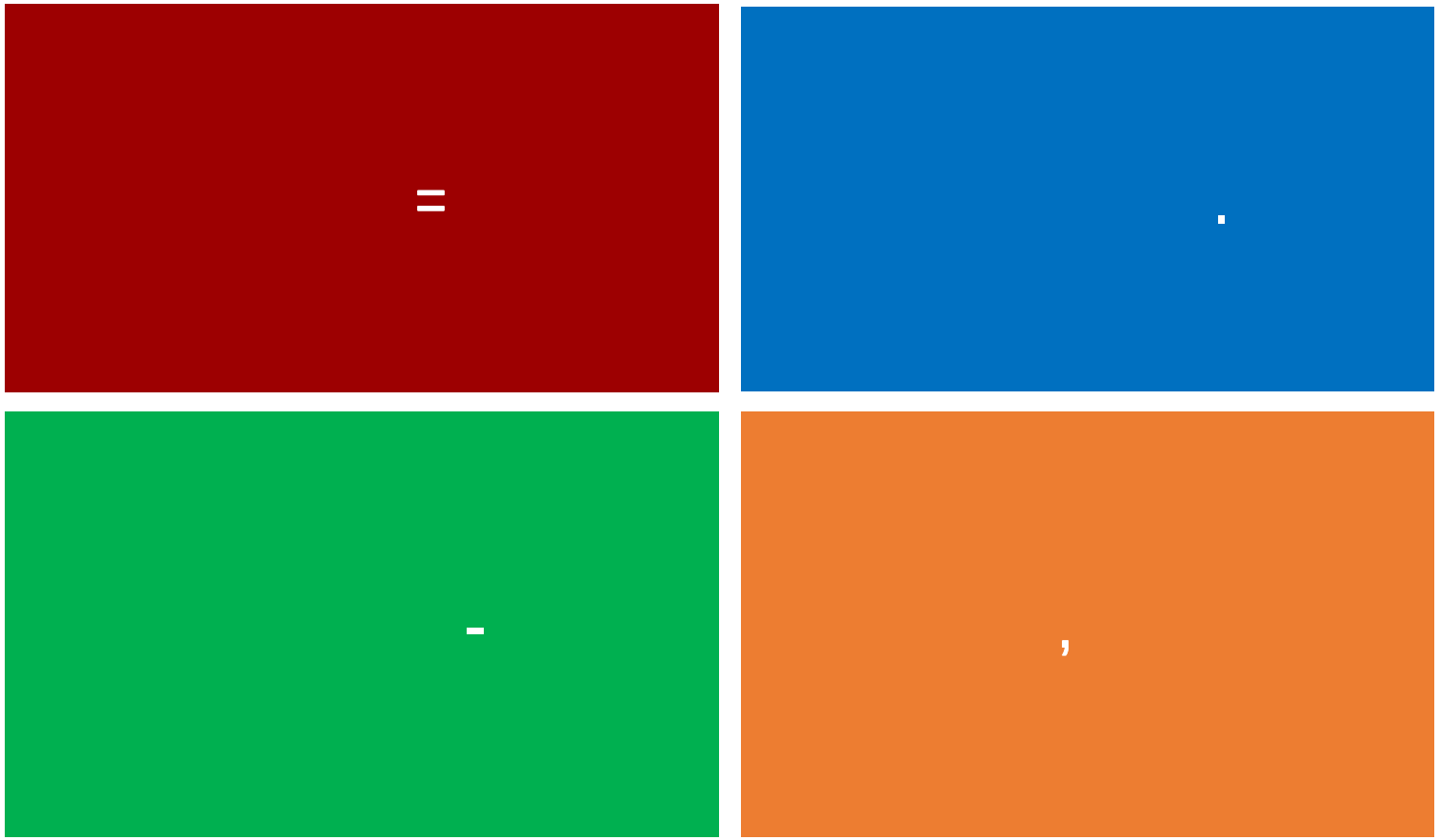


Using Docker

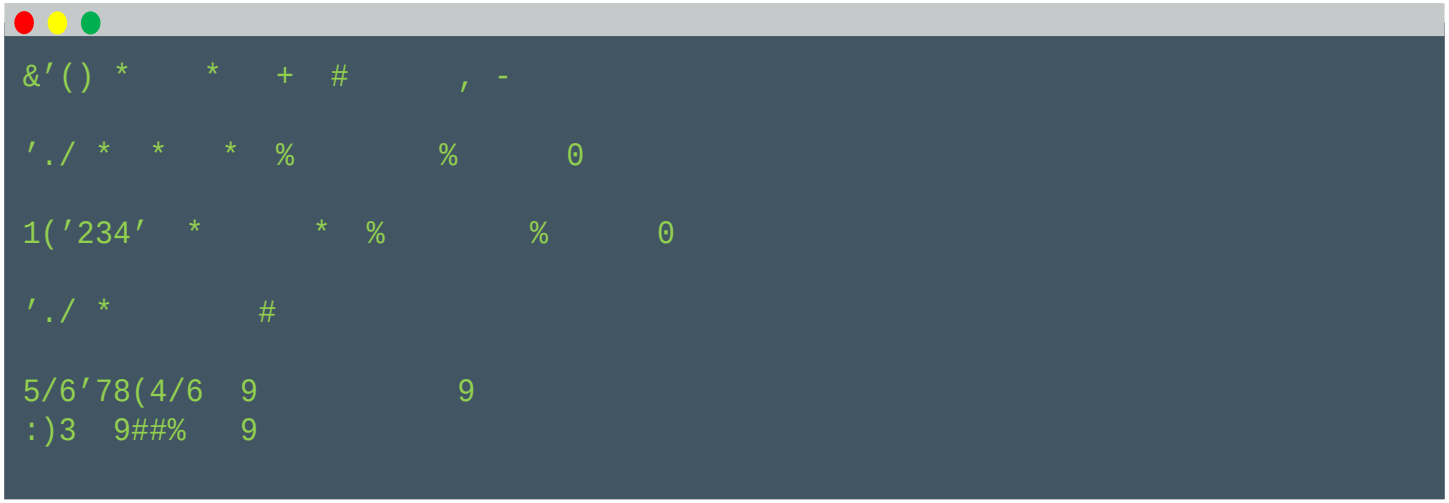
heptio

Using Docker

heptio



Dockerfile



Dockerfile

heptio

: 8 - ; ;

- ; < ; ;

; 0

. - go get -

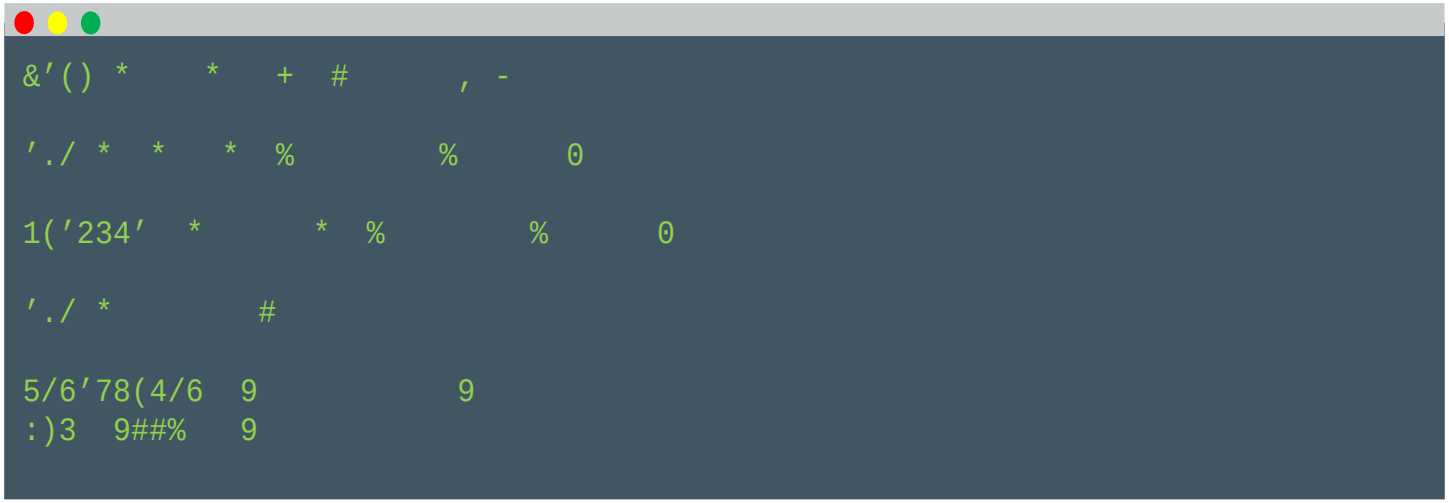
<

-

;

```
&'() *    *   +  #      , -

'./ *  *   *  %        %      0

1('234'  *      *  %        %      0

'./ *        #

5/6'78(4/6  9           9
:)3  9##%   9
```

Dockerfile



Dockerfile

?89:@1,.89 -

;

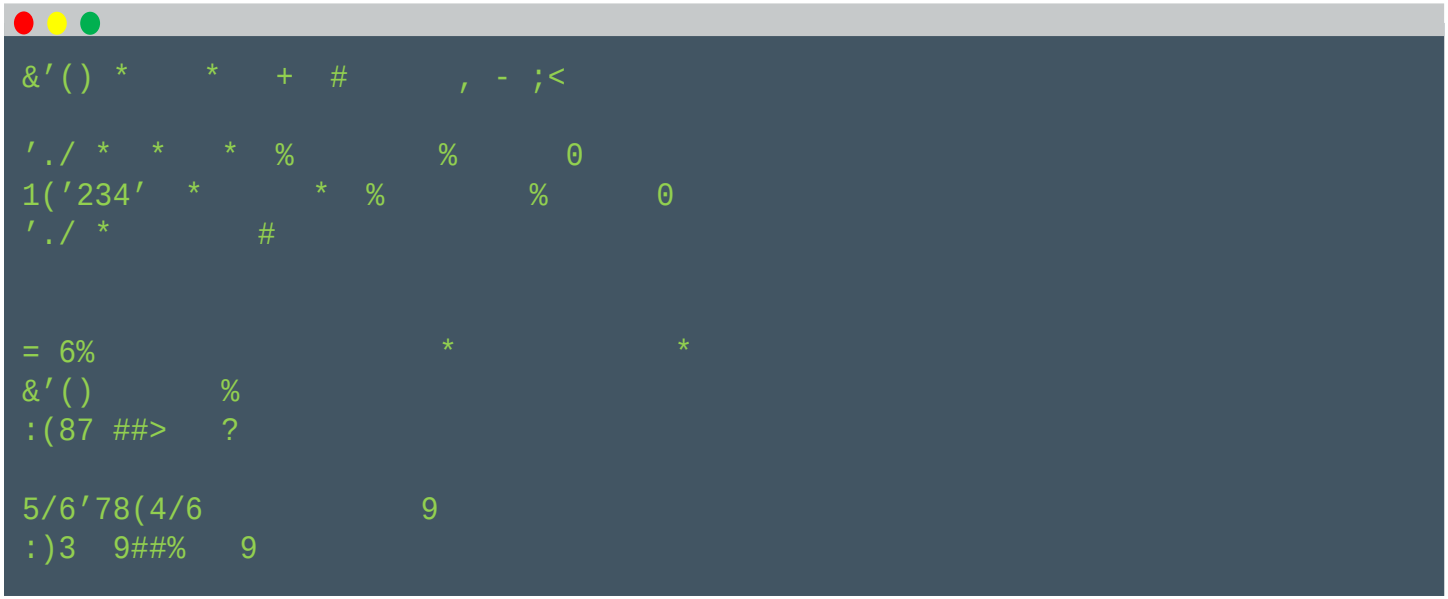
0

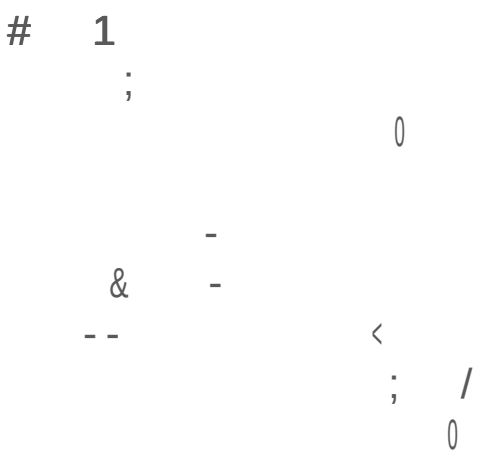
-

- 0

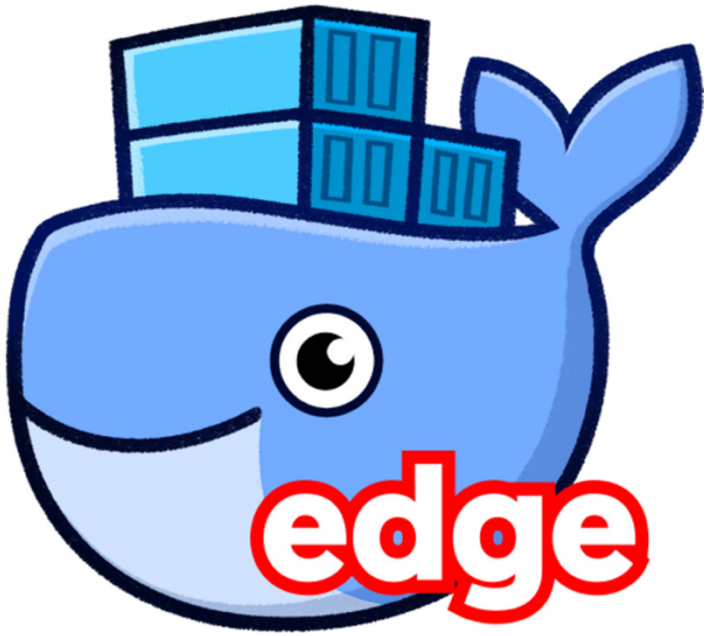
```
&'() *    *   +  #      , -

'./ *  *   *  %        %      0

1('234'  *      *  %        %      0

'./ *        #

5/6'78(4/6  9           9
:)3  9##%   9
```

Efficient Dockerfile(s)

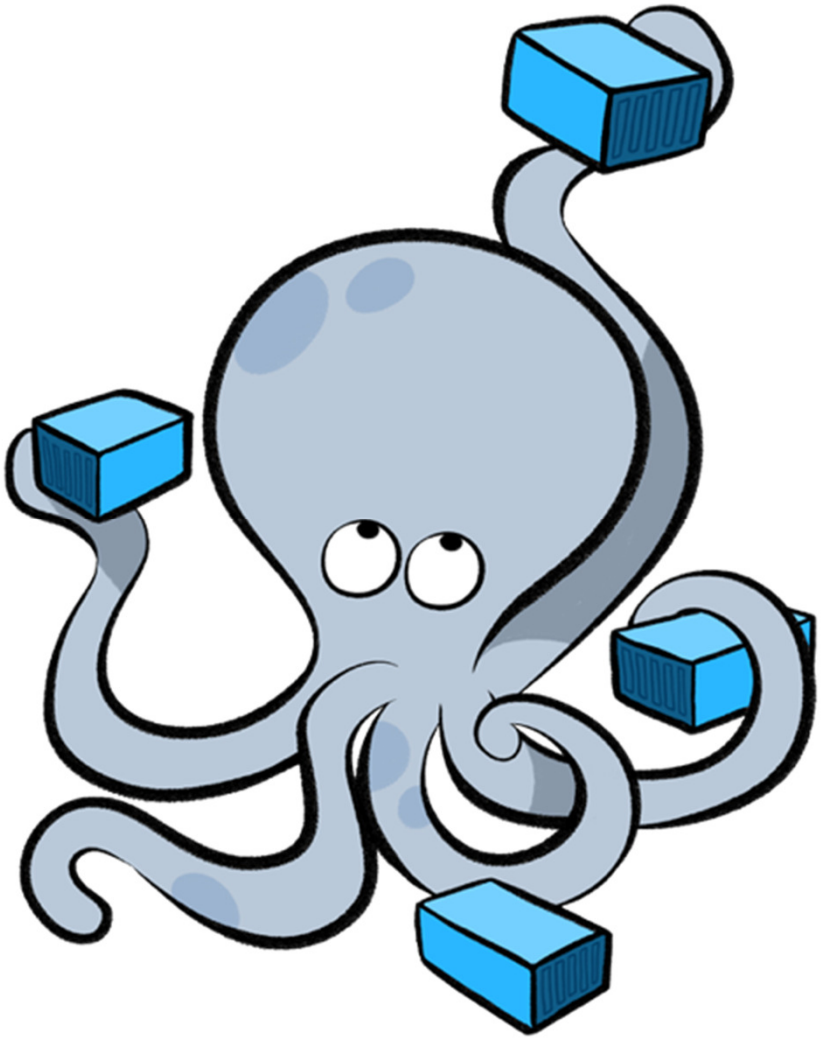




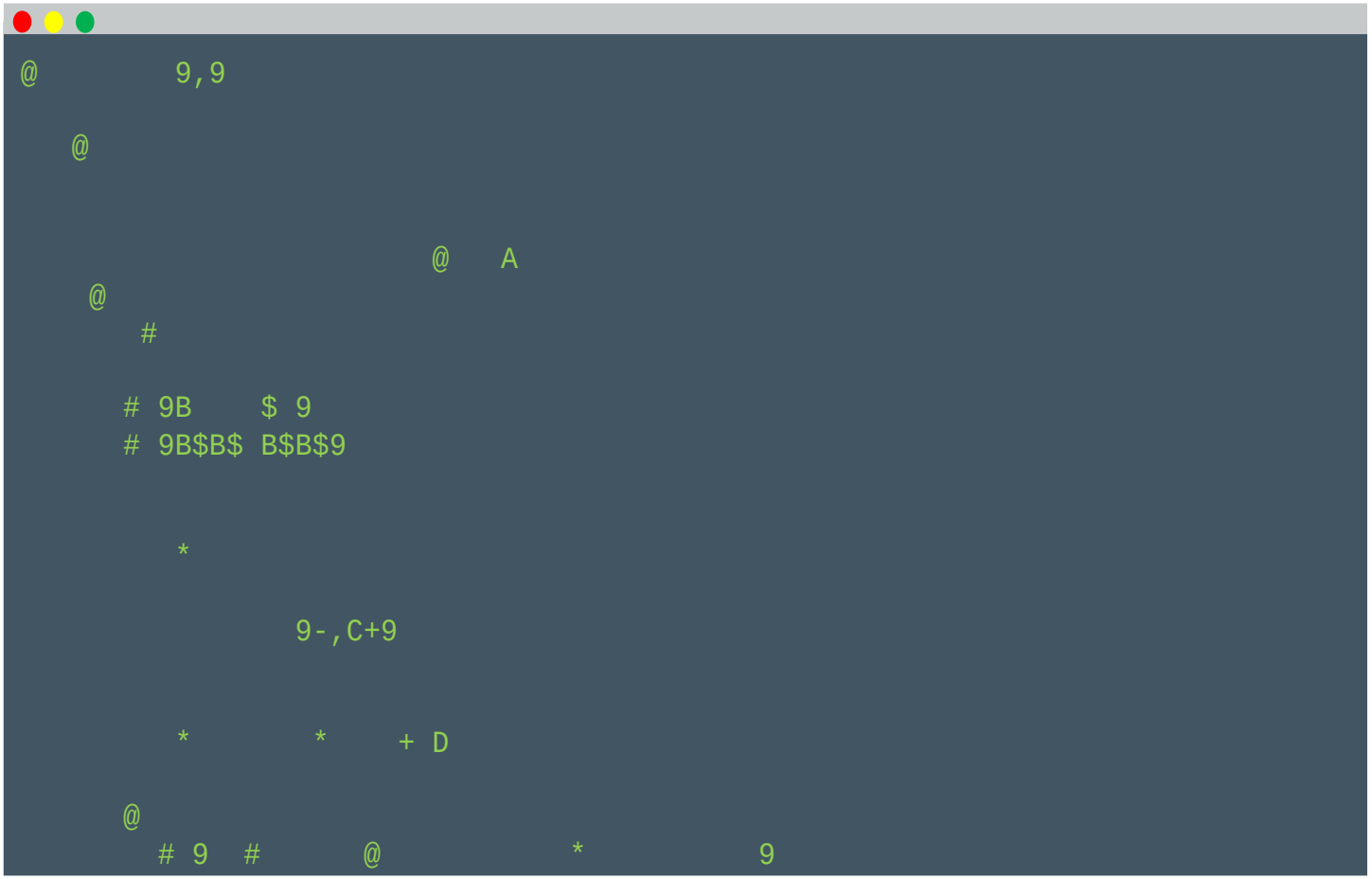
Docker CLI



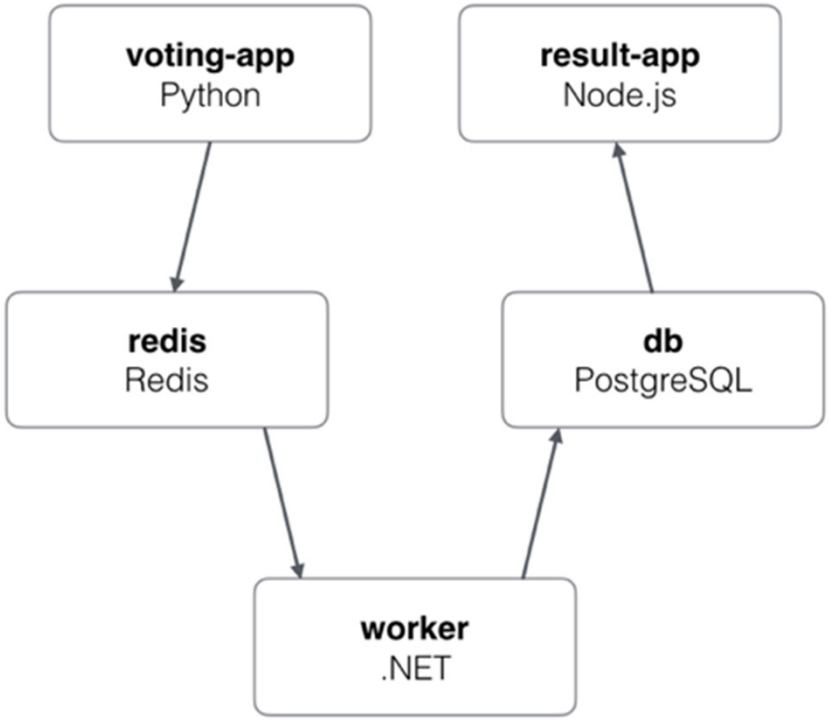
Docker Compose



Docker Compose



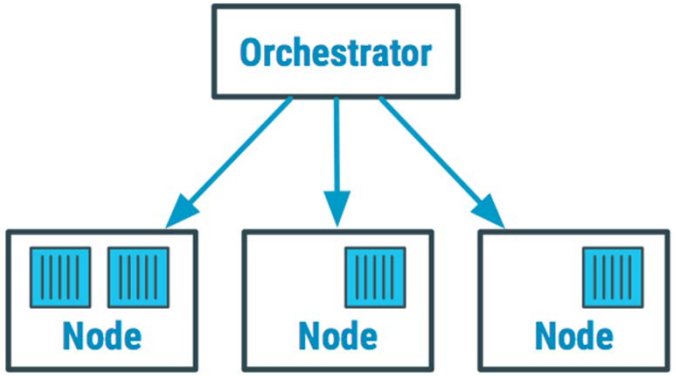
Docker Compose example



/11 $, 1 1 " "

Container Orchestration

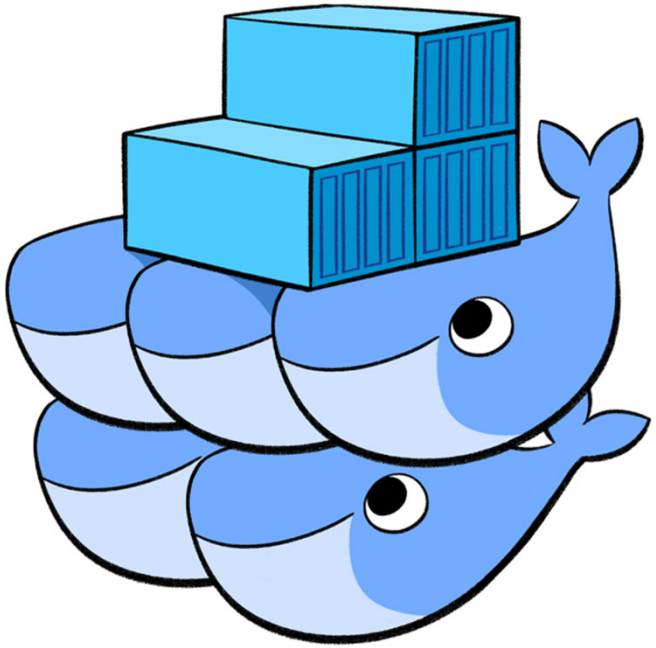
- 1 /
- .
- :
-
- ? - /
- B ; /



Container Orchestrators

heptio

Docker Swarm



```
docker swarm init
...
    docker swarm join --token aabbcc 192.168.0.1:2377
...
```

```
docker swarm join --token aabbcc 192.168.0.1:2377
```

Kubernetes

Questions?

-
- , 2
- 8
-

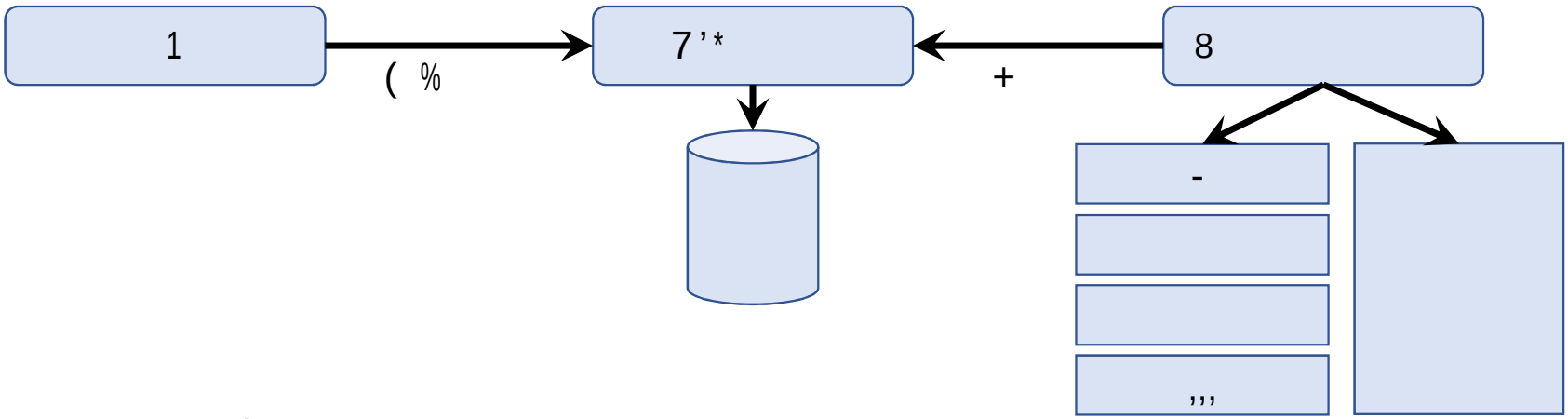
- ,
  - 1 / < < --
- # ; --
  - G
  - 8
  - B
  - OOO
- /
  - 1 / H H --
- |
  - ! 6 & "C J A E

heptio

- 4 E A 4 ,
- , - E /
  - 8 / - =
- - ; ? -
  - : < # < G # < . 4 # < +

<
!
"0

- 9 4 -
- 40
- -
;



9 1. B / 991& : ?B9

4

! 000"

- 9 < ; ;
A C -- ; <
; < - <
; / < 0

- , ; A/ ; <
A 0 !B C 0 "

:

/ ; - -

- # -
- B
- - ;
- ?/
- ? -
- .
- K
- 8
- 8 -
- 1
- 1 G
- : - B
- B
- B /
- B /
- B B < 000

# #

- /
  ; / - 0
- 9 <
  0

; :

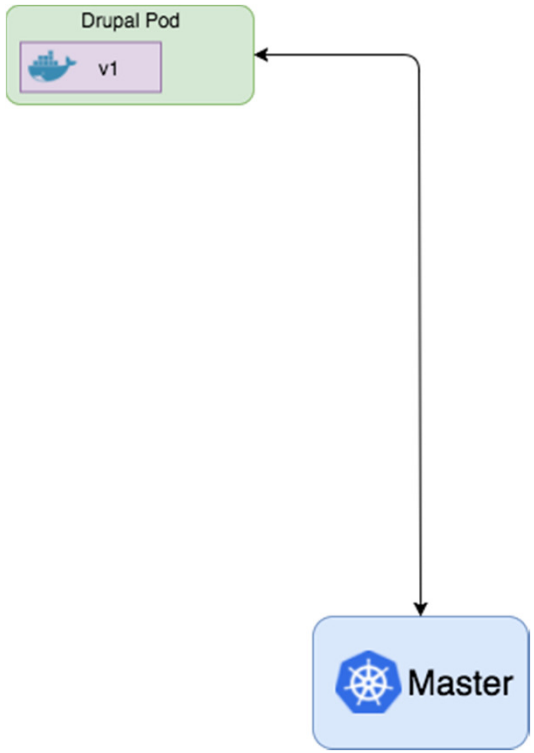
- 1 C F
  - B - ;
  - B / ;- -
  - : - B < - ; <B B <000
- B /
  - - ; -- 8B ;
  - ; - -- ;

, 2

9 C

- 1
- B /
- G
- 8 -

, 2 C -



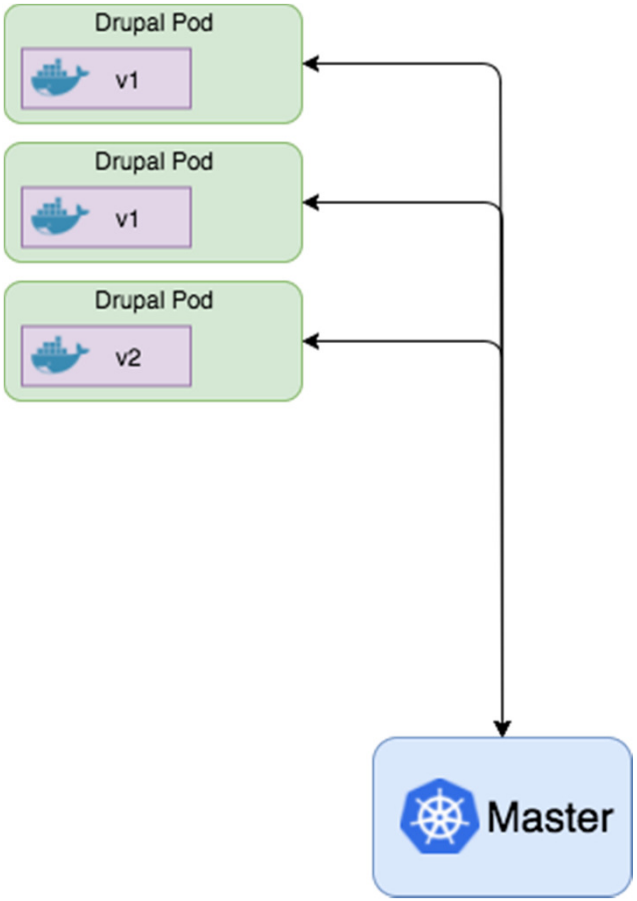
- 9 ’ ! : $
- ! ;
- 4 ! #
  - $
  ! !

```
spec:
  template:
    spec:
      containers:
        - name: drupal
          image: cr.io/repo/mydrupal:v1
```

, 2 C -

- - - ; 0
  - < -
  - ; - ! ;F - "
  - < 6 --
- ? - C
  - > .1
  - / / -
  - ;
  - - - -

, 2 C -

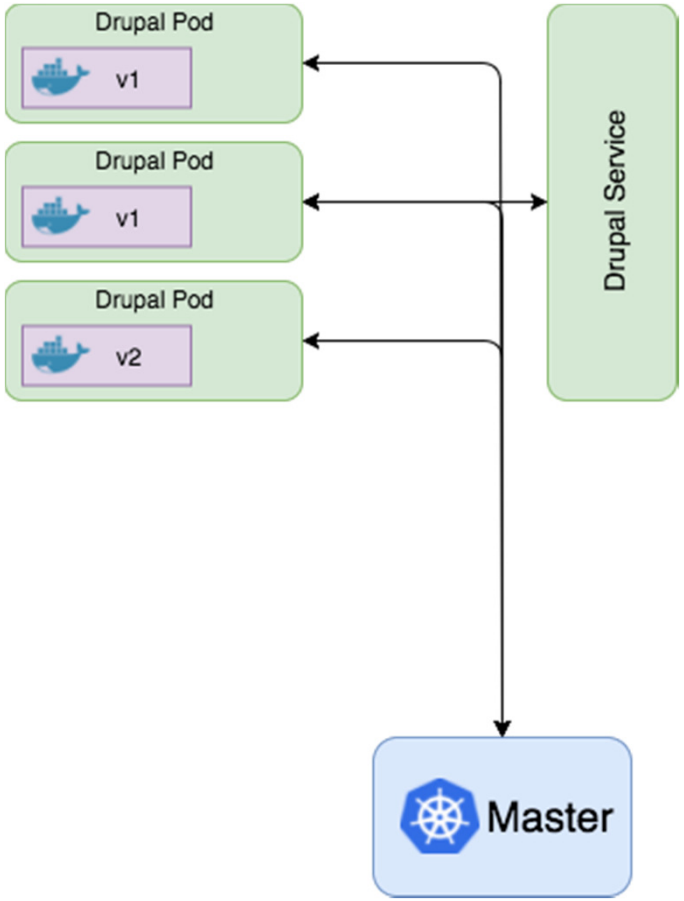


- , - < -
  / C
- B; 1
  - B -& - 1
- B; #
  - 1 -
  - ; ; - - /
- - ;
  - - ; /
  - - /
    - 4 &E - ;
    - : - ;

, 2 C /

- -
  - /
  - - - ! 0 0< "
- B / C
  - / .1 ! F.1" ; ! ; ; "
  - - / - < /
  - / < / /

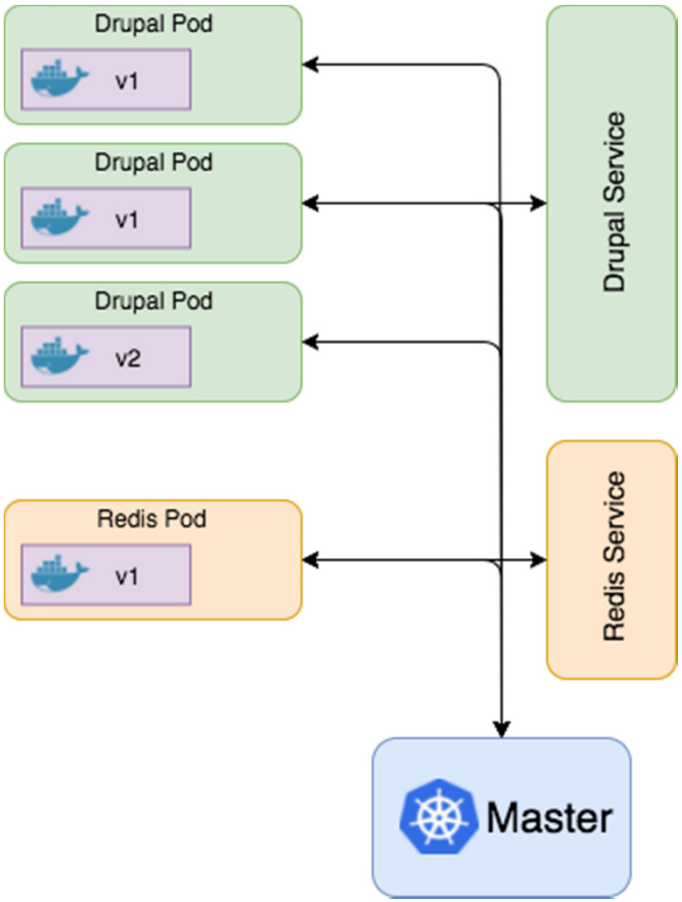
, 2 C /



- B /
  -
  - >
  - A ;
  - , ; /

```
apiVersion: v1
kind: Service
metadata:
  name: drupal
spec:
  selector:
    app: drupal
  ports:
    - name: http-port
      port: 80
  type: LoadBalancer
```

, 2 C /



- B /
  ; /
  - B / /
  -
  - B
- B / / ; - 2
  /
- B / / - -
  - B
  - B - /
  - ? B /
- 9 B / -
  ; / ; ; ;

, 2 C /

heptio

- ;< ; < -
- - - ; /
- / < - / F - L

, 2 C -

- - / - ;
- - / - C - >
- /
- ; A - 2 /
C

- - ;
  - : - B
  - < -- ;
  - / ;
  - / - !
- B B
  - - ; - <
    -
  - ; <- <
- B
  - -; -
  - < 0
- K
  - - <

- .
- 1 - ; /
  - - C&& 0 & & & & F
- 9 ; - / 2 &;

```
$ kubectl (create|get|apply|delete) -f myResource.yaml
```

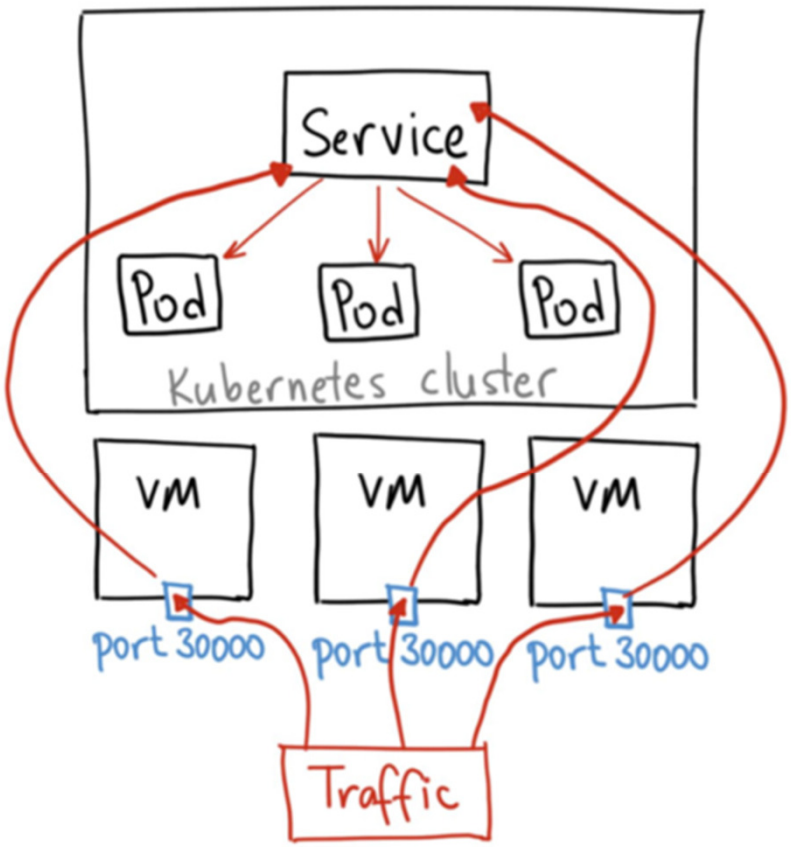
8

9;- &=	’	M	,/ ;	
B ;	1 ; ’	1 / ;	1 - / ; ;	1 /
; 9 ;	’ :1‹ 4	: - 4E1	GN 8	
? -	8	8	,/ ;	8
? -			= ‹ /	E B‹ B‹ B

8

=	8 1	4	.
B ;	B / - / - ! C M’%%%FM’O(O"	9;- ; -	9;- ; - -
.1	8 .1	? / / .1	# ; / .1‹ -
	9	M B /	O B /
? -		E ? 8	8 ‹

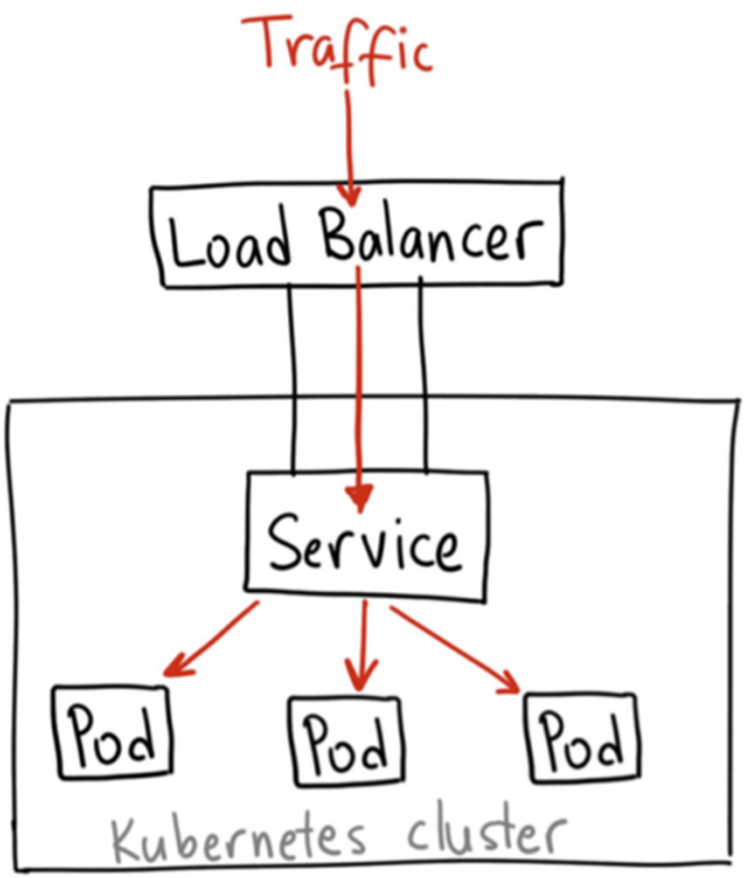
8 1




```
apiVersion: v1
kind: Service
metadata:
  name: productpage
  labels:
    app: productpage
spec:
  type: NodePort
  ports:
  - port: 30000
    targetPort: 9080
selector:
  app: productpage
```

heptio

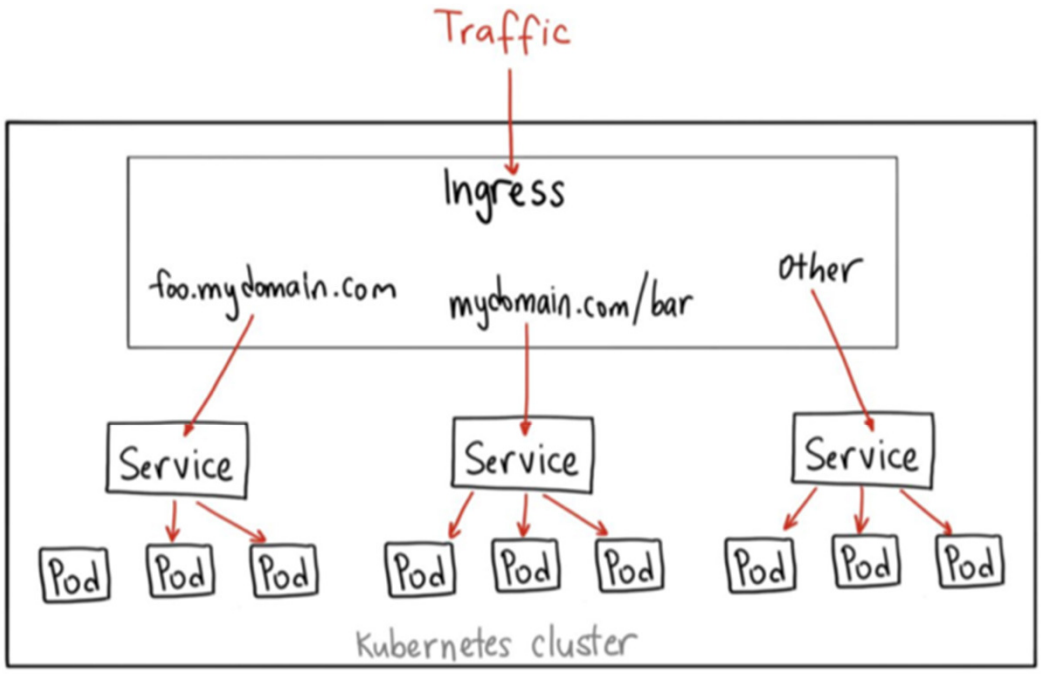
4




```
apiVersion: v1
kind: Service
metadata:
  name: productpage
  labels:
    app: productpage
spec:
  type: LoadBalancer
  ports:
  - port: 80
    targetPort: 9080
selector:
  app: productpage
```

heptio

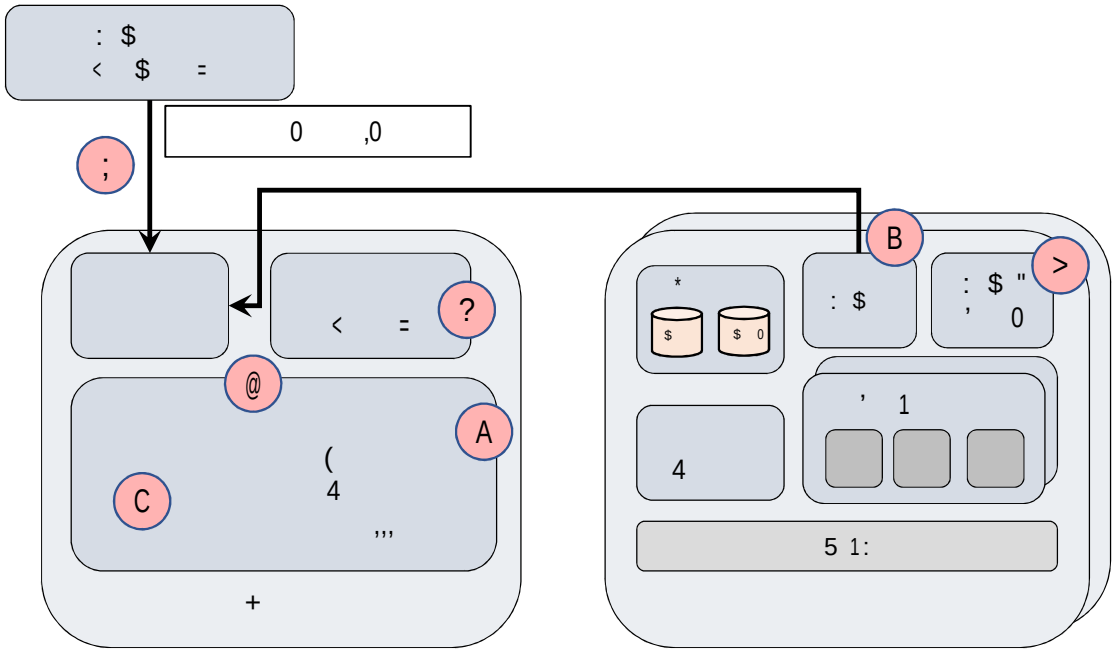
4




```
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: gateway
spec:
  backend:
     serviceName: productpage
     servicePort: 9080
  rules:
   - host: mydomain.com
    http:
       paths:
       - path: /productpage
       backend:
          serviceName: productpage
          servicePort: 9080
```

/

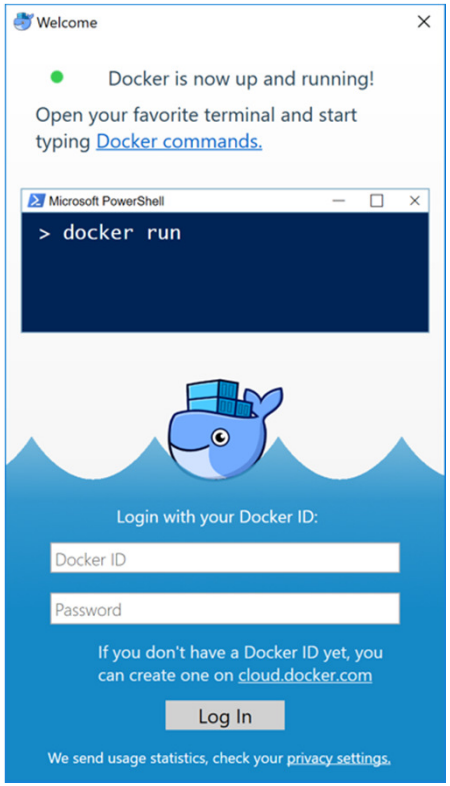
$0 / H H - ; - -
’0 1. / / >
4 ! "
M0 &
-
70 : - B &
- - -
P
50 B -
(0 - - ;
/ ! 0 0 "
O0 - ;
- Q / / ;
F

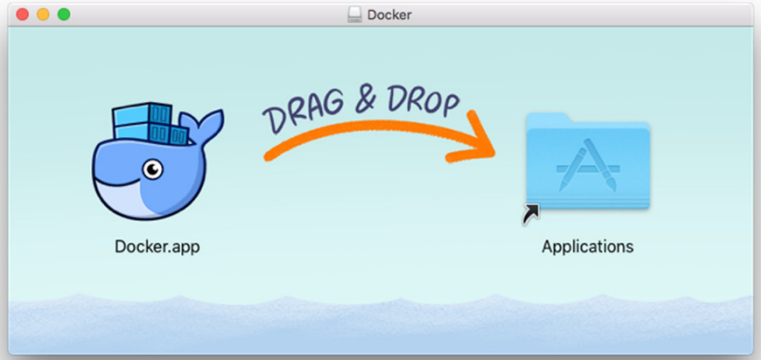


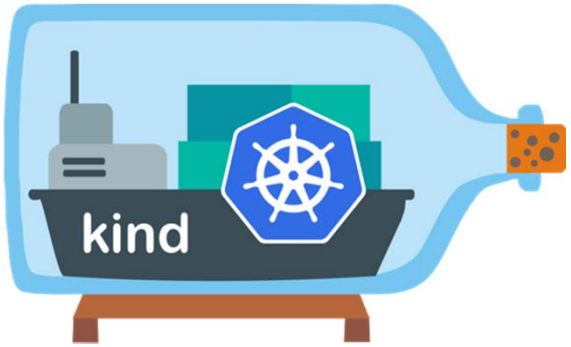
L

- # F -C&& 0
- B F - C&& 0 &
- @ 9 F - C&& 0; 0 & & R’ %> 9,#% @ 32 .

E


Welcome
Docker is now up and running!
Open your favorite terminal and start typing Docker commands.
Microsoft PowerShell
> docker run
Login with your Docker ID:
Docker ID
Password
If you don't have a Docker ID yet, you can create one on cloud.docker.com
Log In
We send usage statistics, check your privacy settings.


Docker
DRAG & DROP
Docker.app
Applications


kind

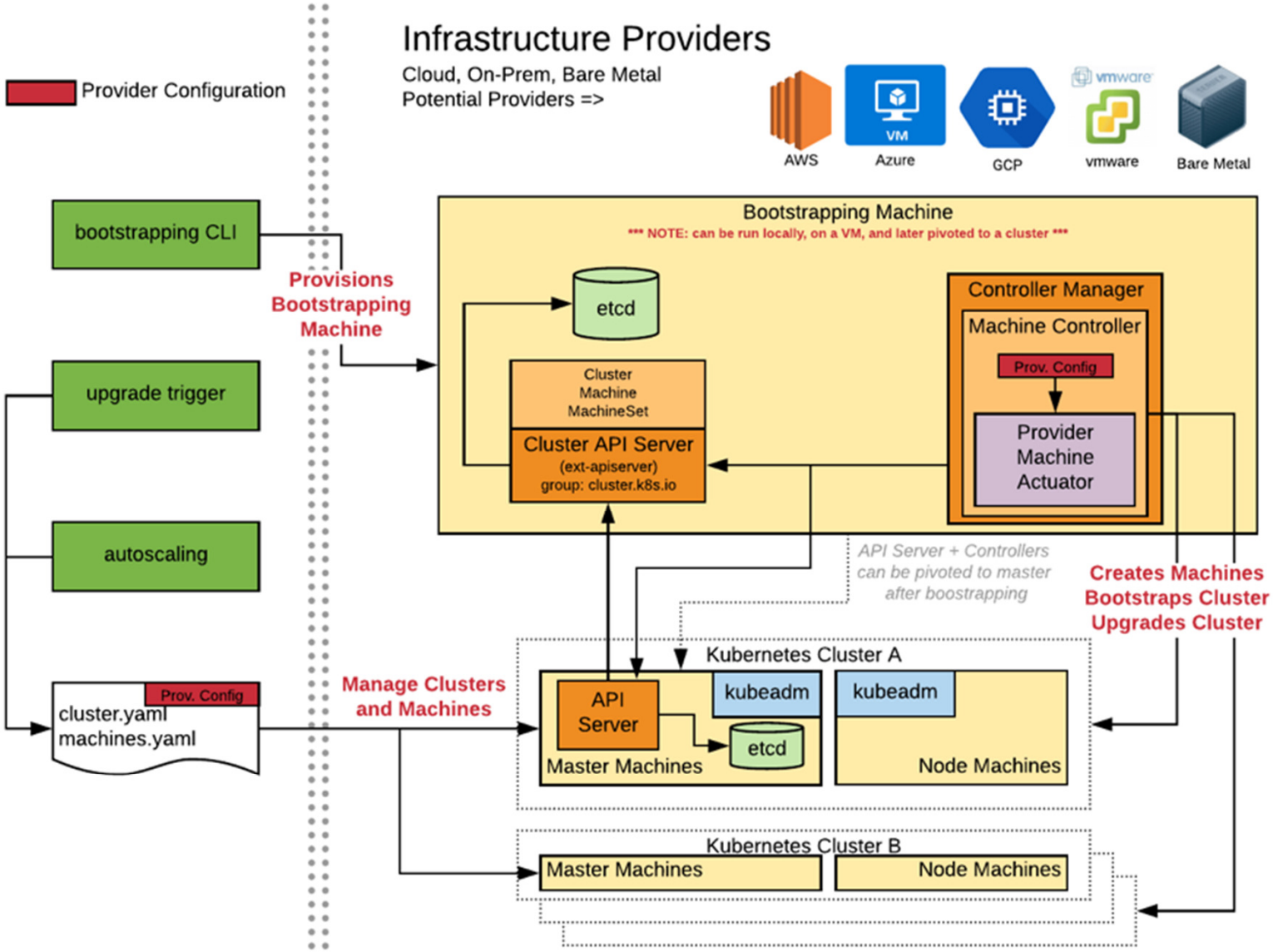
- + B /
- + ? B /
- E ?
- ,

F 1.

heptio

- ; $ ’ -
  - ; $" 4 -
    - B / %
  - ; ’ " #
    - # ;
    - -
    - B
  - B + ;
    - # ; < / ; - -

•? - L


Infrastructure Providers
Cloud, On-Prem, Bare Metal
Potential Providers =>
Provider Configuration
AWS
Azure
VM
GCP
vmware
vmware
Bare Metal
bootstrapping CLI
upgrade trigger
autoscaling
Prov. Config
cluster.yaml
machines.yaml
Provisions Bootstrapping Machine
Manage Clusters and Machines
Bootstrapping Machine
*** NOTE: can be run locally, on a VM, and later pivoted to a cluster ***
etcd
Cluster
Machine
MachineSet
Cluster API Server
(ext-apiserver)
group: cluster.k8s.io
Controller Manager
Machine Controller
Prov. Config
Provider
Machine
Actuator
API Server + Controllers can be pivoted to master after boostrapping
Creates Machines
Bootstraps Cluster
Upgrades Cluster
Kubernetes Cluster A
API Server
kubeadm
etcd
Master Machines
kubeadm
Node Machines
Kubernetes Cluster B
Master Machines
Node Machines

/

heptio

Leverage KubeVirt and Kubernetes to manage virtual machines for impractical-to-containerize apps.

Combine existing virtualized workloads with new container workloads on the one platform.

Support development of new microservice applications in containers that interact with existing virtualized applications.

heptio

* 8 / - =