

第 1 节

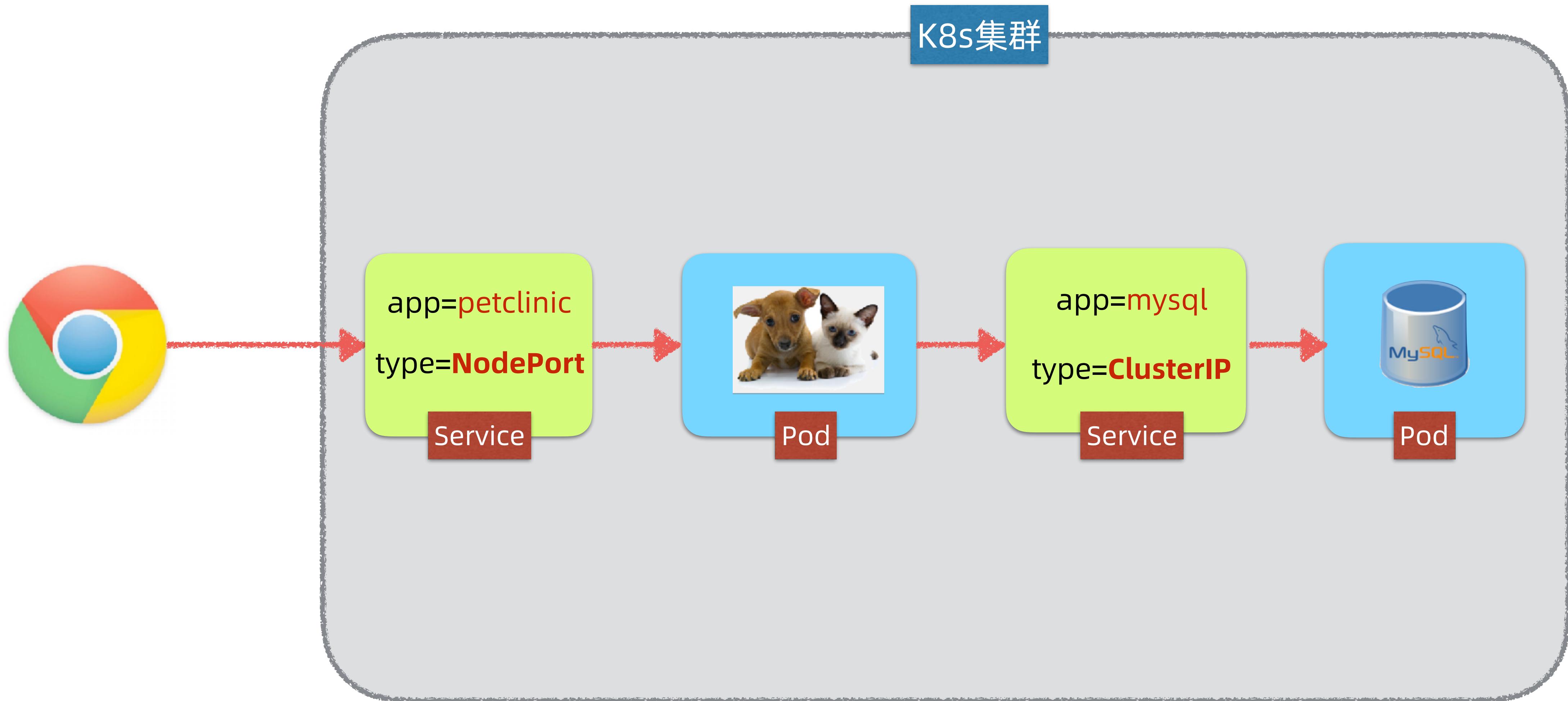
# K8s存储卷抽象Volume

# 本课内容

- MySql Pod重启演示(不挂载存储卷Volume)
- K8s存储卷抽象Volume
- MySql Pod重启演示(挂载存储卷Volume)



# 单体版Petclinic



# mysql-svc.yml

```
25 apiVersion: v1
26 kind: Service
27 metadata:
28   name: mysql
29 spec:
30   selector:
31     app: mysql
32   ports:
33     - name: tcp
34       port: 3306
35       targetPort: 3306
36   type: ClusterIP
```

```
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: mysql
5  spec:
6    selector:
7      matchLabels:
8        app: mysql
9    replicas: 1
10   template:
11     metadata:
12       labels:
13         app: mysql
14     spec:
15       containers:
16         - name: mysql
17           image: mysql:5.7
18           env:
19             - name: MYSQL_ROOT_PASSWORD
20               value: petclinic
21             - name: MYSQL_DATABASE
22               value: petclinic
```

# petclinic-svc.yml

```
33 apiVersion: v1
34 kind: Service
35 metadata:
36   name: petclinic
37 spec:
38   ports:
39     - name: http
40       port: 8080
41       targetPort: 8080
42       nodePort: 31080
43   selector:
44     app: petclinic
45   type: NodePort
```

```
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: petclinic
5  spec:
6    selector:
7      matchLabels:
8        app: petclinic
9    replicas: 1
10   template:
11     metadata:
12       labels:
13         app: petclinic
14     spec:
15       containers:
16         - name: petclinic
17           image: spring2go/spring-petclinic:1.0.1.RELEASE
18           env:
19             - name: SPRING_PROFILES_ACTIVE
20               value: mysql
21             - name: DATASOURCE_URL
22               value: jdbc:mysql://mysql/petclinic
23             - name: DATASOURCE_USERNAME
24               value: root
25             - name: DATASOURCE_PASSWORD
26               value: petclinic
27             - name: DATASOURCE_INIT_MODE
28               value: always
```

# 发布mysql-svc和petclinic-svc

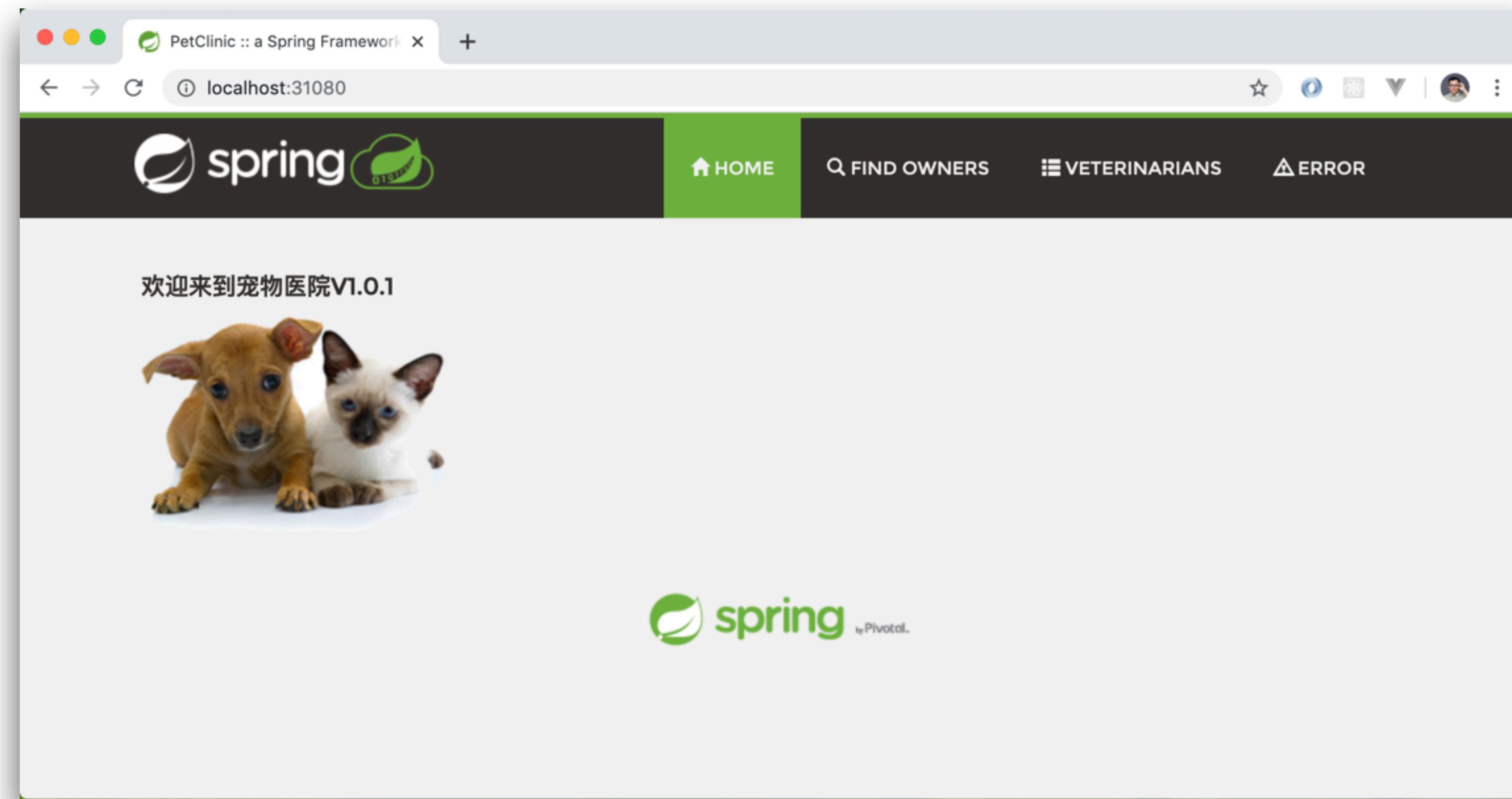
```
1. william@jskill: ~/csdn/k8s-msa-in-action/ch07/01 (zsh)
→ 01 git:(master) ✘ pwd
/Users/william/csdn/k8s-msa-in-action/ch07/01
→ 01 git:(master) ✘ ls
mysql-svc.yml      petclinic-svc.yml
→ 01 git:(master) ✘ kubectl apply -f mysql-svc.yml
deployment.apps/mysql created
service/mysql created
→ 01 git:(master) ✘ kubectl apply -f petclinic-svc.yml
deployment.apps/petclinic created
service/petclinic created
→ 01 git:(master) ✘ kubectl get all
NAME                           READY   STATUS    RESTARTS   AGE
pod/mysql-7bff4b4f56-t7rc7    1/1     Running   0          14s
pod/petclinic-5864c7d4d8-hkbb6 1/1     Running   0          3s

NAME              TYPE        CLUSTER-IP      EXTERNAL-IP      PORT(S)        AGE
service/kubernetes ClusterIP  10.96.0.1      <none>           443/TCP       2m21s
service/mysql      ClusterIP  10.106.53.39  <none>           3306/TCP      14s
service/petclinic NodePort    10.99.186.98  <none>           8080:31080/TCP 3s

NAME                           READY   UP-TO-DATE  AVAILABLE   AGE
deployment.apps/mysql         1/1     1           1           14s
deployment.apps/petclinic     1/1     1           1           3s

NAME                           DESIRED  CURRENT  READY   AGE
replicaset.apps/mysql-7bff4b4f56  1        1        1        14s
replicaset.apps/petclinic-5864c7d4d8  1        1        1        3s
→ 01 git:(master) ✘ █
```

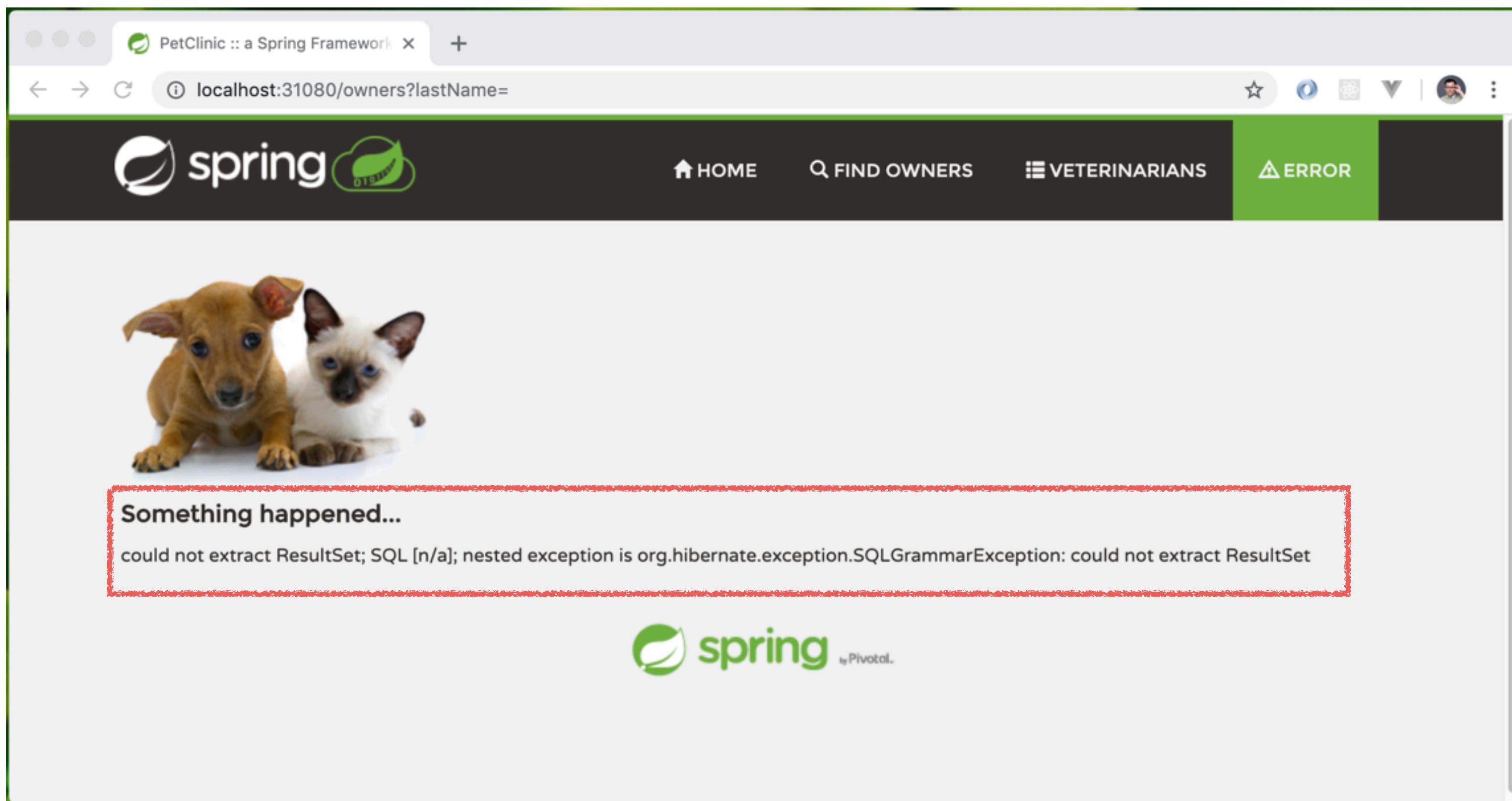
# 浏览器校验成功



# 删除并重启mysql pod

```
1. william@jskill: ~/csdn/k8s-msa-in-action/ch07/01 (zsh)
→ 01 git:(master) ✘ kubectl get po
NAME                  READY   STATUS    RESTARTS   AGE
mysql-7bff4b4f56-t7rc7   1/1     Running   0          2m20s
petclinic-5864c7d4d8-hkbb6   1/1     Running   0          2m9s
→ 01 git:(master) ✘ kubectl delete po mysql-7bff4b4f56-t7rc7
pod "mysql-7bff4b4f56-t7rc7" deleted
→ 01 git:(master) ✘ kubectl get po
NAME                  READY   STATUS    RESTARTS   AGE
mysql-7bff4b4f56-446ct   1/1     Running   0          9s
petclinic-5864c7d4d8-hkbb6   1/1     Running   0          2m32s
→ 01 git:(master) ✘
```

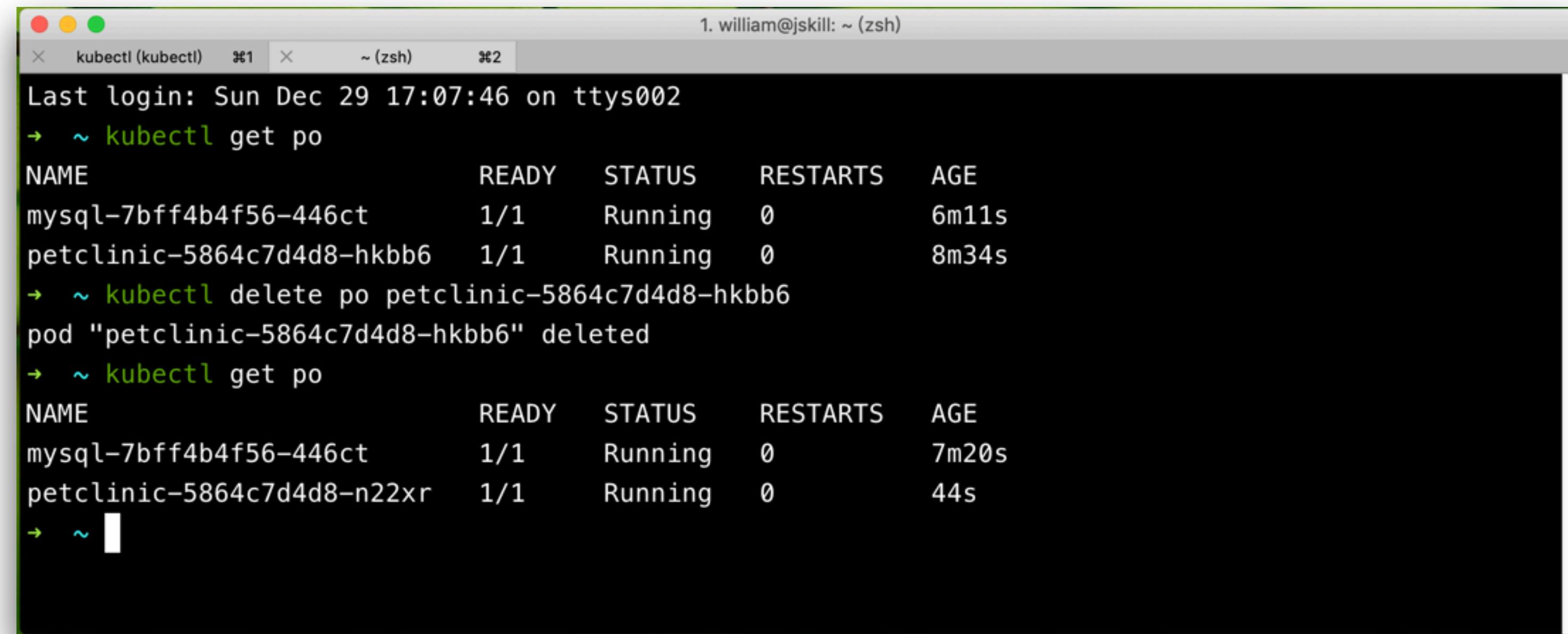
# 浏览器校验失败



# var/lib/mysql数据为空

```
1. kubectl exec -it mysql-7bff4b4f56-446ct sh (kubectl)
→ 01 git:(master) ✘ kubectl get po
NAME                  READY   STATUS    RESTARTS   AGE
mysql-7bff4b4f56-446ct   1/1     Running   0          4m57s
petclinic-5864c7d4d8-hkbb6   1/1     Running   0          7m20s
→ 01 git:(master) ✘ kubectl exec -it mysql-7bff4b4f56-446ct sh
# cd var/lib/mysql
# ls
auto.cnf    client-cert.pem  ib_logfile0  ibtmp1      petclinic      server-cert.pem
ca-key.pem  client-key.pem  ib_logfile1  mysql       private_key.pem  server-key.pem
ca.pem      ib_buffer_pool   ibdata1     performance_schema  public_key.pem  sys
# cd petclinic
# ls
db.opt
#
```

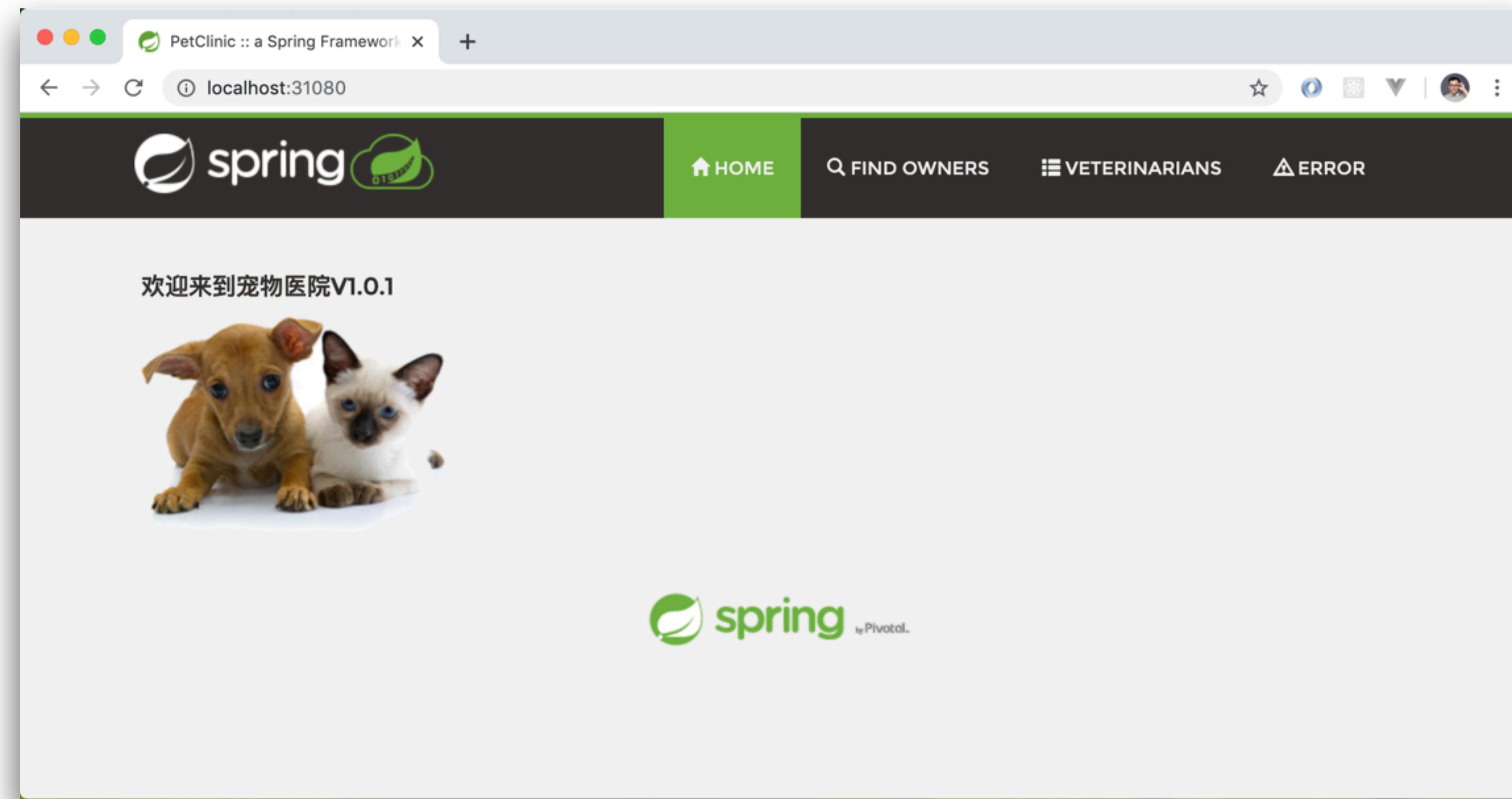
# 删除并重启petclinic pod



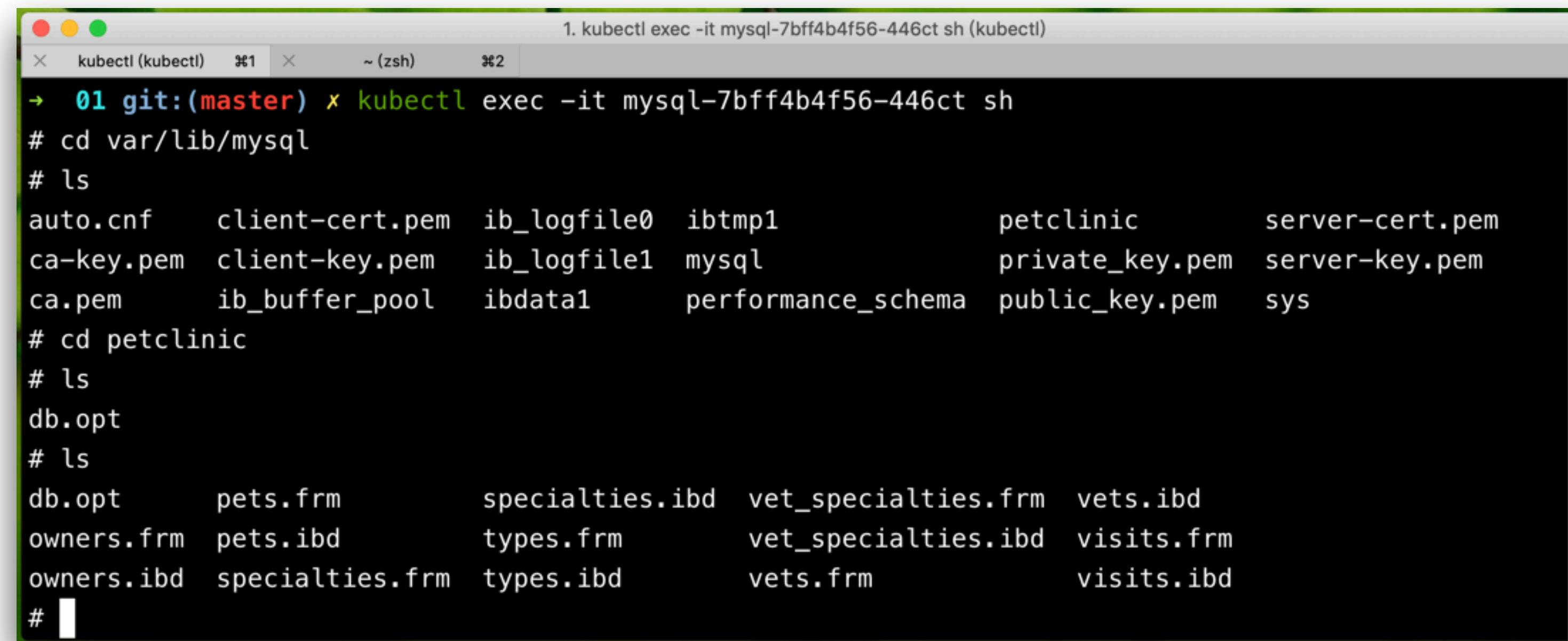
1. william@jskill: ~ (zsh)

```
Last login: Sun Dec 29 17:07:46 on ttys002
→ ~ kubectl get po
NAME                 READY   STATUS    RESTARTS   AGE
mysql-7bff4b4f56-446ct   1/1     Running   0          6m11s
petclinic-5864c7d4d8-hkbb6   1/1     Running   0          8m34s
→ ~ kubectl delete po petclinic-5864c7d4d8-hkbb6
pod "petclinic-5864c7d4d8-hkbb6" deleted
→ ~ kubectl get po
NAME                 READY   STATUS    RESTARTS   AGE
mysql-7bff4b4f56-446ct   1/1     Running   0          7m20s
petclinic-5864c7d4d8-n22xr   1/1     Running   0          44s
→ ~ █
```

# 浏览器校验成功



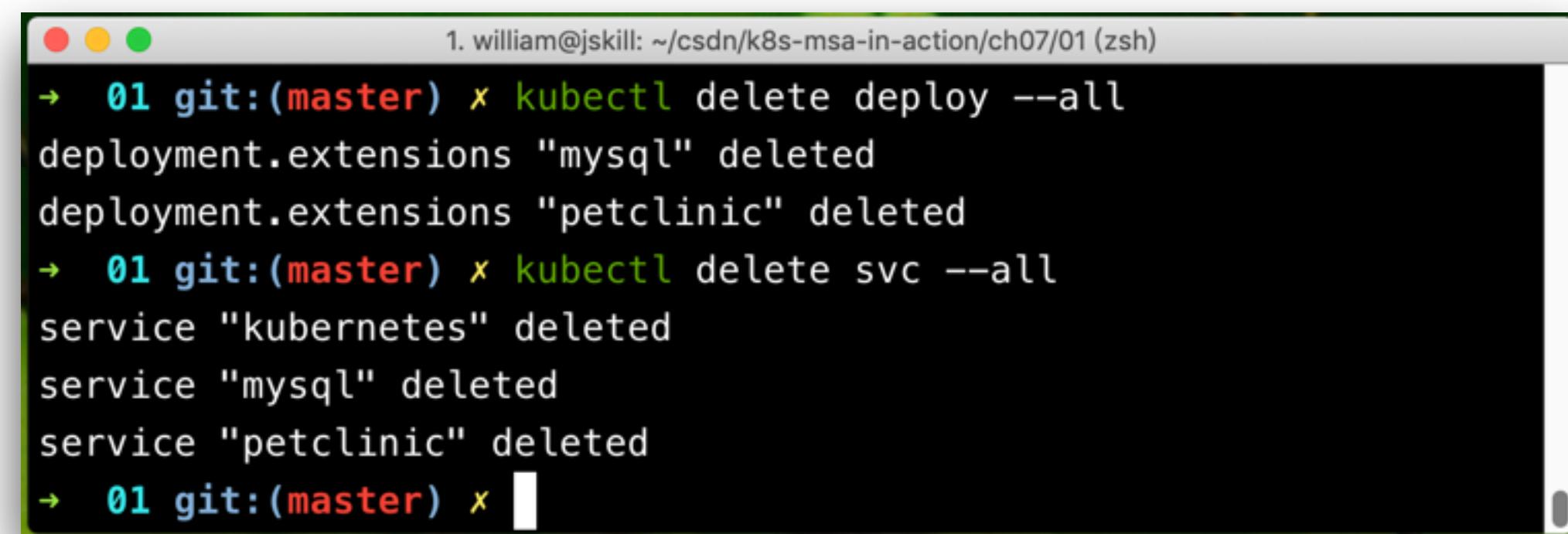
# var/lib/mysql有表和数据



The screenshot shows a terminal window with two tabs. The active tab is titled 'kubectl (kubectl)' and contains the following command-line session:

```
→ 01 git:(master) ✘ kubectl exec -it mysql-7bff4b4f56-446ct sh (kubectl)
# cd var/lib/mysql
# ls
auto.cnf      client-cert.pem    ib_logfile0   ibtmp1          petclinic      server-cert.pem
ca-key.pem    client-key.pem    ib_logfile1   mysql           private_key.pem  server-key.pem
ca.pem        ib_buffer_pool     ibdata1       performance_schema public_key.pem  sys
# cd petclinic
# ls
db.opt
# ls
db.opt      pets.frm        specialties.ibd  vet_specialties.frm  vets.ibd
owners.frm   pets.ibd       types.frm      vet_specialties.ibd  visits.frm
owners.ibd   specialties.frm  types.ibd      vets.frm        visits.ibd
#
```

# 环境清理



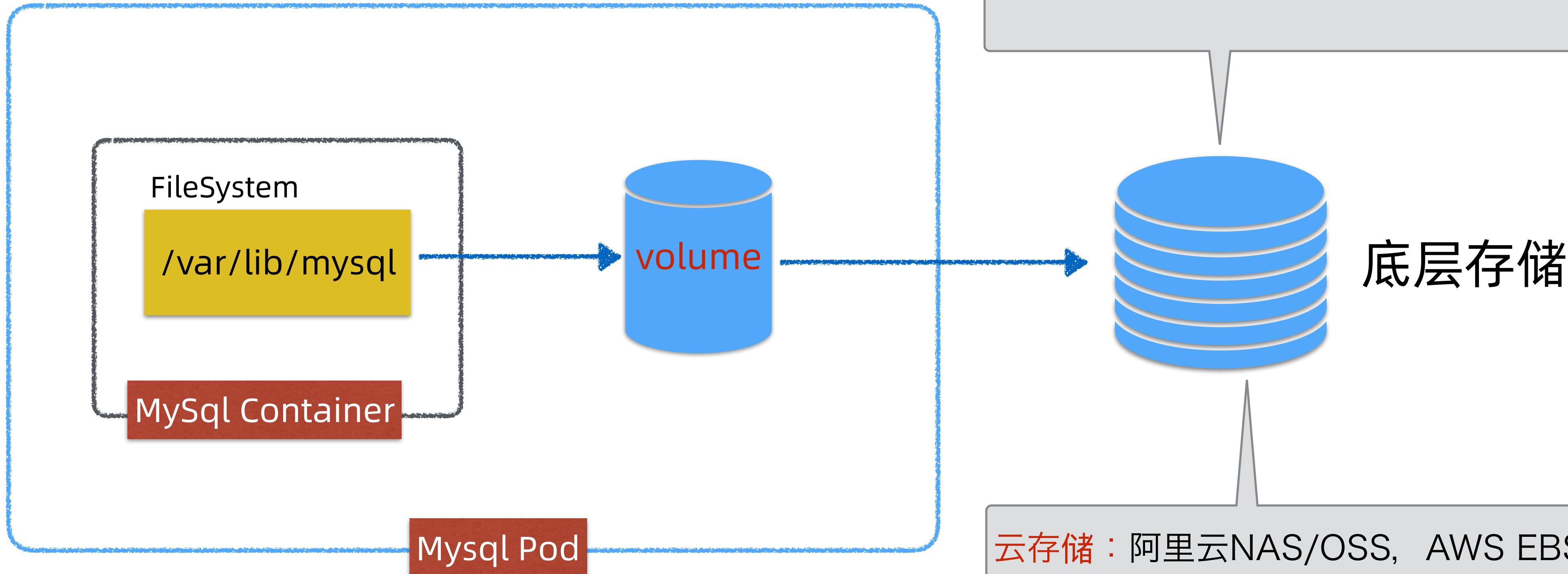
A terminal window titled "1. william@jskill: ~/csdn/k8s-msa-in-action/ch07/01 (zsh)". The window contains the following command and its output:

```
→ 01 git:(master) ✘ kubectl delete deploy --all
deployment.extensions "mysql" deleted
deployment.extensions "petclinic" deleted
→ 01 git:(master) ✘ kubectl delete svc --all
service "kubernetes" deleted
service "mysql" deleted
service "petclinic" deleted
→ 01 git:(master) ✘ █
```

# K8s存储卷抽象Volume

Ephemeral：临时存储，如emptyDir

**Persistent**：持久化存储，如云存储，NFS等



**云存储**：阿里云NAS/OSS, AWS EBS等

# 网络文件系统 : Ceph, GlusterFS, NFS等

其它：emptyDir, hostPath, local等

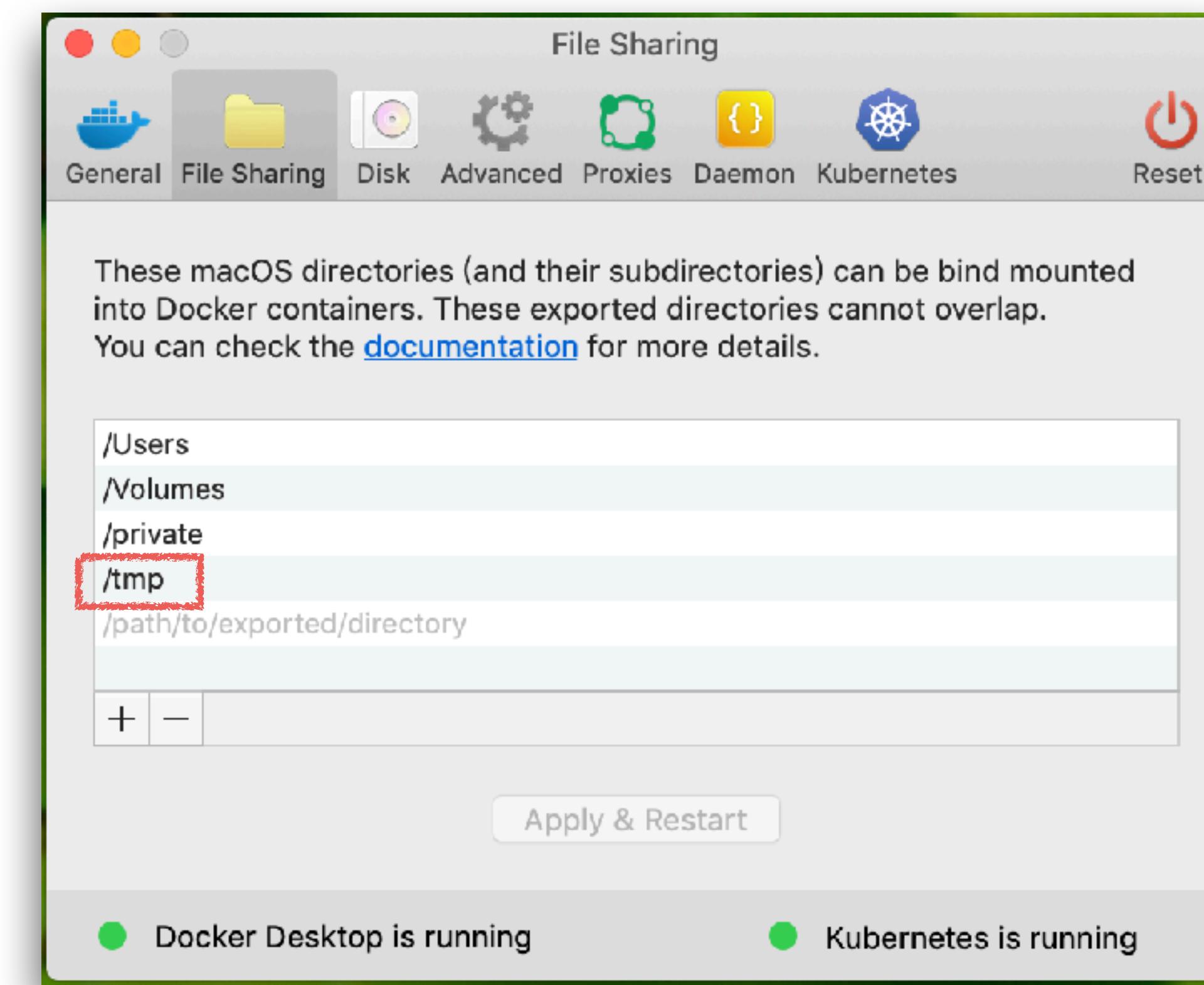
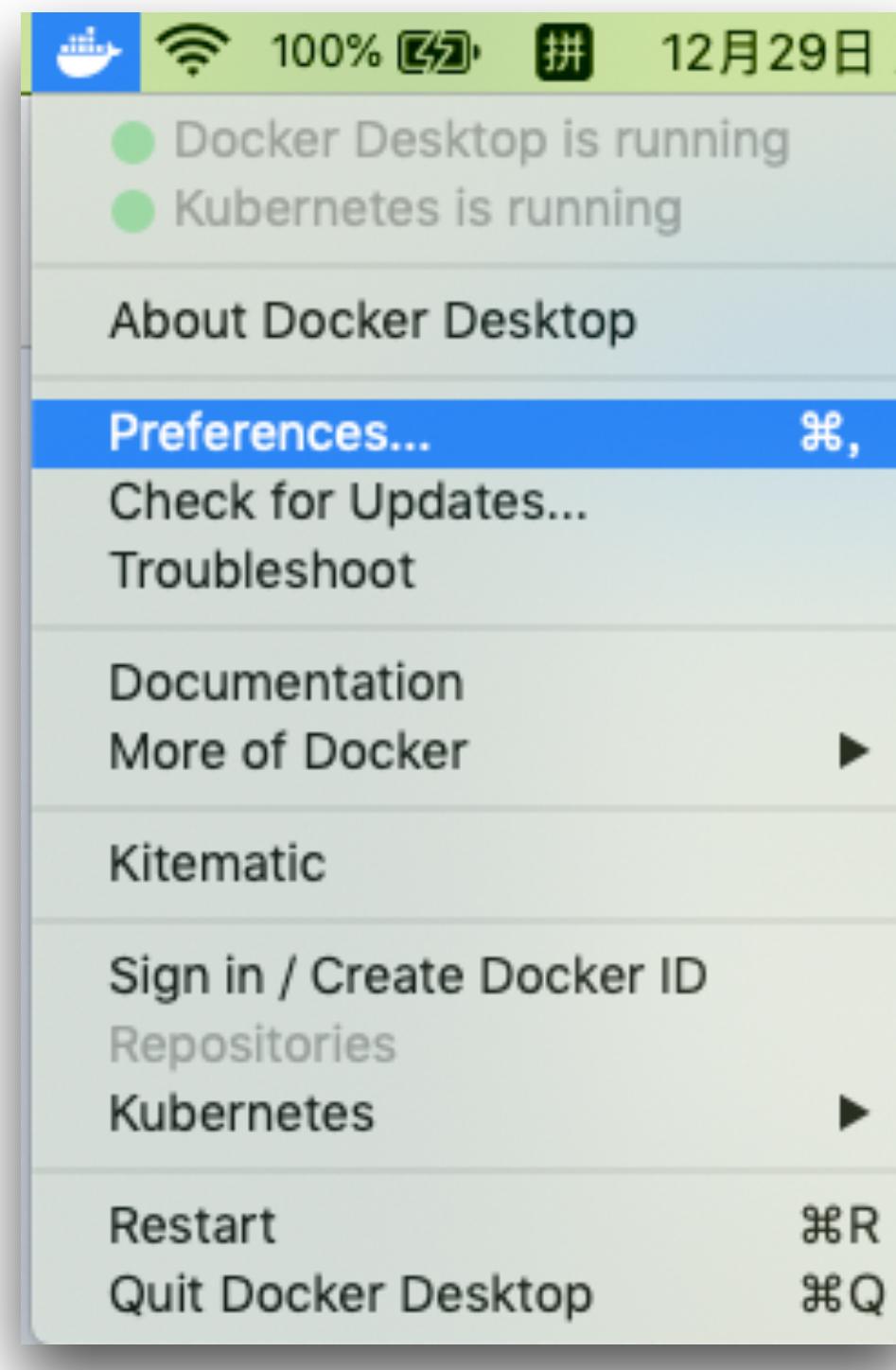
# mysql-svc.yml

## 增加hostPath存储卷

```
25 apiVersion: v1
26 kind: Service
27 metadata:
28   name: mysql
29 spec:
30   selector:
31     app: mysql
32   ports:
33     - name: tcp
34       port: 3306
35       targetPort: 3306
36   type: ClusterIP
```

```
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: mysql
5  spec:
6    selector:
7      matchLabels:
8        app: mysql
9    replicas: 1
10   template:
11     metadata:
12       labels:
13         app: mysql
14     spec:
15       containers:
16         - name: mysql
17           image: mysql:5.7
18           env:
19             - name: MYSQL_ROOT_PASSWORD
20               value: petclinic
21             - name: MYSQL_DATABASE
22               value: petclinic
23   volumeMounts:
24     - name: mysql-persistent-volume
25       mountPath: /var/lib/mysql
26   volumes:
27     - name: mysql-persistent-volume
28       hostPath:
29         path: /tmp/data01
30         type: DirectoryOrCreate
```

# Docker Desktop for Mac文件共享



# 再次发布mysql-svc和petclinic-svc

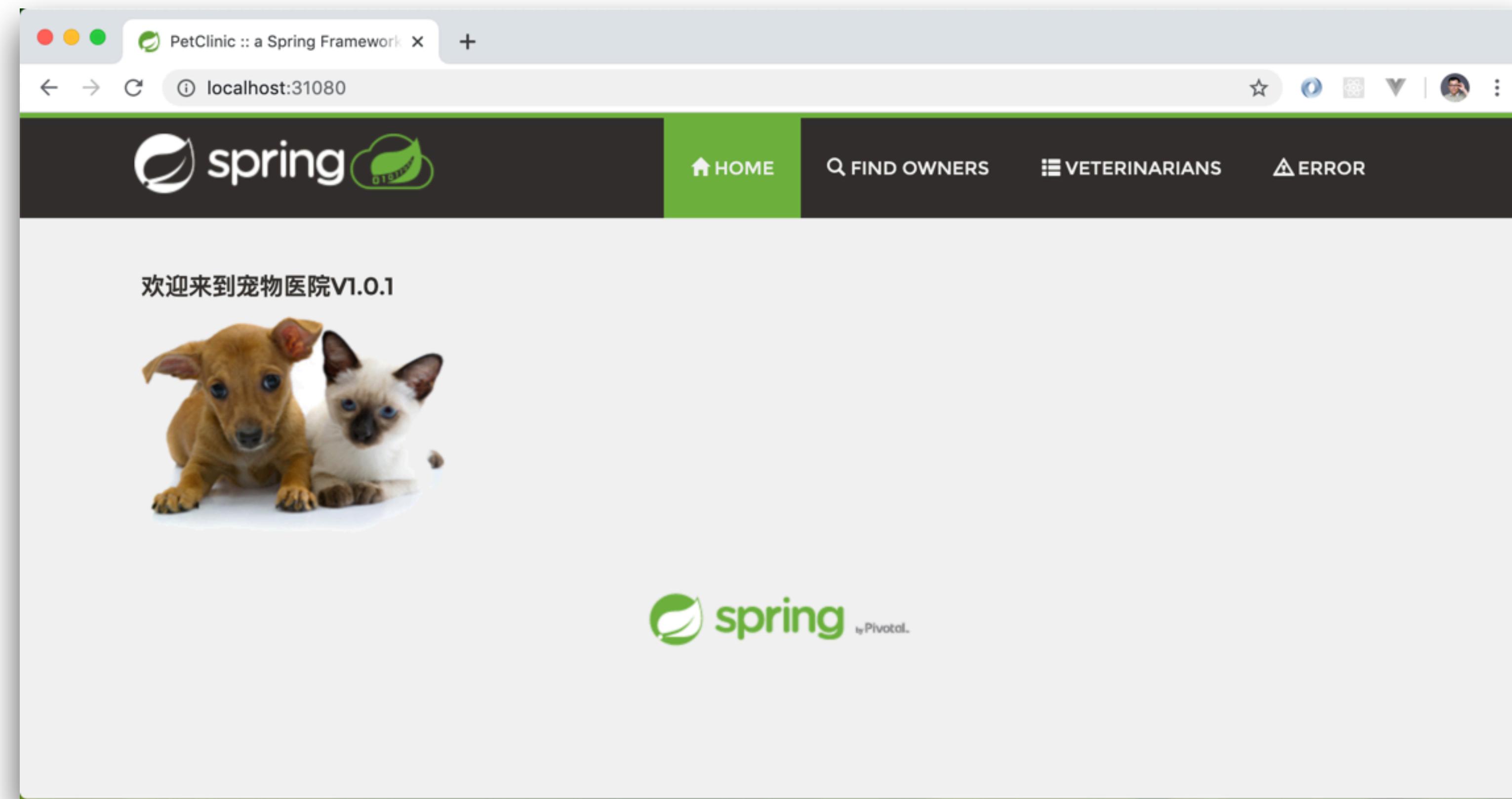
```
1. william@jskill: ~/csdn/k8s-msa-in-action/ch07/01 (zsh)
→ 01 git:(master) ✘ ls
mysql-svc.yml      petclinic-svc.yml
→ 01 git:(master) ✘ kubectl apply -f mysql-svc.yml
deployment.apps/mysql created
service/mysql created
→ 01 git:(master) ✘ kubectl apply -f petclinic-svc.yml
deployment.apps/petclinic created
service/petclinic created
→ 01 git:(master) ✘ kubectl get all
NAME                           READY   STATUS    RESTARTS   AGE
pod/mysql-8546bd94d9-zqn9w   1/1     Running   0          16s
pod/petclinic-5864c7d4d8-g9526 1/1     Running   0          8s

NAME           TYPE      CLUSTER-IP      EXTERNAL-IP      PORT(S)      AGE
service/kubernetes ClusterIP  10.96.0.1      <none>        443/TCP      79s
service/mysql   ClusterIP  10.101.167.208  <none>        3306/TCP      16s
service/petclinic NodePort   10.111.194.226  <none>        8080:31080/TCP  8s

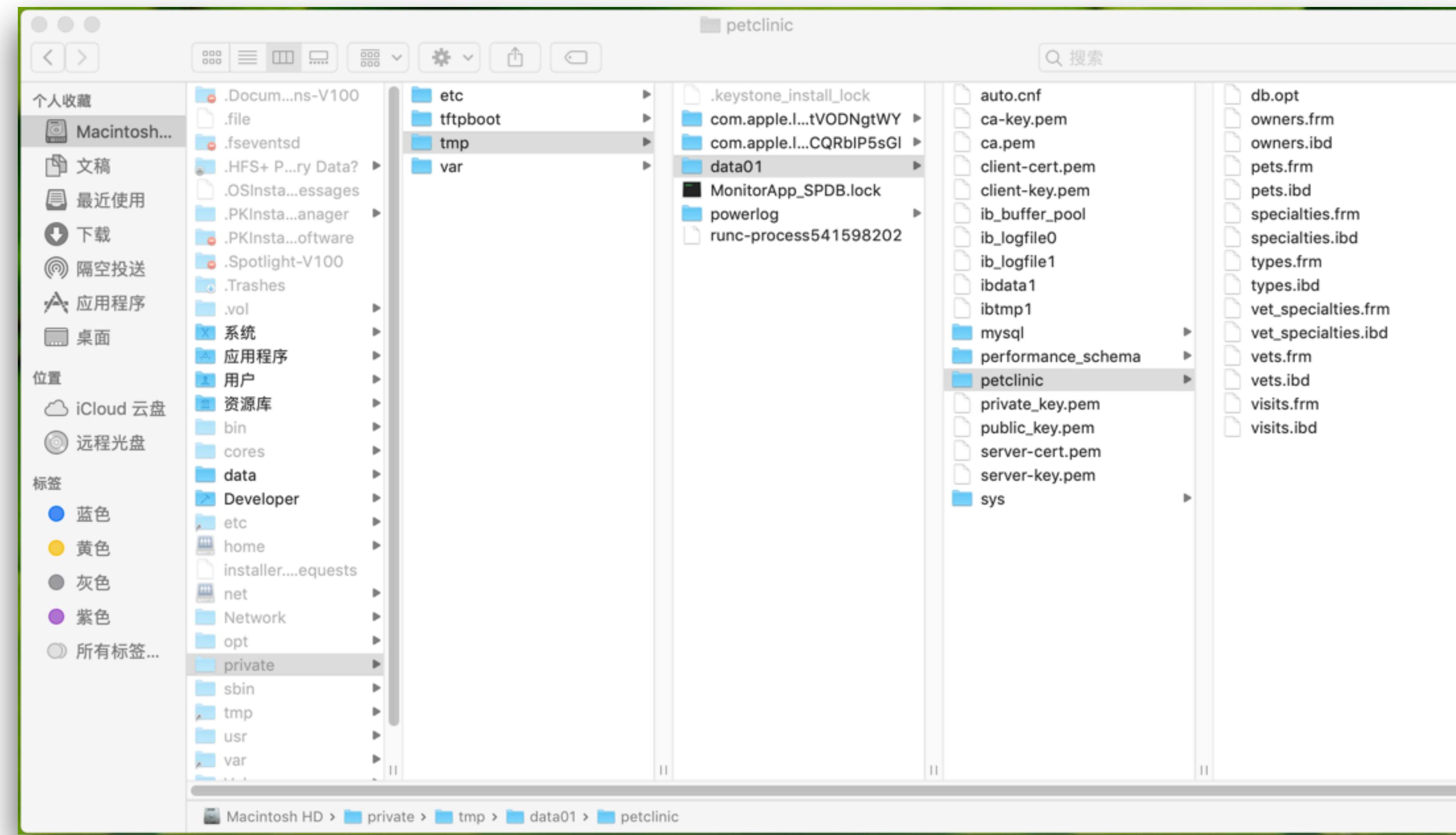
NAME           READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/mysql   1/1       1           1           16s
deployment.apps/petclinic 1/1       1           1           8s

NAME           DESIRED   CURRENT   READY   AGE
replicaset.apps/mysql-8546bd94d9   1         1         1       16s
replicaset.apps/petclinic-5864c7d4d8  1         1         1       8s
→ 01 git:(master) ✘ █
```

# 浏览器校验成功



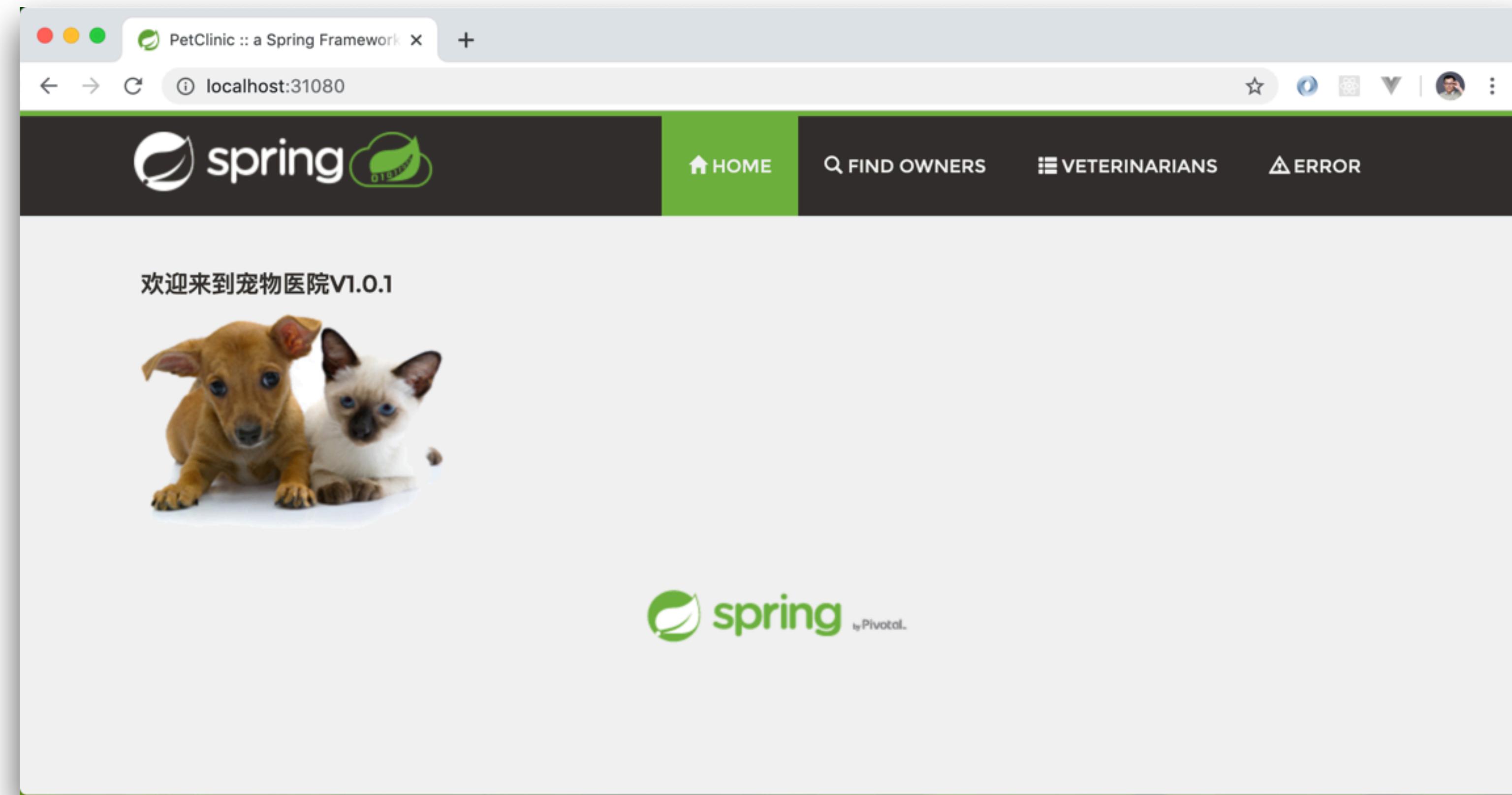
# tmp/data0目录下生成mysql和petclinic数据文件



# 删除并重启mysql pod

```
1. william@jskill: ~/csdn/k8s-msa-in-action/ch07/01 (zsh)
→ 01 git:(master) ✘ kubectl get po
NAME                  READY   STATUS    RESTARTS   AGE
mysql-8546bd94d9-zqn9w   1/1     Running   0          4m10s
petclinic-5864c7d4d8-g9526   1/1     Running   2          4m2s
→ 01 git:(master) ✘ kubectl delete po mysql-8546bd94d9-zqn9w
pod "mysql-8546bd94d9-zqn9w" deleted
→ 01 git:(master) ✘ kubectl get po
NAME                  READY   STATUS    RESTARTS   AGE
mysql-8546bd94d9-xmmgx   1/1     Running   0          13s
petclinic-5864c7d4d8-g9526   1/1     Running   2          4m52s
→ 01 git:(master) ✘
```

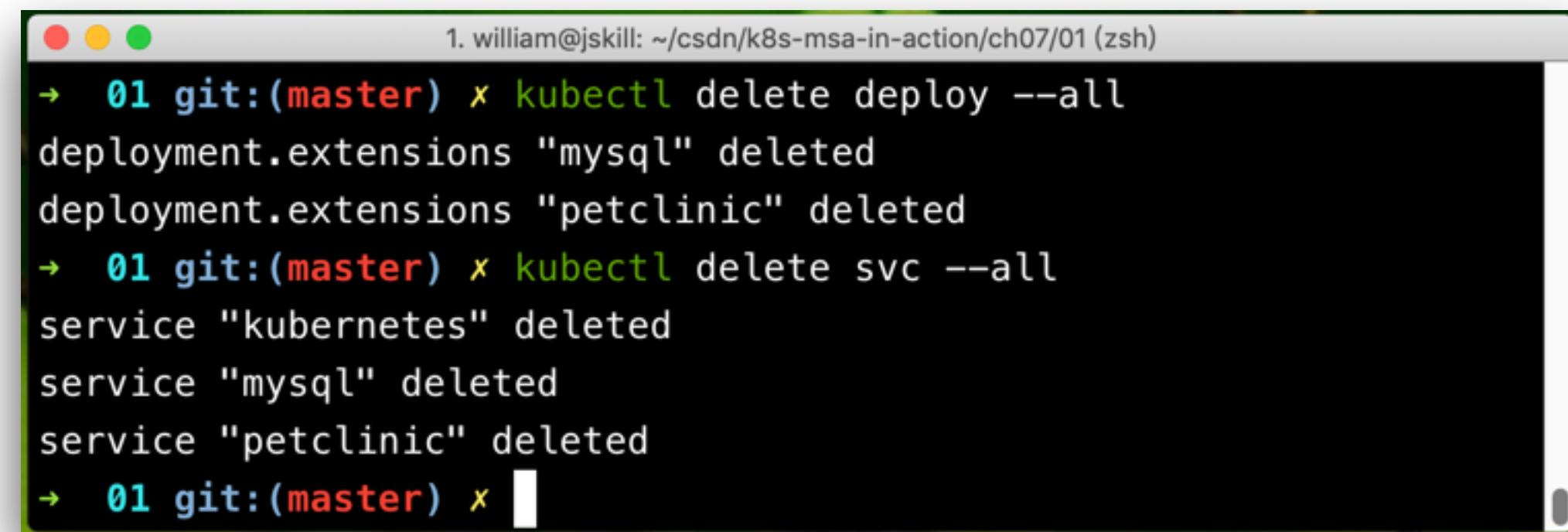
# 浏览器校验仍然成功



# var/lib/mysql表和数据都存在

```
1. kubectl exec -it mysql-8546bd94d9-xmmgx sh (kubectl)
→ 01 git:(master) ✘ kubectl get po
NAME                      READY   STATUS    RESTARTS   AGE
mysql-8546bd94d9-xmmgx   1/1     Running   0          118s
petclinic-5864c7d4d8-g9526 1/1     Running   2          6m37s
→ 01 git:(master) ✘ kubectl exec -it mysql-8546bd94d9-xmmgx sh
# cd /var/lib/mysql
# ls
auto.cnf      ib_buffer_pool  mysql           server-cert.pem
ca-key.pem    ib_logfile0    performance_schema  server-key.pem
ca.pem        ib_logfile1    petclinic         sys
client-cert.pem ibdata1      private_key.pem
client-key.pem  ibtmp1       public_key.pem
# cd petclinic
# ls
db.opt      pets.frm      specialties.ibd  vet_specialties.frm  vets.ibd
owners.frm   pets.ibd      types.frm       vet_specialties.ibd  visits.frm
owners.ibd   specialties.frm types.ibd       vets.frm          visits.ibd
#
```

# 环境清理



A terminal window titled "1. william@jskill: ~/csdn/k8s-msa-in-action/ch07/01 (zsh)". The window contains the following command and its output:

```
→ 01 git:(master) ✘ kubectl delete deploy --all
deployment.extensions "mysql" deleted
deployment.extensions "petclinic" deleted
→ 01 git:(master) ✘ kubectl delete svc --all
service "kubernetes" deleted
service "mysql" deleted
service "petclinic" deleted
→ 01 git:(master) ✘ █
```

# 本课小结



- 存储卷Volume是K8s提供的一种**存储抽象**，可以挂载到容器文件系统
- 存储卷类型
  - 持久化的(Persistent) ~ Pod重启后数据存在
  - 临时的(Ephemeral) ~ Pod重启后数据丢失
- 存储卷可以对接**云存储/远程存储**，或者**本地存储**