



Moving from VMs to Pods

#vSphere #storage #scale #PKS

Brice Dereims

Cloud Architect | VMware

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One of challenges when designing and operate application is the data and scalability.

In this example, we will demonstrate how to leverage vSphere capabilities to move App from VMs to Pods without copy data and using k8s scalability.

This use case could be used to avoid copying large amount of data mitigating the risk of corruption and accelerating “containerization”.

Big-Mountain Corp.

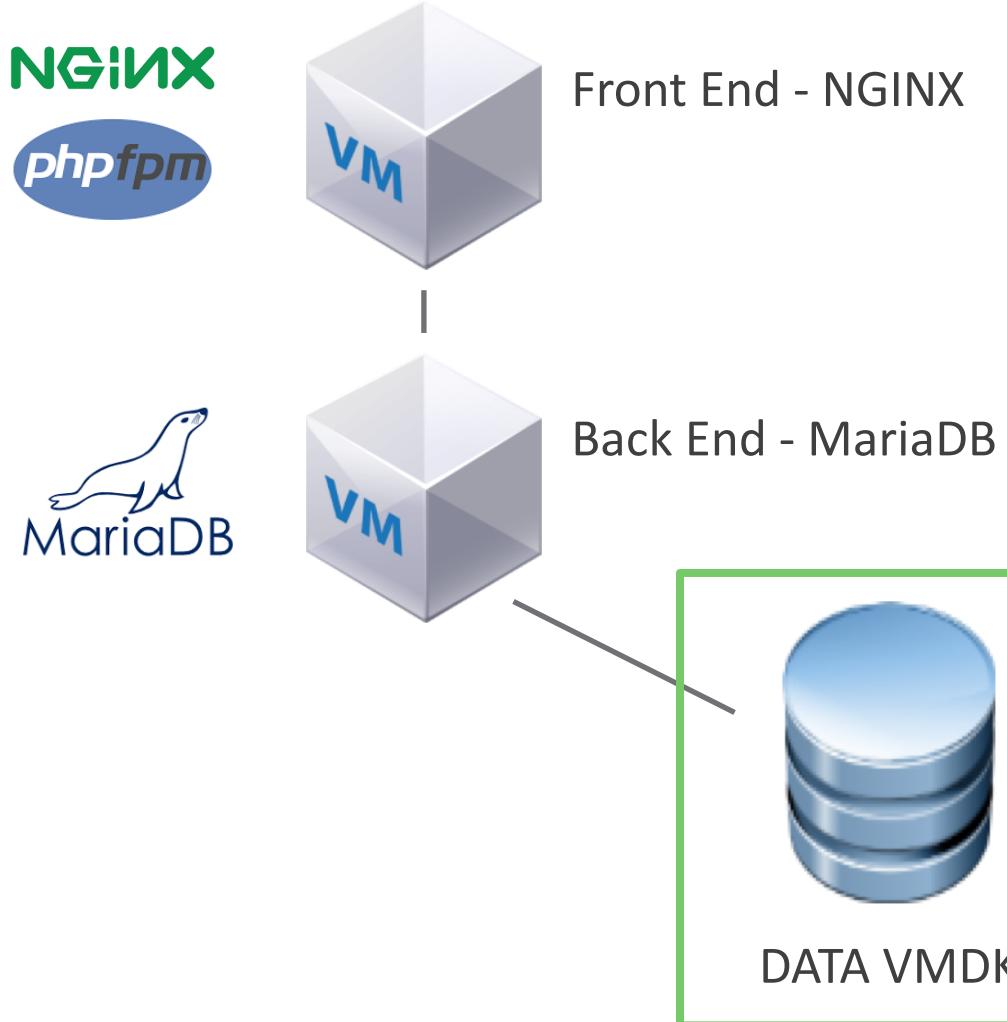
The Fictive Company

- Online electronic and spare parts vendor
- Double digit growth
- Competitor : Farnell, Conrad, Radiospare



A new project improving web app to serve more and more customers as fast as possible and reach revenue target.

The problem to solve

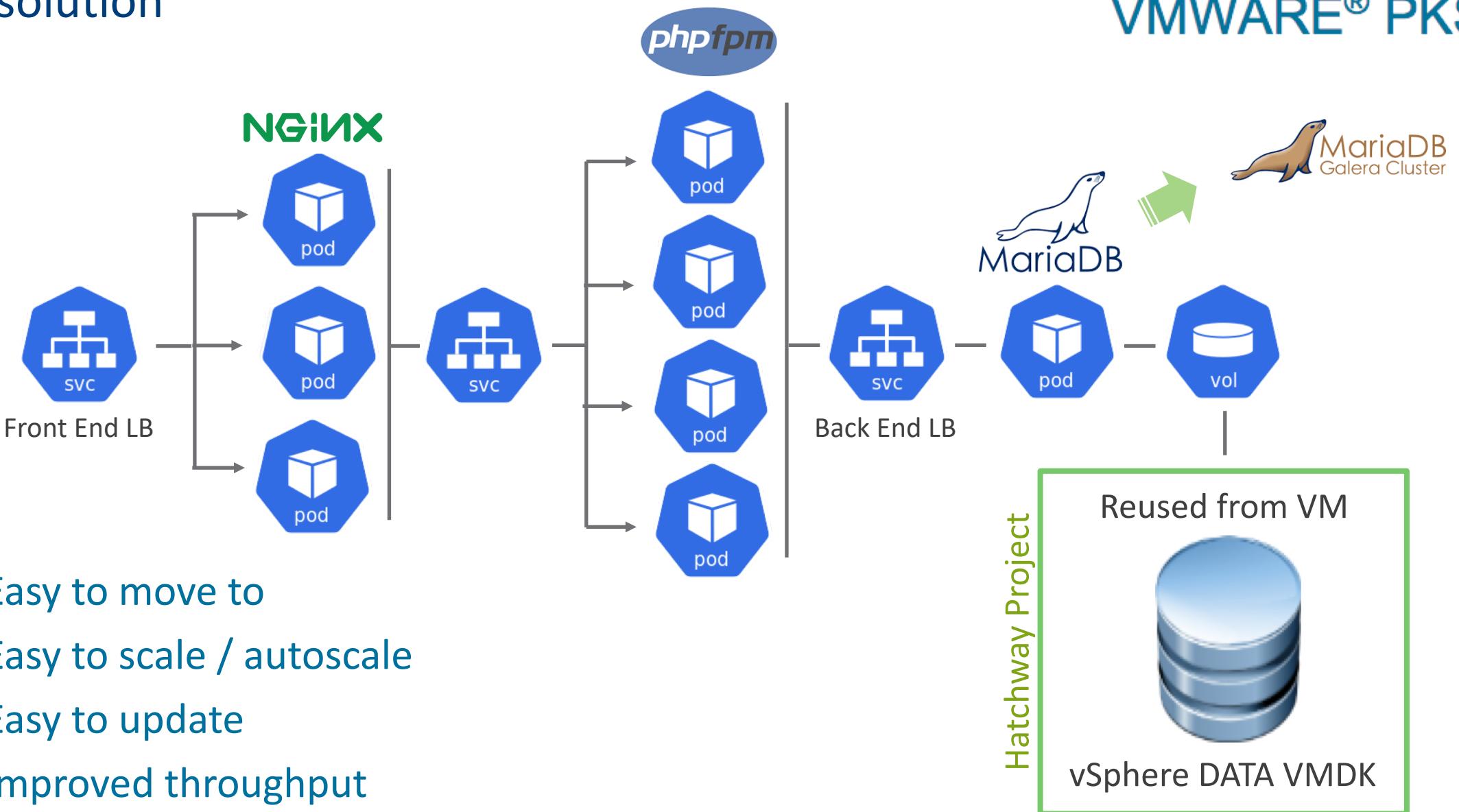


- Limited throughput
 - Does not scale easily
- Hard to update
 - Monolith components
 - Not transportable

- We want to keep these data
- Importing this into pod could be painful
- How to do that?

The solution

VMWARE® PKS



Demo

The App in VMs

The screenshot shows the vSphere Client interface. On the left, the navigation tree displays a cluster named 'cPod-APPSTX' containing several hosts (esx-01 to esx-04) and two VMs: 'BACKEND-MARIADB' and 'FRONTEND-NGINX'. The 'VM' node is highlighted with a red box. On the right, the main pane shows the details for the 'BACKEND-MARIADB' VM. The 'Summary' tab is selected, displaying basic information like Guest OS (Ubuntu Linux 64-bit), Compatibility (ESXi 6.7 and later), and CPU/Memory usage. The 'VM Hardware' section shows two hard disks: Hard disk 1 (16 GB) and Hard disk 2 (50 GB). The 'Recent Tasks' table at the bottom lists completed tasks related to powering on the VM and initializing the host.

Task Name	Target	Status	Initiator	Queued For	Start Time	Completion Time	Server
Power On virtual machine	BACKEND-MARIADB	Completed	System	8 ms	02/18/2019, 9:29:18 AM	02/18/2019, 9:29:29 AM	vcsa.cpod-appstx...
Initialize powering On	cPod-APPSTX	Completed	CPOD-APPSTX.A...	8 ms	02/18/2019, 9:29:18 AM	02/18/2019, 9:29:18 AM	vcsa.cpod-appstx...

MariaDB at VM Side

```
4. root@mariadb: /etc/mysql/mariadb.conf.d (ssh)
root@mariadb:/etc/mysql/mariadb.conf.d# mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 6
Server version: 10.1.38-MariaDB-0ubuntu0.18.04.1 Ubuntu 18.04

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> use nginx;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
MariaDB [nginx]> select *from web;
Empty set (0.00 sec)

MariaDB [nginx]> insert into web (name, description) values ('brice', 'demoing');
Query OK, 1 row affected (0.01 sec)

MariaDB [nginx]> select *from web;
+-----+-----+
| name | description |
+-----+-----+
| brice | demoing   |
+-----+
1 row in set (0.00 sec)

MariaDB [nginx]> █
```

MariaDB at VM Side

```
4. root@mariadb: /etc/mysql/mariadb.conf.d (ssh)
tmpfs on /run type tmpfs (rw,nosuid,noexec,relatime,size=404000k,mode=755)
/dev/mapper/ubuntu--vg-root on / type ext4 (rw,relatime,errors=remount-ro,data=ordered)
securityfs on /sys/kernel/security type securityfs (rw,nosuid,nodev,noexec,relatime)
tmpfs on /dev/shm type tmpfs (rw,nosuid,nodev)
tmpfs on /run/lock type tmpfs (rw,nosuid,nodev,noexec,relatime,size=5120k)
tmpfs on /sys/fs/cgroup type tmpfs (ro,nosuid,nodev,noexec,mode=755)
cgroup on /sys/fs/cgroup/unified type cgroup2 (rw,nosuid,nodev,noexec,relatime)
cgroup on /sys/fs/cgroup/systemd type cgroup (rw,nosuid,nodev,noexec,relatime,xattr,name=systemd)
pstore on /sys/fs/pstore type pstore (rw,nosuid,nodev,noexec,relatime)
cgroup on /sys/fs/cgroup/devices type cgroup (rw,nosuid,nodev,noexec,relatime,devices)
cgroup on /sys/fs/cgroup/rdma type cgroup (rw,nosuid,nodev,noexec,relatime,rdma)
cgroup on /sys/fs/cgroup/net_cls,net_prio type cgroup (rw,nosuid,nodev,noexec,relatime,net_cls,net_prio)
cgroup on /sys/fs/cgroup/memory type cgroup (rw,nosuid,nodev,noexec,relatime,memory)
cgroup on /sys/fs/cgroup/cpu,cpuacct type cgroup (rw,nosuid,nodev,noexec,relatime,cpu,cpuacct)
cgroup on /sys/fs/cgroup/freezer type cgroup (rw,nosuid,nodev,noexec,relatime,freezer)
cgroup on /sys/fs/cgroup/blkio type cgroup (rw,nosuid,nodev,noexec,relatime,blkio)
cgroup on /sys/fs/cgroup/hugetlb type cgroup (rw,nosuid,nodev,noexec,relatime,hugetlb)
cgroup on /sys/fs/cgroup/perf_event type cgroup (rw,nosuid,nodev,noexec,relatime,perf_event)
cgroup on /sys/fs/cgroup/cpuset type cgroup (rw,nosuid,nodev,noexec,relatime,cpuset)
cgroup on /sys/fs/cgroup/pids type cgroup (rw,nosuid,nodev,noexec,relatime,pids)
systemd-1 on /proc/sys/fs/binfmt_misc type autofs (rw,relatime,fd=35,pgrp=1,timeout=0,minproto=5,maxproto=5,direct,pipe_ino=14571)
mqueue on /dev/mqueue type mqueue (rw,relatime)
debugfs on /sys/kernel/debug type debugfs (rw,relatime)
hugetlbfs on /dev/hugepages type hugetlbfs (rw,relatime,pagesize=2M)
fusectl on /sys/fs/fuse/connections type fusectl (rw,relatime)
configfs on /sys/kernel/config type configfs (rw,relatime)
lxcfs on /var/lib/lxcfs type fuse.lxcfs (rw,nosuid,nodev,relatime,user_id=0,group_id=0,allow_other)
tmpfs on /run/user/1000 type tmpfs (rw,nosuid,nodev,relatime,size=403996k,mode=700,uid=1000,gid=1000)
/dev/sdb on /var/lib/mysql type ext4 (rw,relatime,data=ordered)
```

The App in Pods

```
5. bdereims@forty-two: /data/bdereims/cpod-appstx/pks-prep (ssh)
bdereims@forty-two:/data/bdereims/cpod-appstx/pks-prep$ kubectl get deployments.
NAME        DESIRED   CURRENT   UP-TO-DATE   AVAILABLE   AGE
nginx-deployment   3          3          3           3          34h
php-fpm-deployment 4          4          4           4          34h
bdereims@forty-two:/data/bdereims/cpod-appstx/pks-prep$ kubectl get pods
NAME                  READY   STATUS    RESTARTS   AGE
mariadb                1/1    Running   0          34h
nginx-deployment-6b7cc6f9b7-m6q2z  1/1    Running   0          34h
nginx-deployment-6b7cc6f9b7-pp8pc  1/1    Running   0          34h
nginx-deployment-6b7cc6f9b7-vh2hx  1/1    Running   0          34h
php-fpm-deployment-dcf9f76dd-h785g 1/1    Running   0          34h
php-fpm-deployment-dcf9f76dd-qh4pt 1/1    Running   0          34h
php-fpm-deployment-dcf9f76dd-tr9hh 1/1    Running   0          34h
php-fpm-deployment-dcf9f76dd-z7nvq 1/1    Running   0          34h
bdereims@forty-two:/data/bdereims/cpod-appstx/pks-prep$ kubectl get svc
NAME        TYPE        CLUSTER-IP      EXTERNAL-IP      PORT(S)        AGE
kubernetes  ClusterIP   10.100.200.1   <none>          443/TCP       2d21h
mariadb-service-lb  LoadBalancer  10.100.200.219  100.64.64.1,192.168.72.10  3306:30859/TCP  34h
nginx-service-lb   LoadBalancer  10.100.200.175  100.64.64.1,192.168.72.9   80:31890/TCP   34h
php-fpm-service    ClusterIP   10.100.200.220   <none>          9000/TCP       34h
bdereims@forty-two:/data/bdereims/cpod-appstx/pks-prep$ kubectl get pv,pvc
No resources found.
bdereims@forty-two:/data/bdereims/cpod-appstx/pks-prep$
```

MariaDB at Pod Side

```
4. bdereims@forty-two: /data/bdereims/cpod-appstx/pks-prep/k8s/TechSummit (ssh)
  /var/run/secrets/kubernetes.io/serviceaccount from default-token-hz7kt (ro)

Conditions:
  Type      Status
  Initialized  True
  Ready       True
  ContainersReady  True
  PodScheduled  True

Volumes:
  data:
    Type:          VSphereVolume (a Persistent Disk Resource in vSphere)
    VolumePath:   [Datastore] BACKEND-MARIADB/BACKEND-MARIADB_1.vmdk
    FSType:        ext4
    StoragePolicyName:
  default-token-hz7kt:
    Type:          Secret (a volume populated by a Secret)
    SecretName:   default-token-hz7kt
    Optional:     false
    QoS Class:    BestEffort
    Node-Selectors: <none>
    Tolerations:  node.kubernetes.io/not-ready:NoExecute for 300s
                  node.kubernetes.io/unreachable:NoExecute for 300s

Events:
  Type  Reason           Age   From               Message
  ----  -----           --   --                --
  Normal Scheduled       3m2s  default-scheduler  Successfully assigned default/mariadb to 8
  303cb9e-132f-413e-aef8-c2473c19eb1b
  Normal SuccessfulAttachVolume 3m1s  attachdetach-controller  AttachVolume.Attach succeeded for volume "data"
  Normal Pulled          2m51s kubelet, 8303cb9e-132f-413e-aef8-c2473c19eb1b  Container image "mariadb/server:10.1.37" already present on machine
  Normal Created          2m51s kubelet, 8303cb9e-132f-413e-aef8-c2473c19eb1b  Created container
  Normal Started          2m51s kubelet, 8303cb9e-132f-413e-aef8-c2473c19eb1b  Started container
bdereims@forty-two:/data/bdereims/cpod-appstx/pks-prep/k8s/TechSummit$
```

MariaDB at Pod Side

```
4. root@mariadb: / (ssh)
bdereims@forty-two:/data/bdereims/cpod-appstx/pks-prep/k8s/TechSummit$ kubectl get pod
No resources found.
bdereims@forty-two:/data/bdereims/cpod-appstx/pks-prep/k8s/TechSummit$ kubectl create -f mariadb.yaml
pod/mariadb created
service/svc-mariadb created
bdereims@forty-two:/data/bdereims/cpod-appstx/pks-prep/k8s/TechSummit$ kubectl get pod
NAME      READY   STATUS    RESTARTS   AGE
mariadb   1/1     Running   0          18s
bdereims@forty-two:/data/bdereims/cpod-appstx/pks-prep/k8s/TechSummit$ kubectl exec -ti mariadb bash
root@mariadb:/# mysql -u root -p
Enter password:
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MariaDB connection id is 2
Server version: 10.1.38-MariaDB-1~bionic mariadb.org binary distribution

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Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> use nginx;
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Database changed
MariaDB [nginx]> select * from web;
+-----+-----+
| name | description |
+-----+-----+
| brice | demoing   |
+-----+-----+
1 row in set (0.00 sec)

MariaDB [nginx]>
```

Wrap-Up :

PKS on vSphere allow to reuse data
avoiding to copy large amount of data.

Speedups container transition and
leverage vSphere investments.