Support for Cloud Native Storage (CNS) on TKGI Clusters with Stateful Application Example

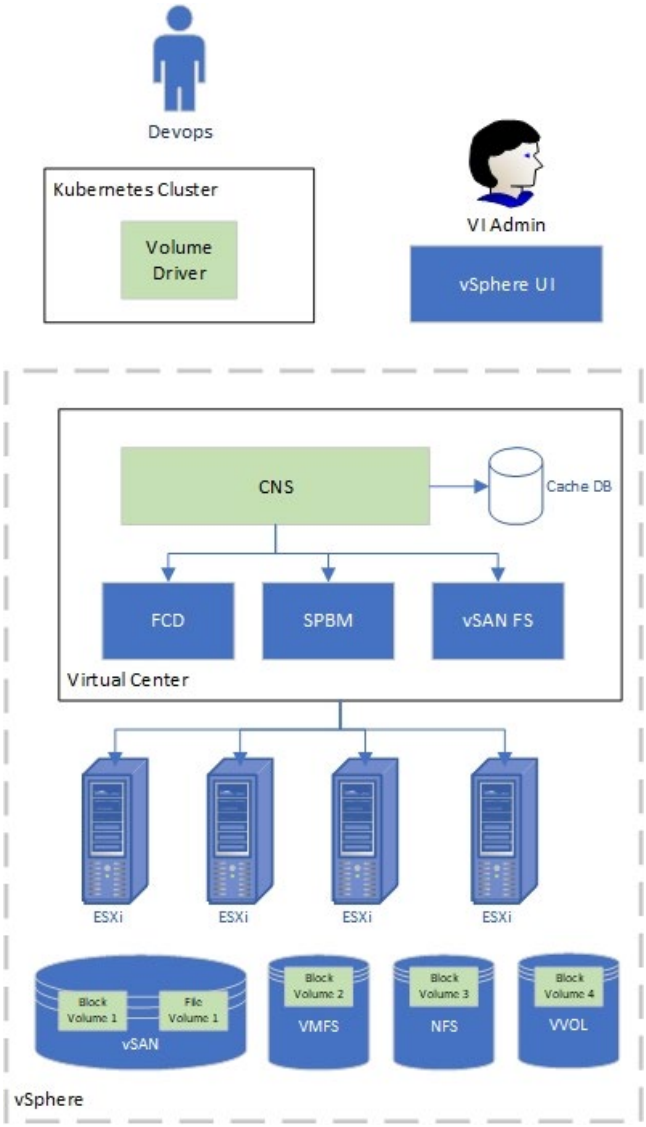
Introduction

This document is a quick start guide for enabling CNS volume support on a Tanzu Kubernetes Grid Integrated (TKGI, formerly known as Enterprise PKS) Kubernetes clusters and deploying applications using persistent volumes. This document will provide details on configuration of CSI drivers in designated K8s cluster, deployment a stateful application using K8s storage class with CSI driver (OPTIONAL: and backing it up/restoring using Velero open source solution.

Note: thanks to Alexander Ullah for creating a very helpful "how to" blog for workload migration between K8s clusters with CSI which I took definition of the stateful Ghost application from.

Overview

Cloud Native Storage (CNS) provides comprehensive data management for stateful, containerized apps, enabling apps to survive restarts and outages.



CNS vSphere offers the following two components:

- CNS in vCenter Server
- vSphere volume driver in Kubernetes

CNS control plane introduces a concept of volumes: **container volumes and persistent volumes** in vSphere - it is the Storage control plane for container volumes. CNS is responsible for managing the lifecycle of volumes, including such operations as create, read, update, and delete.

It is also responsible for managing volume metadata, snapshot and restore, volume copy and clone, as well as monitoring the health and compliance of volumes.

These volumes are independent of the virtual machine lifecycle and have their own identity in vSphere.

CNS supports block volumes backed by First Class Disk (FCD) and file volumes backed by vSAN file shares.

A ***block volume*** can only be attached to one Kubernetes pod with ***ReadWriteOnce*** access mode at any point in time. A ***file volume*** can be attached to one or more pods with ***ReadWriteMany/ReadOnlyMany*** access modes.

In Kubernetes, CNS provides a volume driver that has two sub-components: the **CSI driver** and the **syncer**.

- The **CSI driver** is responsible for volume provisioning, attaching and detaching the volume to VMs, mounting, formatting and unmounting volumes from the pod within the node VM, etc.The CSI driver is built as an out-of-tree CSI plugin for Kubernetes.
- The **syncer** is responsible for pushing PV, PVC, and pod metadata to CNS. It also has a CNS operator that is used in the context of vSphere with Kubernetes (formerly "Project Pacific").

Stateful containers can use vSphere storage primitives - standard volume, persistent volume, and dynamic provisioning - independent of VM and container lifecycle. vSphere storage backs the volumes, and we can set a storage policy directly on the volumes.

After creation of volumes, we can review them and their backing virtual disks, and monitor their storage policy compliance via use vSphere client.

Prerequisites for CNS with TGKI

(See https://docs.pivotal.io/pks/1-7/vsphere-cns.html for complete list of pre-requisites)

Install CSI Driver on a TGKI Cluster

Follow documentation: https://docs.pivotal.io/pks/1-7/vsphere-cns.html and use sample files provided

(provided input to Docs team for some inaccuracies which were corrected)

1. Create CSI Secret based on provided sample deployment file (*csi-vsphere.conf*)

```
[Global]

cluster-id = PKS-COMPUTE-EDGES

[VirtualCenter "192.168.2.20"]

insecure-flag = "true"

user = "administrator@vsphere.local"

password = "XXXXXX"

port = "443"

datacenters = "PKS-NESTED-DC2"
```

NOTES:

cluster-id is a unique identifier, can be a name of vSphere cluster which data store will be used
VirtualCenter contains IP address (FQDN) of vSphere vCenter
user and *password* are credentials of vSphere admin user (or user with sufficient access level)
datacenters are vSphere Data center(s) where clusters are contained

Create a secret for accessing vSphere Data Center/Cluster

kubectl create secret generic vsphere-config-secret --from-file=csi-vsphere.conf --namespace=kube-system
secret/vsphere-config-secret created

2. Create RBAC objects for CSI access based on provided sample deployment file (*vsphere-csi-controller-rbac.yaml* included into 'samples' repository folder, partially shown below)

```
kind: ServiceAccount

apiVersion: v1

metadata:

  name: vsphere-csi-controller

  namespace: kube-system

---

kind: ClusterRole

apiVersion: rbac.authorization.k8s.io/v1

metadata:

  name: vsphere-csi-controller-role

rules:

  - apiGroups: [""]

    resources: ["nodes", "persistentvolumeclaims", "pods"]

    verbs: ["get", "list", "watch"]

….
```

kubectl apply -f vsphere-csi-controller-rbac.yaml

serviceaccount/vsphere-csi-controller created
clusterrole.rbac.authorization.k8s.io/vsphere-csi-controller-role created
clusterrolebinding.rbac.authorization.k8s.io/vsphere-csi-controller-binding created

Verify that service account, cluster roles/cluster role binding exist in 'kube-system' namespace:

kubectl get serviceaccounts -n kube-system

.....

vrealize-med01 1 25h

vsphere-csi-controller 1 3m4s

kubectl get clusterroles -n kube-system

vrops-cadvisor 47h

vsphere-csi-controller-role <invalid>

kubectl get clusterrolebindings -n kube-system

vrops-cadvisor 47h

vsphere-csi-controller-binding <invalid>

3. Install the vSphere CSI Driver using sample manifest file (*vsphere-csi-controller-ss.yaml* included into 'samples' repository folder)

kubectl apply -f vsphere-csi-controller-ss.yaml
statefulset.apps/vsphere-csi-controller created
csidriver.storage.k8s.io/csi.vsphere.vmware.com created

Optionally, monitor events in kube-system namespace to check initialization of vsphere-csi-controller:

kubectl get events -n kube-system

LAST SEEN TYPE REASON OBJECT MESSAGE
<unknown> Normal Scheduled pod/vsphere-csi-controller-0 Successfully assigned kube-system/vsphere-csi-controller-0 to a208e18a-fbe4-4e36-a17f-6efe7c204d78
27s Normal Pulling pod/vsphere-csi-controller-0 Pulling image "quay.io/k8scsi/csi-attacher:v1.1.1"
22s Normal Pulled pod/vsphere-csi-controller-0 Successfully pulled image "quay.io/k8scsi/csi-attacher:v1.1.1"
20s Normal Created pod/vsphere-csi-controller-0 Created container csi-attacher
20s Normal Started pod/vsphere-csi-controller-0 Started container csi-attacher
20s Normal Pulling pod/vsphere-csi-controller-0 Pulling image "gcr.io/cloud-provider-vsphere/csi/release/driver:v1.0.2"
7s Normal Pulled pod/vsphere-csi-controller-0 Successfully pulled image "gcr.io/cloud-provider-vsphere/csi/release/driver:v1.0.2"
3s Normal Created pod/vsphere-csi-controller-0 Created container vsphere-csi-controller
2s Normal Started pod/vsphere-csi-controller-0 Started container vsphere-csi-controller
2s Normal Pulling pod/vsphere-csi-controller-0 Pulling image "quay.io/k8scsi/livenessprobe:v1.1.0"
30s Normal SuccessfulCreate statefulset/vsphere-csi-controller create Pod vsphere-csi-controller-0 in StatefulSet vsphere-csi-controller successful

4. Install CSI Driver DaemonSet using sample manifest file (*vsphere-csi-node-ds.yaml* included into 'samples' repository folder)

kubectl apply -f vsphere-csi-node-ds.yaml

daemonset.apps/vsphere-csi-node created

Verify that DaemonSet (that is guaranteed Pod/Node) is running on all cluster nodes:

kubectl get ds -n kube-system

NAME	DESIRED	CURRENT	READY	UP-TO-DATE	AVAILABLE	NODE SELECTOR	AGE
vsphere-csi-node	4	4	4	4	4	<none>	2m8s

5. Verify that CSI Driver Deployed Successfully

Check that all pods are running in the kube-system namespace (look for **vsphere-csi-…** pod names)

kubectl get po --namespace=kube-system

NAME	READY	STATUS	RESTARTS	AGE

NAME	READY	STATUS	RESTARTS	AGE
coredns-5b6649768f-7zzfr	1/1	Running	0	97m
coredns-5b6649768f-8rg9m	1/1	Running	0	97m
coredns-5b6649768f-c4ktq	1/1	Running	0	97m
metrics-server-7f9887fbb5-64rtk	1/1	Running	0	97m
vsphere-csi-controller-0	**5/5**	**Running**	**0**	**7m**
vsphere-csi-node-b47k4	**3/3**	**Running**	**0**	**5m45s**
vsphere-csi-node-cvcm2	**3/3**	**Running**	**0**	**5m45s**
vsphere-csi-node-fxfsj	**3/3**	**Running**	**0**	**5m45s**
vsphere-csi-node-p4wgc	**3/3**	**Running**	**0**	**5m45s**

6. Verify that CRDs for CSI are deployed and working:

kubectl get CSINode

NAME	CREATED AT
23f8a803-50de-4d2a-be42-5f4482f35fb3	2020-06-25T19:31:44Z

3f178b02-514c-415d-9716-470b30175b44 2020-06-30T05:11:41Z
576e0ba9-5621-4ecd-a1b1-eb39af781390 2020-06-25T19:31:42Z
9dcd874c-c86e-4b59-af77-c914619fd38c 2020-06-10T19:23:29Z

kubectl describe CSINode

```
Name:         23f8a803-50de-4d2a-be42-5f4482f35fb3
Namespace:
Labels:       <none>
Annotations:  <none>
API Version:  storage.k8s.io/v1beta1
Kind:         CSINode
Metadata:
  Creation Timestamp:  2020-06-25T19:31:44Z
  Owner References:
    API Version:     v1
    Kind:            Node
    Name:            23f8a803-50de-4d2a-be42-5f4482f35fb3
    UID:             2e495151-1a4a-4aac-baab-f5182b504e21
  Resource Version:  7801510
  Self Link:         /apis/storage.k8s.io/v1beta1/csinodes/23f8a803-50de-4d2a-be42-5f4482f35fb3
  UID:               ef1d6c57-3965-499b-8493-5952e454dadc
Spec:
  Drivers:
    Name:          csi.vsphere.vmware.com
    Node ID:       23f8a803-50de-4d2a-be42-5f4482f35fb3
    Topology Keys:  <nil>
Events:            <none>
```

....

7. Verification that CSI Driver is installed

   kubectl get csidrivers

```
NAME                     CREATED AT
csi.vsphere.vmware.com   2020-07-03T02:42:08Z
```

8. Verify that CSI ProviderID was added to all Cluster Nodes

kubectl describe nodes | grep "ProviderID"**

```
ProviderID:                 vsphere://421c57b9-99bb-ef5a-c2d4-38b857f8d9d5
ProviderID:                 vsphere://421cef46-3327-d66c-4d52-5e6f2bb1bfaa
ProviderID:                 vsphere://421c04c4-13fd-069e-c2a9-d13166d81a4c
ProviderID:                 vsphere://421ce760-a829-deb2-82d9-45ff4fc5ec95
```

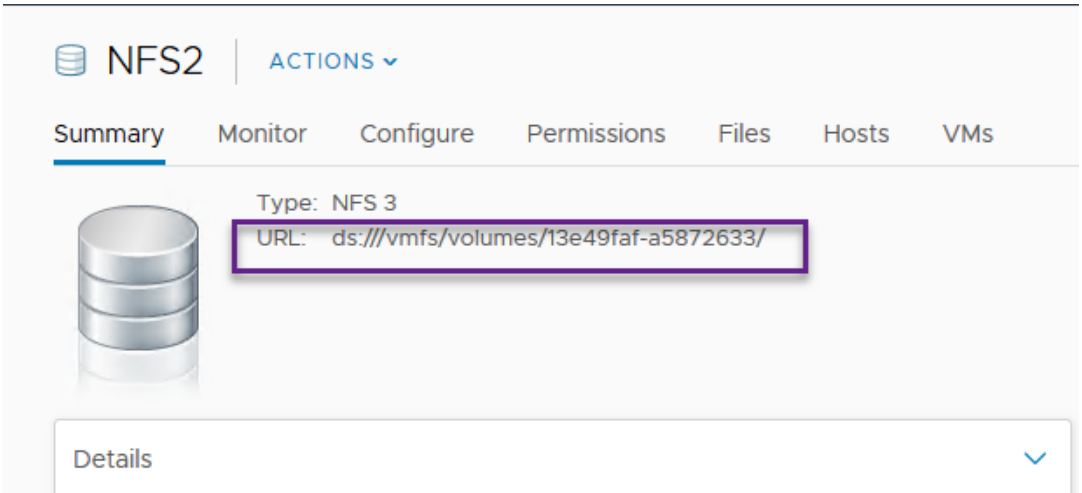
Deploy Stateful Containerized Application

We will simple simple Ghost blogging application that preserves state using PVC (source code available from https://github.com/beyondelastic/velero_vSphere)

1. Create storage class that is using CSI driver (using csi-sc.yaml deployment descriptor file available in 'samples' folder)

```
apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  name: demo-sts-sc
  annotations:
    storageclass.kubernetes.io/is-default-class: "true"
provisioner: csi.vsphere.vmware.com
parameters:
  datastoreurl: "ds:///vmfs/volumes/13e49faf-a5872633/"
```

NOTE: datastoreurl should point to a folder in the associated vSphere data store:



kubectl apply -f csi-sc-dan.yaml -n ghost

storageclass.storage.k8s.io/demo-sts-sc created

Verify that storage class primitive has been created at K8s cluster level:

kubectl get sc

NAME PROVISIONER RECLAIMPOLICY VOLUMEBINDINGMODE ALLOWVOLUMEEXPANSION AGE

demo-sts-sc (default) csi.vsphere.vmware.com Delete Immediate false 4m40s

2. Create PVS using SC above and deploy Ghost app based on that PVC (ghost-claim.yaml sample deployment descriptor is included into the ‘samples’ repository folder)

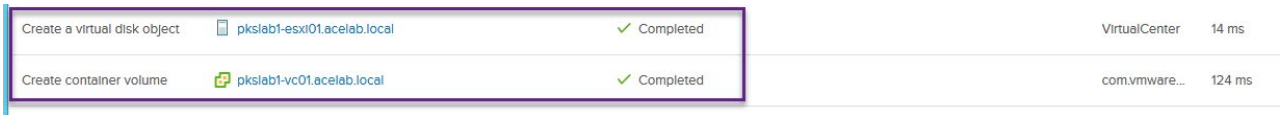
```
kind: PersistentVolumeClaim
apiVersion: v1
metadata:
  name: blog-content-new
  namespace: ghost
  annotations:
    volume.beta.kubernetes.io/storage-class: demo-sts-sc
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 2Gi
```

Run the following command:

kubectl apply -f ghost-claim.yaml

persistentvolumeclaim/blog-content-new created

NOTE: on vSphere UI we can monitor tasks of creation of persistent volume:



Verify that PVC that volume are in “bound” state:

kubectl get pvc -n ghost

NAME STATUS VOLUME CAPACITY ACCESS MODES STORAGECLASS AGE

blog-content-new Bound pvc-f9ec1bce-c2c1-4477-b118-e3b333a57151 2Gi RWO demo-sts-sc 119s

3. Deploy Ghost stateful application (using *ghost-new.yaml* sample deployment descriptor file found in the ‘samples’ folder, shown below):

```
apiVersion: v1

  kind: Service

  metadata:

    labels:

      name: blog

    name: blog

    namespace: ghost
```

```
spec:
  ports:
    - port: 80
      targetPort: 2368
  selector:
    app: blog
  type: LoadBalancer
---
apiVersion: apps/v1
kind: Deployment
metadata:
  name: blog
  namespace: ghost
  labels:
    app: blog
spec:
  replicas: 1
  selector:
    matchLabels:
      app: blog
  template:
    metadata:
      labels:
        app: blog
    spec:
      containers:
      - name: blog
        image: ghost:latest
```

```
          imagePullPolicy: Always
          ports:
          - containerPort: 2368
          env:
          - name: url
            value: http://my-blog.acelab.local ← needs to be registered in DNS
          volumeMounts:
          - mountPath: /var/lib/ghost/content
            name: content
        volumes:
        - name: content
          persistentVolumeClaim:
            claimName: blog-content-new  ← needs to match PVC name created in the previous step
```

---

kubectl apply -f ghost-new.yaml

service/blog created

deployment.apps/blog created

4. Verify that all application objects have been created in the designated K8s namespace:

kubectl get all -n ghost

NAME	READY	STATUS	RESTARTS	AGE
pod/blog-8646cd4d56-fpqz9	1/1	Running	0	10m

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
service/blog	LoadBalancer	10.100.200.102	192.168.74.81	80:35713/TCP	10m

NAME	READY	UP-TO-DATE	AVAILABLE	AGE
deployment.apps/blog	1/1	1	1	10m

…….

Navigate to the URL defined by EXTERNAL-IP address of LoadBalancer service:

Now we can start using the Blog application as it is intedned – posting blogs etc.

Install Velero Backup/Restore product w/support for CSI volume snapshots

1. Install miniIO for local object store using Helm3 chart from VMware Bitnami:

```
helm install minio-release -n minio \
--set access.Key.password=minio \
--set secretKey.password=minio123 \
--set persistence.storageClass=thin-disk \
bitnami/minio
```

NOTE: If access.Key.password and secretKey.password values are different from those passed into Helm chart, you can retrieve their values by:

export MINIO_ACCESS_KEY=$(kubectl get secret --namespace minio minio-release -o jsonpath="{.data.access-key}" | base64 --decode)

export MINIO_SECRET_KEY=$(kubectl get secret --namespace minio minio-release -o jsonpath="{.data.secret-key}" | base64 --decode)

use outputs of those commands in **credentials** file to provide access to S3 object store (minIO) used in the script below:

[default]

aws_access_key_id=mtTK1JFdwQ

aws_secret_access_key=minio123

2. Use the following command script to install Velero w/support for CSI:

```
export BUCKET=velero
export REGION=minio
./velero install  \
  --provider aws \
  --bucket $BUCKET \
  --secret-file ./credentials \
  --backup-location-config
region=$REGION,s3ForcePathStyle="true",s3Url=http://192.168.74.104 \
  --snapshot-location-config region=$REGION \
  --plugins velero/velero-plugin-for-aws:v1.1.0
```

Follow https://github.com/vmware-tanzu/velero-plugin-for-vsphere to install vSphere snapshot plugin (v 1.0.1!)

3. Add vSphere volume snapshot plugin

velero plugin add vsphereveleroplugin/velero-plugin-for-vsphere:1.0.1

and create vSphere volume snapshot location:

velero snapshot-location create vsl-vsphere-dz --provider velero.io/vsphere

Snapshot volume location "vsl-vsphere-dz" configured successfully.

(Steps below are optional)

verify that snapshot location has been created:

velero snapshot-location get

NAME	PROVIDER
default	aws
vsl-vsphere-dz	velero.io/vsphere

Optionally, verify that all pods, including "datamgr." to handle volume snapshots, are running in the velero namespace:

kubectl get po -n velero

NAME	READY	STATUS	RESTARTS	AGE
pod/datamgr-for-vsphere-plugin-d5hbl	0/1	ContainerCreating	0	4m22s
pod/datamgr-for-vsphere-plugin-lmrpw	1/1	Running	0	4m22s
pod/datamgr-for-vsphere-plugin-mwgcv	1/1	Running	0	4m22s

pod/velero-5f8889f694-8whdz 1/1 Running 0 10m

Backup Stateful App with vSphere Volume Snapshot

1. Using volume snapshot above, initiate backup of stateful application Ghost namespace configured earlier:

```
velero backup create ghost-backup3 --include-namespaces=ghost --snapshot-volumes --
volume-snapshot-locations vsl-vsphere-dz
```

Backup request "ghost-backup1" submitted successfully.

Run `velero backup describe ghost-backup1` or `velero backup logs ghost-backup1` for more details.

2. Verify that backup completed successfully and volume snapshots were inlcuded:

```
velero describe backup ghost-backup3 --details
```

Name: ghost-backup3
Namespace: velero
Labels: velero.io/storage-location=default
Annotations: velero.io/source-cluster-k8s-gitversion=v1.16.7+vmware.1
velero.io/source-cluster-k8s-major-version=1
velero.io/source-cluster-k8s-minor-version=16

Phase: Completed
Namespaces:
Included: ghost
Excluded: <none>

Resources:
Included: *
Excluded: <none>
Cluster-scoped: auto

Label selector: <none>
Storage Location: default
Velero-Native Snapshot PVs: true
TTL: 720h0m0s
Hooks: <none>
Backup Format Version: 1
Started: 2020-07-07 19:19:55 +0000 UTC
Completed: 2020-07-07 19:20:35 +0000 UTC

Expiration: 2020-08-06 19:19:55 +0000 UTC
Total items to be backed up: 10
Items backed up: 10

Resource List:
apps/v1/Deployment:
- ghost/blog

apps/v1/ReplicaSet:
- ghost/blog-8646cd4d56
v1/Endpoints:
- ghost/blog
v1/Namespace:
- ghost
v1/PersistentVolume:
- **pvc-f9ec1bce-c2c1-4477-b118-e3b333a57151**
v1/PersistentVolumeClaim:
- ghost/blog-content-new
v1/Pod:
- ghost/blog-8646cd4d56-fpqz9
v1/Secret:
- ghost/default-token-c6zpx
v1/Service:
- ghost/blog
v1/ServiceAccount:
- ghost/default

Velero-Native Snapshots:
pvc-f9ec1bce-c2c1-4477-b118-e3b333a57151:
Snapshot ID: ivd:be575613-2aae-4823-9e6d-16d4ce3a6fca:651985e4-642a-4a78-93e3-976f566d652d
Type: ivd
Availability Zone:
IOPS: 100

NOTES:

- notice the **PersistentVolume** object being included into the backup and corresponding Velero Native Snapshots, it should match the PVC ID of app created by deployment (see above)
- uploading volume snapshots may take a long time due to many processes happening on the background, make sure to check backup upload status:

  kubectl -n velero get uploads

Delete & Restore Stateful App from Backup with vSphere Volume Snapshot

1. Delete namespace where app is deployed:

   kubectl delete ns ghost

   make sure the application namespace is fully deleted

2. Initiate a restore process using previously created backup (with volume snapshots) :

   velero restore create restore-ghost-backup3 --from-backup ghost-backup3

   Restore request “restore-ghost-backup3” submitted successfully.

Run ‘velero restore describe restore-ghost-backup3’ or ‘velero restore logs restore-ghost-backup3’ for more details

3. Monitor restore process status/check logs:

velero restore describe restore-ghost-backup3
Name: restore-ghost-backup3
Namespace: velero
Labels: <none>
Annotations: <none>
Phase: Completed
Backup: ghost-backup3

Namespaces:
Included: all namespaces found in the backup
Excluded: <none>

Resources:
Included: *
Excluded: nodes, events, events.events.k8s.io, backups.velero.io, restores.velero.io, resticrepositories.velero.io
Cluster-scoped: auto

Namespace mappings: <none>
Label selector: <none>
Restore PVs: auto

---

4. Check status of restored namespace, PVC, deployments, pods and services:

kubectl get ns ghost

NAME STATUS AGE

ghost Active 3m37s

kubectl get pvc -n ghost

NAME STATUS VOLUME CAPACITY ACCES
S MODES STORAGECLASS AGE

blog-content-new Bound pvc-f9ec1bce-c2c1-4477-b118-
e3b333a57151 2Gi RWO demo-sts-sc 5m41s <== important to verify PVC is bound

kubectl get po,svc -n ghost

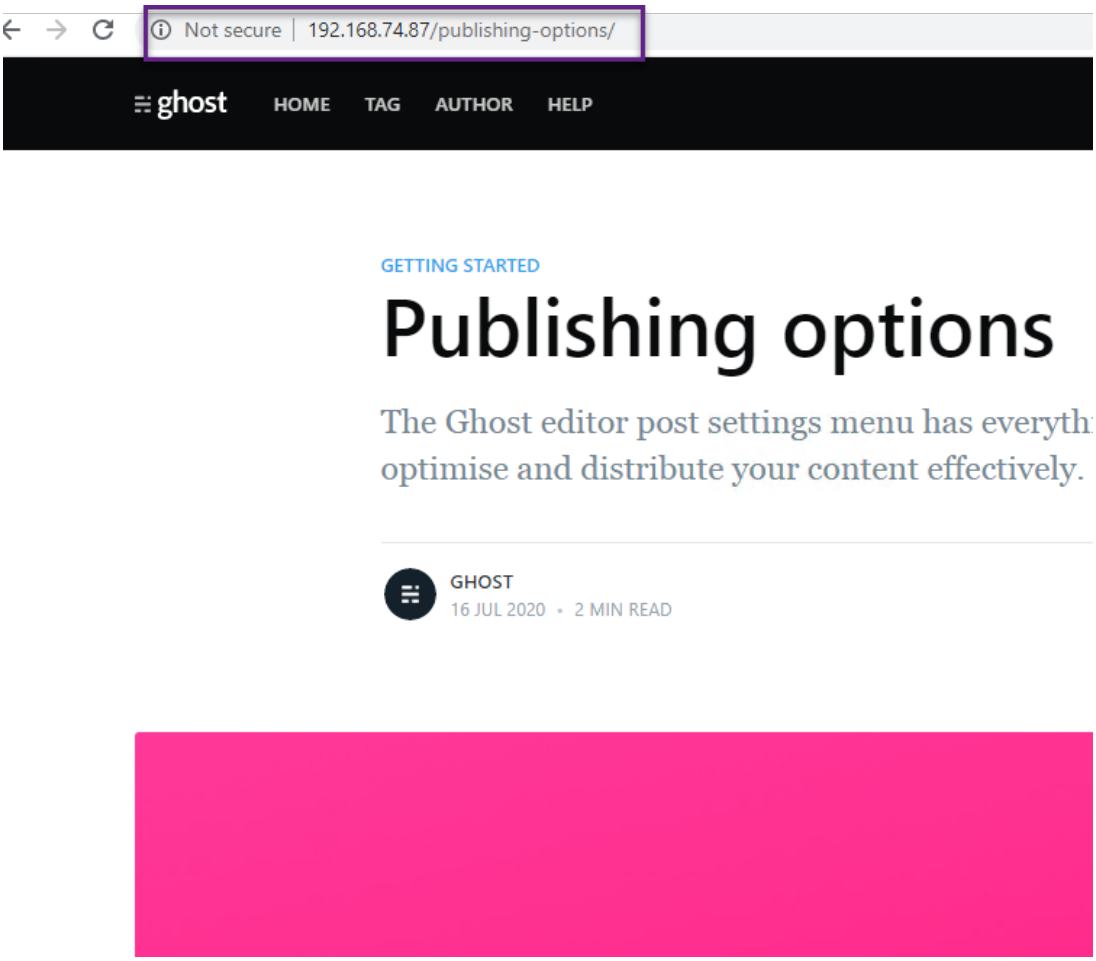
NAME READY STATUS RESTARTS AGE

pod/blog-8646cd4d56-fpqz9 1/1 Running 0 17m

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
service/blog	LoadBalancer	10.100.200.246	**192.168.74.81**	80:34241/TCP	17m

---

Finally, navigate to the LoadBalancer URL of restored version of the Ghost app and check its availability (may need to update the DNS record matching URL specified in deployment descriptor):



Troubleshooting Notes

1. If validation of all Pods implementing CSI driver is failing (e.g. **vsphere-csi-controller** pod) is failing, examine pod logs for RCA:

kubectl logs vsphere-csi-controller-0 vsphere-csi-controller -n kube-system

```
I0702 20:16:00.623537       1 config.go:261] GetCnsconfig called with cfgPath: /etc/cloud/csi-vsphere.conf
I0702 20:16:00.624455       1 config.go:206] Initializing vc server your_vc_ip
I0702 20:16:00.624493       1 controller.go:67] Initializing CNS controller
I0702 20:16:00.624663       1 virtualcentermanager.go:63] Initializing defaultVirtualCenterManager...
I0702 20:16:00.624736       1 virtualcentermanager.go:65] Successfully initialized
defaultVirtualCenterManager
I0702 20:16:00.624750       1 virtualcentermanager.go:107] Successfully registered VC "your_vc_ip"
```

I0702 20:16:00.624878 1 manager.go:62] Initializing volume.volumeManager...
I0702 20:16:00.624885 1 manager.go:66] volume.volumeManager initialized
E0702 20:16:00.643785 1 virtualcenter.go:127] Failed to create new client with err: Post https://your_vc_ip:443/sdk: dial tcp: lookup your_vc_ip on 192.168.2.10:53: server misbehaving
E0702 20:16:00.644010 1 virtualcenter.go:238] Failed to create govmomi client with err: Post https://your_vc_ip:443/sdk: dial tcp: lookup your_vc_ip on 192.168.2.10:53: server misbehaving
E0702 20:16:00.644251 1 virtualcenter.go:201] Cannot connect to vCenter with err: Post https://your_vc_ip:443/sdk: dial tcp: lookup your_vc_ip on 192.168.2.10:53: server misbehaving
E0702 20:16:00.644408 1 util.go:41] Failed to connect to VirtualCenter host: "your_vc_ip". err=Post https://your_vc_ip:443/sdk: dial tcp: lookup your_vc_ip on 192.168.2.10:53: server misbehaving
E0702 20:16:00.644575 1 controller.go:92] Failed to get vcenter. err=Post https://your_vc_ip:443/sdk: **dial tcp: lookup your_vc_ip on 192.168.2.10:53: server misbehaving**
E0702 20:16:00.644617 1 service.go:107] Failed to init controller. Error: Post https://your_vc_ip:443/sdk: dial tcp: lookup your_vc_ip on 192.168.2.10:53: server misbehaving
I0702 20:16:00.644726 1 service.go:88] configured: csi.vsphere.vmware.com with map[mode:controller]
time="2020-07-02T20:16:00Z" level=info msg="removed sock file" path=/var/vcap/data/csi/sockets/pluginproxy/csi.sock
time="2020-07-02T20:16:00Z" level=fatal msg="grpc failed" error="Post https://your_vc_ip:443/sdk: dial tcp: lookup your_vc_ip on 192.168.2.10:53: server misbehaving"

Resolution: make sure that DNS server is running and listening on port 53, restart if needed

2. Running backup using vSphere volume snapshot:

velero snapshot-location get
NAME PROVIDER
default aws
*vsl-vsphere-dz velero.io/vsphere

initiate velero backup using snapshot location:

velero backup create ghost-backup2 --include-namespaces=ghost --snapshot-volumes --volume-snapshot-locations vsl-vsphere-dz
Backup request "ghost-backup2" submitted successfully.

Run `velero backup describe ghost-backup2` or `velero backup logs ghost-backup2` for more details.

However, when running backup of stateful up using CSI volumes, I am getting the following exception:
time="2020-07-07T16:26:21Z" level=error msg="Error getting volume snapshotter for volume snapshot location" backup=velero/ghost-backup2 error="unable to locate VolumeSnapshotter plugin named **velero.io/vsphere**" logSource="pkg/backup/item_backupper.go:437" name=pvc-f9ec1bce-c2c1-4477-b118-e3b333a57151 namespace= persistentVolume=pvc-f9ec1bce-c2c1-4477-b118-e3b333a57151 resource=persistentvolumes volumeSnapshotLocation=vsl-vsphere-dz

Resolution: (worked after a few retries)

3. Examine events when restoring application from backup:

kubectl get events -n ghost
LAST SEEN TYPE REASON OBJECT MESSAGE

<unknown> Normal Scheduled pod/blog-8646cd4d56-fpqz9 Successfully assigned ghost/blog-8646cd4d56-fpqz9 to 576e0ba9-5621-4ecd-a1b1-eb39af781390
14m Normal SuccessfulAttachVolume pod/blog-8646cd4d56-fpqz9 AttachVolume.Attach succeeded for volume "pvc-f9ec1bce-c2c1-4477-b118-e3b333a57151"
79s Warning FailedMount pod/blog-8646cd4d56-fpqz9 MountVolume.MountDevice failed for volume "pvc-f9ec1bce-c2c1-4477-b118-e3b333a57151" : rpc error: code = Unavailable desc = all SubConns are in TransientFailure, latest connection error: connection error: desc = "transport: Error while dialing dial unix /var/vcap/data/kubelet/plugins_registry/csi.vsphere.vmware.com/csi.sock: connect: no such file or directory"
78s Warning FailedMount pod/blog-8646cd4d56-fpqz9 Unable to attach or mount volumes: unmounted volumes=[content], unattached volumes=[default-token-cmqfq content]: timed out waiting for the condition
3m32s Warning FailedMount pod/blog-8646cd4d56-fpqz9 Unable to attach or mount volumes: unmounted volumes=[content], unattached volumes=[content default-token-cmqfq]: timed out waiting for the condition

Resolution: make sure all nodes in K8s cluster are running and pods can be scheduled on them, wait for scheduler to retry (??)

Conclusion

We hope this document was useful. As you try these configuration steps, please provide any feedback or questions in the comments section for this document on code.vmware.com. Also, please let us know if you have any suggestions or if you would like to see guidance on other topics