Backup and Restore Solution: ONAP-OOM

- **Problem Statement and Requirement (User Story): -**

As an ONAP Operator- We require the ability to backup and restore ONAP state data, We want to have Disaster recovery solution for ONAP deployment done over K8.

Basic Use case would be: -

1) Add/Update/Modify the POD Data or DB Data.
2) Simulate a Disaster
3) Restore using Backup.
4) POD Data/DB entries should be recovered.

- **Solution Description: -**

Narrowed down upon a tool which can be used for K8 Backup and Restoration for ONAP deployments named as Heptio-ARK

Ark is an Opensource tool to back up and restore your Kubernetes cluster resources and persistent volumes. Ark lets you:

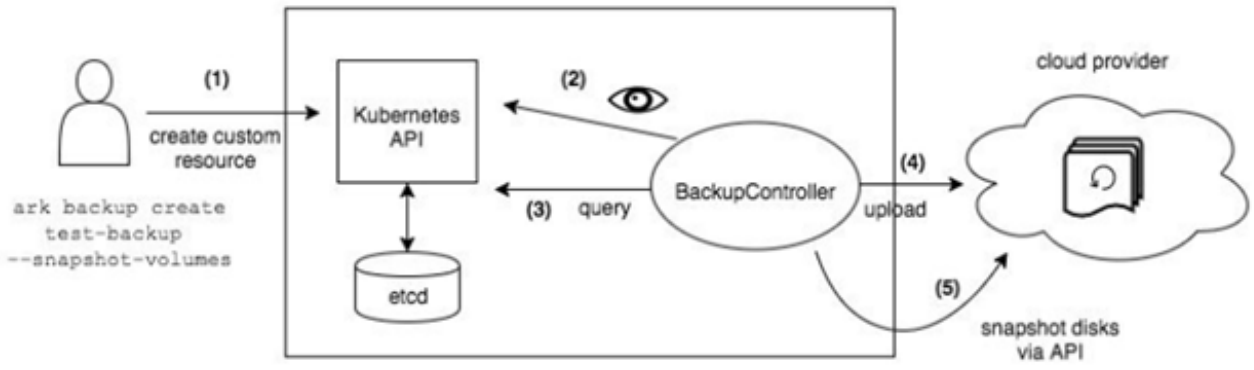
- Take backups of your cluster and restore in case of loss.
- Copy cluster resources across cloud providers. NOTE: Cloud volume migrations are not yet supported.

Replicate your production environment for development and testing environments.

Ark consists of:

- A server that runs on your cluster
- A command-line client that runs locally

Working Flow diagram: -



- **Installation**: -

Prerequisites

- Access to a Kubernetes cluster, version 1.7 or later.
- A DNS server on the cluster
- kubectl installed
- Labels should be defined there.

Script Delivered: -

https://jira.onap.org/secure/attachment/12222/oom_ark_setup.sh

- Below script will setup the ARK server and Client as well, It is using the MINIO, an S3-compatible storage service that runs locally on your cluster, but yes it gives liberty to modify according to your cloud provider

```
#!/bin/bash

PWD=`pwd`

ARK_VERSION=0.9.3

#Download Ark repo

git clone https://github.com/heptio/ark.git

PWD=`pwd`

ARK_VERSION=0.9.3

#Run the Pre-requistites

kubectl apply -f $PWD/ark/examples/common/00-prereqs.yaml

#Run the Ark POD deployment

kubectl apply -f $PWD/ark/examples/minio/

#Download the Client and Make it executable

cd ark

wget https://github.com/heptio/ark/releases/download/v0.9.3/ark-v${ARK_VERSION}-linux-amd64.tar.gz

sudo tar -zxvf ark-v${ARK_VERSION}-linux-amd64.tar.gz

sudo chmod +x ./ark

sudo mv ./ark /usr/local/bin/ark

exit 0
```

Code Delivered:-

As Labels need to be defined, because that is a unique identity which we need to have for any backup of our k8 containers,

So in OOM code, Where -ever we don't have labels, We need to define that whether its configmap or secret, for eg below:-

```
labels:

app: {{ include "common.name" . }}
chart: {{ .Chart.Name }}-{{ .Chart.Version | replace "+" "_" }}
release: {{ .Release.Name }}
heritage: {{ .Release.Service }}
```

- **Running ARK Example (Backup and Restoration with Logs)**: -

1) INSTALL SO COMPONENT:-

```
root@k8s-1:/vaibhav/backup/oom/kubernetes# helm install so -n bkup --namespace test3

NAME:   bkup

LAST DEPLOYED: Fri Jul 20 06:59:09 2018

NAMESPACE: test3

STATUS: DEPLOYED
```

```
RESOURCES:
==> v1/Pod(related)
NAME                          READY  STATUS    RESTARTS  AGE
bkup-so-db-744fccd888-w67zk   0/1    Init:0/1  0         0s
bkup-so-7668c746c-vngk8       0/2    Init:0/1  0         0s


==> v1/Secret
NAME        TYPE    DATA  AGE
bkup-so-db  Opaque  1     0s


==> v1/ConfigMap
NAME                      DATA  AGE
confd-configmap           1     0s
so-configmap              5     0s
so-docker-file-configmap  1     0s
so-filebeat-configmap     1     0s
so-log-configmap          11    0s


==> v1/PersistentVolume
NAME        CAPACITY  ACCESS MODES  RECLAIM POLICY  STATUS  CLAIM             STORAGECLASS  REASON  AGE
bkup-so-db  2Gi       RWX           Retain          Bound   test3/bkup-so-db  0s


==> v1/PersistentVolumeClaim
NAME        STATUS  VOLUME      CAPACITY  ACCESS MODES  STORAGECLASS  AGE
bkup-so-db  Bound   bkup-so-db  2Gi       RWX           0s


==> v1/Service
NAME   TYPE      CLUSTER-IP   EXTERNAL-IP  PORT
(S)                                                                                AGE
so-db  NodePort  10.43.63.96  <none>       3306:30252
/TCP                                                                               0s
so     NodePort  10.43.59.93  <none>       8080:30223/TCP,3904:30225/TCP,3905:30224/TCP,9990:30222/TCP,8787:30250
/TCP  0s


==> v1beta1/Deployment
NAME        DESIRED  CURRENT  UP-TO-DATE  AVAILABLE  AGE
bkup-so-db  1        1        1           0          0s
bkup-so     1        1        1           0          0s



NOTES:
```

```
1. Get the application URL by running these commands:
  export NODE_PORT=$(kubectl get --namespace test3 -o jsonpath="{.spec.ports[0].nodePort}" services so)
  export NODE_IP=$(kubectl get nodes --namespace test3 -o jsonpath="{.items[0].status.addresses[0].address}")
  echo http://$NODE_IP:$NODE_PORT
```

2) CHECKING STATUS OF POD:-

```
root@k8s-1:/vaibhav/backup/oom/kubernetes# kubectl get pods --all-namespaces | grep -i so
NAMESPACE       NAME                                    READY     STATUS             RESTARTS   AGE
test3           bkup-so-7668c746c-vngk8                 2/2       Running            0          8m
test3           bkup-so-db-744fccd888-w67zk             1/1       Running            0          8m
root@k8s-1:/vaibhav/backup/oom/kubernetes#
```

3) CREATING BACKUP OF DEPLOYMENT:-

Here I am using selector label as release name

```
root@k8s-1:/vaibhav/backup/oom/kubernetes# ark backup create so-backup --selector release=bkup
Backup request "so-backup" submitted successfully.
Run `ark backup describe so-backup` for more details.
root@k8s-1:/vaibhav/backup/oom/kubernetes#
```

4) CHECKING BACKUP LOGS:-

```
root@k8s-1:/vaibhav/backup/oom/kubernetes# ark backup describe so-backup
Name:         so-backup
Namespace:    heptio-ark
Labels:       <none>
Annotations:  <none>

Phase:  Completed

Namespaces:
  Included:  *
  Excluded:  <none>

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

```
Label selector:  release=bkup

Snapshot PVs:  auto

TTL:  720h0m0s

Hooks:  <none>

Backup Format Version:  1

Started:    2018-07-20 07:09:51 +0000 UTC
Completed:  2018-07-20 07:09:53 +0000 UTC

Expiration:  2018-08-19 07:09:51 +0000 UTC

Validation errors:  <none>

Persistent Volumes: <none included>
```

5) SIMULATING A DISASTER:-

```
root@k8s-1:/vaibhav/backup/oom/kubernetes# helm delete --purge bkup
release "bkup" deleted
```

6)CREATE BACKUP OF THE PODS USING ARK :-

```
root@k8s-1:/vaibhav/backup/oom/kubernetes# ark restore create --from-backup so-backup
Restore request "so-backup-20180720071236" submitted successfully.
Run `ark restore describe so-backup-20180720071236` for more details.
root@k8s-1:/vaibhav/backup/oom/kubernetes#
```

7) CHECKING RESTORATION LOGS:-

```
root@k8s-1:/vaibhav/backup/oom/kubernetes# ark restore describe so-backup-20180720071236
Name:         so-backup-20180720071236
Namespace:    heptio-ark
Labels:       <none>
Annotations:  <none>
```

```
Backup:  so-backup

Namespaces:
  Included:  *
  Excluded:  <none>

Resources:
  Included:        *
  Excluded:        nodes, events, events.events.k8s.io, backups.ark.heptio.com, restores.ark.heptio.com
 Cluster-scoped:  auto

Namespace mappings:  <none>

Label selector:  <none>

Restore PVs:  auto

Phase:  Completed

Validation errors:  <none>

Warnings:  <none>
Errors:    <none>
```

8)CHECK TARBALL:-

```
root@k8s-1:/vaibhav/backup/resources# tree
.
??? configmaps
?   ??? namespaces
?       ??? test3
?           ??? confd-configmap.json
?           ??? so-configmap.json
?           ??? so-docker-file-configmap.json
?           ??? so-filebeat-configmap.json
?           ??? so-log-configmap.json
??? deployments.apps
?   ??? namespaces
?       ??? test3
```

```
?           ??? bkup-so-db.json
?           ??? bkup-so.json
??? endpoints
?   ??? namespaces
?       ??? test3
?           ??? so-db.json
?           ??? so.json
??? persistentvolumeclaims
?   ??? namespaces
?       ??? test3
?           ??? bkup-so-db.json
??? persistentvolumes
?   ??? cluster
?       ??? bkup-so-db.json
??? pods
?   ??? namespaces
?       ??? test3
?           ??? bkup-so-7668c746c-vngk8.json
?           ??? bkup-so-db-744fccd888-w67zk.json
??? replicasets.apps
?   ??? namespaces
?       ??? test3
?           ??? bkup-so-7668c746c.json
?           ??? bkup-so-db-744fccd888.json
??? secrets
?   ??? namespaces
?       ??? test3
?           ??? bkup-so-db.json
??? services
    ??? namespaces
        ??? test3
            ??? so-db.json
            ??? so.json

26 directories, 18 files
```

9) RESTORE RUN :-

```
root@k8s-1:/vaibhav/backup/oom/kubernetes# ark restore get
```

```
NAME                          BACKUP         STATUS      WARNINGS   ERRORS    CREATED                         SELE
CTOR


so-backup-20180720071236      so-backup      Completed   0          0         2018-07-20 07:12:36 +0000
UTC   <none>
```

10) CHECK THE POD STATUS:-

```
root@k8s-1:/vaibhav/backup/oom/kubernetes# kubectl get pods --all-namespaces | grep -i so
NAMESPACE       NAME                                    READY     STATUS             RESTARTS   AGE
test3           bkup-so-7668c746c-vngk8                 2/2       Running            0          8m
test3           bkup-so-db-744fccd888-w67zk             1/1       Running            0          8m
```

Another Example with DB and PV Backup:-

***APPC COMPONENT BACKUP and RESTORATION**

```
root@rancher:~/oom/kubernetes# kubectl get pods --all-namespaces | grep -i appc
onap bk-appc-0 1/2 Running 0 1m
onap bk-appc-cdt-7cd6f6d674-5thwj 1/1 Running 0 1m
onap bk-appc-db-0 2/2 Running 0 1m
onap bk-appc-dgbuilder-59895d4d69-7rp9q 1/1 Running 0 1m
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
```

** CREATING DUMMY ENTRY IN DB **

```
root@rancher:~/oom/kubernetes# kubectl exec -it -n default bk-appc-db-0 bash
Defaulting container name to appc-db.
Use 'kubectl describe pod/bk-appc-db-0 -n onap' to see all of the containers in this pod.
root@bk-appc-db-0:/#
root@bk-appc-db-0:/#
root@bk-appc-db-0:/#
root@bk-appc-db-0:/# mysql -u root -p
Enter password:
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 42
Server version: 5.7.23-log MySQL Community Server (GPL)

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affiliates. Other names may be trademarks of their respective
owners.

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

mysql>
mysql>
mysql>
mysql> connect mysql
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Connection id: 44
Current database: mysql
```

```
mysql>
mysql>
mysql> select * from servers;
Empty set (0.00 sec)

mysql> desc servers;
+-------------+----------+------+-----+---------+-------+
| Field | Type | Null | Key | Default | Extra |
+-------------+----------+------+-----+---------+-------+
| Server_name | char(64) | NO | PRI | | |
| Host | char(64) | NO | | | |
| Db | char(64) | NO | | | |
| Username | char(64) | NO | | | |
| Password | char(64) | NO | | | |
| Port | int(4) | NO | | 0 | |
| Socket | char(64) | NO | | | |
| Wrapper | char(64) | NO | | | |
| Owner | char(64) | NO | | | |
+-------------+----------+------+-----+---------+-------+
9 rows in set (0.00 sec)

mysql> insert into servers values ("test","ab","sql","user","pwd",1234,"test","wrp","vaib");
Query OK, 1 row affected (0.03 sec)

mysql>
mysql>
mysql>
mysql> select * from servers;
+-------------+------+-----+----------+----------+------+--------+---------+-------+
| Server_name | Host | Db | Username | Password | Port | Socket | Wrapper | Owner |
+-------------+------+-----+----------+----------+------+--------+---------+-------+
| abc | ab | sql | user | pwd | 1234 | test | wrp | vaib |
+-------------+------+-----+----------+----------+------+--------+---------+-------+
1 row in set (0.00 sec)

mysql>
mysql>
mysql> exit
Bye
root@bk-appc-db-0:/#
root@bk-appc-db-0:/#
root@bk-appc-db-0:/#
root@bk-appc-db-0:/#
root@bk-appc-db-0:/#
root@bk-appc-db-0:/#
root@bk-appc-db-0:/# exi
bash: exi: command not found
root@bk-appc-db-0:/# exit
exit
command terminated with exit code 127
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes# kubectl get pods --all-namespaces | grep -i appc
onap bk-appc-0 1/2 Running 0 5m
onap bk-appc-cdt-7cd6f6d674-5thwj 1/1 Running 0 5m
onap bk-appc-db-0 2/2 Running 0 5m
onap bk-appc-dgbuilder-59895d4d69-7rp9q 1/1 Running 0 5m
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
```

*** CREATING DUMMY FILE IN APPC PV ***
root@rancher:~/oom/kubernetes# kubectl exec -it -n onap bk-appc-0 bash
Defaulting container name to appc.
Use 'kubectl describe pod/bk-appc-0 -n onap' to see all of the containers in this pod.
root@bk-appc-0:/#
root@bk-appc-0:/#
root@bk-appc-0:/#
root@bk-appc-0:/#
root@bk-appc-0:/#
root@bk-appc-0:/#
root@bk-appc-0:/#
root@bk-appc-0:/#
root@bk-appc-0:/#
root@bk-appc-0:/# cd /opt/opendaylight/current/d
daexim/ data/ deploy/
root@bk-appc-0:/# cd /opt/opendaylight/current/daexim/
root@bk-appc-0:/opt/opendaylight/current/daexim# ls
root@bk-appc-0:/opt/opendaylight/current/daexim# ls
root@bk-appc-0:/opt/opendaylight/current/daexim#
root@bk-appc-0:/opt/opendaylight/current/daexim#
root@bk-appc-0:/opt/opendaylight/current/daexim# touch abc.txt
root@bk-appc-0:/opt/opendaylight/current/daexim# ls
abc.txt
root@bk-appc-0:/opt/opendaylight/current/daexim# exit
exit
root@rancher:~/oom/kubernetes# kubectl get pods --all-namespaces | grep -i appc
onap bk-appc-0 1/2 Running 0 6m
onap bk-appc-cdt-7cd6f6d674-5thwj 1/1 Running 0 6m
onap bk-appc-db-0 2/2 Running 0 6m
onap bk-appc-dgbuilder-59895d4d69-7rp9q 1/1 Running 0 6m
root@rancher:~/oom/kubernetes#

** CREATING BACKUP USING ARK **

root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes# ark backup create appc-bkup1 --selector release=bk
Backup request "appc-bkup1" submitted successfully.
Run `ark backup describe appc-bkup1` for more details.
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes# ark backup describe appc-bkup1
Name: appc-bkup1
Namespace: heptio-ark
Labels: <none>
Annotations: <none>

Phase: Completed

Namespaces:
Included: *
Excluded: <none>

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

Label selector: release=bk

Snapshot PVs: auto

TTL: 720h0m0s

Hooks: <none>

Backup Format Version: 1

Started: 2018-08-27 05:07:45 +0000 UTC
Completed: 2018-08-27 05:07:47 +0000 UTC

Expiration: 2018-09-26 05:07:44 +0000 UTC

Validation errors: <none>

Persistent Volumes: <none included>
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes# pwd
/root/oom/kubernetes
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes# ls
aaf appc cli config contrib dist esr LICENSE Makefile multicloud onap policy portal README.md sdc sniro-emulator uui vid
aai clamp common consul dcaegen2 dmaap helm log msb nbi oof pomba readiness robot sdnc so vfc vnfsdk
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#

** SIMULATING DISASTER BY DELETING APPC **

root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes# helm delete --purge bk
release "bk" deleted
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#

** RESTORATION USING ARK **

root@rancher:~/oom/kubernetes# ark restore create --from-backup appc-bkup1
Restore request "appc-bkup1-20180827052651" submitted successfully.
Run `ark restore describe appc-bkup1-20180827052651` for more details.
root@rancher:~/oom/kubernetes# ark restore describe appc-bkup1-20180827052651
Name: appc-bkup1-20180827052651
Namespace: heptio-ark
Labels: <none>
Annotations: <none>

Backup: appc-bkup1

Namespaces:
Included: *
Excluded: <none>

Resources:
Included: *
Excluded: nodes, events, events.events.k8s.io, backups.ark.heptio.com, restores.ark.heptio.com
Cluster-scoped: auto

Namespace mappings: <none>

Label selector: <none>

Restore PVs: auto

Phase: InProgress

Validation errors: <none>

Warnings: <none>
Errors: <none>
root@rancher:~/oom/kubernetes# ark restore describe appc-bkup1-20180827052651
Name: appc-bkup1-20180827052651
Namespace: heptio-ark
Labels: <none>
Annotations: <none>

Backup: appc-bkup1

Namespaces:
Included: *
Excluded: <none>

Resources:
Included: *
Excluded: nodes, events, events.events.k8s.io, backups.ark.heptio.com, restores.ark.heptio.com
Cluster-scoped: auto

Namespace mappings: <none>

Label selector: <none>

Restore PVs: auto

Phase: Completed

Validation errors: <none>

Warnings: <error getting warnings: Get http://minio.heptio-ark.svc:9000/ark/appc-bkup1/restore-appc-bkup1-20180827052651-results.gz?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Content-Sha256=UNSIGNED-PAYLOAD&X-Amz-Credential=minio%2F20180827%2Fminio%2Fs3%2Faws4_request&X-Amz-Date=20180827T052706Z&X-Amz-Expires=600&X-Amz-SignedHeaders=host&X-Amz-Signature=0f806ff4dbbb40fa5563a969b27d19c87405bc23d707f4a5d80f6b2a49ac7053: dial tcp: lookup minio.heptio-ark.svc on 10.11.0.13:53: no such host>

Errors: <error getting errors: Get http://minio.heptio-ark.svc:9000/ark/appc-bkup1/restore-appc-bkup1-20180827052651-results.gz?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Content-Sha256=UNSIGNED-PAYLOAD&X-Amz-Credential=minio%2F20180827%2Fminio%2Fs3%2Faws4_request&X-Amz-Date=20180827T052706Z&X-Amz-Expires=600&X-Amz-SignedHeaders=host&X-Amz-Signature=0f806ff4dbbb40fa5563a969b27d19c87405bc23d707f4a5d80f6b2a49ac7053: dial tcp: lookup minio.heptio-ark.svc on 10.11.0.13:53: no such host>
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#

** RESTORATION DETAILS **

root@rancher:~/oom/kubernetes# ark restore describe appc-bkup1-20180827052651
Name: appc-bkup1-20180827052651
Namespace: heptio-ark
Labels: <none>
Annotations: <none>

Backup: appc-bkup1

Namespaces:
Included: *
Excluded: <none>

Resources:
Included: *
Excluded: nodes, events, events.events.k8s.io, backups.ark.heptio.com, restores.ark.heptio.com
Cluster-scoped: auto

Namespace mappings: <none>

Label selector: <none>

Restore PVs: auto

Phase: Completed

Validation errors: <none>

Warnings: <error getting warnings: Get http://minio.heptio-ark.svc:9000/ark/appc-bkup1/restore-appc-bkup1-20180827052651-results.gz?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Content-Sha256=UNSIGNED-PAYLOAD&X-Amz-Credential=minio%2F20180827%2Fminio%2Fs3%2Faws4_request&X-Amz-Date=20180827T052709Z&X-Amz-Expires=600&X-Amz-SignedHeaders=host&X-Amz-Signature=d716695beaab18b8ef8f98c5ac1a54fc9d38922a7499224926b564695f4cf969: dial tcp: lookup minio.heptio-ark.svc on 10.11.0.13:53: no such host>

```
Errors: <error getting errors: Get http://minio.heptio-ark.svc:9000/ark/appc-bkup1/restore-appc-bkup1-20180827052651-results.gz?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Content-Sha256=UNSIGNED-PAYLOAD&X-Amz-Credential=minio%2F20180827%2Fminio%2Fs3%2Faws4_request&X-Amz-Date=20180827T052709Z&X-Amz-Expires=600&X-Amz-SignedHeaders=host&X-Amz-Signature=d716695beaab18b8ef8f98c5ac1a54fc9d38922a7499224926b564695f4cf969: dial tcp: lookup minio.heptio-ark.svc on 10.11.0.13:53: no such host>
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes# ark restore get
NAME BACKUP STATUS WARNINGS ERRORS CREATED SELECTOR
appc-bkup-20180827045955 appc-bkup Completed 2 0 2018-08-27 04:59:52 +0000 UTC <none>
appc-bkup1-20180827052651 appc-bkup1 Completed 5 0 2018-08-27 05:26:48 +0000 UTC <none>
vid-bkp-20180824053001 vid-bkp Completed 149 2 2018-08-24 05:29:59 +0000 UTC <none>
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#

** RESTORATION SUCCESSFUL ***

root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes# kubectl get pods --all-namespaces | grep -i appc
onap bk-appc-0 1/2 Running 0 26m
onap bk-appc-cdt-7cd6f6d674-5thwj 1/1 Running 0 26m
onap bk-appc-db-0 2/2 Running 0 26m
onap bk-appc-dgbuilder-59895d4d69-7rp9q 1/1 Running 0 26m
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes# kubectl exec -it -n onap bk-appc-db-0 bash
Defaulting container name to appc-db.
Use 'kubectl describe pod/bk-appc-db-0 -n onap' to see all of the containers in this pod.
root@bk-appc-db-0:/#
root@bk-appc-db-0:/#
root@bk-appc-db-0:/#


** RESTORATION OF DB SUCCESSFUL **

root@bk-appc-db-0:/# mysql -u root
ERROR 1045 (28000): Access denied for user 'root'@'localhost' (using password: NO)
root@bk-appc-db-0:/# mysql -u root -p
Enter password:
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 335
Server version: 5.7.23-log MySQL Community Server (GPL)

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owners.

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

mysql> connect mysql
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Connection id: 337
Current database: mysql

mysql> select * from servers;
+-------------+------+-----+----------+----------+------+--------+---------+-------+
| Server_name | Host | Db | Username | Password | Port | Socket | Wrapper | Owner |
+-------------+------+-----+----------+----------+------+--------+---------+-------+
| abc | ab | sql | user | pwd | 1234 | test | wrp | vaib |
+-------------+------+-----+----------+----------+------+--------+---------+-------+
1 row in set (0.00 sec)

mysql> quit
Bye
root@bk-appc-db-0:/# exit
exit
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
```

** RESTORATION of PV SUCCESSFUL ***

root@rancher:~/oom/kubernetes# kubectl get pods --all-namespaces | grep -i appc
onap bk-appc-0 1/2 Running 0 27m
onap bk-appc-cdt-7cd6f6d674-5thwj 1/1 Running 0 27m
onap bk-appc-db-0 2/2 Running 0 27m
onap bk-appc-dgbuilder-59895d4d69-7rp9q 1/1 Running 0 27m
root@rancher:~/oom/kubernetes# kubectl exec -it -n onap bk-appc-0 bash
Defaulting container name to appc.
Use 'kubectl describe pod/bk-appc-0 -n onap' to see all of the containers in this pod.
root@bk-appc-0:/#
root@bk-appc-0:/#
root@bk-appc-0:/#
root@bk-appc-0:/#
root@bk-appc-0:/# cd /opt/opendaylight/current/daexim/
root@bk-appc-0:/opt/opendaylight/current/daexim# ls
abc.txt
root@bk-appc-0:/opt/opendaylight/current/daexim#
root@bk-appc-0:/opt/opendaylight/current/daexim#
root@bk-appc-0:/opt/opendaylight/current/daexim# exit
exit
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#
root@rancher:~/oom/kubernetes#

root@k8s-1:/vaibhav/backup# ark restore get
NAME BACKUP STATUS WARNINGS ERRORS CREATED SELECTOR
oof-back-20180820084100 oof-back Completed 2 0 2018-08-20 08:41:00 +0000 UTC <none>

root@k8s-1:/vaibhav/backup# kubectl get pods --all-namespaces
NAMESPACE NAME READY STATUS RESTARTS AGE
default bkup-oof-9764b4bc4-szvz7 0/1 Init:0/1 2 26m
default bkup-oof-has-api-d696fb4c8-dk559 1/1 Running 0 26m
default bkup-oof-has-cassandra-6bb5bd84f9-jhb8b 1/1 Running 0 26m
default bkup-oof-has-controller-f949cc6f9-n9d2c 1/1 Running 0 26m
default bkup-oof-has-data-95bbc6f9c-749xn 1/1 Running 0 26m
default bkup-oof-has-music-684f6d5ddc-gq5lf 1/1 Running 0 26m
default bkup-oof-has-reservation-849f49fc7-2vhhx 1/1 Running 0 26m
default bkup-oof-has-solver-687f699b5c-7rshd 1/1 Running 0 26m
default bkup-oof-has-zookeeper-5c447c8f-6d528 1/1 Running 0 26m

root@k8s-1:/vaibhav/backup# kubectl exec -it -n default bkup-oof-has-cassandra-6bb5bd84f9-jhb8b bash
root@bkup-oof-has-cassandra-6bb5bd84f9-jhb8b:/#
)
root@bkup-oof-has-cassandra-6bb5bd84f9-jhb8b:/# /usr/bin/cqlsh -u root -p Aa123456
Connected to Test Cluster at 127.0.0.1:9042.
[cqlsh 5.0.1 | Cassandra 3.0.16 | CQL spec 3.4.0 | Native protocol v4]
Use HELP for help.
root@cqlsh>
root@cqlsh>
root@cqlsh>
root@cqlsh>

root@cqlsh> DESC cycling.cyclist_category

```
CREATE TABLE cycling.cyclist_category (
category text,
points int,
id uuid,
lastname text,
PRIMARY KEY (category, points)
) WITH CLUSTERING ORDER BY (points DESC)
AND bloom_filter_fp_chance = 0.01
AND caching = {'keys': 'ALL', 'rows_per_partition': 'NONE'}
AND comment = ''
AND compaction = {'class': 'org.apache.cassandra.db.compaction.SizeTieredCompactionStrategy', 'max_threshold': '32', 'min_threshold': '4'}
AND compression = {'chunk_length_in_kb': '64', 'class': 'org.apache.cassandra.io.compress.LZ4Compressor'}
AND crc_check_chance = 1.0
AND dclocal_read_repair_chance = 0.1
AND default_time_to_live = 0
AND gc_grace_seconds = 864000
AND max_index_interval = 2048
AND memtable_flush_period_in_ms = 0
AND min_index_interval = 128
AND read_repair_chance = 0.0
AND speculative_retry = '99PERCENTILE';

root@cqlsh>
```

- `Use Cases:-`

Disaster recovery

Using Schedules and Restore-Only Mode

If you periodically back up your cluster's resources, you are able to return to a previous state in case of some unexpected mishap, such as a service outage.

Cluster migration

Using Backups and Restores

Heptio Ark can help you port your resources from one cluster to another, as long as you point each Ark Config to the same cloud object storage.

- `References`

https://heptio.github.io/ark/v0.9.0/