AKS Backup Using Azure Backup Vault

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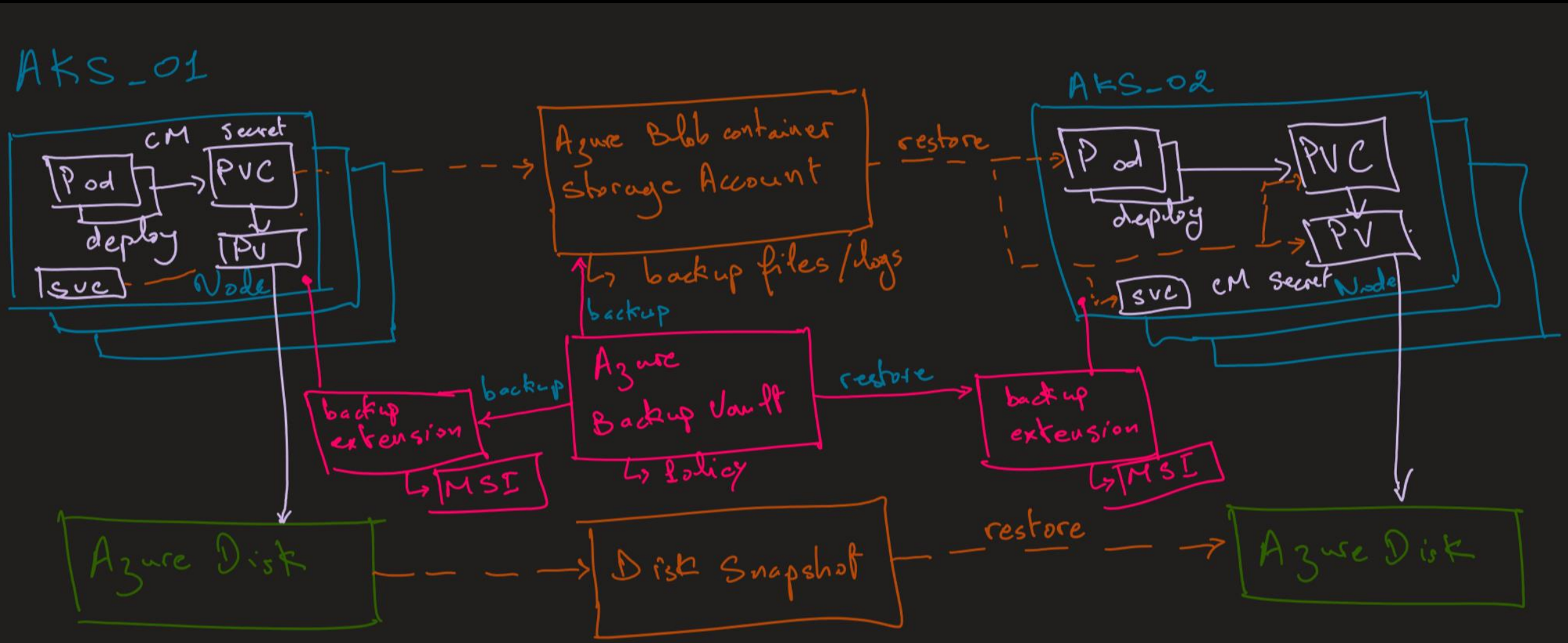
AKS Backup architecture



AKS Backup – Limitations

Supports Kubernetes version 1.21.1 or later.

Supports only CSI driver. In tree not supported.

Supports only Persistent Volumes (PV) using Azure Disk.

Azure Blob Containers and Azure File Shares are not supported.
They could be backed up using Azure Backup.

Supports only AKS with Managed Identity (MI).
AKS with Service Principal (SPN) is not supported. AKS can migrate from SPN to MI.

The backup for Kubernetes objects will be saved into a Blob container.
This Blob should be in the same region and subscription as the AKS cluster.

Both the Backup vault and AKS cluster should be in the same subscription and region.

AKS Backup – Limitations

Setting	Maximum limit
Number of backup policies per Backup vault	5000
Number of backup instances per Backup vault	5000
Number of on-demand backups allowed in a day per backup instance	10
Number of allowed restores per backup instance in a day	10

Currently, AKS backup supports once-a-day backup.
It also supports more frequent backups (in every 4, 6, 8, and 12 hours intervals) per day.
This solution allows you to retain your data for restore for up to 360 days.

Deploy sample apps: Pods+PV/Azure Disk

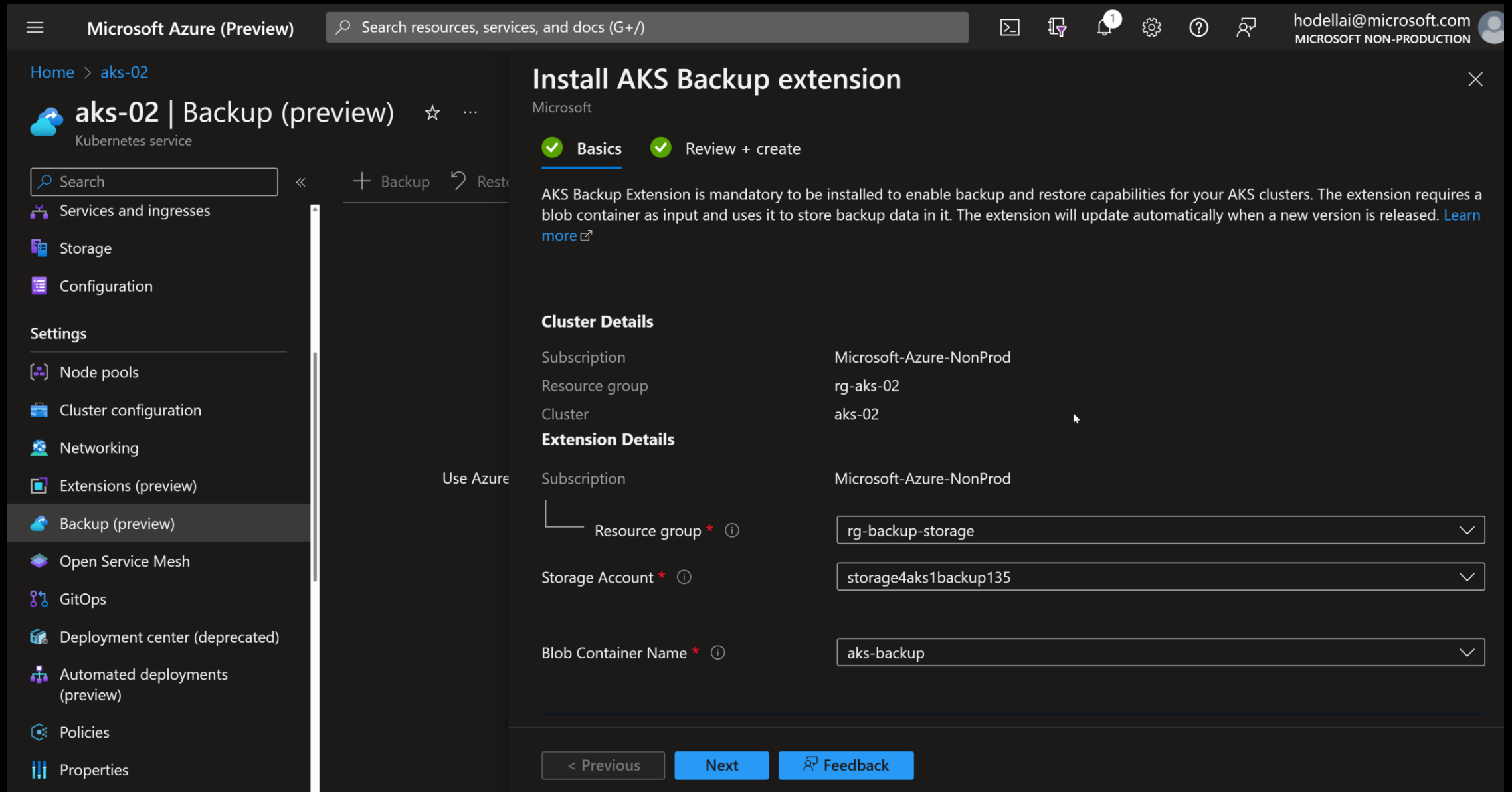
```
$ az aks get-credentials -n aks-01 -g rg-aks-01 --overwrite-existing
Merged "aks-01" as current context in C:\Users\hodellai\.kube\config
$
$ kubectl get nodes
NAME                                STATUS ROLES AGE VERSION
aks-systempool-20780455-vmss000000 Ready  agent 28m v1.25.5
aks-systempool-20780455-vmss000001 Ready  agent 28m v1.25.5
aks-systempool-20780455-vmss000002 Ready  agent 28m v1.25.5
$
$ kubectl apply -f deploy_disk_lrs.yaml
deployment.apps/nginx-lrs created
persistentvolumeclaim/azure-managed-disk-lrs created
$
$ kubectl apply -f deploy_disk_zrs_sc.yaml
deployment.apps/nginx-zrs created
storageclass.storage.k8s.io/managed-csi-zrs created
persistentvolumeclaim/azure-managed-disk-zrs created
```

Data is saved into the Azure Disk

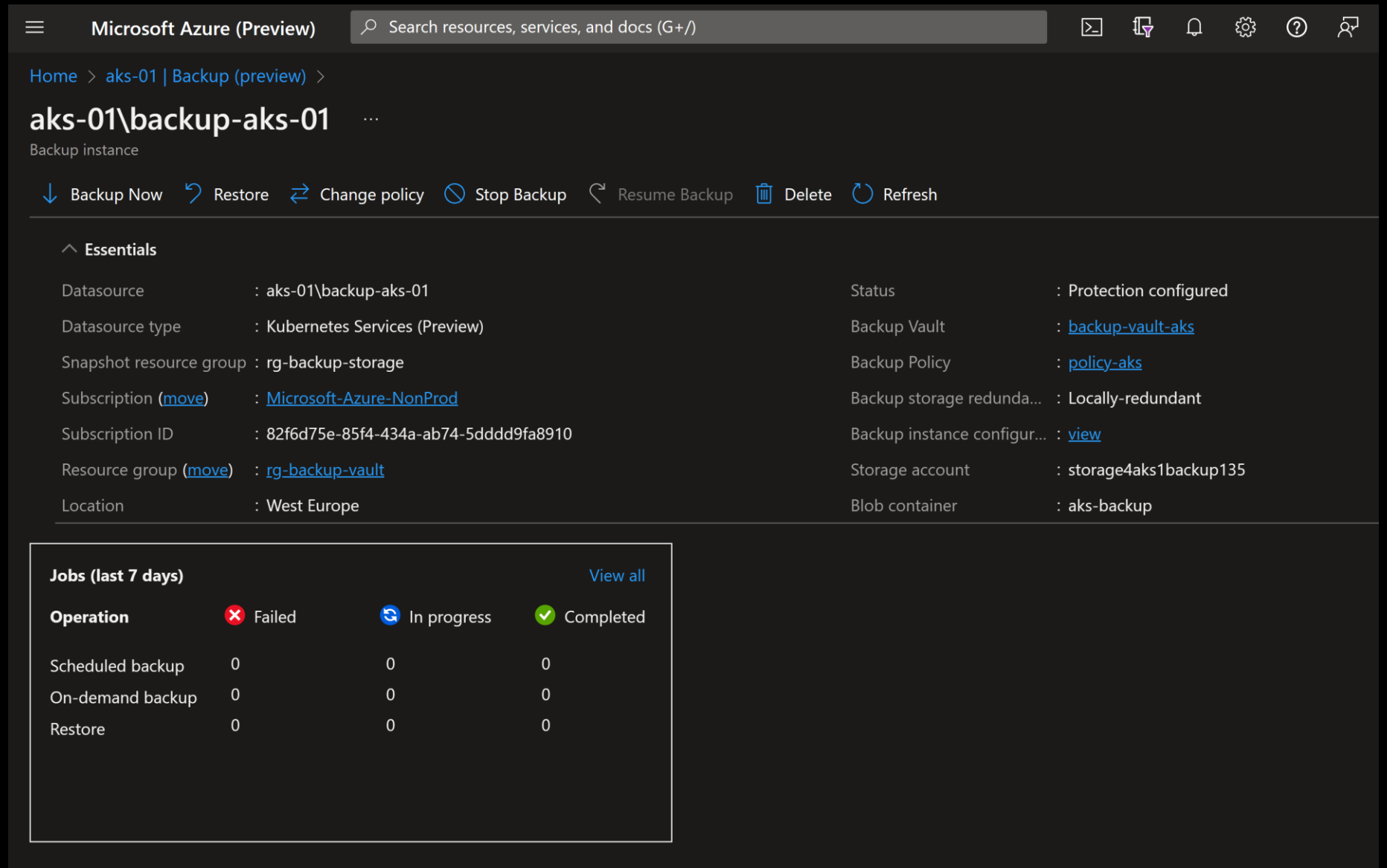
```
kubectl exec nginx-lrs-7db4886f8c-x4hzz -it -- cat /mnt/azuredisk/outfile
Tue Mar 21 15:00:14 UTC 2023
Tue Mar 21 15:01:14 UTC 2023
Tue Mar 21 15:02:14 UTC 2023

kubectl exec nginx-zrs-5567fd9ddc-hbtfs -it -- cat /mnt/azuredisk/outfile
Tue Mar 21 15:00:48 UTC 2023
Tue Mar 21 15:01:48 UTC 2023
Tue Mar 21 15:02:48 UTC 2023
```

We will try to backup (Snapshot) the Disk and then restore it into another AKS cluster.

Install AKS Backup extension



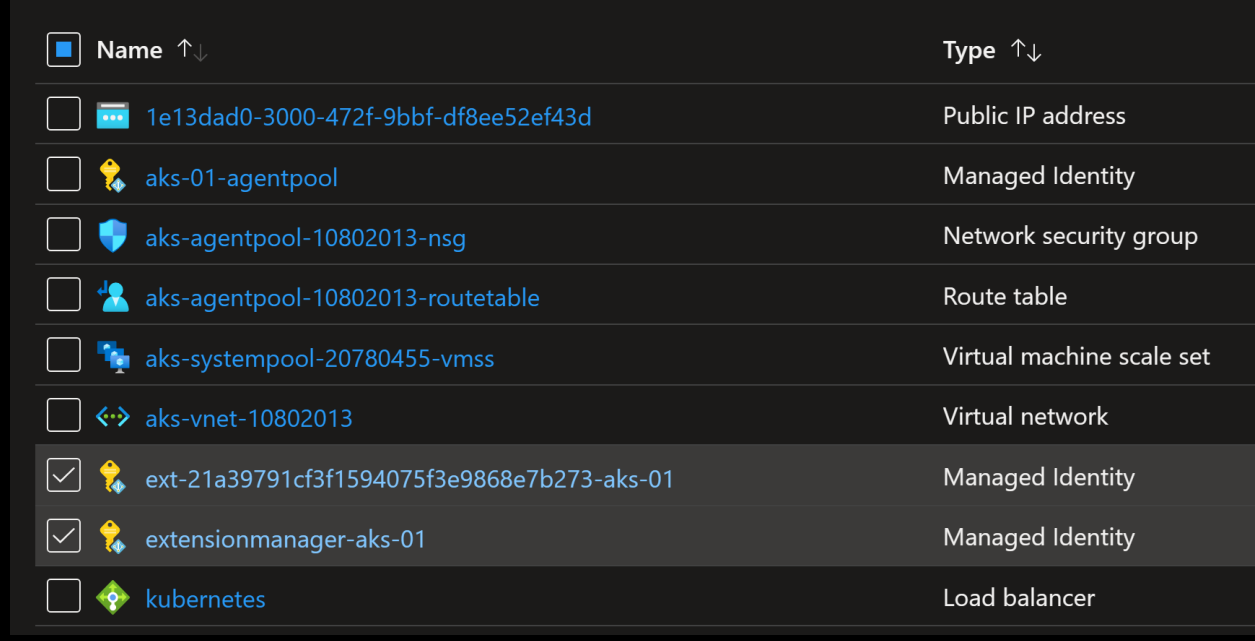
AKS Backup extension installed

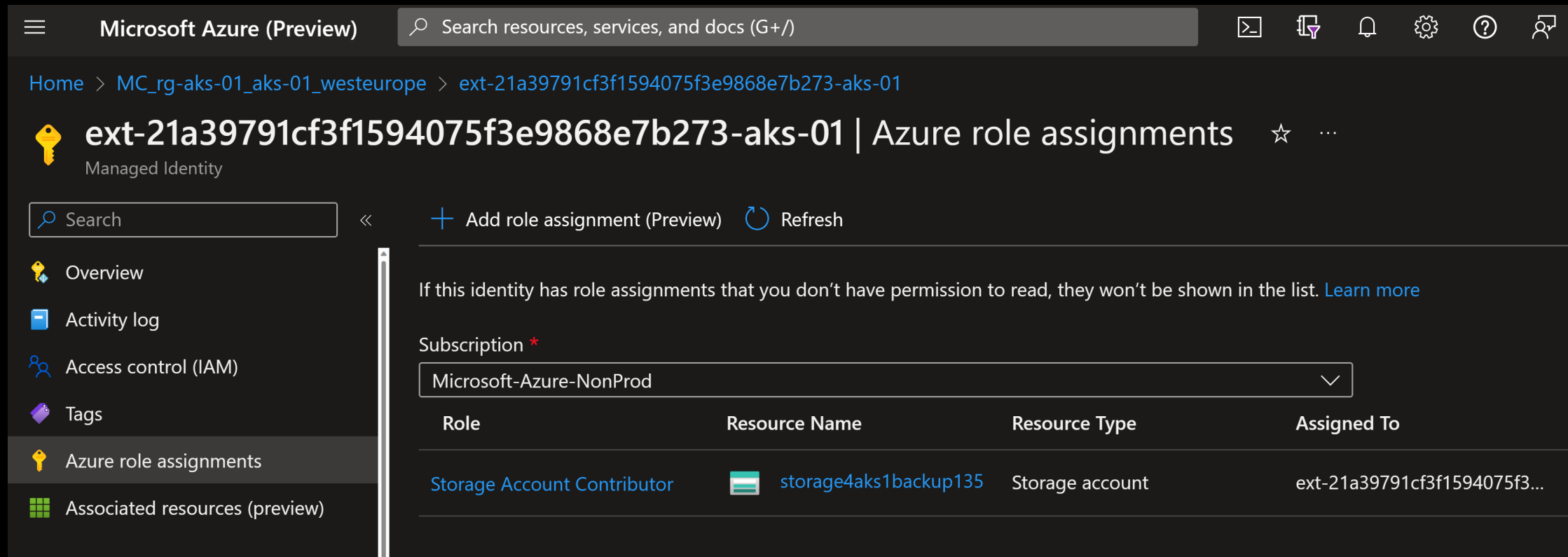


AKS Backup extension resources

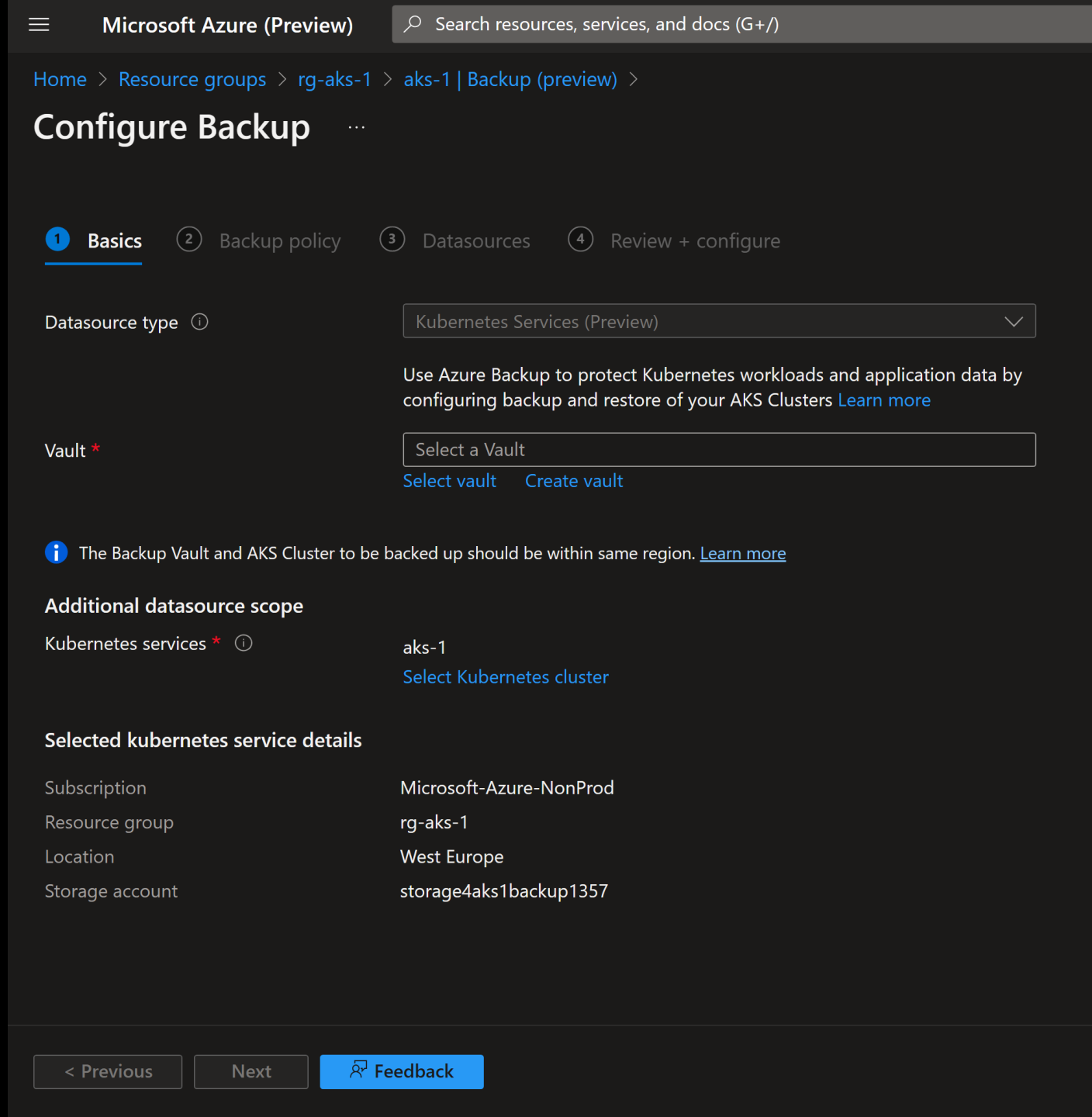
```
 $
 $ kubectl get all -n dataprotection-microsoft
NAME                                                  READY   STATUS    RESTARTS        AGE
pod/dataprotection-microsoft-controller-7b8977698c-2hcxn          2/2     Running   0               5m16s
pod/dataprotection-microsoft-geneva-service-6c8457bbd-h6phd       2/2     Running   0               5m16s
pod/dataprotection-microsoft-kubernetes-agent-5558dbbf8f-shl4s    2/2     Running   3 (4m26s ago)   5m16s

NAME                                              TYPE        CLUSTER-IP     EXTERNAL-IP   PORT(S)             AGE
service/dataprotection-microsoft-geneva-service     ClusterIP   10.0.151.200   <none>        8125/UDP,8130/TCP   5m16s
service/dataprotection-microsoft-kubernetes-agent   ClusterIP   10.0.127.139   <none>        8085/TCP            5m16s

NAME                                                 READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/dataprotection-microsoft-controller          1/1     1            1           5m16s
deployment.apps/dataprotection-microsoft-geneva-service      1/1     1            1           5m16s
deployment.apps/dataprotection-microsoft-kubernetes-agent    1/1     1            1           5m16s

NAME                                                            DESIRED   CURRENT   READY   AGE
replicaset.apps/dataprotection-microsoft-controller-7b8977698c          1         1         1       5m16s
replicaset.apps/dataprotection-microsoft-geneva-service-6c8457bbd       1         1         1       5m16s
replicaset.apps/dataprotection-microsoft-kubernetes-agent-5558dbbf8f    1         1         1       5m16s
 $
```

AKS Backup
Managed Identity

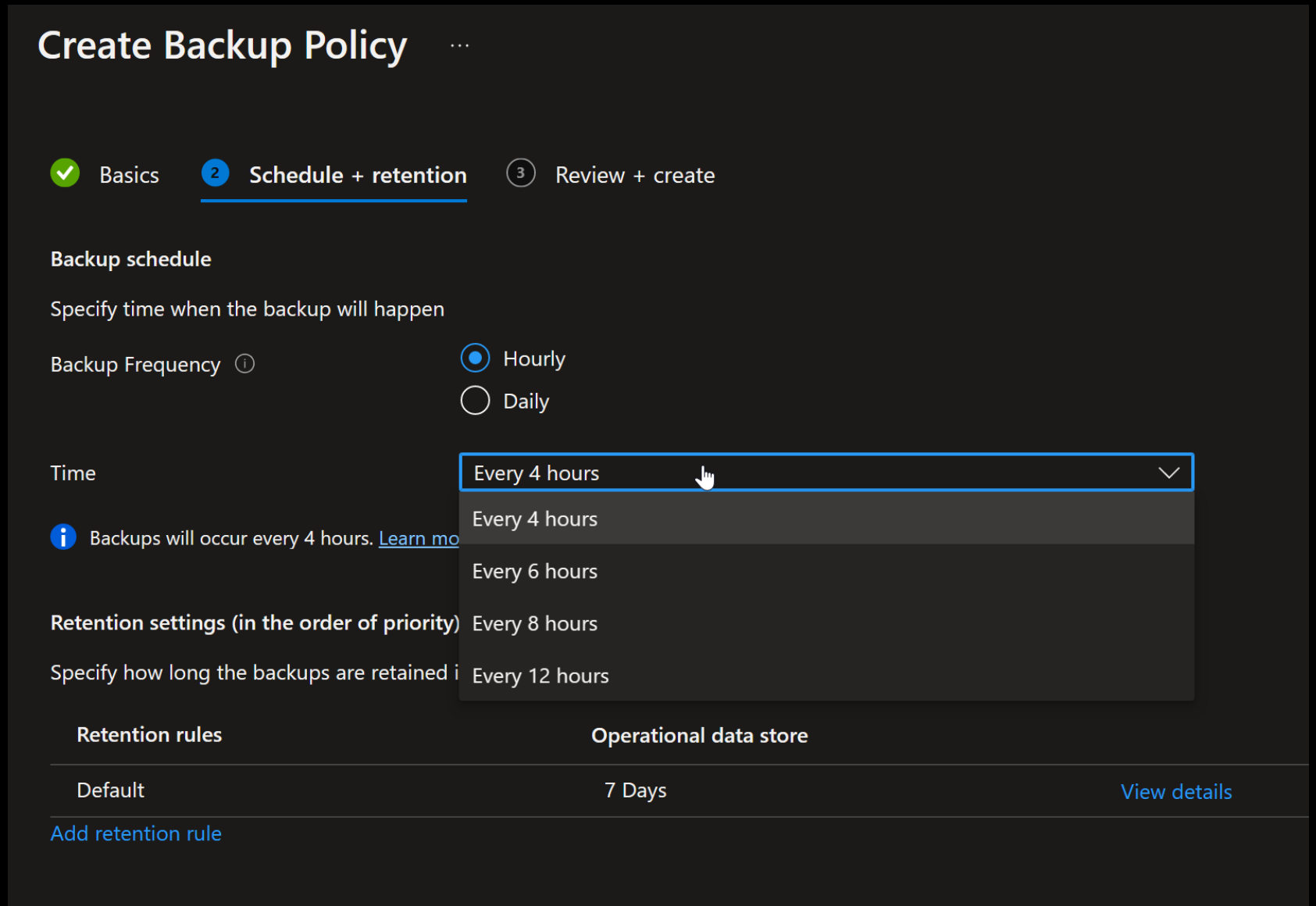




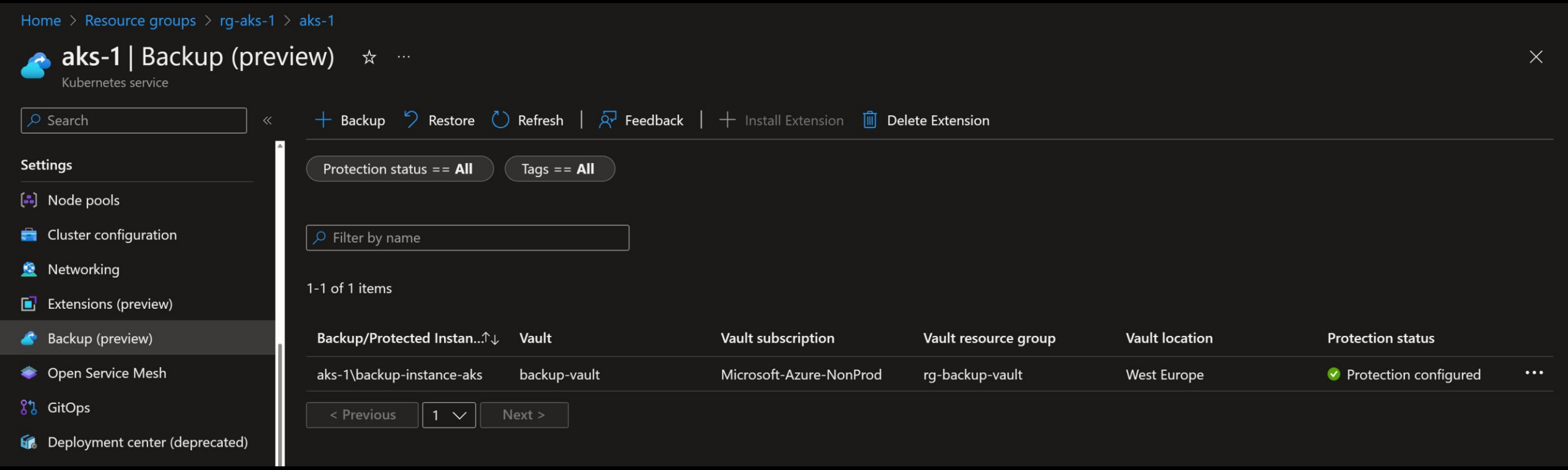
Configure Backup



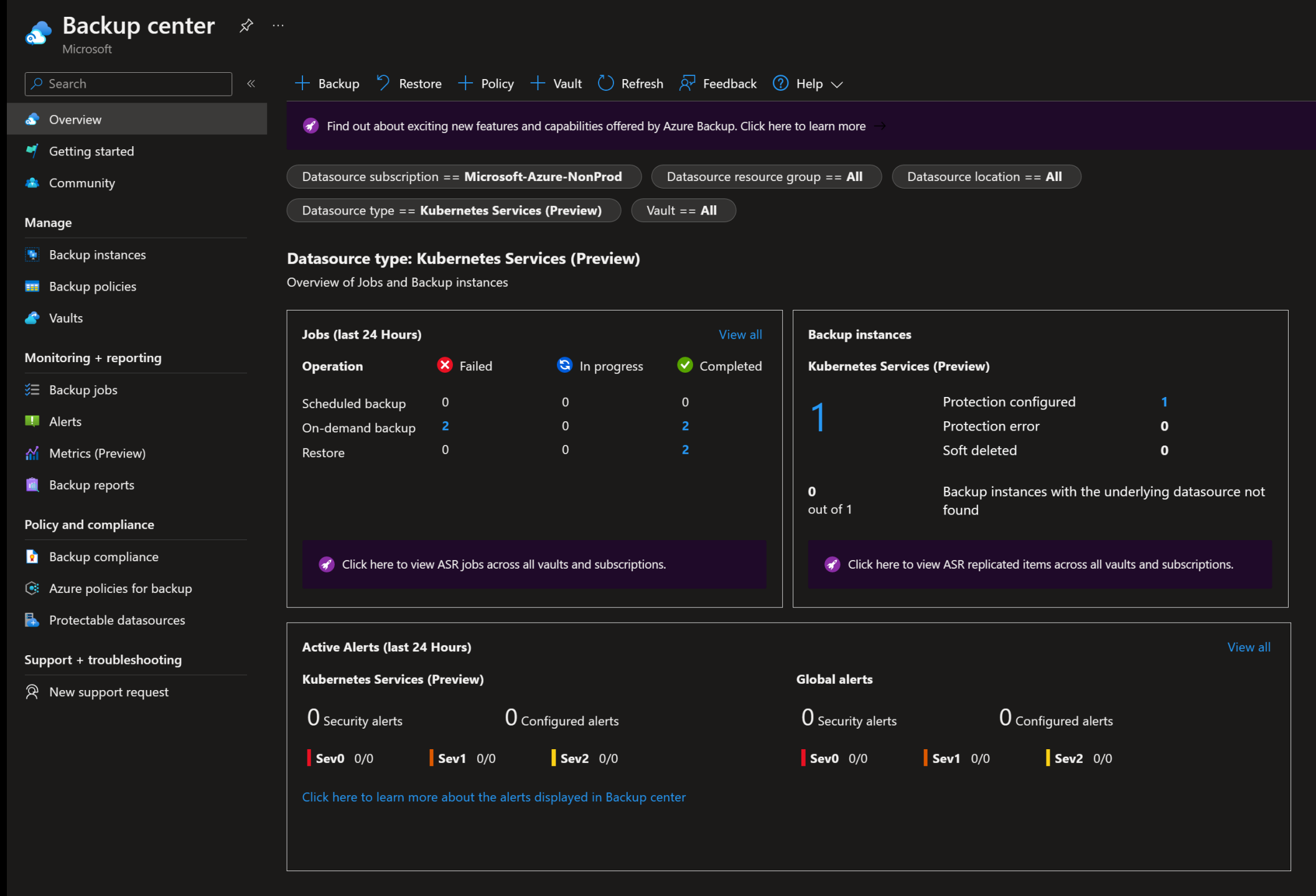
Create a Backup Policy for AKS



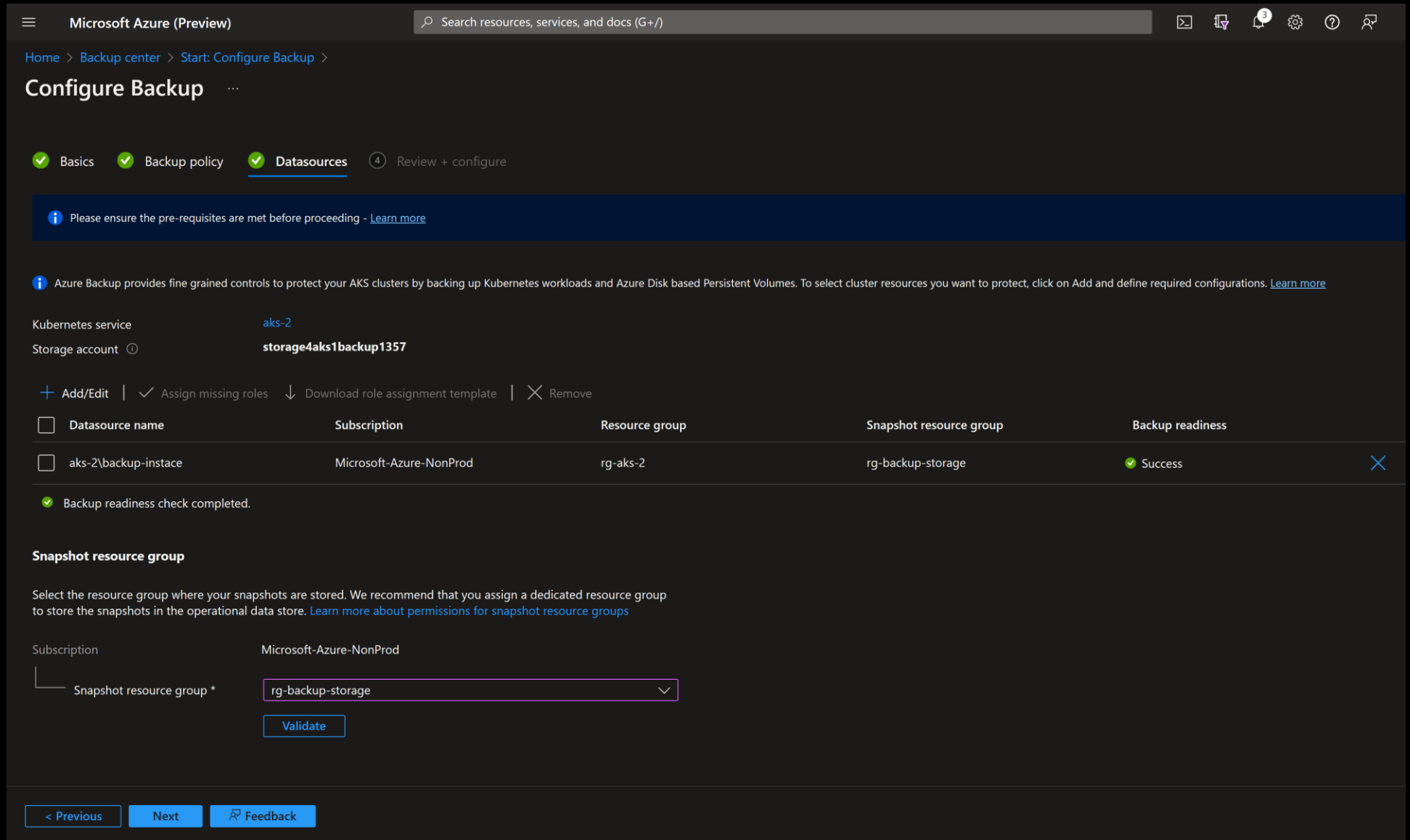
Backup configured



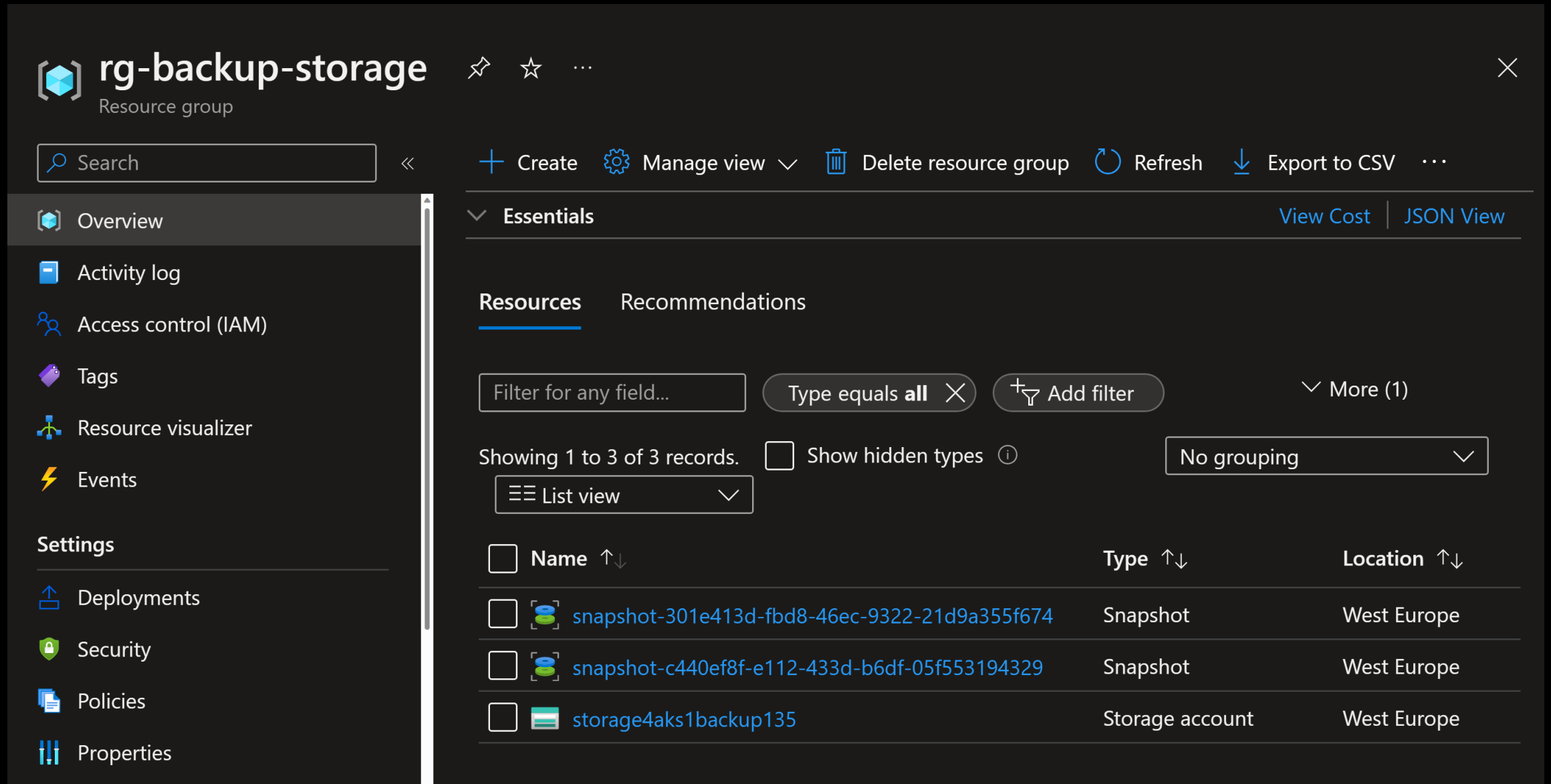
Backup Center



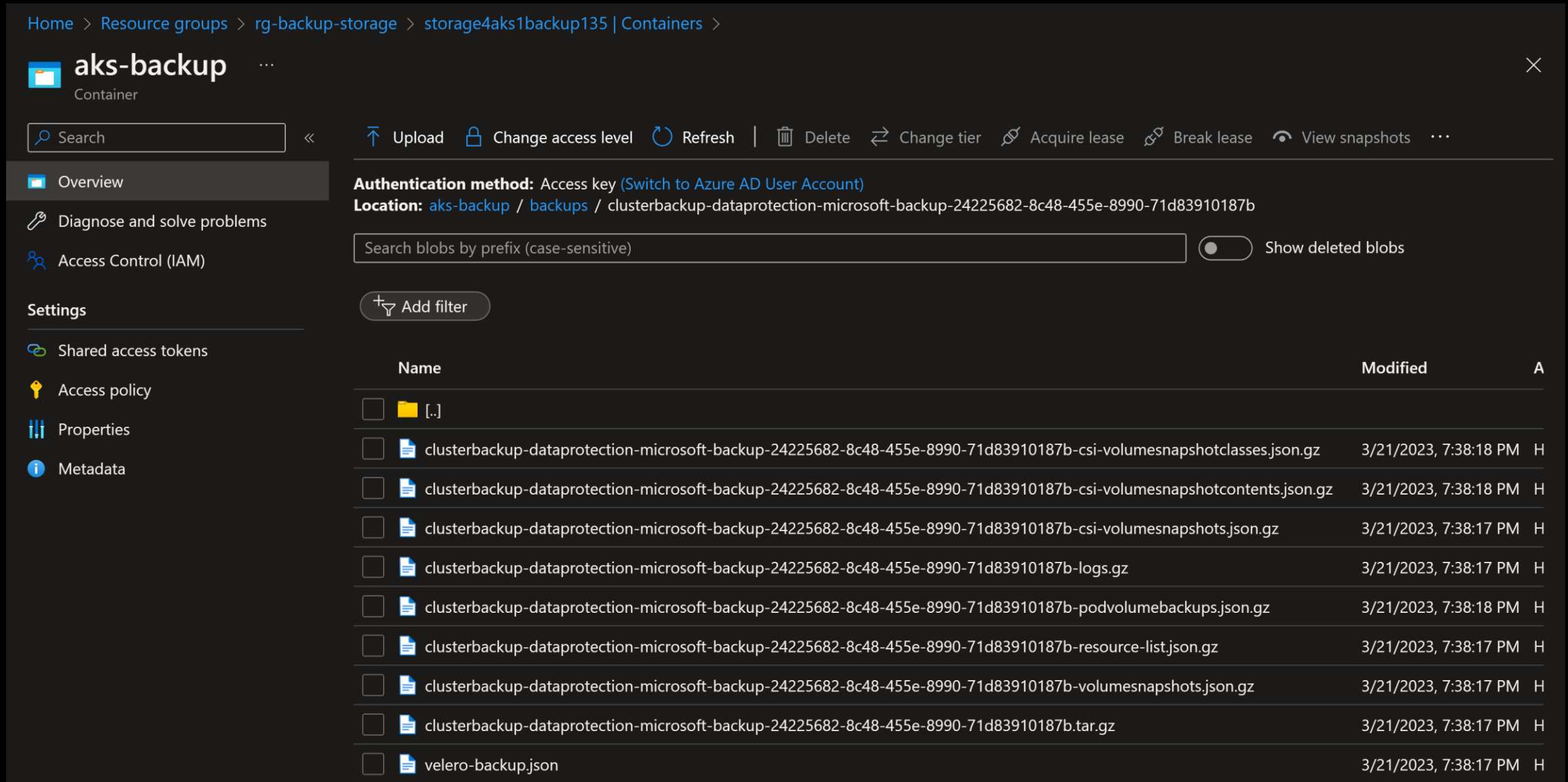
Trigger backup from Backup center



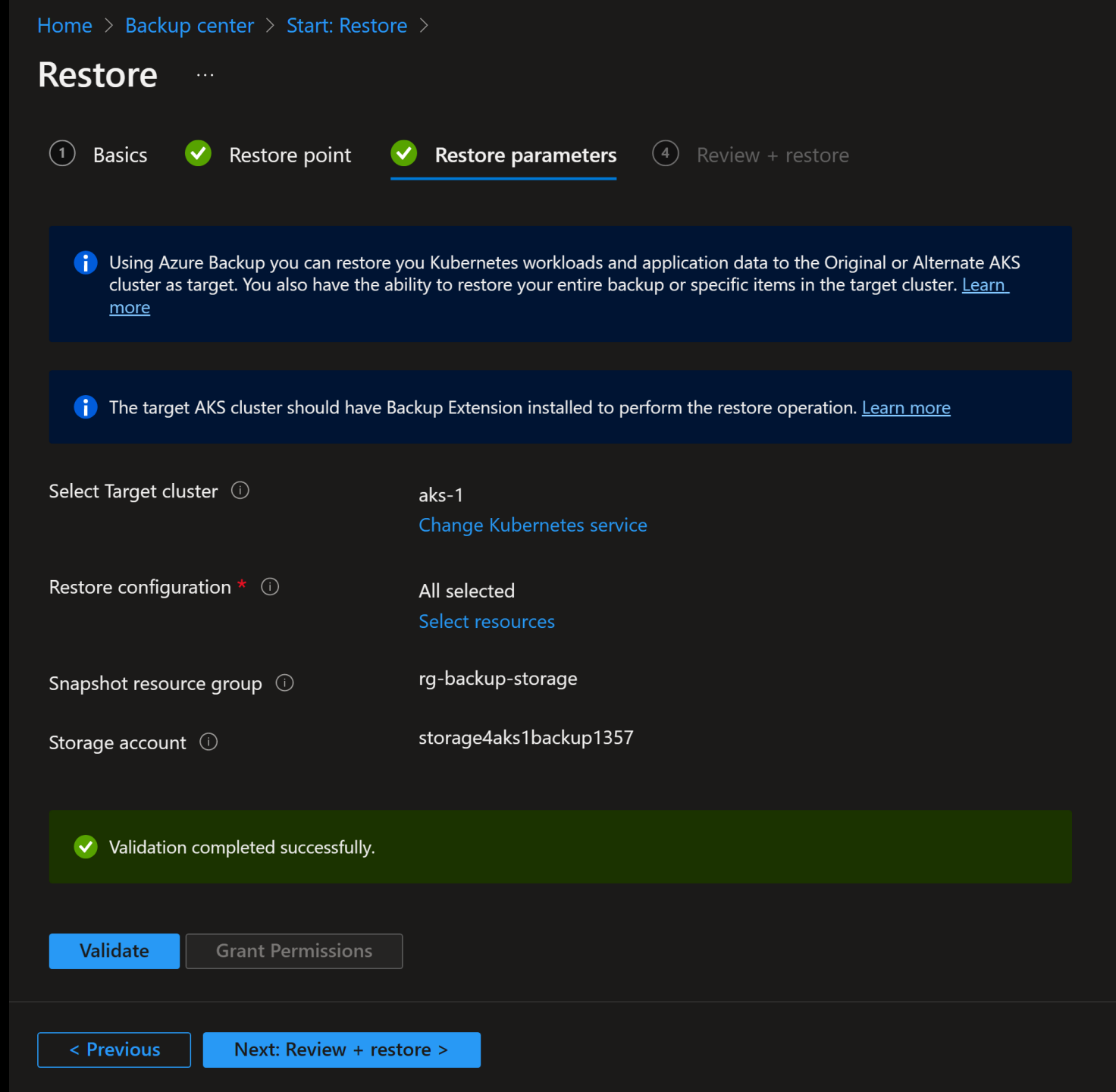
Backup created for Persistent Volumes (Azure Disk)



Backup created for Kubernetes objects



Restore a cluster from backup center



Backup restored on the second cluster

```
 $
 $ az aks get-credentials -n aks-2 -g rg-aks-2 --overwrite-existing
The behavior of this command has been altered by the following extension: aks-preview
Merged "aks-2" as current context in C:\Users\hodellai\.kube\config
 $
 $ kubectl get pods,svc,pv,pvc
NAME                              READY   STATUS    RESTARTS   AGE
pod/nginx-lrs-7db4886f8c-2c7mz    1/1     Running   0          97m
pod/nginx-zrs-5567fd9ddc-9h4qz    0/1     Pending   0          97m

NAME                 TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
service/kubernetes   ClusterIP   10.0.0.1     <none>        443/TCP   3h54m

NAME                                                        CAPACITY   ACCESS MODES   RECLAIM POLICY   STATUS   CLAIM
     STORAGECLASS   REASON   AGE
persistentvolume/pvc-a2cd5abb-744d-45f0-9ece-e0da8b3ff504   5Gi        RWO            Delete           Bound    default/azure-managed-disk-l
rs   managed-csi             97m

NAME                                          STATUS    VOLUME                                     CAPACITY   ACCESS MODES   STORAGECLASS
    AGE
persistentvolumeclaim/azure-managed-disk-lrs   Bound     pvc-a2cd5abb-744d-45f0-9ece-e0da8b3ff504   5Gi        RWO            managed-csi
    97m
persistentvolumeclaim/azure-managed-disk-zrs   Pending                                                                             managed-csi-zr
s   97m
 $
 $ kubectl exec nginx-lrs-7db4886f8c-2c7mz -it -- cat /mnt/azuredisk/outfile
Wed Mar 22 06:47:12 UTC 2023
Wed Mar 22 06:48:12 UTC 2023
Wed Mar 22 06:49:12 UTC 2023
Wed Mar 22 06:50:12 UTC 2023
```