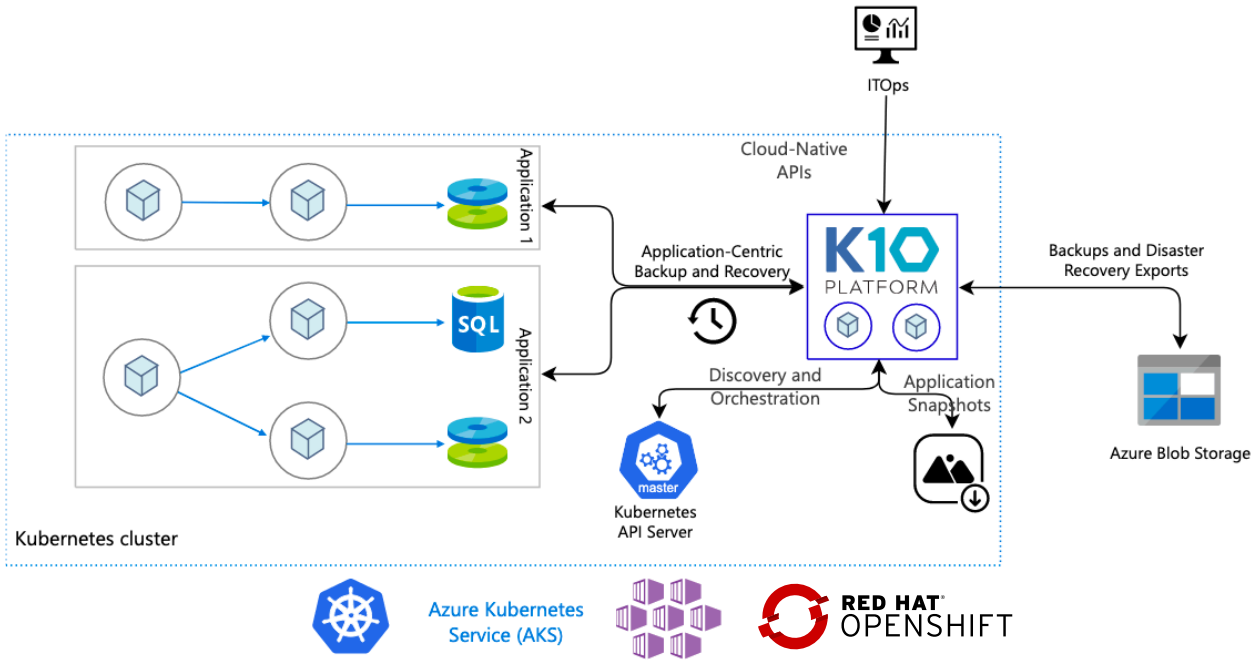
PostgreSQL Backup and Restore on Microsoft Azure using Kasten K10

In this post, we will walk through how to use Kasten K10 to backup and restore PostgreSQL databases operating in a Kubernetes environment on Microsoft Azure. There are two primary options for running Kubernetes on Azure: Azure Kubernetes Service (AKS), and Azure Red Hat OpenShift. This post is based on AKS.

The fully managed AKS makes deploying and managing containerized applications easy and offers serverless Kubernetes, an integrated continuous integration and continuous delivery (CI/CD) experience, and enterprise-grade security and governance.

PostgreSQL (often referred to as Postgres), is an Open Source relational database, popular in the cloud-native community.

Kasten's K10 data management platform, it is a secure software-only product that has been purpose-built for Kubernetes and provides operations teams an easy-to-use, scalable, and secure system for backup/restore, disaster recovery, and mobility of Kubernetes applications.



Top level reference diagram of Kasten K10 on Azure

This assumes that you already have an AKS cluster set up. If not, you can follow instructions here to deploy an AKS cluster using the Azure portal. The instructions in this post are organized in three sections:

1. Installing Kasten K10 on your AKS cluster
2. Installing PostgreSQL
3. Backup and restore workflow using Kasten K10

1. Installing Kasten K10 on Your AKS Cluster

Detailed instructions for installing K10 are available in the K10 documentation. In this example a "happy path" install is used for demo purposes. Before proceeding with the install, the install prerequisites (Helm package manager and Kasten Helm charts repository) need to be satisfied. The Helm commands use Helm v3, but using Helm v2 is also straightforward.

Add the Kasten Helm charts repository and create the namespace where K10 will be installed using the commands below.

```
$ helm repo add kasten https://charts.kasten.io/
$ kubectl create namespace kasten-io
```

Use the command below to install K10. You will need to specify your Azure tenant, service principal client ID, and service principal client secret.

```
$ helm install k10 kasten/k10 --namespace=kasten-io \
    --set secrets.azureTenantId=<tenantID> \
    --set secrets.azureClientId=<azureclient_id> \
    --set secrets.azureClientSecret=<azureclientsecret>
```

To validate K10 install, use the command below in K10's namespace (kasten-io, by default) to confirm that all K10 pods display a status of Running within a couple of minutes.

```
$ kubectl get pods --namespace kasten-io --watch
```

You can now access the K10 dashboard at http://127.0.0.1:8080/k10/#/ after running the command below.

```
$ kubectl --namespace kasten.io port-forward service/gateway 8080:8000
```

2. Installing PostgreSQL

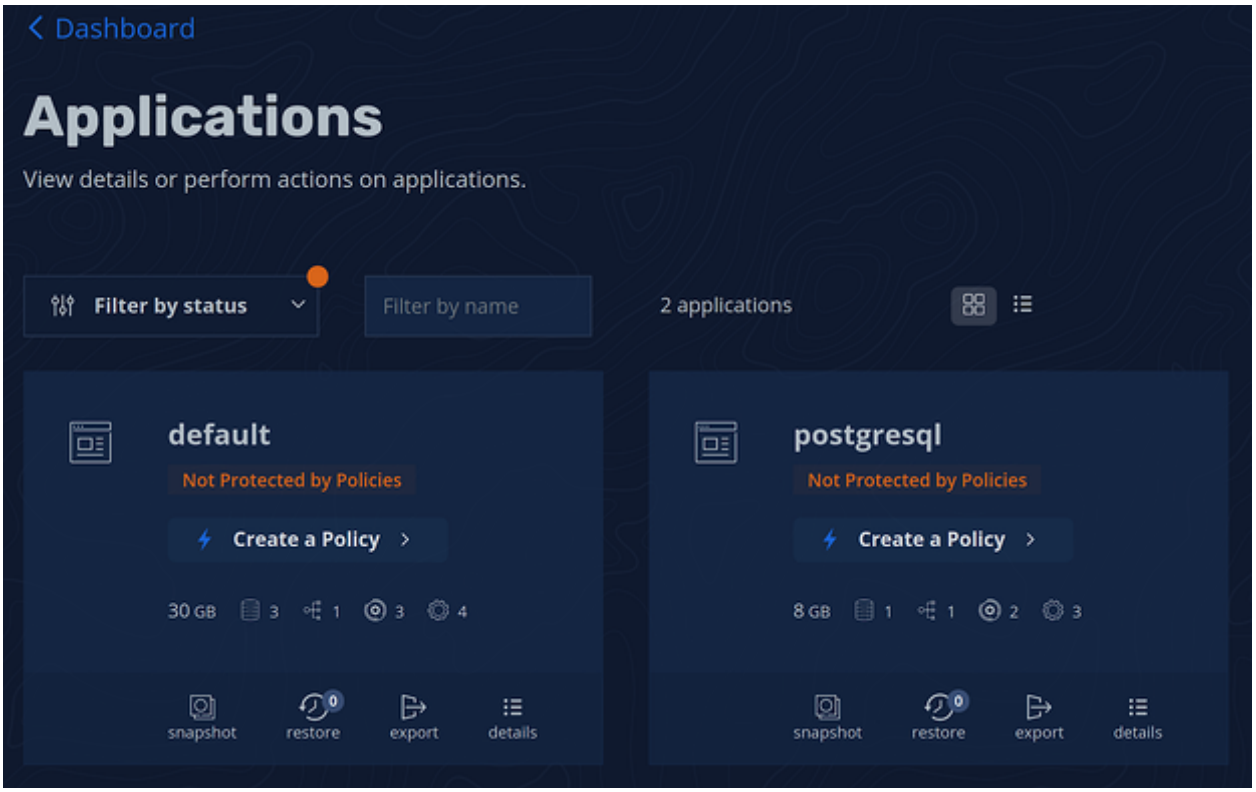
Use the commands below to create a namespace called postgresql and install PostgreSQL into your AKS cluster.

```
$ helm repo add bitnami https://charts.bitnami.com/bitnami
$ helm repo update
$ kubectl create namespace postgresql
$ helm install my-release bitnami/postgresql
```

To validate the PostgreSQL install, use the command below in the postgresql namespace to confirm that all PostgreSQL pods display a status of Running within a couple of minutes.

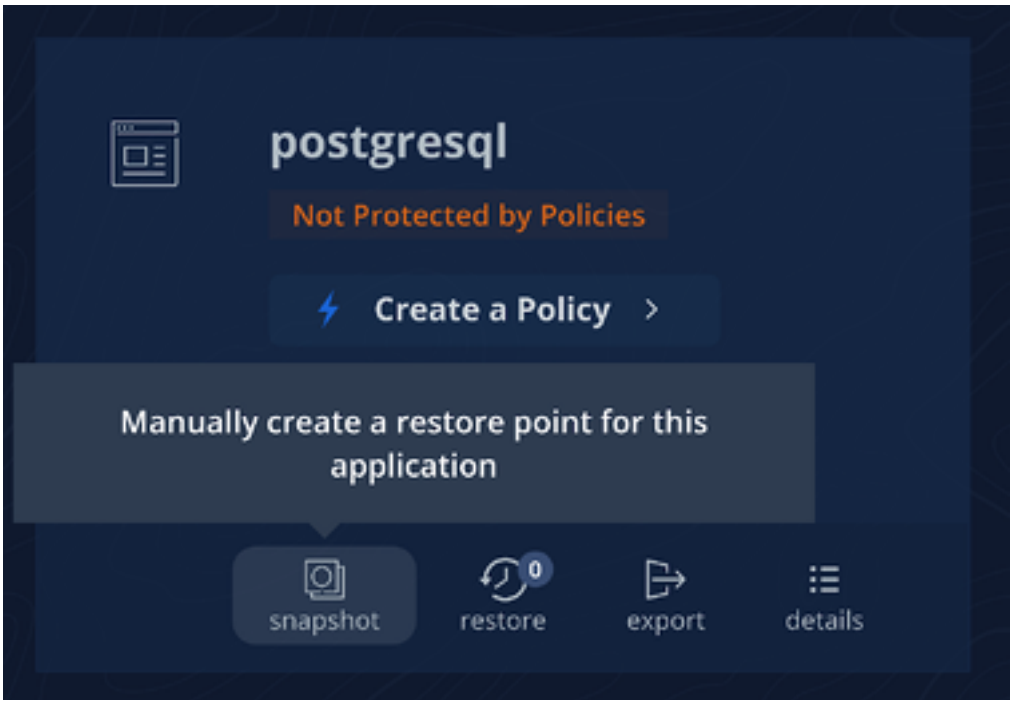
```
$ kubectl get pods  --namespace postgresql
```

K10 automatically discovers the instance of PostgreSQL. Following the successful install of PostgreSQL, ***click on the Applications card on the K10 dashboard to see the discovered PostgreSQL instance.***

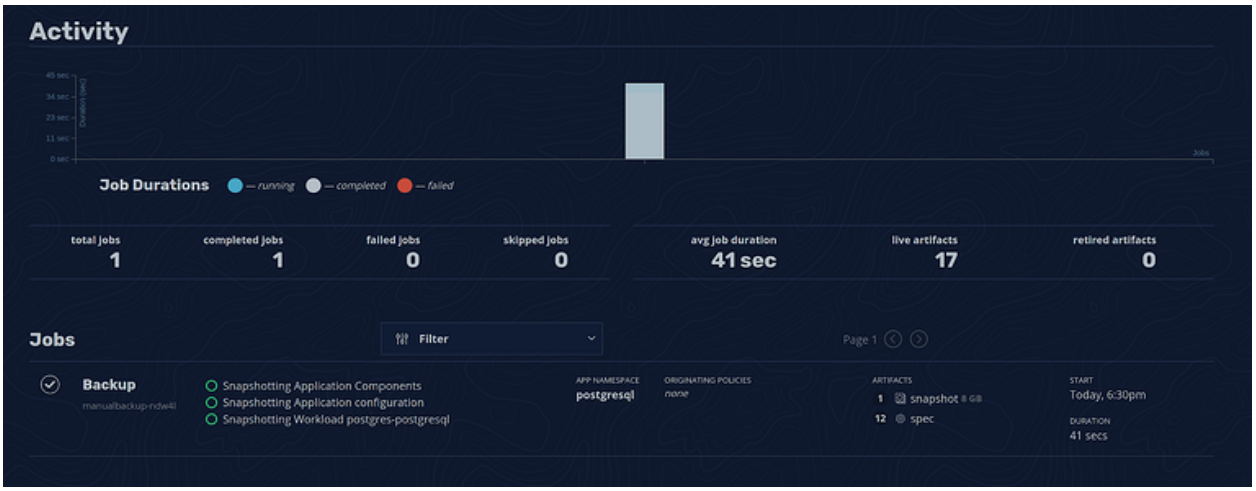


3. Backup and Restore Workflow using Kasten K10

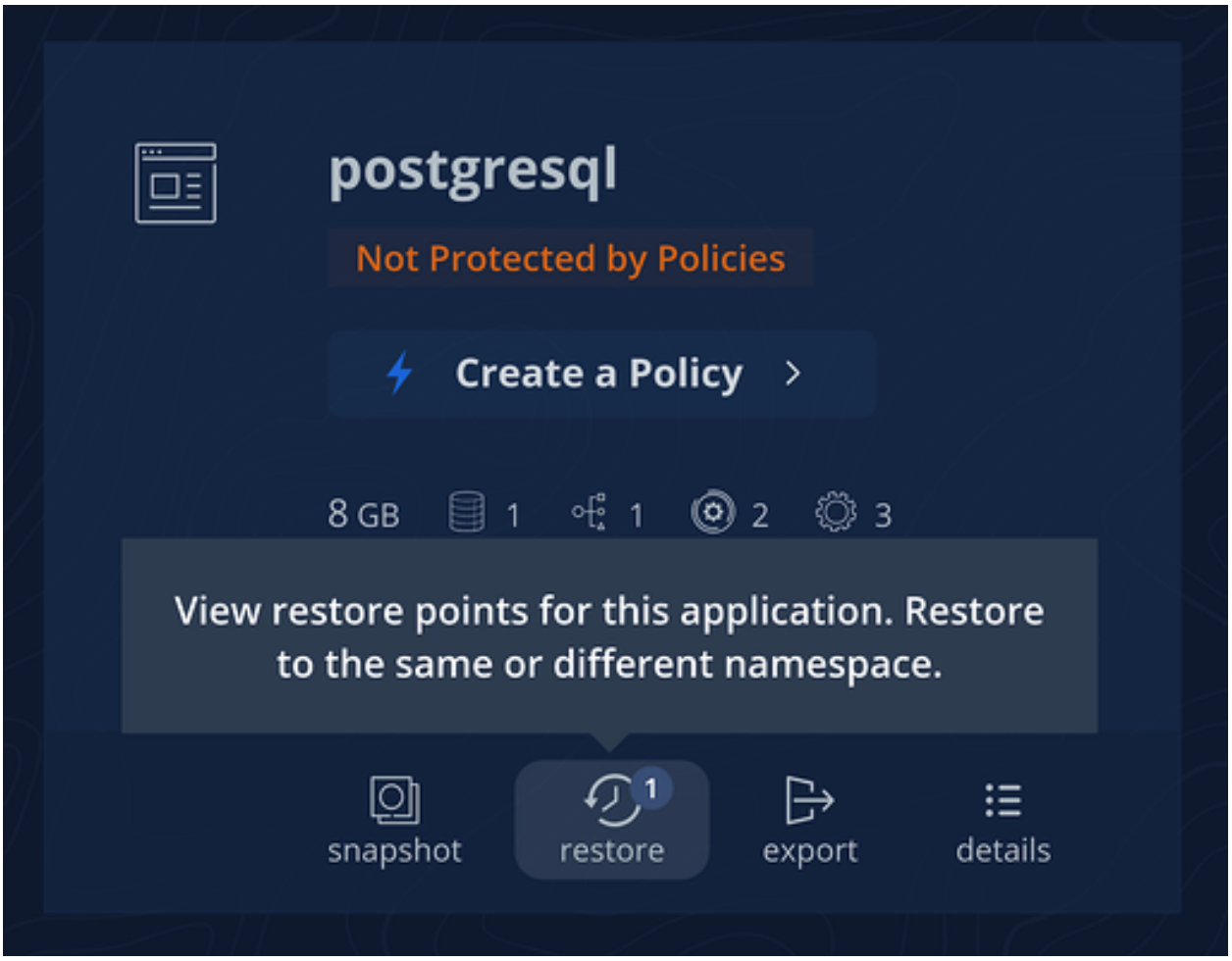
In this example, we will use K10's default backup mechanism which relies on taking volume snapshots. ***Click on the Applications card in the K10 dashboard and either create a backup policy, or for experimentation, simply create a restore point to do a full manual backup.***



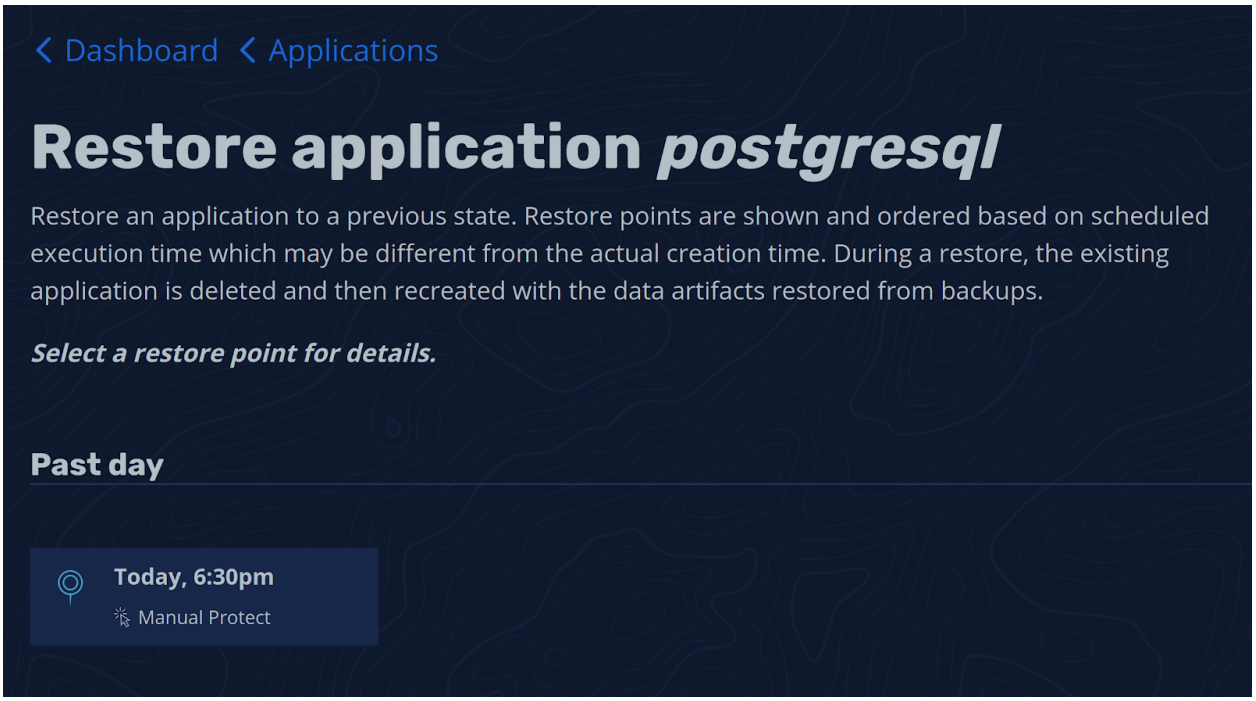
Check the progress of the backup action in the main K10 dashboard.

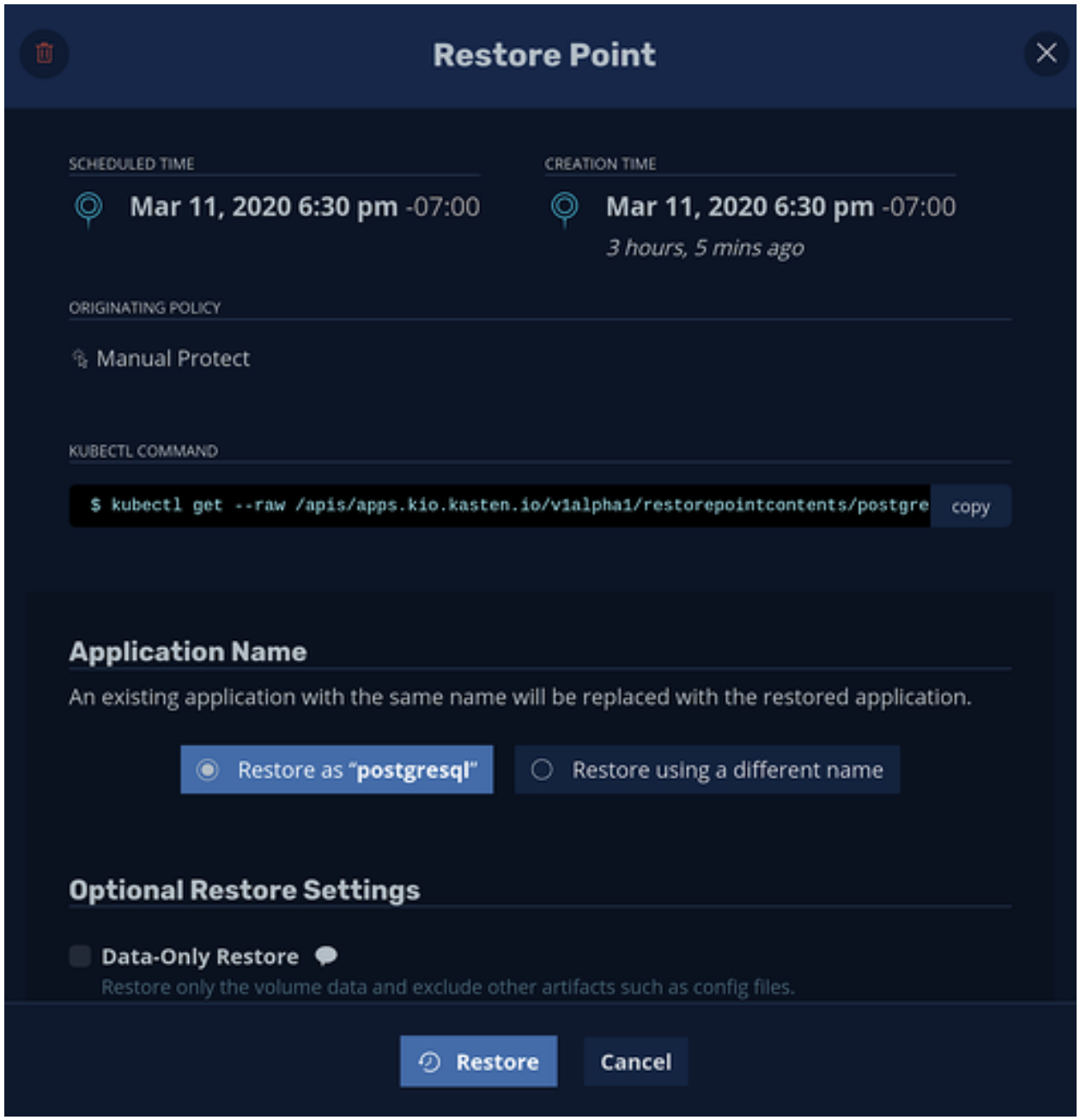


Completion of the backup action will result in the creation of a restore point (a set of configuration and data artifacts) which can be used to restore from. To restore from the restore point, ***go to the Applications card and click on `restore` button for the `postgresql` application.*** Here you should see all the available restore points.

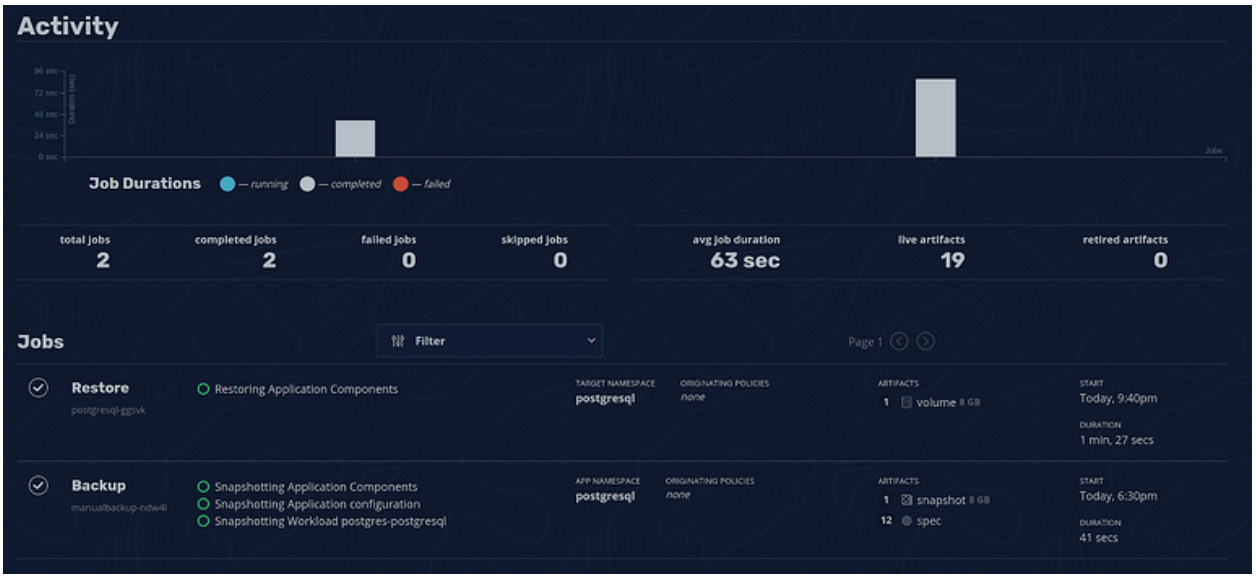


Click on the restore point. This will open the Restore panel where you can view and modify the restore parameters. ***Click on the Restore button*** to restore the associated data and specs.


Dashboard
Applications
Restore application postgresql
Restore an application to a previous state. Restore points are shown and ordered based on scheduled execution time which may be different from the actual creation time. During a restore, the existing application is deleted and then recreated with the data artifacts restored from backups.
Select a restore point for details.
Past day
Today, 6:30pm
Manual Protect



Check the progress of the restore action in the main K10 dashboard.

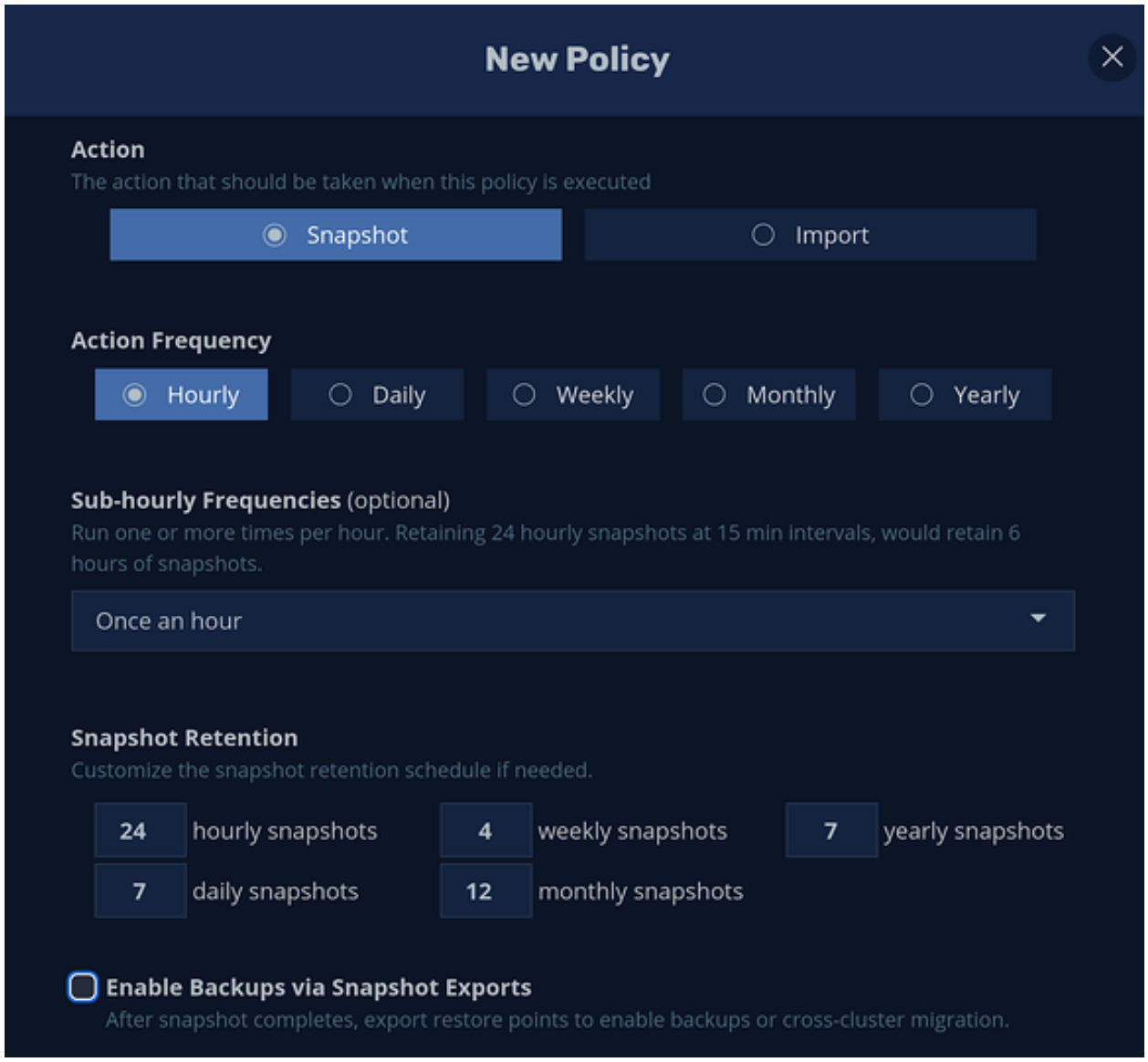


The data and application configuration have been successfully restored.

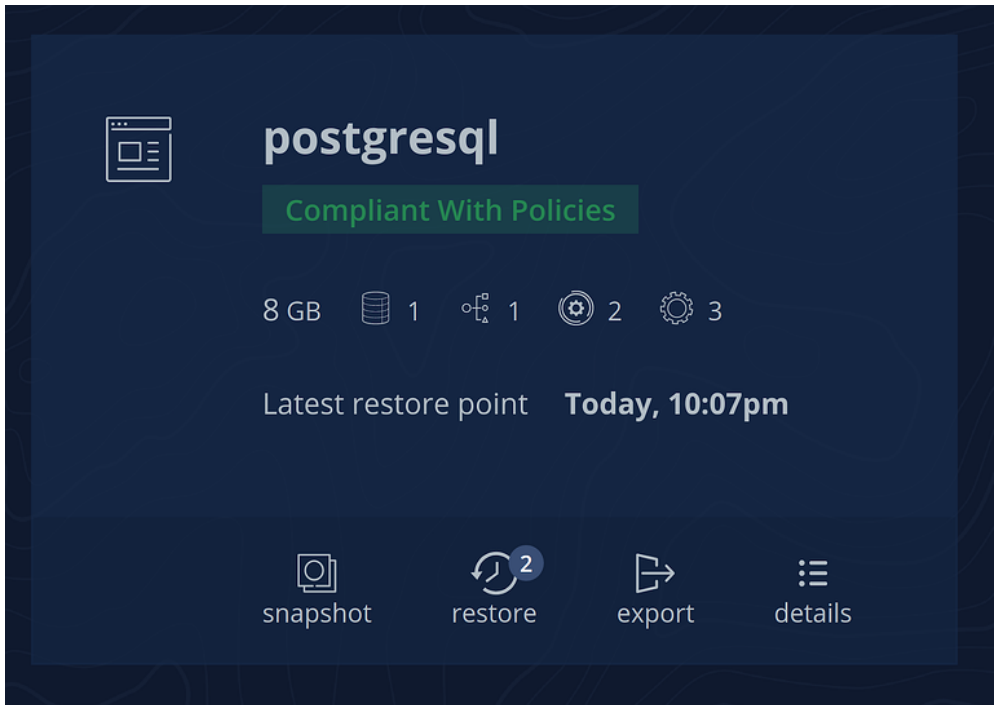
Using Backup Policies

Note that the workflow demonstrated above used a manual backup. You can also create policies to execute backups on a scheduled basis. Policies are extremely configurable. You can set the backup schedule and snapshot retention schedule independently for fine-grained control over how often backups are performed and how much total storage they consume.

To try this out ***click on Create New Policy*** on the application card on the dashboard.



When a policy that applies to an application successfully executes a backup, the application's compliance with the policy is reported in the application card. In the screenshot below, we can see that our postgresql application is now compliant with all policies.



Advanced Use Cases: Disaster Recovery (DR) and Mobility

The workflow in this blog covers snapshot, backup, and restore in a single AKS cluster. K10 can be used to export the entire application stack and its data from production clusters and restore them to a geographically separate DR cluster. You can also mask data, store it in an object store, and then read it from your local development cluster. Such use cases are described in the K10 documentation.

Conclusion

This post has shared steps for backing up and restoring PostgreSQL running on Microsoft AKS using snapshots as the backup mechanism. You can also explore the more advanced backup and restore approaches (based on logical dumps and database quiescing) discussed here: PostgreSQL Disaster Recovery and Data Mobility on Microsoft Azure using Kasten K10.

In addition to backups and restores for PostgreSQL, K10 also supports backups and restores for a range of other relational databases (e.g., MySQL) and NoSQL systems (e.g., MongoDB or Elastic).