AKS Provisioning using Terraform

- We will provision the AKS using Terraform as an Infrastructure as Code.
- We will deploy it in a custom Virtual Network for isolation.
- We will connect the AKS to ACR for Docker Image.
- We will also deploy MySQL Flexible to store the relational data and connect it to AKS.

Prerequisites

1. Azure Account with Subscription.
2. Terraform installed.
3. Kubectl installed.

Write Terraform Configuration files

First, we will write Terraform configuration files for Azure resources using predefined modules available on the internet.

Steps

1. Create the **aks-terraform** directory.
2. The folder structure for the above-created directory is as follows:

```
aks-terraform
├──.terraform.lock.hcl
├──locals.tf
├──main.tf
├──outputs.tf
├──providers.tf
├──terraform.tfstate
├──terraform.tfstate.backup
└──.terraform
```

> We need to only create *providers.tf*, *main.tf*, *outputs.tf*, & *locals.tf* file. Other files are generated while initiating terraform.

3. Create a *providers.tf* file inside the above-created directory.
4. Inside it, define the following:
    - terraform
        - required_providers
    - provider
        - azurerm
5. Click code for reference.

6. The definition of *providers.tf* file is complete.
7. Now, create the *main.tf* file.
8. Inside *main.tf* file, we will use the following predefined modules:
    - module.resource-group
    - module.virtual-network
    - module.acr
    - module.mysql-flexible
    - module.aks
9. Click code for reference.
10. The definition of *main.tf* file is complete.
11. Now we will create *outputs.tf* file.
12. Inside it, define the following outputs.
    - output.acr-login-server
    - output.acr-admin-username
    - output.acr-admin-password
    - output.DB_HOST
13. Click code for reference.
14. The definition of *outputs.tf* file is complete.
15. Now we will create *locals.tf* file.
16. Inside it, define the following variables:
    - local.resource-group-properties
    - local.virtual-network-properties
    - local.acr-properties
    - local.mysql-flexible-properties
    - local.aks-properties
17. Click code for reference.
18. The definition of *locals.tf* file is complete.

> Ensure you give the appropriate values to the variables defined in *locals.tf* file.

Provisioning the Infrastructure

Now we will provision the Azure infrastructure by applying the above-created configuration files.

> Ensure Azure CLI is configured with appropriate Azure Account credentials and enough permissions.

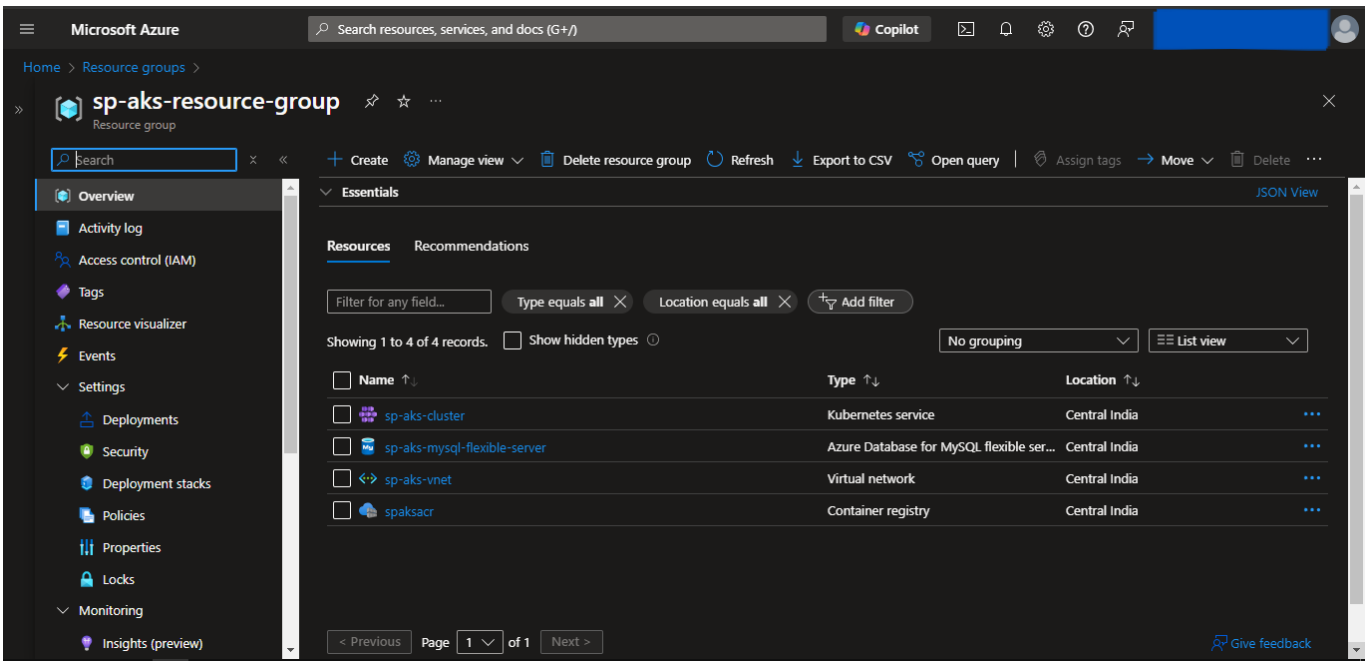
> Also first provision the ACR, push the Docker Image, and then provision the Container App. To do that, comment out the **aks** module and follow the further steps.

Steps:

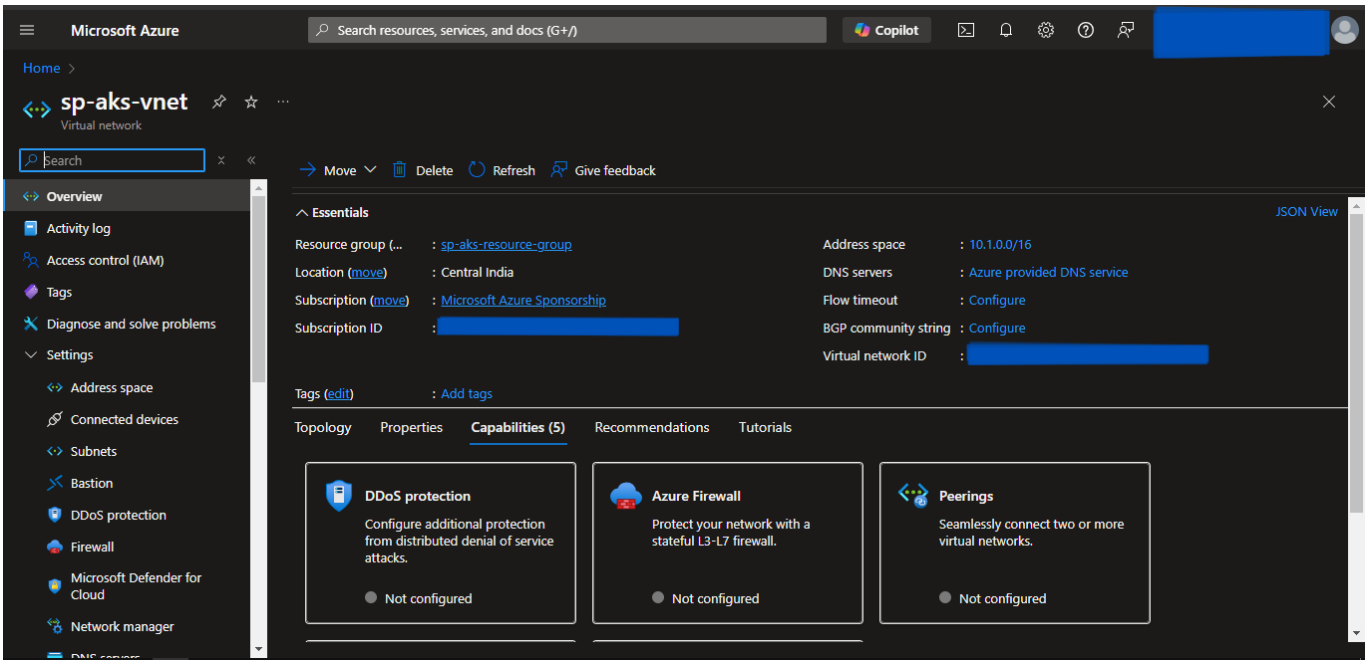
1. Open the PowerShell.
2. Change the directory to the above-created **aks-terraform** directory using `cd` command.
3. Run the `terraform fmt -recursive` command to format the syntax of the files.
4. Run the `terraform init` command to initialize the *terraform*.
5. Run the `terraform validate` command to validate the configuration files.
6. Run the `terraform plan` command to plan the resources to be created.
7. Run the `terraform apply` command and if prompted, type `yes` to provision the infrastructure.
8. Run the `terraform output` command to get the values of defined variables in *outputs.tf* file.
9. Head to the Azure Console, and verify the created resources.

Screenshots of Provisioned Infrastructure

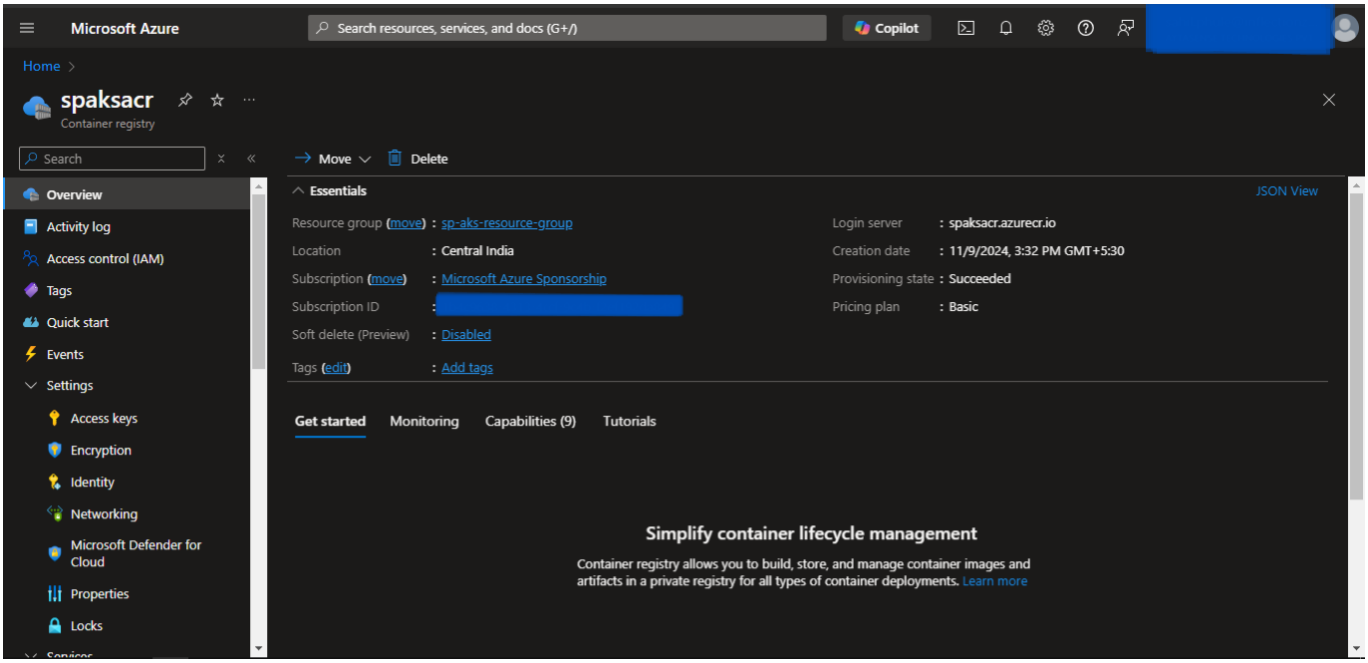
Resource Group Image



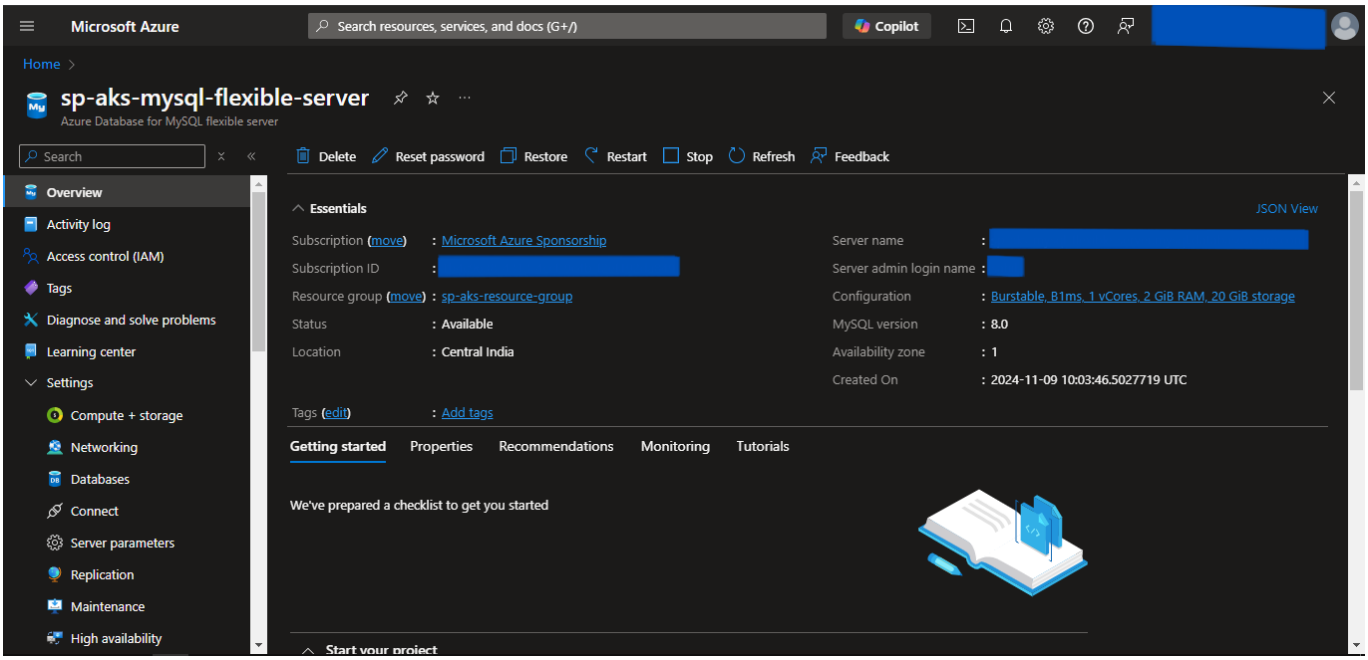
Virtual Network Image



ACR Image



MySQL Flexible Server Image



Now push the Docker Image to ACR

Steps

1. Open a new Powershell window.
2. Run the following commands to log into ACR:

```
az login
az acr login --name <acr-name>
```

3. Then tag & push the docker image using the following commands:

```
docker tag <image-name:tag> <acr-name>.azurecr.io/<image-name:tag>
docker push <acr-name>.azurecr.io/<image-name:tag>
```

> Substitute <*acr-name*> with the value defined in the above-created *locals.tf* file. Also, substitute <*image-name:tag*> with its respective name.

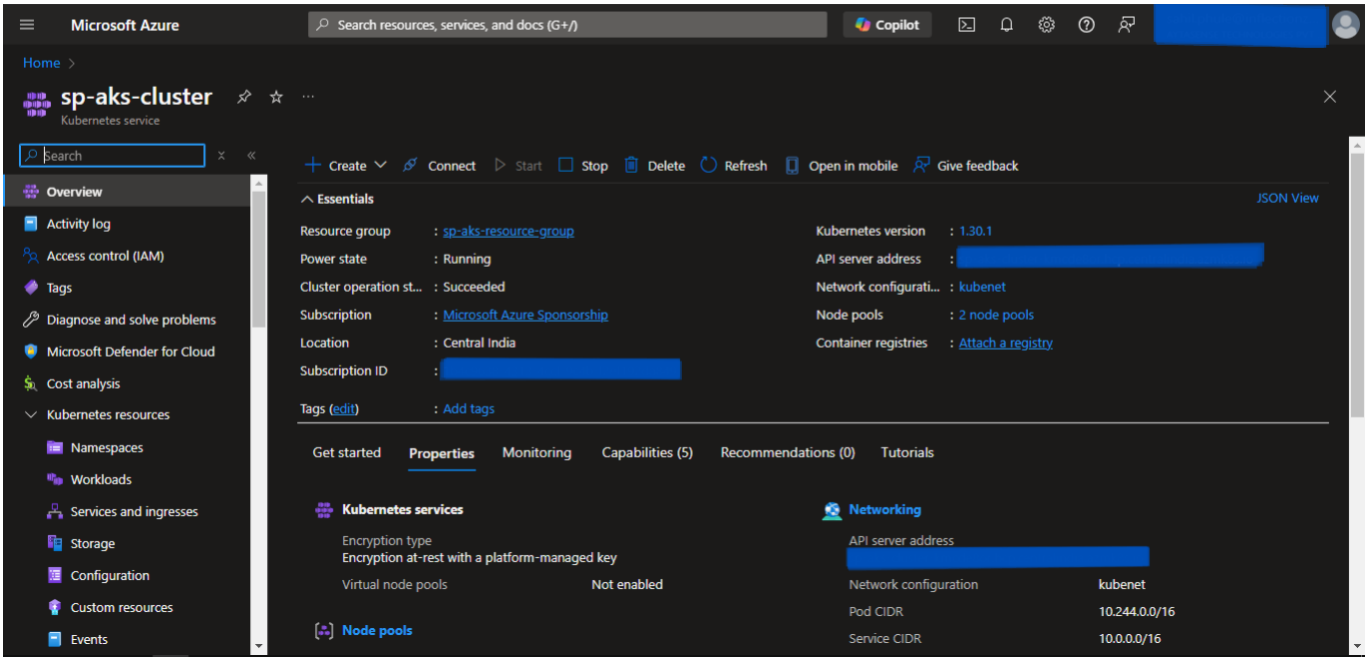
Provisioning the AKS

> Uncommment the **aks** module that we commented on earlier and follow the further steps.

Steps:

1. Open the Powershell Window.
2. Run the `terraform fmt -recursive` command to format the syntax of the files.
3. Run the `terraform init` command to initialize the *terraform*.
4. Run the `terraform validate` command to validate the configuration files.
5. Run the `terraform plan` command to plan the resources to be created.
6. Run the `terraform apply` command and if prompted, type `yes` to provision the infrastructure.
7. Once completed, head to the Azure Console, and verify the created resources.
8. Run the `terraform output` command to get the values of defined variables in *outputs.tf* file.

AKS Image



Connect to the AKS Cluster from Powershell

Steps

1. Open a new Powershell window.
2. Run the following commands to configure local kubectl with aks cluster:

```
az login
az account set --subscription <subscription-id>
az aks get-credentials --resource-group <resource-group-name> --name <cluster-
name> --overwrite-existing
```

> Substitute <*subscription-id*> which can be found by running `az account list` in the *id* field. Also, substitute <*resource-group-name*> and <*cluster-name*> with the values defined in the above-created *locals.tf* file.

3. Now apply the Kubernetes manifest files of the application using the following command:

```
kubectl apply -f <file-path>
```

> Substitute with the Kubernetes manifest file path.

4. To list them all, run `kubectl get all`.
5. If a Load Balancer type Service is present then try accessing the External IP of that service in the browser.

Destroy the provisioned infrastructure

Lastly, we will destroy the above-created resources.

Steps

1. Firstly, delete all the Kubernetes Deployments using:
   - `kubectl delete -f "file-path"`
     Substitute *file-path* with the Kubernetes manifest file path.
2. To destroy infrastructure, change the directory to the above-created **aks-terraform** directory using the `cd` command.
3. Run `terraform destroy` & if prompted, type `yes`.
4. Infrastructure will be destroyed.