

# AKS Provisioning using Terraform

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- 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.
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## Prerequisites

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1. Azure Account with Subscription.
  2. Terraform installed.
  3. Kubectl installed.
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## Write Terraform Configuration files

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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
    - azurearm
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.

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# Provisioning the Infrastructure

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

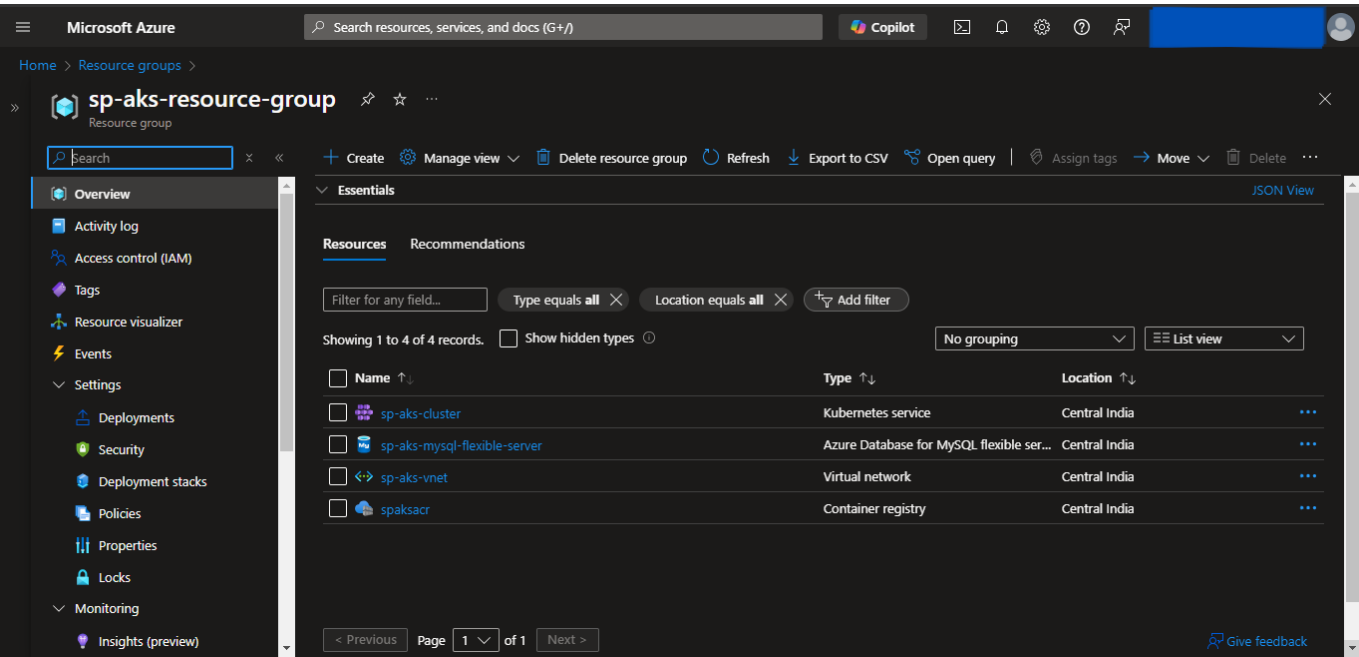
- Ensure Azure CLI is configured with appropriate Azure Account credentials and enough permissions.
- Also first provision the ACR, push the Docker Image, and then provision the Container App. To do that, comment out the **aks** module and follow the further steps.

## Steps:

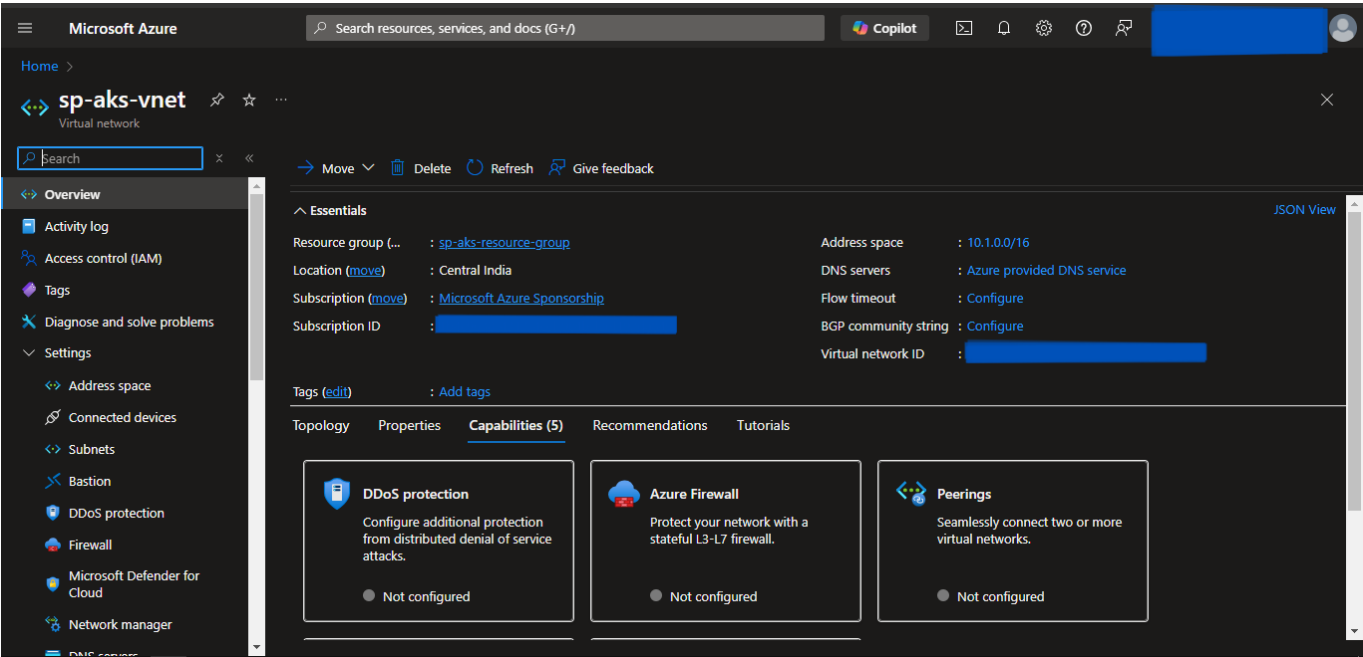
1. Open the PowerShell.
2. Change the directory to the above-created **aks-terraform** directory using **cd** command.
3. Run the **terraform fmt -recursive** command to format the syntax of the files.
4. Run the **terraform init** command to initialize the *terraform*.
5. Run the **terraform validate** 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

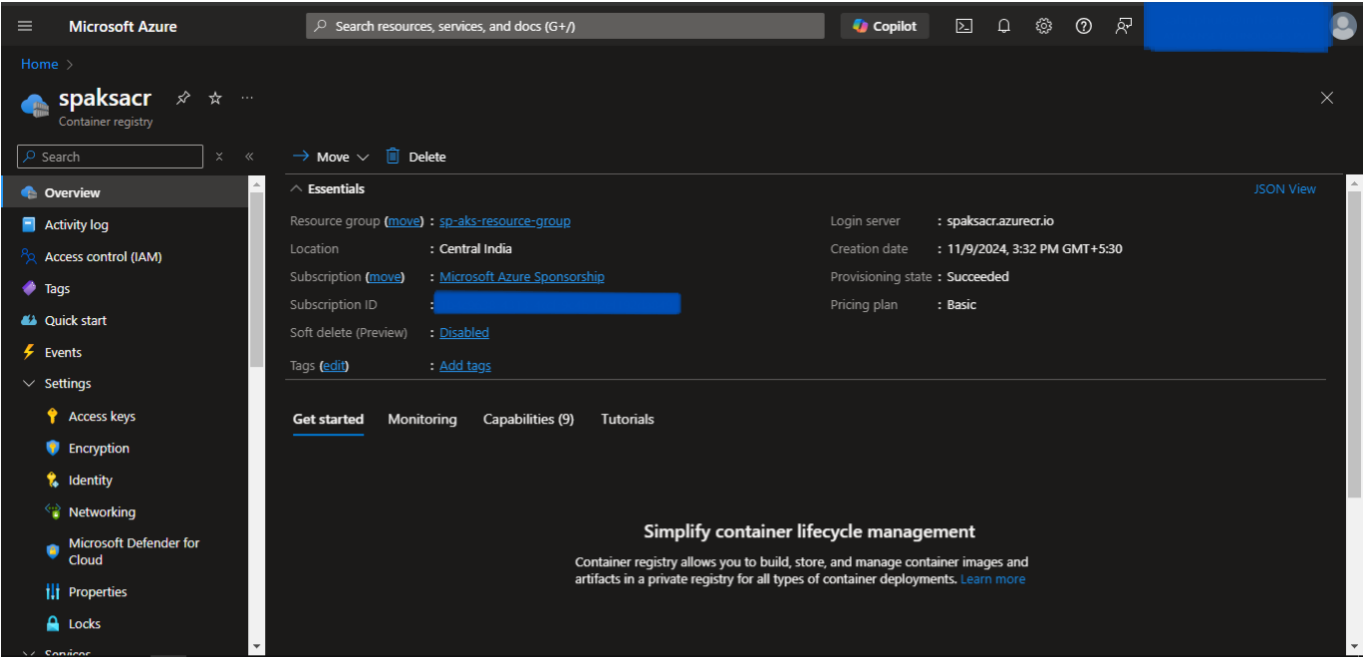
## Resource Group Image



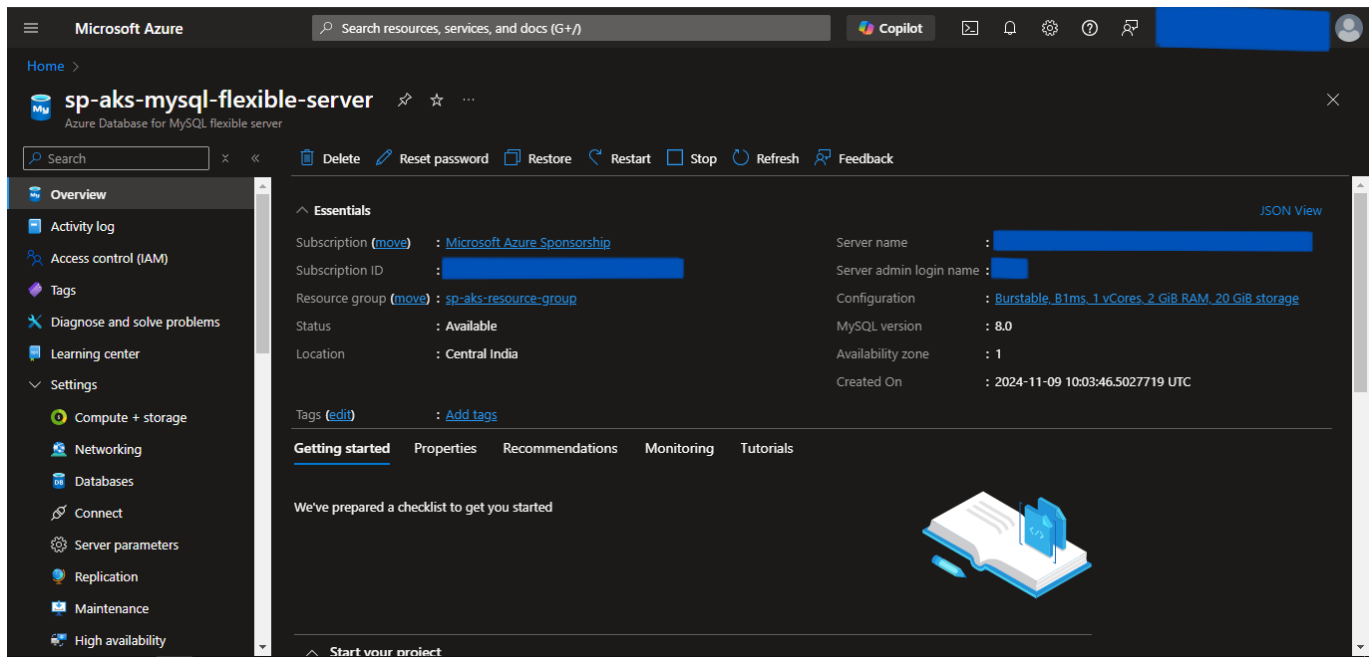
Virtual Network Image



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.

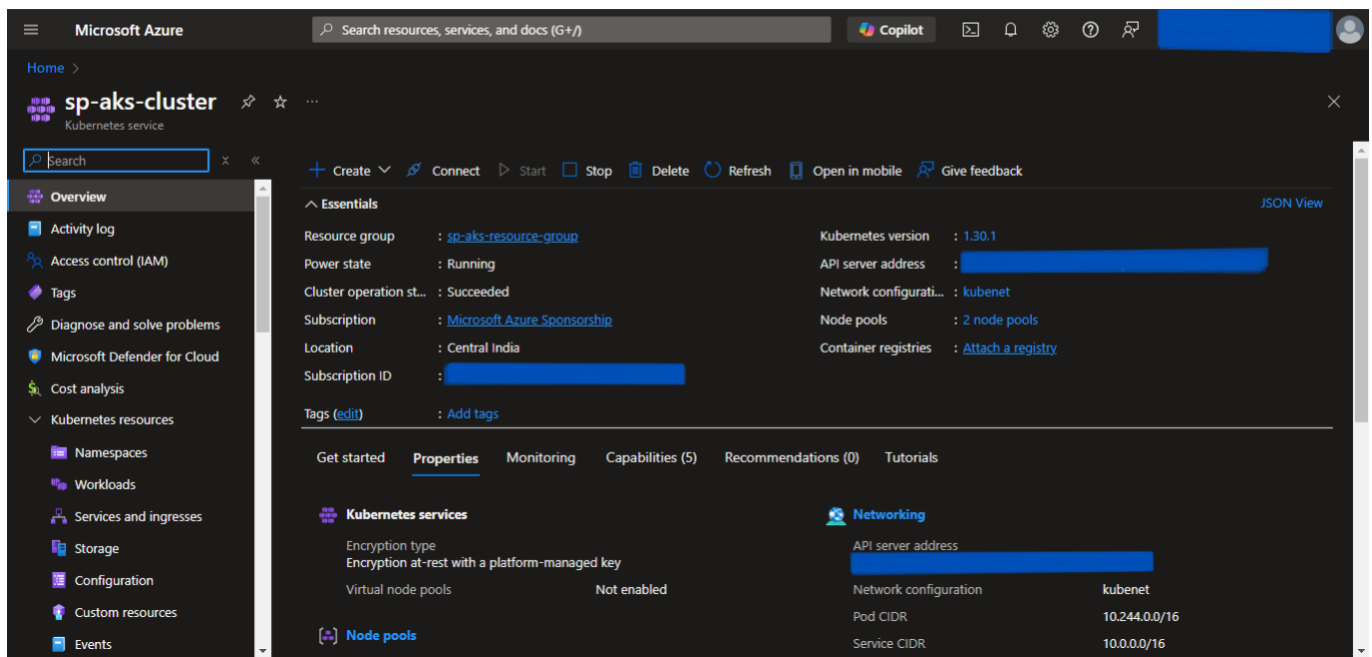
## Provisioning the AKS

Uncomment 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



The screenshot displays the Microsoft Azure portal interface for a Kubernetes service named 'sp-aks-cluster'. The left sidebar shows the navigation menu with 'Overview' selected. The main content area is divided into two sections: 'Essentials' and 'Properties'.

**Essentials**

Property	Value
Resource group	sp-aks-resource-group
Power state	Running
Cluster operation st...	Succeeded
Subscription	Microsoft Azure Sponsorship
Location	Central India
Subscription ID	[Redacted]
Tags	Add tags

**Properties**

Property	Value
Kubernetes version	1.30.1
API server address	[Redacted]
Network configurati...	kubenet
Node pools	2 node pools
Container registries	Attach a registry

**Networking**

Property	Value
API server address	[Redacted]
Network configuration	kubenet
Pod CIDR	10.244.0.0/16
Service CIDR	10.0.0.0/16

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## Connect to the AKS Cluster from Powershell

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### 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 *file-path* 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.

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## Destroy the provisioned infrastructure

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Lastly, we will destroy the above-created resources by Terraform configuration files for Azure.

### 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.
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