Problem Statement: Automate Deployment of a .NET Core API to Azure Kubernetes using Terraform, Jenkins, and Docker

Scenario:
You are a DevOps engineer at a startup named CodeCraft. The development team has built a basic .NET Core REST API for managing tasks. They want to containerize this application and deploy it to Azure Kubernetes Service (AKS) using a fully automated CI/CD pipeline.

Your job is to:

Objectives:

1. Use Terraform to Provision Azure Resources
You need to write Terraform scripts to:
- Create a Resource Group
- Create an Azure Kubernetes Service (AKS) cluster
- Create an Azure Container Registry (ACR)

Hint:
Use the `azurerm_kubernetes_cluster`, `azurerm_container_registry`, and `azurerm_resource_group` resources. Configure ACR so AKS can pull images using the `identity` block in AKS.

2. Store Everything in GitHub
- Push the .NET Core project, Dockerfile, Terraform scripts, and Kubernetes YAML files to GitHub.

Hint:
Maintain proper folder structure: /terraform, /app, /k8s.

3. Create a Docker Image of the .NET App
- Write a Dockerfile to containerize the app.

Hint:
Use mcr.microsoft.com/dotnet/aspnet as the base image and expose port 80.

4. Set Up Jenkins for CI/CD
- Set up a Jenkins pipeline that:
  - Pulls code from GitHub
  - Builds the Docker image
  - Pushes it to ACR

- Applies Kubernetes manifests to deploy it on AKS

Hint:
Use a Jenkinsfile with docker, acr login, and kubectl commands. Install the necessary plugins and configure service principal access to Azure from Jenkins.

5. Create Kubernetes Manifests
- Write YAML files to:
  - Deploy the app using a Deployment
  - Expose it using a LoadBalancer Service

Hint:
Use imagePullSecrets if needed to allow Kubernetes to pull the image from ACR.

Deliverables:

- A GitHub repository with:
  - Terraform files to provision resources
  - Dockerfile for the .NET app
  - Jenkinsfile for the pipeline
  - Kubernetes YAML files
- A deployed .NET app running in AKS, accessible via a public IP
- Screenshot or output of kubectl get svc showing the external IP