**CI/CD Pipeline with Jenkins, GitHub, and Terraform**

**Project Overview**

This project sets up a **CI/CD pipeline** using **Jenkins**, **GitHub**, and **Terraform** to automate the deployment of infrastructure on **AWS**. The pipeline fetches Terraform configuration files from a GitHub repository, initializes Terraform, plans changes, and applies them to provision resources.

**Technologies Used**

* **Jenkins** - For automating the CI/CD pipeline
* **GitHub** - Source control repository
* **Terraform** - Infrastructure as Code (IaC) for AWS
* **AWS** - Cloud provider for hosting infrastructure
* **Docker** (optional) - For containerized deployments

**Project Structure**

CI-CD-jenkins-repository/

│── terraform/ # Terraform configuration files

│ ├── main.tf # Main infrastructure configuration

│ ├── variables.tf # Variables used in Terraform

│ ├── outputs.tf # Output values from Terraform

│── Jenkinsfile # Defines the Jenkins pipeline

│── README.md # Project documentation

**Jenkins Pipeline Workflow**

1. **Checkout Code**: Jenkins pulls the latest Terraform files from GitHub.
2. **Initialize Terraform**: Runs terraform init to set up Terraform in Jenkins workspace.
3. **Plan Terraform**: Runs terraform plan to preview changes.
4. **Apply Terraform**: Runs terraform apply to deploy resources on AWS.

**Setup Instructions**

**1. Clone the Repository**

git clone git@github.com:Tafadzwagithhubb/CI-CD-jenkins-repository.git

cd CI-CD-jenkins-repository

**2. Configure SSH Access for Jenkins**

* Generate an SSH key for Jenkins (if not already done):
* ssh-keygen -t rsa -b 4096 -C "jenkins-server-key"
* Copy the public key to GitHub under **Settings → SSH and GPG keys**.
* Verify connection:
* ssh -T git@github.com

**3. Configure Jenkins**

* Install necessary plugins: **Git**, **Pipeline**, **Terraform**, **AWS Credentials**.
* Add GitHub SSH credentials in Jenkins (Manage Jenkins → Manage Credentials).
* Create a new **Pipeline Job** in Jenkins and link it to this repository.
* Use the **Jenkinsfile** from this repo to define the pipeline.

**4. Run the Pipeline**

* Manually trigger the pipeline in Jenkins.
* Check the Jenkins console output for logs.
* If successful, Terraform should provision resources on AWS.

**Troubleshooting**

* **GitHub Permission Denied**: Ensure the SSH key is correctly added to GitHub.
* **No Terraform Files Found**: Verify .tf files exist in the repo.
* **Terraform Errors**: Check AWS credentials and Terraform syntax.

**Future Improvements**

* Implement **Automated Testing** before applying Terraform changes.
* Add **Docker & Kubernetes** for containerized deployments.
* Enable **Slack Notifications** for build status.

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**Contributions**: Open for contributions, feel free to submit a pull request!