# Complete Setup Instructions for Configuring GitHub, Docker, Kubernetes, Ansible, and Terraform on a Single Node Ubuntu System

Prerequisites  
A machine running Ubuntu 22.04/20.04 LTS   
Minimum System Requirements:  
- CPU: 4 cores   
- RAM: 8GB+ (16GB recommended for Kubernetes)   
- Storage: 50GB+ free space   
- Network: Internet access   
  
User Permissions:  
sudo usermod -aG sudo $USER && newgrp sudo   
Update the system:  
sudo apt update

sudo apt upgrade -y  
   
# Step 1: Install and Configure GitHub CLI  
sudo apt install git -y  
#1.2 Configure Git  
git config --global user.name "Your Name"  
git config --global user.email "your-email@example.com"

#1.3 Install GitHub CLI  
type -p curl >/dev/null || sudo apt install curl –y

curl -fsSL https://cli.github.com/packages/githubcli-archive-keyring.gpg | sudo tee /usr/share/keyrings/githubcli-archive-keyring.gpg >/dev/null

echo "deb [signed-by=/usr/share/keyrings/githubcli-archive-keyring.gpg] https://cli.github.com/packages stable main" | sudo tee /etc/apt/sources.list.d/github-cli.list > /dev/null  
sudo apt update  
sudo apt install gh -y  
  
#1.4 Authenticate with GitHub  
gh auth login  
  
# Step 2: Install Docker  
#2.1 Remove Older Versions  
sudo apt remove docker docker-engine docker.io containerd runc -y  
  
#2.2 Install Required Packages  
sudo apt install -y ca-certificates curl gnupg  
  
#2.3 Add Docker Repository  
sudo install -m 0755 -d /etc/apt/keyrings  
curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo tee /etc/apt/keyrings/docker.asc > /dev/null  
sudo chmod a+r /etc/apt/keyrings/docker.asc  
echo "deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.asc] https://download.docker.com/linux/ubuntu $(lsb\_release -cs) stable" | sudo tee /etc/apt/sources.list.d/docker.list > /dev/null  
  
#2.4 Install Docker  
sudo apt update  
sudo apt install -y docker-ce docker-ce-cli containerd.io docker-buildx-plugin docker-compose-plugin  
  
#2.5 Enable and Start Docker  
sudo systemctl enable docker  
sudo systemctl start docker  
  
#2.6 Verify Installation  
docker --version  
sudo docker run hello-world  
  
#2.7 Add User to Docker Group  
sudo usermod -aG docker $USER  
newgrp docker  
  
# Step 3: Install Kubernetes (K3s - Lightweight Kubernetes)  
#3.1 Install K3s  
curl -sfL https://get.k3s.io | sh -  
  
#3.2 Verify K3s Installation  
sudo k3s kubectl get nodes  
  
#3.3 Alias for kubectl  
echo 'alias kubectl="sudo k3s kubectl"' >> ~/.bashrc  
source ~/.bashrc  
  
#3.4 Enable K3s Service  
sudo systemctl enable k3s  
  
# Step 4: Install Ansible  
#4.1 Install Ansible  
sudo apt install -y ansible  
  
#4.2 Verify Ansible Installation  
ansible --version  
  
#4.3 Test Ansible Local Execution  
echo -e "[local]  
localhost ansible\_connection=local" | sudo tee /etc/ansible/hosts  
ansible all -m ping  
  
# Step 5: Install Terraform  
#5.1 Download Terraform  
sudo apt install -y wget unzip  
wget https://releases.hashicorp.com/terraform/1.6.0/terraform\_1.6.0\_linux\_amd64.zip  
  
#5.2 Extract and Install  
unzip terraform\_1.6.0\_linux\_amd64.zip  
sudo mv terraform /usr/local/bin/  
rm terraform\_1.6.0\_linux\_amd64.zip  
  
#5.3 Verify Terraform Installation  
terraform --version  
  
# Step 6: Validate the Setup  
Run the following commands to check if everything is working:  
  
git --version  
docker --version  
kubectl version --client  
ansible --version  
terraform --version  
  
To check the Kubernetes cluster:  
kubectl get nodes  
  
To verify Docker can run containers:  
docker run hello-world  
  
To test Ansible:  
ansible all -m ping