# DevOps Automation: Infrastructure as Code (IaC) & Configuration Management Tools

🚀 1. What is Automation in DevOps?  
Automation in DevOps means using tools and scripts to perform repetitive tasks automatically — such as provisioning servers, deploying applications, configuring environments, or monitoring systems — instead of doing them manually.  
  
Why Automation?  
- Reduces manual errors  
- Ensures consistency across environments (dev, test, prod)  
- Enables rapid provisioning and scaling  
- Supports Continuous Integration & Continuous Deployment (CI/CD) pipelines  
  
⚙️ 2. What is Infrastructure as Code (IaC)?  
IaC is the process of managing and provisioning infrastructure (servers, networks, databases, etc.) using code and automation tools rather than manual processes.  
  
Benefits:  
- Repeatability  
- Version control  
- Disaster recovery  
- Cost efficiency  
  
🏗️ 3. What is Configuration Management?  
Configuration Management ensures infrastructure and software stay consistent across environments.  
  
Tools:  
- Ansible  
- Puppet  
- Chef  
  
🧠 Part 1: Ansible  
Ansible is an open-source configuration management, deployment, and orchestration tool by Red Hat.  
- Uses YAML playbooks  
- Agentless (works via SSH)  
  
Example Playbook (install\_nginx.yml):  
---  
- name: Install and configure Nginx  
 hosts: webservers  
 become: yes  
 tasks:  
 - name: Install Nginx  
 apt:  
 name: nginx  
 state: present  
  
Run: ansible-playbook install\_nginx.yml -i inventory.txt  
  
☁️ Part 2: Terraform  
Terraform is an open-source IaC tool developed by HashiCorp that lets you define, deploy, and manage cloud infrastructure using HCL (HashiCorp Configuration Language).  
  
Example (main.tf):  
provider "azurerm" {  
 features {}  
}  
resource "azurerm\_resource\_group" "demo\_rg" {  
 name = "demo-resource-group"  
 location = "East US"  
}  
  
Commands:  
terraform init  
terraform plan  
terraform apply  
terraform destroy  
  
🏢 Real-World Example:  
Use Terraform to provision infrastructure → Use Ansible to configure applications → Automate via Azure DevOps Pipeline.  
  
🧩 Comparison: Terraform vs Ansible  
| Feature | Terraform | Ansible |  
|----------|------------|----------|  
| Type | IaC | Configuration Management |  
| Language | HCL | YAML |  
| Agents | Agentless | Agentless |  
| Best For | Creating infra | Configuring software |  
  
📘 Next Steps for Learners  
1. Install Terraform & Ansible  
2. Connect to Azure or AWS  
3. Deploy & Configure infrastructure automatically  
4. Integrate with CI/CD Pipeline (Azure DevOps or Jenkins)  
  
Author: ItTechGenie DevOps Specialist Training Notes  
Trainer: Gopinath Subbaian