Streamline Your IT Automation with Ansible and YAML

Class 19

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Acknowledgement

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Ministry of Economy, Trade and Industry

Overseas Employment Corporation

What you have Learnt Last Week

We were focused on following points.

- Usage of control and loop flow statement
- Performing Linear Algebra in Numpy
- Why Requirement Analysis is so important in the process?
- Software development Life cycle
- Importance of Security compliance
- Introduction of Bash Scripting
- Introduction of docker and docker compose
- Dockerized the web app and deploy on AWS

What you will Learn Today

We will focus on following points.

1. Introduction of Yaml file and its importance
2. Step-by-step guide to creating a Yaml file
3. Introduction of Ansible
4. Create your first ansible playbook
5. Quiz
6. Q&A Session

Introduction to YAML

What is YAML and Why It Matters in DevOps

YAML stands for **“YAML Ain’t Markup Language.”**

It's a human-readable format used for configuration files in DevOps.

It simplifies complex setups in tools like Docker, Kubernetes, Ansible, and

CI/CD pipelines.

YAML vs JSON

Understanding the Simplicity of YAML

Feature	YAML	JSON
Syntax	Indentation-based	Braces/quotes
Comments	✅ Yes (#)	❌ No
Readability	✅ Easy to read	Less readable
Use Cases	DevOps configs	APIs, data sharing

YAML is **cleaner** and more **human-friendly** than JSON.

YAML Structure Basics

How a YAML File is Formatted

- Uses **key-value pairs**
- Indentation is critical (no tabs!)
- Arrays use hyphens -
- No commas or curly braces

Example:

```
app:
  name: myproject
  version: 1.0
  authors:
    - Ali
    - Sara
```

Where YAML is Used in DevOps

Tools and Platforms That Rely on YAML

- ✅ **Docker Compose** - multi-container setup
- ✅ **Kubernetes** - deployment & service manifests
- ✅ **GitHub Actions** - automation workflows
- ✅ **Ansible** - playbooks for provisioning

YAML is a **standard language** for configuration across most DevOps tool

Why DevOps Engineers Love YAML

Key Benefits in Automation and Scaling

- ✅ Simple & readable for humans
- ✅ Great for version control with Git
- ✅ Easy to automate infrastructure setups
- ✅ Reduces complexity in large deployments

YAML helps DevOps teams move faster with fewer errors.

Real-World YAML Examples

How YAML is Used in Projects

Docker Compose File:

```
version: "3"
services:
  web:
    image: nginx
    ports:
      - "80:80"
```

GitHub Action:

```
name: CI
on: [push]
jobs:
  build:
    runs-on: ubuntu-latest
```

These files automate deployment, testing, and services.

Create a YAML File on EC2

Start with Basic Tools

- Open your EC2 terminal via SSH
- Use a command-line text editor like:

✅ nano (easy for beginners)

✅ vim (advanced users)

- No installation required – both are usually pre-installed

nano config.yml

Writing YAML on EC2

Use Correct Formatting

- Use **spaces only** (no tabs)
- Keep consistent indentation (2 spaces per level)

Example:

```
app:
  name: my-ec2-app
  port: 8080
```

Add Lists and Nested Data

Expand the YAML File

```
database:
  name: student_db
  user: admin
  password: secret

services:
  - backend
  - frontend
```

✅ Use - for lists
✅ Indent properly to avoid errors

Validate YAML on EC2

Make Sure It’s Correct

Install validator tool if needed:

pip install yamllint

Run validation:

yamllint config.yml

✅ This helps you catch spacing and syntax mistakes before using in Docker Compose or other tools.

Docker Compose for Django ToDo

YAML to Run Multi-Container App

```
version: "3.3"
services:
  web:
    build: .
    ports:
      - "8000:8000"
```

To check docker compose file is it correct or not write command:

docker-compose config

To Run Docker Compose File:

Sudo docker-compose up

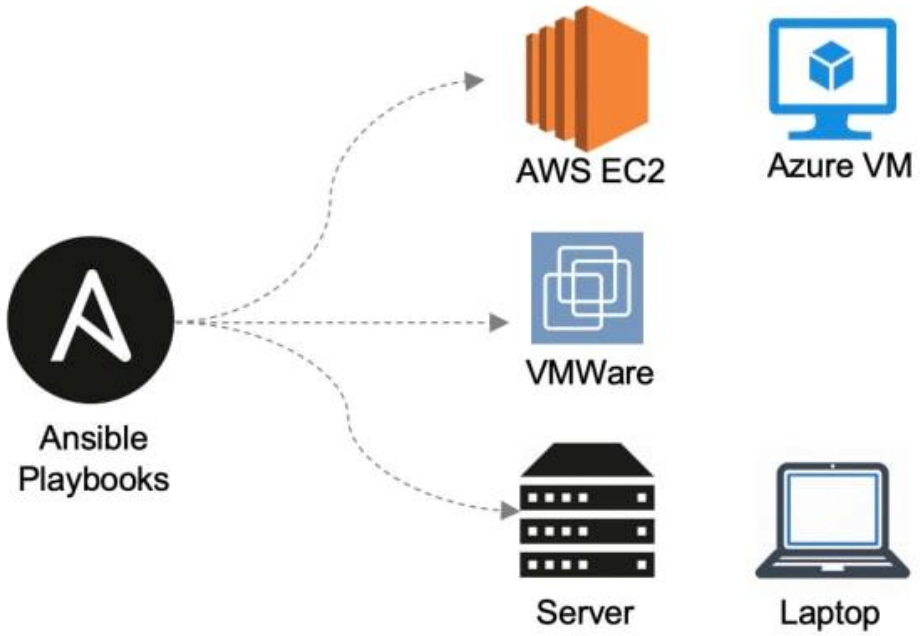
Introduction to Ansible

Automate IT Infrastructure Easily

Ansible is an open-source automation tool used for:

- Configuration management
- Application deployment
- Server provisioning
- Orchestration across multiple systems

It helps simplify complex tasks using simple YAML scripts.



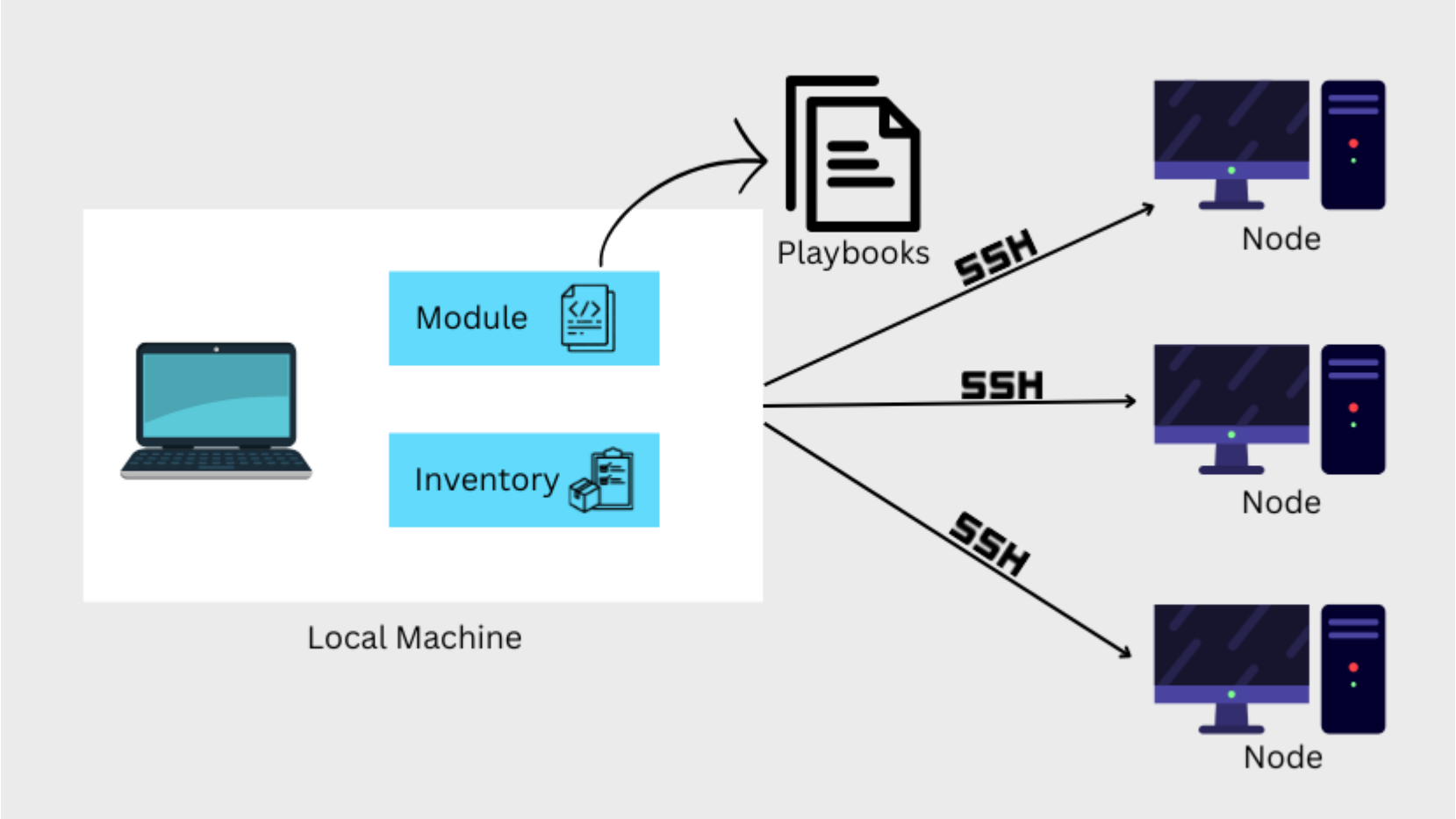
How Ansible Works

Agentless & SSH-based Architecture

- No agents required on client machines
- Uses SSH for communication
- Control Node sends instructions to Managed Nodes
- Lightweight and simple to set up

How Ansible Works

Agentless & SSH-based Architecture



Core Components of Ansible

Key Building Blocks

- **Inventory**: List of managed hosts
- **Modules**: Reusable scripts to perform tasks
- **Playbooks**: YAML files that define automation workflows
- **Tasks**: Individual steps in a playbook

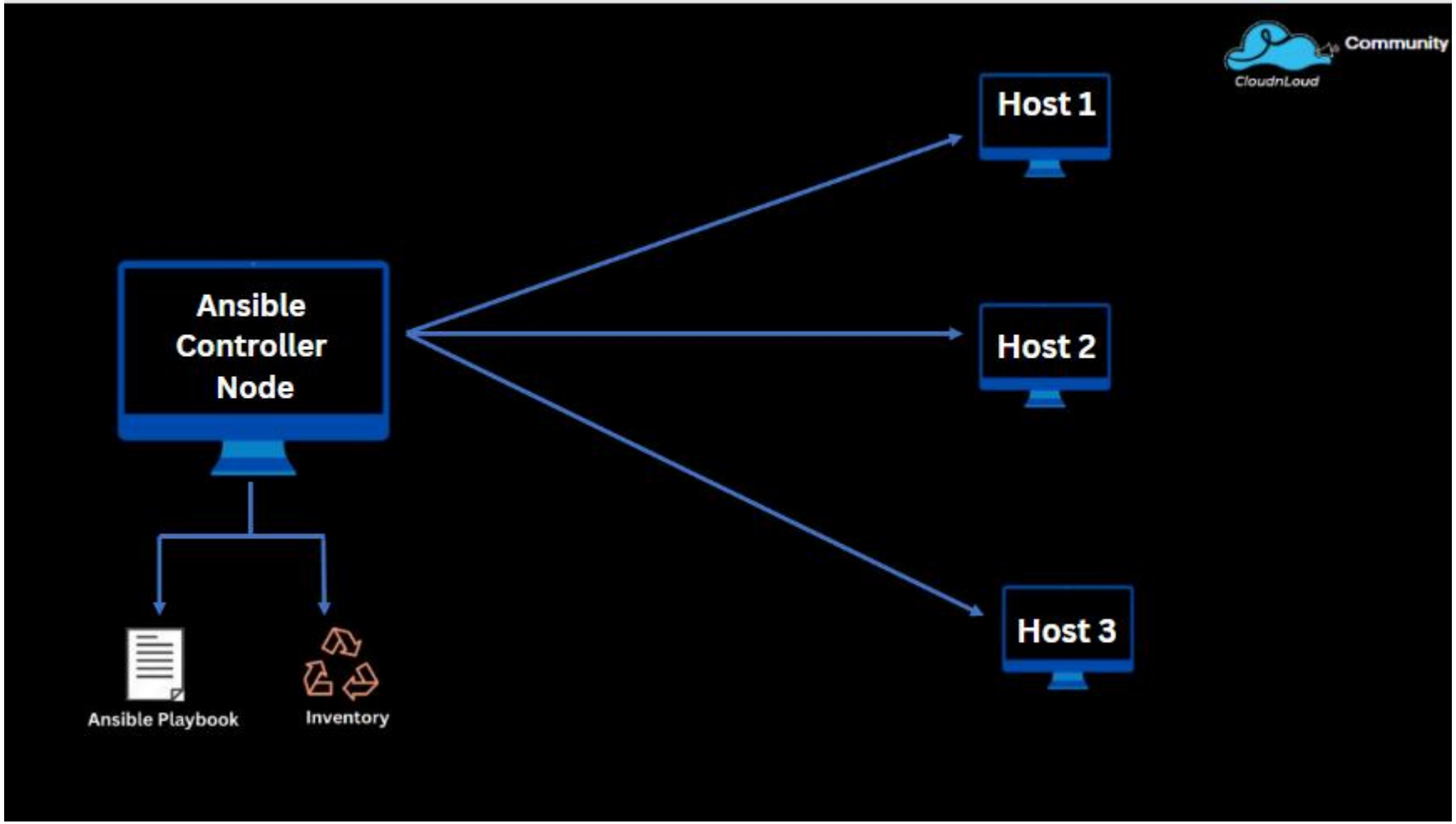
Ansible Architecture

Control & Managed Nodes

- **Control Node**: Where Ansible runs
- **Managed Nodes**: Target systems (no agent needed)
- Sends instructions to multiple systems in parallel
- Maintains idempotency (no repetition if already done)

How Ansible Works

Agentless & SSH-based Architecture



Ansible vs Other Tools

How It Stands Out

Tool	Agentless	Language	Ease of Use
Ansible	✅ Yes	YAML	⭐⭐⭐⭐☆
Puppet	❌ No	DSL	⭐⭐⭐
Chef	❌ No	Ruby	⭐⭐⭐
Terraform	✅ Yes	HCL	⭐⭐⭐⭐☆

Use Cases of Ansible

Where It’s Used in Real World

- Automating server setup for dev/test/prod
- Deploying code on multiple servers
- Ensuring consistent configurations
- Integrating with CI/CD pipelines
- Provisioning cloud infrastructure (e.g., AWS)

What is an Ansible Playbook?

Automate Tasks with Simple YAML Files

- A Playbook is a YAML file with instructions
- Automates tasks like installing software, updating systems
- Written in human-readable format
- Run using ansible-playbook command

Setting Up Ansible

Install on Ubuntu Control Node

sudo apt update

sudo apt install ansible

- Make sure SSH is enabled
- You are now ready to manage remote machines

Creating Ansible Playbook

Make a playbook to install Nginx

Vim install_nginx_play.yml

```
-

    name: This playbook will
    install nginx
    hosts: servers
    become: yes
    tasks:
        - name: install nginx
        apt:
          name: nginx
          state: latest
        - name: start nginx
          service:
```

Run the Ansible Playbook

Use ansible-playbook Command

ansible-playbook install_docker.yml

```
- name: Install Docker on Ubuntu and Amazon Linux
  hosts: servers
  become: true

  tasks:
    - name: Install Docker on Ubuntu
      apt:
        name: docker.io
        state: latest
        update_cache: true
      when: ansible_distribution == "Ubuntu"

    - name: Start and enable Docker service on Ubuntu
      service:
        name: docker
        state: started
        enabled: yes
      when: ansible_distribution == "Ubuntu"

    - name: Install Docker on Amazon Linux
      yum:
        name: docker
        state: latest
      when: ansible_distribution == "Amazon"

    - name: Start and enable Docker service on Amazon Linux
      service:
        name: docker
        state: started
        enabled: yes
      when: ansible_distribution == "Amazon"
```

Assignment

Assignment

Commands

Upload this whole project into your GitHub profile

with proper documentation

Quiz Section

Quiz

Everyone student should click on submit button before time ends otherwise MCQs will not be submitted

[Guidelines of MCQs]

1. There are 20 MCQs
2. Time duration will be 10 minutes
3. This link will be share on 12:25pm (Pakistan time)
4. MCQs will start from 12:30pm (Pakistan time)
5. This is exact time and this will not change
6. Everyone student should click on submit button otherwise MCQs will not be submitted after time will finish
7. Every student should submit Github profile and LinkedIn post link for every class. It include in your performance

Assignment

Assignment should be submit before the next class

[Assignments Requirements]

1. Create a post of today's lecture and post on LinkedIn.
2. Make sure to tag @Plus W @Pak-Japan Centre and instructors LinkedIn profile
3. Upload your code of assignment and lecture on GitHub and share your GitHub profile in respective your region group WhatsApp group
4. If you have any query regarding assignment, please share on your region WhatsApp group.
5. Students who already done assignment, please support other students

Q&A Session

ありがとうございます。
Thank you.
شکریا

For the World with Diverse Individualities