**Ansible Lab Manual: Converting Ad-Hoc Command to Playbook with Complete Prerequisites**

**Lab Structure**

**Part 1: Prerequisites Setup (Control & Managed Nodes)**

**Control Node Requirements**:

* Ansible 2.9 or later installed
* Python 3.6+
* SSH client configured

**Managed Node Requirements**:

* Ubuntu 18.04/20.04/22.04/24.04
* Python 3 installed
* SSH server running
* User with sudo privileges

**Part 2: SSH Key-Based Authentication**

The lab includes detailed steps for setting up passwordless SSH:[[5]](#fn5)

# Generate SSH key on control node  
ssh-keygen -t rsa -b 4096 -C "ansible@controlnode"  
  
# Copy public key to managed node  
ssh-copy-id ansible@192.168.1.100  
  
# Test connection  
ssh ansible@192.168.1.100

**Part 3: Inventory File Configuration**

The inventory file properly defines the host with **hostname alias** and **ansible\_user** parameter:[[6]](#fn6)[[7]](#fn7)[[8]](#fn8)[[9]](#fn9)

[webserver]  
web01 ansible\_host=192.168.1.100 ansible\_user=ansible  
  
[webserver:vars]  
ansible\_connection=ssh  
ansible\_port=22  
ansible\_become=yes  
ansible\_become\_method=sudo

**Key Inventory Parameters Explained**:[[7]](#fn7)[[9]](#fn9)[[6]](#fn6)

* **web01**: Host alias (descriptive name you choose)
* **ansible\_host**: Actual IP address or FQDN of the target server
* **ansible\_user**: SSH username for connection
* **ansible\_become**: Enable privilege escalation (equivalent to -b flag)

**Part 4: Playbook Conversion**

The basic playbook converts the ad-hoc command to a structured, reusable format:[[10]](#fn10)[[11]](#fn11)[[12]](#fn12)

---  
- name: Install Apache2 Web Server  
 hosts: webserver  
 become: yes  
   
 tasks:  
 - name: Update apt cache  
 ansible.builtin.apt:  
 update\_cache: yes  
 cache\_valid\_time: 3600  
   
 - name: Install Apache2 package  
 ansible.builtin.apt:  
 name: apache2  
 state: present  
   
 - name: Ensure Apache2 is started and enabled  
 ansible.builtin.service:  
 name: apache2  
 state: started  
 enabled: yes

**Playbook Breakdown**:[[13]](#fn13)[[11]](#fn11)

* **become: yes**: Enables privilege escalation (replaces -b flag from ad-hoc command)
* **hosts: webserver**: Targets the webserver group from inventory
* **ansible.builtin.apt**: The apt module for package management[[14]](#fn14)[[10]](#fn10)
* **state: present**: Ensures package is installed[[10]](#fn10)

**Part 5: Execution Commands**

# Syntax check  
ansible-playbook -i inventory install\_apache.yml --syntax-check  
  
# Dry run (no changes)  
ansible-playbook -i inventory install\_apache.yml --check  
  
# Execute playbook  
ansible-playbook -i inventory install\_apache.yml  
  
# With verbose output  
ansible-playbook -i inventory install\_apache.yml -v

If you need to provide a sudo password, use the -K flag:[[15]](#fn15)[[13]](#fn13)

ansible-playbook -i inventory install\_apache.yml -K

**Part 6: Advanced Features**

The lab includes an advanced playbook with:

* **Variables** for reusability[[16]](#fn16)
* **Conditional tasks** with when statements[[13]](#fn13)
* **Custom HTML page** creation
* **Firewall configuration**
* **Dynamic facts** usage (hostname, IP address)

**Part 7: Verification**

Multiple verification methods are provided:

# Using Ansible ad-hoc command  
ansible -i inventory webserver -m shell -a "systemctl status apache2" -b  
  
# Direct SSH access  
ssh ansible@192.168.1.100  
sudo systemctl status apache2  
  
# Web browser test  
http://192.168.1.100

**Part 8: Troubleshooting Guide**

Common issues addressed:[[17]](#fn17)[[18]](#fn18)[[15]](#fn15)

1. **Permission denied**: SSH key setup issues
2. **Sudo password required**: Passwordless sudo configuration
3. **Connection failures**: Network/firewall issues
4. **Module failures**: Python interpreter issues

**Part 9: Passwordless Sudo Setup**

Critical for automation:[[18]](#fn18)[[17]](#fn17)

# On managed node  
sudo visudo  
  
# Add this line:  
ansible ALL=(ALL) NOPASSWD:ALL

This allows the become directive to work without requiring password input during playbook execution.[[19]](#fn19)[[20]](#fn20)[[17]](#fn17)[[15]](#fn15)

**Lab Deliverables**

The complete lab manual includes:

1. **10 detailed sections** covering all aspects
2. **Prerequisites checklist** for both control and managed nodes
3. **Step-by-step SSH setup** with key-based authentication
4. **Inventory examples** with multiple configuration scenarios
5. **Three playbooks**: basic, advanced with variables, and uninstall
6. **Complete command reference** for ad-hoc and playbook operations
7. **Troubleshooting section** with common issues and solutions
8. **Verification checklist** to ensure successful completion
9. **Cleanup procedures** for lab teardown

**Key Learning Objectives**

After completing this lab, you will understand:

* How to structure an Ansible inventory with proper host aliases and connection parameters[[8]](#fn8)[[6]](#fn6)[[7]](#fn7)
* The difference between ad-hoc commands and playbooks[[11]](#fn11)[[12]](#fn12)
* How to use the become privilege escalation mechanism[[20]](#fn20)[[19]](#fn19)[[17]](#fn17)[[15]](#fn15)[[13]](#fn13)
* Proper use of the ansible.builtin.apt module for package management[[10]](#fn10)[[14]](#fn14)
* Best practices for SSH key-based authentication[[5]](#fn5)
* How to organize and execute Ansible playbooks effectively[[12]](#fn12)[[11]](#fn11)