

Certification Project: Problem Statement

Problem Statement

AppleBite Co. is using Cloud for one of their products. The project uses modular components, multiple frameworks and want the components to be developed by different teams or by 3rd party vendors.

The company's goal is to deliver the product updates frequently to production with High quality & Reliability. They also want to accelerate software delivery speed, quality and reduce feedback time between developers and testers

As development progressed, they are facing multiple problems, because of various technologies involved in the project. Following are the problems:

- Building Complex builds is difficult
- Incremental builds are difficult to manage, and deploy

To solve these problems, they need to implement Continuous Integration & Continuous Deployment with DevOps using following tools:

Git –For version control for tracking changes in the code files

Jenkins–For continuous integration and continuous deployment

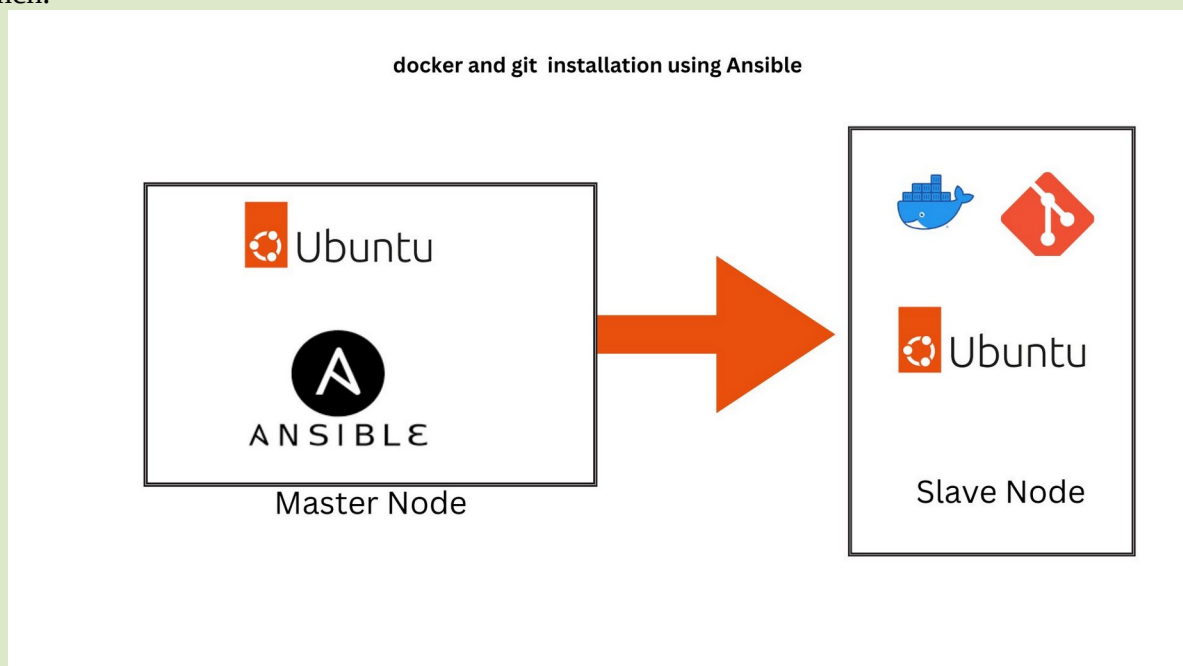
Docker–For deploying containerized applications

Ansible-Configuration management tools

This project will be about how to do deploy code to dev/stage/prod etc, just on a click of button.

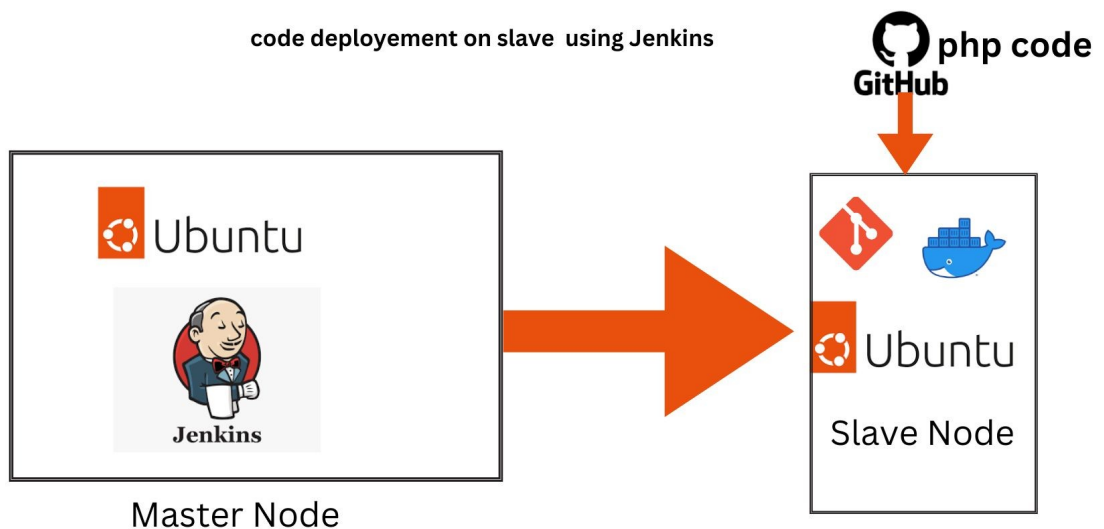
Business challenge/requirement

As soon as the developer pushes the updated code on the GIT master branch, a new test server should be provisioned with all the required software. Post this, the code should be containerized and deployed on the test server. The deployment should then be built and pushed to the prod server. All this should happen automatically and should be triggered from a push to the GitHub master branch.



Git and Jenkins Installation using Ansible

code deployment on slave using Jenkins



PHP code Deployment Using Jenkins

DAY 2

- 1)install KVM on ubuntu Server
- 2)Create Ubuntu VM using virt-manager
- 3)Enable SSH connection between master and test server
- 4)password less authentication
- 5)Ansible installation and basic Setup
- 6)Install Jenkins

Install KVM on Ubuntu

to install kvm on your ubuntu machine refer below blog

<https://phoenixnap.com/kb/ubuntu-install-kvm>

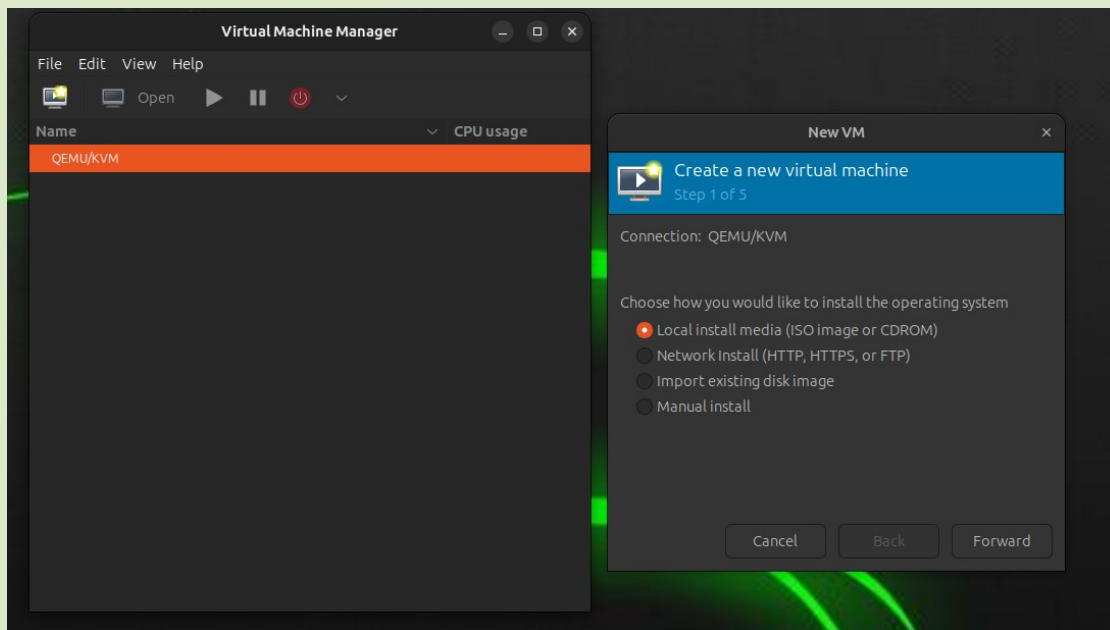
```
ubuntu@master-node:~$  
ubuntu@master-node:~$ virt-manager  
ubuntu@master-node:~$
```

Create UBUNTU VM

- 1) start virt manager
- 2)download ubuntu image from official website.

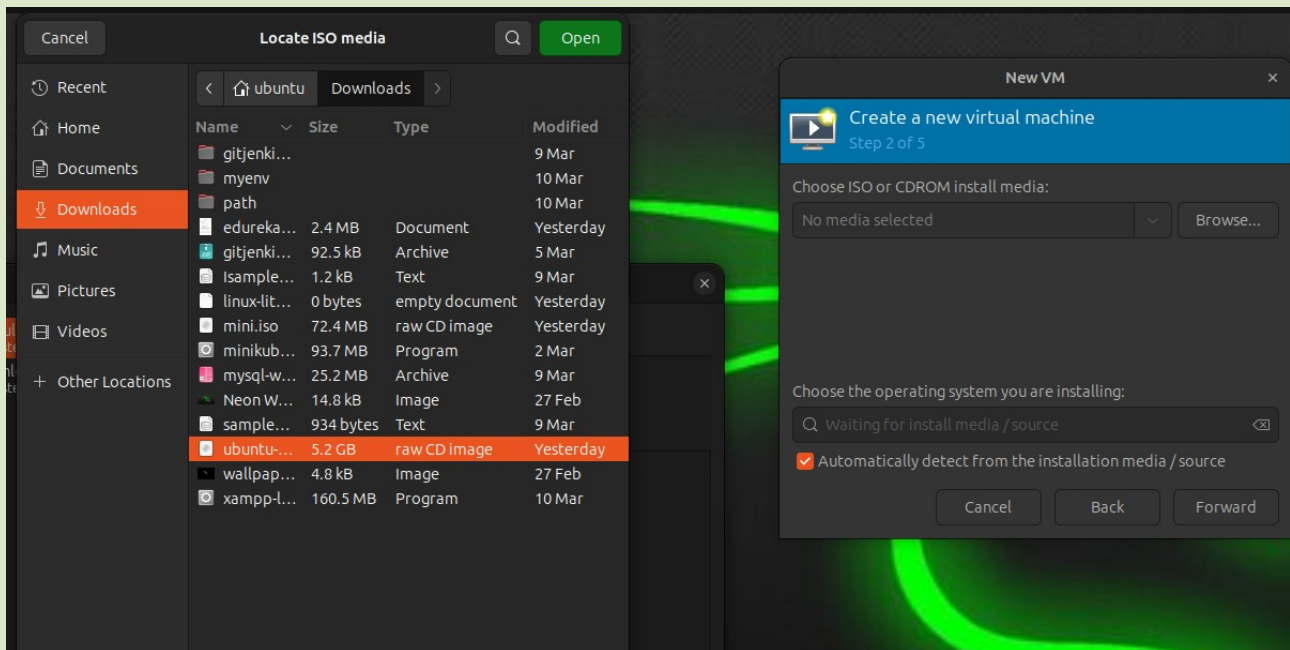
<https://ubuntu.com/download/desktop>

- 3)create ubuntu VM

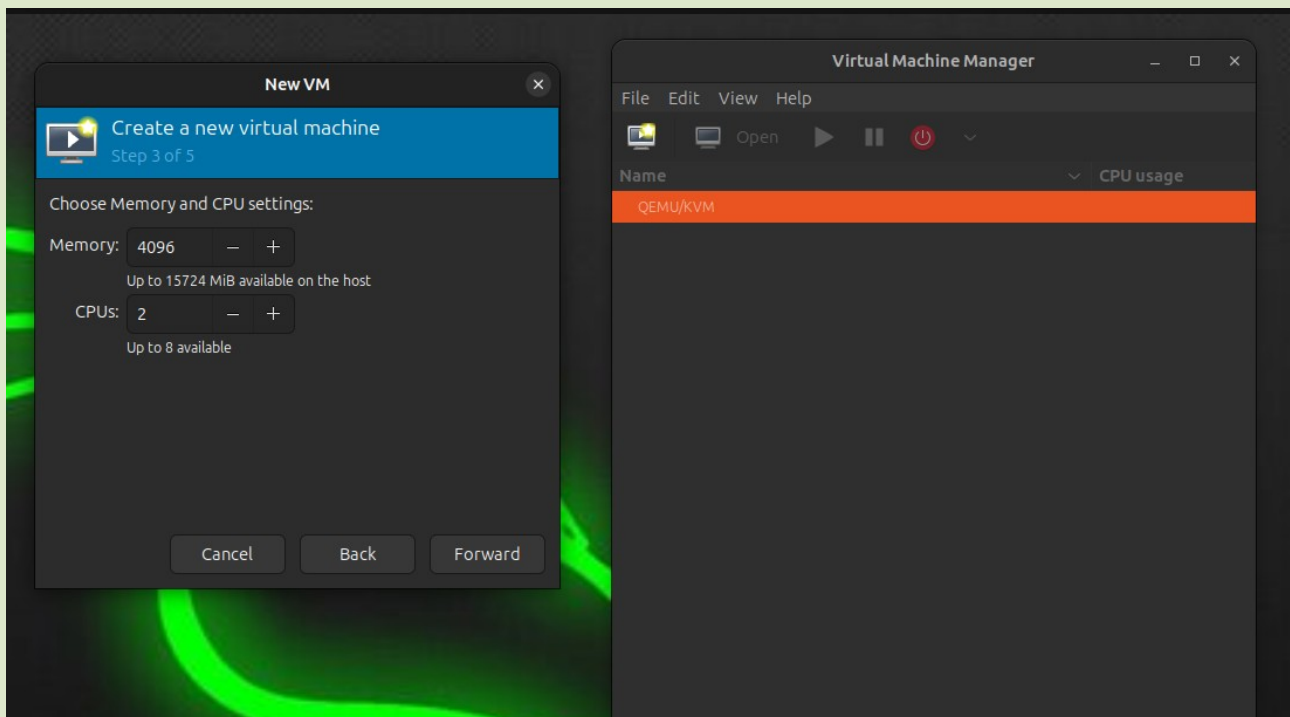


select Ubuntu ISO from Local Machine.

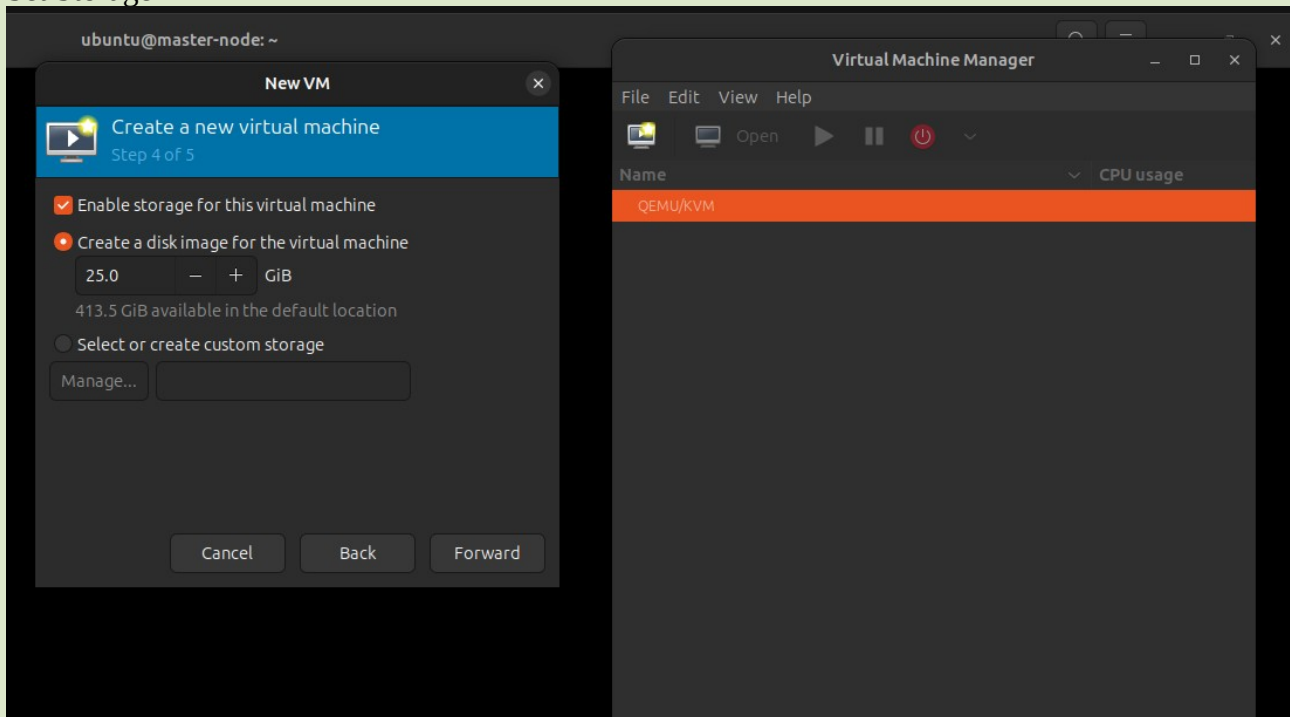
Create ubuntu Machine



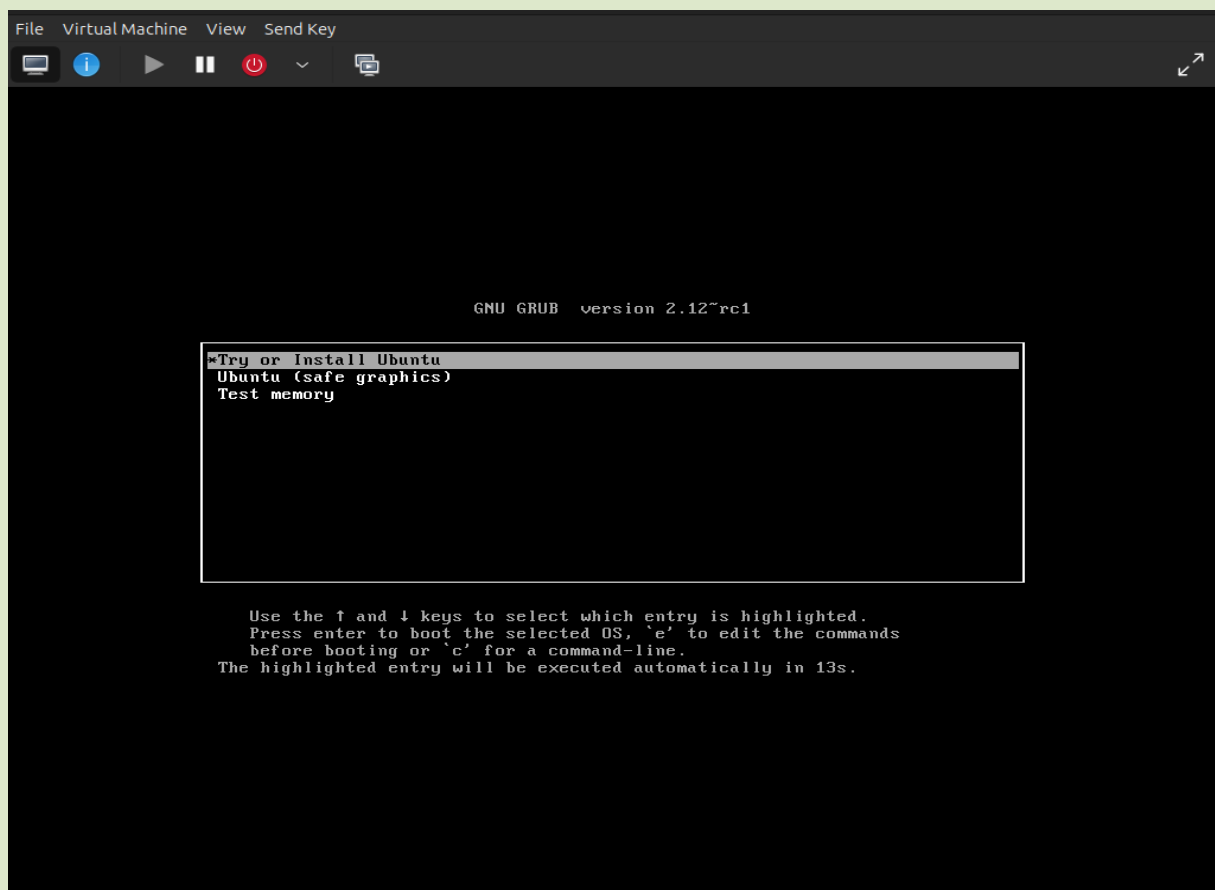
Set memory and CPU



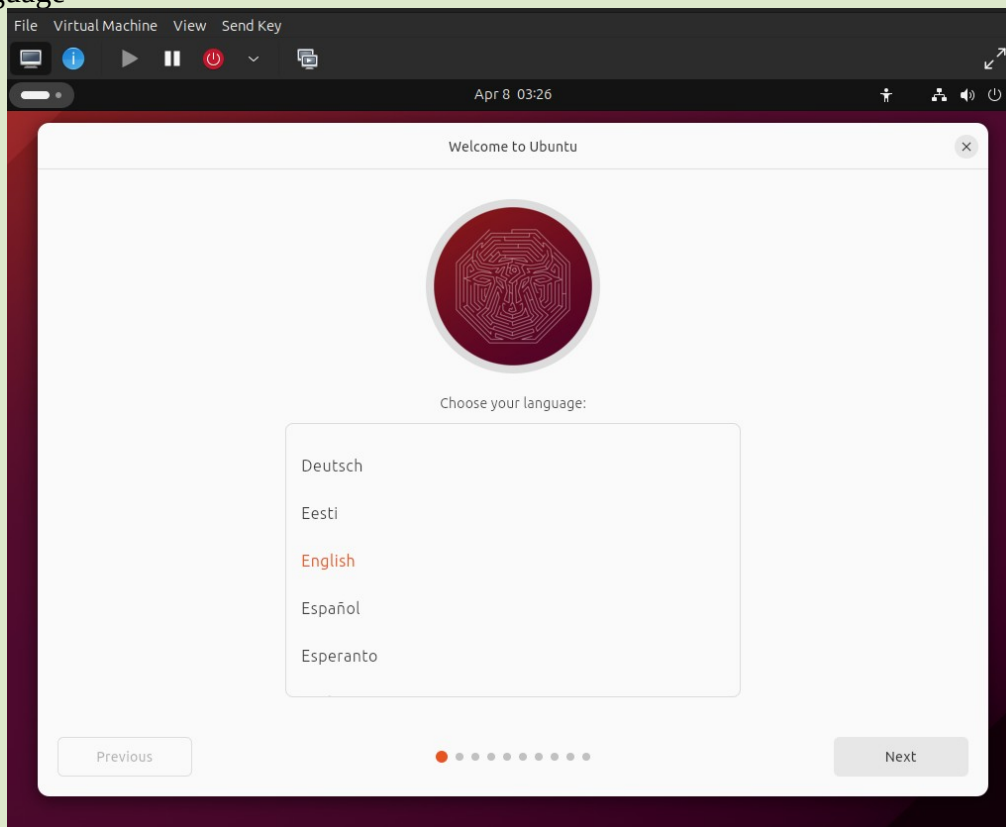
Set Storage



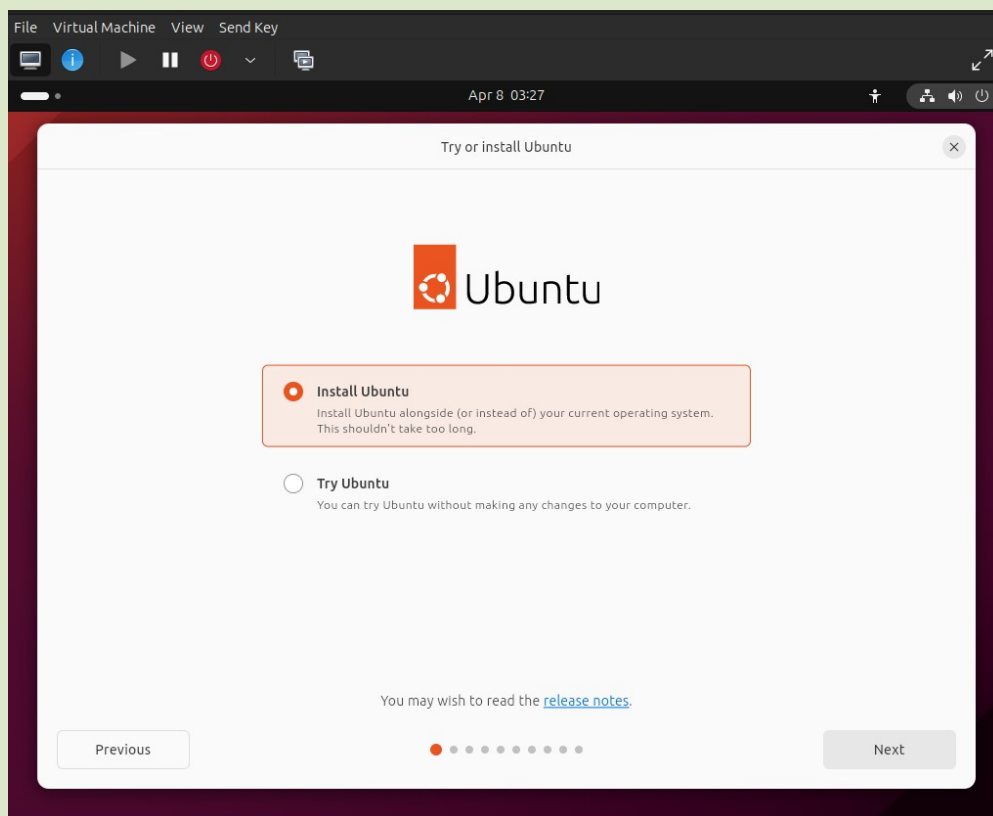
start installation

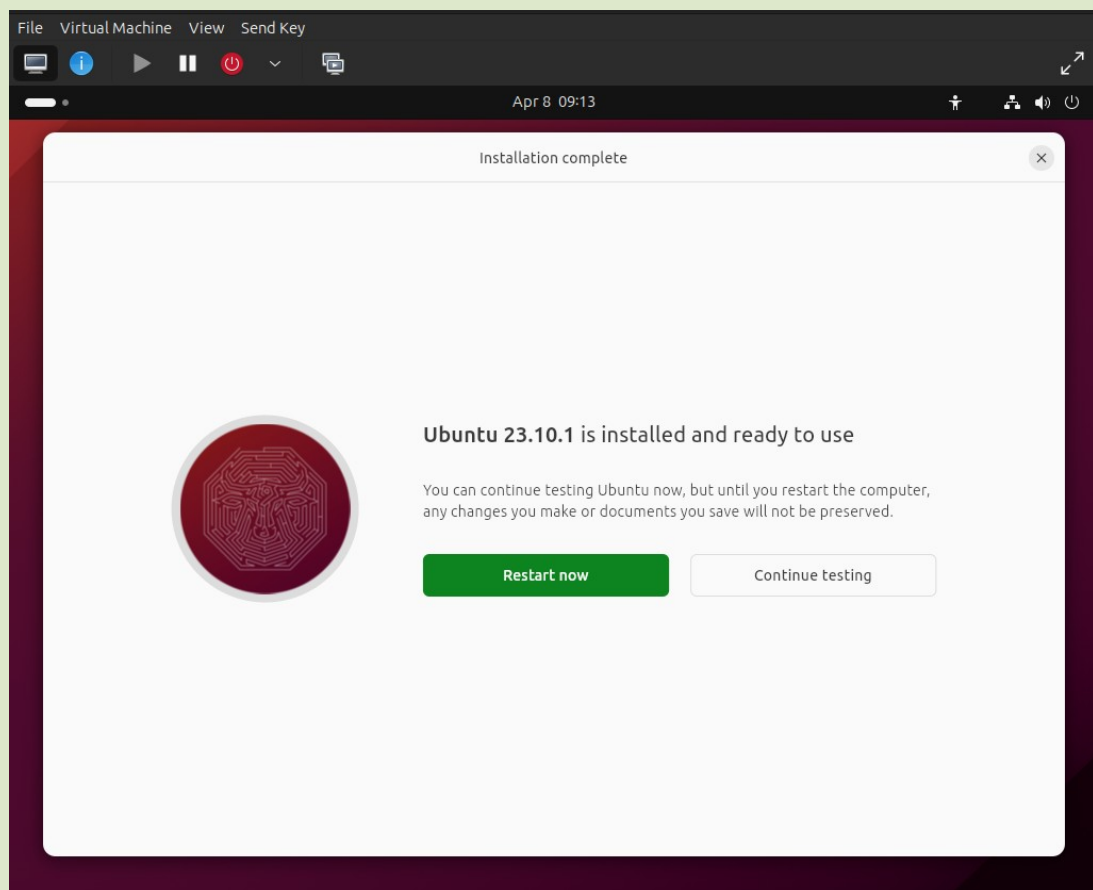
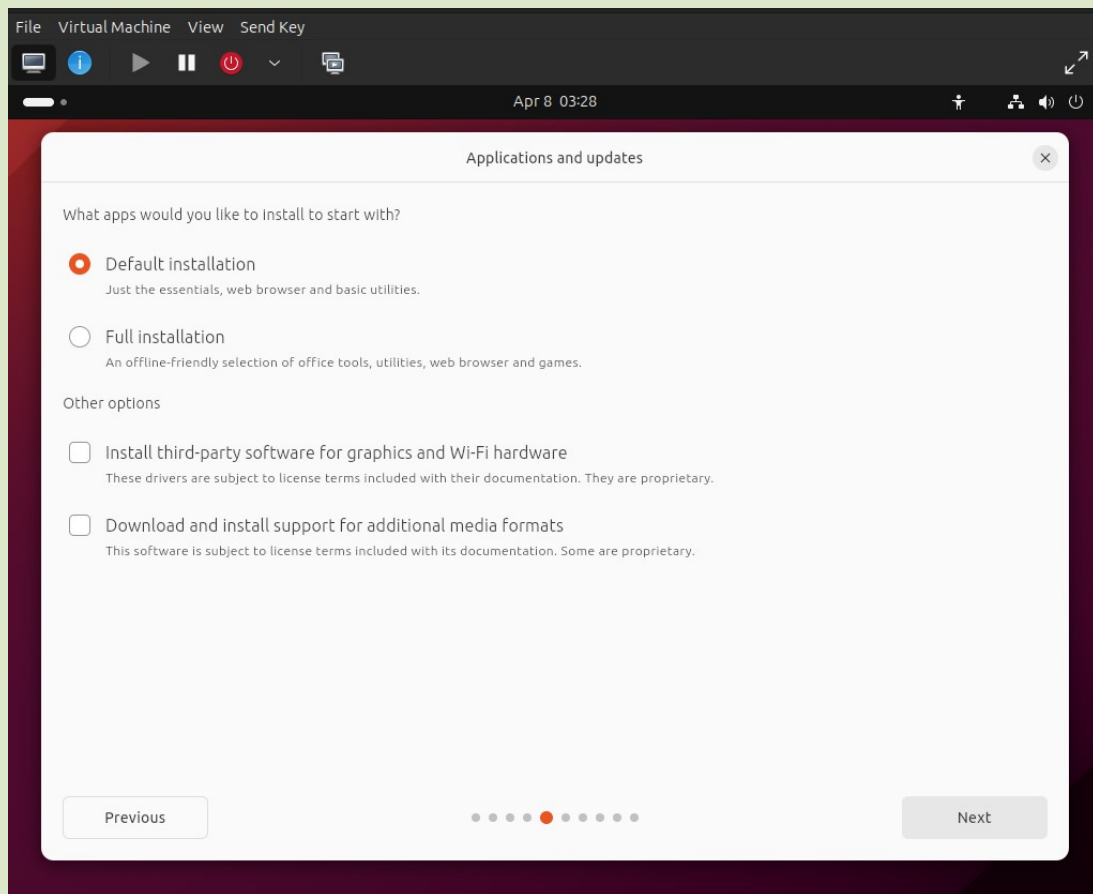


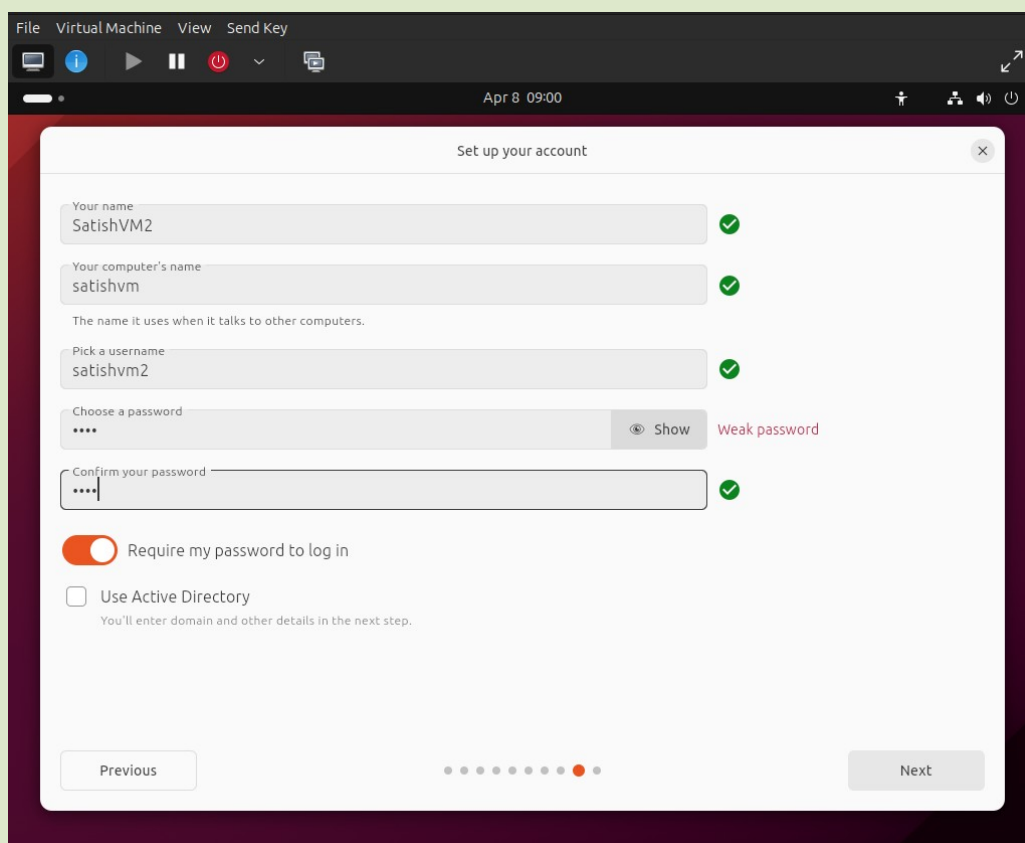
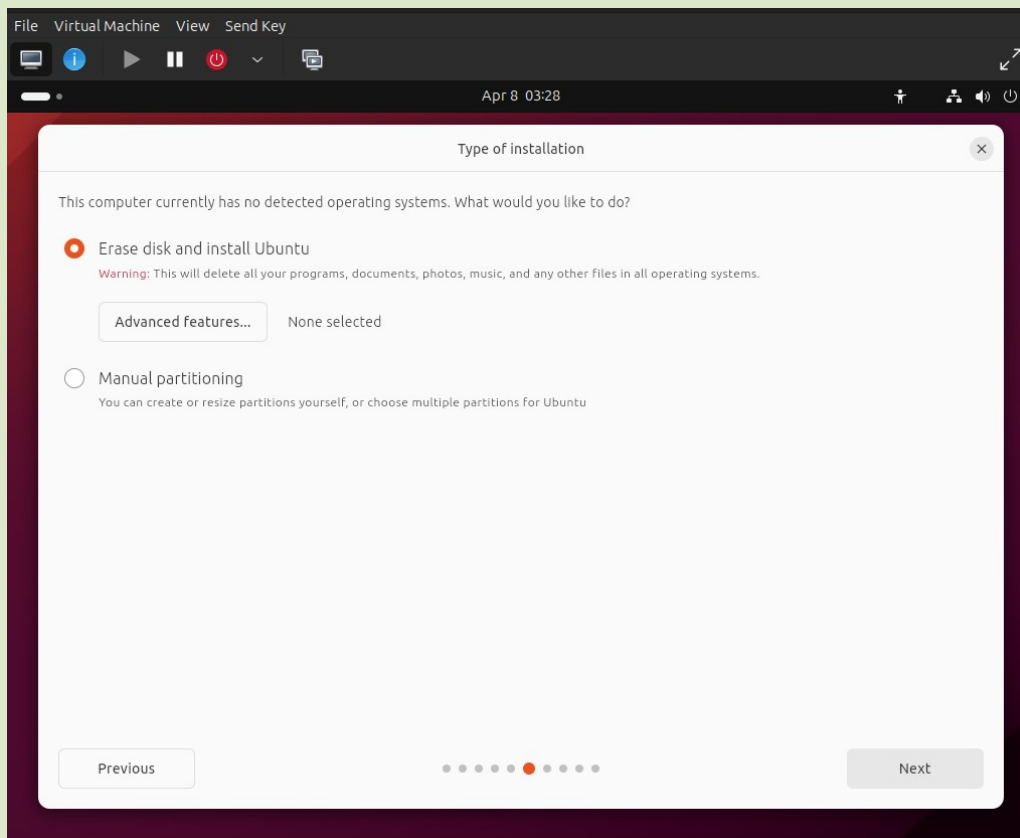
select language

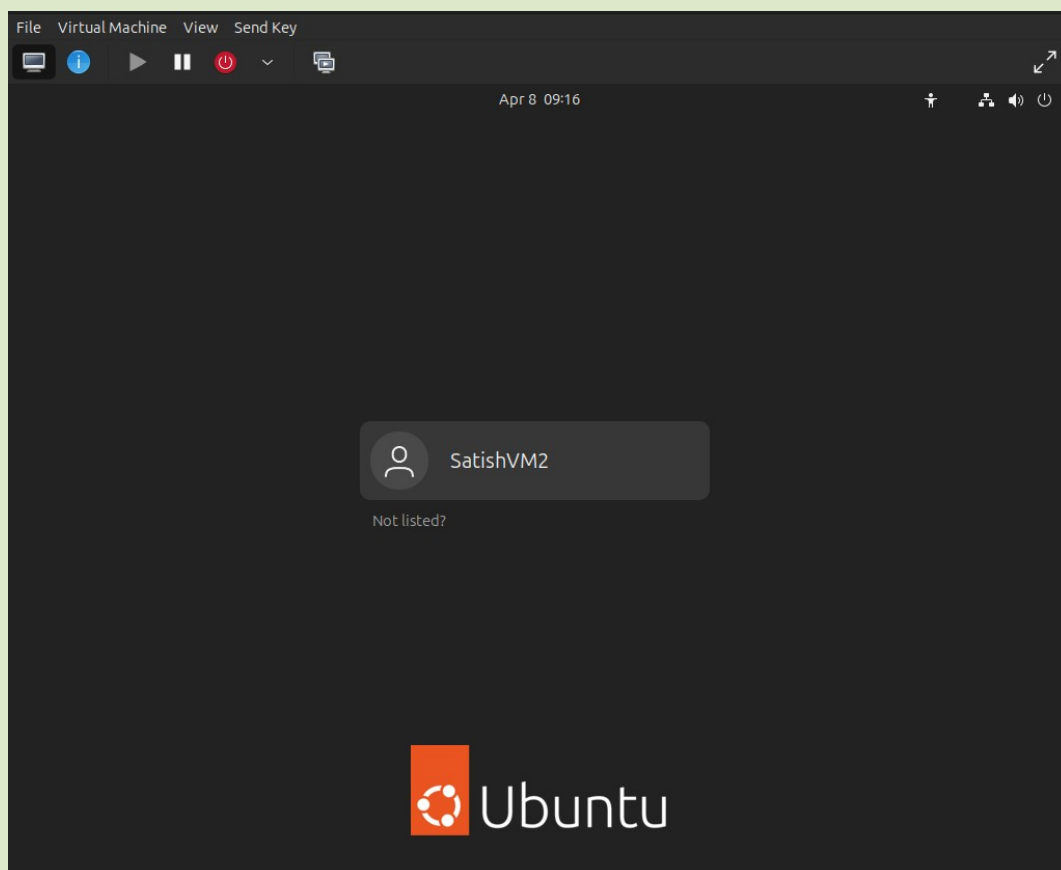
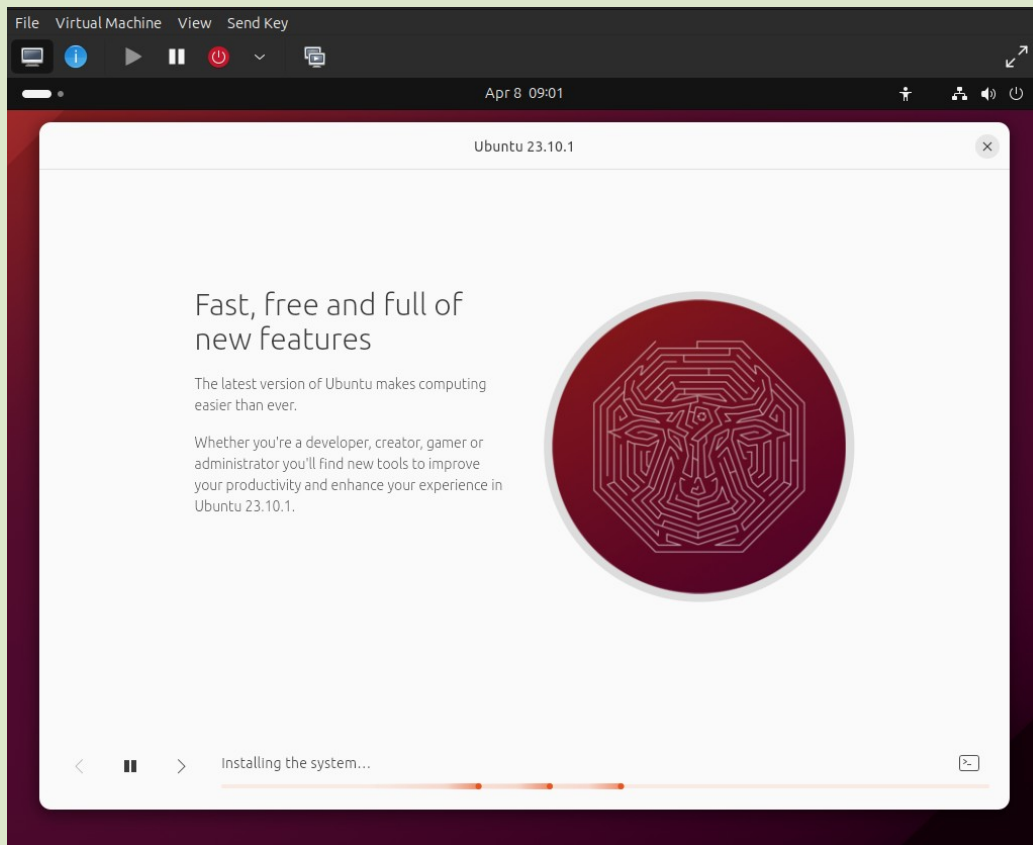


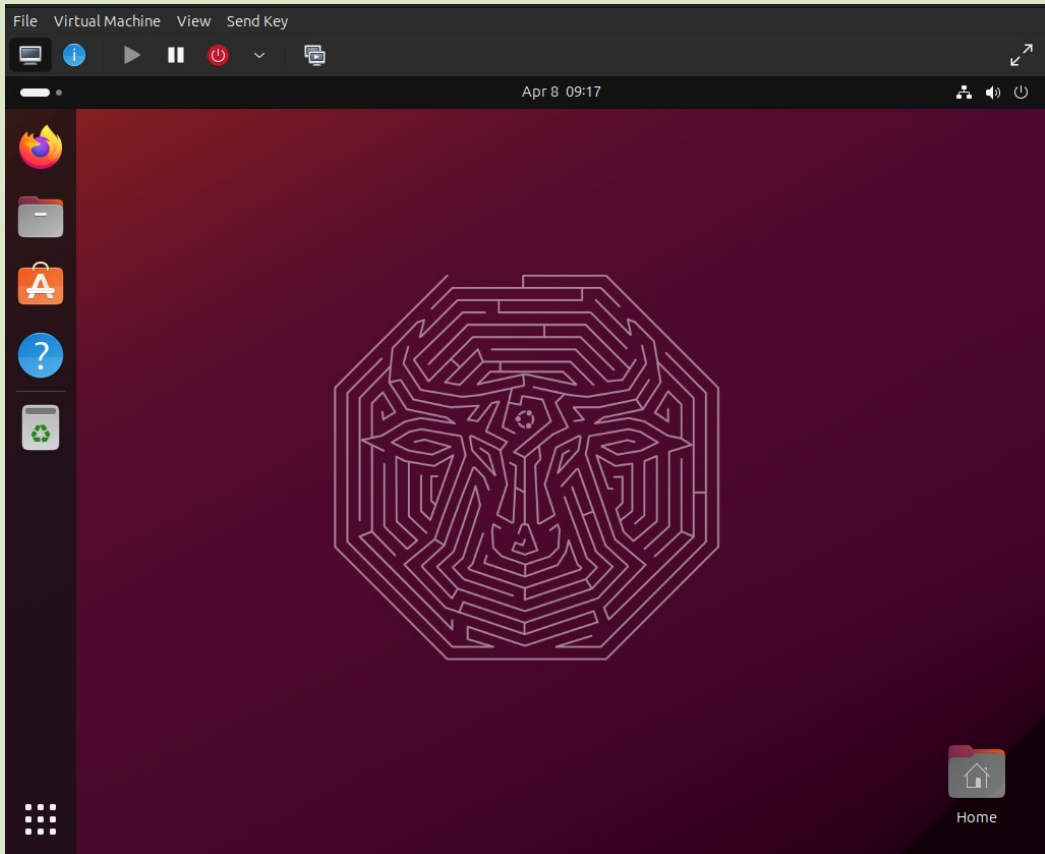
Install Ubuntu











master and test VM SSH Connectivity

sudo apt install openssh-server

```
satishvm2@satishvm:~$ sudo systemctl status ssh
○ ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/lib/systemd/system/ssh.service; disabled; preset: enabled)
   Drop-In: /etc/systemd/system/ssh.service.d
            └─00-socket.conf
   Active: inactive (dead)
   TriggeredBy: ● ssh.socket
   Docs: man:sshd(8)
         man:sshd_config(5)
satishvm2@satishvm:~$ ^C
satishvm2@satishvm:~$ ^C
satishvm2@satishvm:~$
```

update firewall rules and allow ssh

```
satishvm2@satishvm:~$ sudo ufw allow ssh
Rules updated
Rules updated (v6)
```

try to access test machine from master node

ssh satishvm2@192.168.122.208

```
rtt min/avg/max/mdev = 0.383/0.522/0.739/0.155 ms
root@master-node:~# ssh satishvm2@192.168.122.208
ssh: connect to host 192.168.122.208 port 22: Connection refused
root@master-node:~# ssh -p 33556 satishvm2@192.168.122.208
ssh: connect to host 192.168.122.208 port 33556: Connection refused
root@master-node:~# ssh satishvm2@192.168.122.208
The authenticity of host '192.168.122.208 (192.168.122.208)' can't be established.
ED25519 key fingerprint is SHA256:S5CbIFzXtfNa7PczRDtBiAOLXfRin83uGQHxjFT9X1s.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.122.208' (ED25519) to the list of known hosts.
satishvm2@192.168.122.208's password:
Welcome to Ubuntu 23.10 (GNU/Linux 6.5.0-26-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

75 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

satishvm2@satishvm:~$
satishvm2@satishvm:~$
```

Password less authentication

```
root@master-node:~# ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_rsa
Your public key has been saved in /root/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:jX63L8FXJhHdL+0tUrvmH0qpTAZry6+oruN/JiDoBh8 root@master-node
The key's randomart image is:
+---[RSA 3072]-----+
|           .o.o|
|           +oo|
|           . =.|
|           o . + =|
|      S .. . *|
|+ E    . o o = |
|oo o    + + .B .|
| oo . o+ * .ooo |
|..o+=. +o+o+o. |
+---[SHA256]-----+
root@master-node:~# ssh-copy-id satishvm2@192.168.122.208
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/root/.ssh/id_rsa.pub"
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
satishvm2@192.168.122.208's password:

Number of key(s) added: 1

Now try logging into the machine, with: "ssh 'satishvm2@192.168.122.208'"
and check to make sure that only the key(s) you wanted were added.

root@master-node:~# ssh satishvm2@192.168.122.208 "chmod 700 ~/.ssh && chmod 600 ~/.ssh/authorized_keys"
root@master-node:~# sudo systemctl restart sshd
root@master-node:~# ssh satishvm2@192.168.122.208
Welcome to Ubuntu 23.10 (GNU/Linux 6.5.0-26-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

75 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

Last login: Tue Apr  9 10:22:53 2024 from 192.168.122.1
satishvm2@satishvm:~$
```

```
root@master-node:~# ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_rsa
Your public key has been saved in /root/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:jX63L8FXJhHdL+0tUrvmH0qpTAZry6+oruN/JiDoBh8 root@master-node
The key's randomart image is:
+---[RSA 3072]-----+
|           .o.o|
|           +oo|
|           . =.|
|           o . + =|
|      S .. . *|
|+ E    . o o = |
|oo o    + + .B .|
| oo . o+ * .ooo |
|..o+=. +o+o+o. |
+---[SHA256]-----+
root@master-node:~# ssh-copy-id satishvm2@192.168.122.208
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed:
"/root/.ssh/id_rsa.pub"
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter
out any that are already installed
```

```
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are  
prompted now it is to install the new keys  
satishvm2@192.168.122.208's password:
```

Number of key(s) added: 1

Now try logging into the machine, with: "ssh 'satishvm2@192.168.122.208'"
and check to make sure that only the key(s) you wanted were added.

```
root@master-node:~# ssh satishvm2@192.168.122.208 "chmod 700 ~/.ssh && chmod 600  
~/.ssh/authorized_keys"
```

```
root@master-node:~# sudo systemctl restart sshd
```

```
root@master-node:~# ssh satishvm2@192.168.122.208
```

```
Welcome to Ubuntu 23.10 (GNU/Linux 6.5.0-26-generic x86_64)
```

```
* Documentation:  https://help.ubuntu.com  
* Management:    https://landscape.canonical.com  
* Support:        https://ubuntu.com/advantage
```

75 updates can be applied immediately.

To see these additional updates run: apt list --upgradable

Last login: Tue Apr 9 10:22:53 2024 from 192.168.122.1

Installing Ansible on Ubuntu

To configure the PPA on your system and install Ansible run these commands:

```
$ sudo apt update
$ sudo apt install software-properties-common
$ sudo add-apt-repository --yes --update ppa:ansible/ansible
$ sudo apt install ansible
```

output

```
ubuntu@master-node:~$ ansible --version
ansible [core 2.16.5]
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/home/ubuntu/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']
  ansible python module location = /usr/lib/python3/dist-packages/ansible
  ansible collection location = /home/ubuntu/.ansible/collecti
  executable location = /usr/bin/ansible
  python version = 3.11.6 (main, Oct  8 2023, 05:06:43) [GCC 13.2.0] (/usr/bin/python3)
  jinja version = 3.1.2
  libyaml = True
ubuntu@master-node:~$
```

add testVM in ansible hostfile.

vi /etc/ansible/hosts

```
# This is the default ansible 'hosts' file.
#
# It should live in /etc/ansible/hosts
#
# - Comments begin with the '#' character
# - Blank lines are ignored
# - Groups of hosts are delimited by [header] elements
# - You can enter hostnames or ip addresses
# - A hostname/ip can be a member of multiple groups
#
# Ex 1: Ungrouped hosts, specify before any group headers:
## green.example.com
## blue.example.com
# 192.168.100.1
## 192.168.100.10
#
# Ex 2: A collection of hosts belonging to the 'webserver' group:
[webserver]
## alpha.example.org
## beta.example.org
## 192.168.1.100
192.168.122.208 ansible_user=satishvm2 ansible_ssh_pass=root
#
# If you have multiple hosts following a pattern, you can specify
# them like this:
```

Ansible ping Test

```
root@master-node:~# vi /etc/ansible/hosts
root@master-node:~# ansible -m ping webserver
192.168.122.208 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
root@master-node:~#
```

```
root@master-node:~# ansible -m ping webserver
192.168.122.208 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
```

Command:

```
buntu@master-node-5:~$ docker run -p 8080:8080 -p 50000:50000 -v jenkins_home:/var/jenkins_home jenkins/jenkins
Running from: /usr/share/jenkins/jenkins.war
webroot: /var/jenkins_home/war
2024-04-08 18:37:54.209+0000 [id=1] INFO winstone.Logger$logInternal: Beginning extraction from war file
2024-04-08 18:37:54.790+0000 [id=1] WARNING o.e.j.s.handler.ContextHandler$SetContextPath: Empty contextPath
2024-04-08 18:37:54.852+0000 [id=1] INFO org.eclipse.jetty.server.Server#doStart: jetty-10.0.20; built: 2024-01-29T20:46:45.278Z; git: 3a745c71c23682146f262b99f4ddc41bc41630c; jvm 17
0.1047
2024-04-08 18:37:55.831+0000 [id=1] INFO o.e.j.w.StandardDescriptorProcessor$visitServlet: NO JSP Support for /, did not find org.eclipse.jetty.jsp.JettyJspServlet
2024-04-08 18:37:55.863+0000 [id=1] INFO o.e.j.s.DefaultSessionIdManager#doStart: Session workerName=node0
2024-04-08 18:37:55.466+0000 [id=1] INFO hudson.WebAppMain$contextInitialized: Jenkins home directory: /var/jenkins_home found at: EnvVars.masterEnvVars.get("JENKINS_HOME")
2024-04-08 18:37:55.566+0000 [id=1] INFO o.e.j.s.handler.ContextHandler$doStart: Started w.@161f6623[jenkins v2.447./,file:///var/jenkins_home/var,/AVAILABLE]/(var/jenkins_home/war)
2024-04-08 18:37:55.575+0000 [id=1] INFO o.e.j.server.AbstractConnector$doStart: Started ServerConnector@dfddc9a(HTTP/1.1,{http/1.1}){0.0.0.0:8080}
2024-04-08 18:37:55.583+0000 [id=1] INFO org.eclipse.jetty.server.Server#doStart: Started Server@4ba302e0[STARTING][10.0.20,sto=0] @1761ms
2024-04-08 18:37:55.586+0000 [id=27] INFO winstone.Logger$logInternal: Winstone Servlet Engine running: controlPort=disabled
2024-04-08 18:37:55.758+0000 [id=35] INFO jenkins.InitReactorRunner$1onAttained: Started initialization
2024-04-08 18:37:55.771+0000 [id=42] INFO jenkins.InitReactorRunner$1onAttained: Listed all plugins
2024-04-08 18:37:56.345+0000 [id=37] INFO jenkins.InitReactorRunner$1onAttained: Prepared all plugins
2024-04-08 18:37:56.349+0000 [id=33] INFO jenkins.InitReactorRunner$1onAttained: Started all plugins
2024-04-08 18:37:56.354+0000 [id=46] INFO jenkins.InitReactorRunner$1onAttained: Augmented all extensions
2024-04-08 18:37:56.515+0000 [id=46] INFO jenkins.InitReactorRunner$1onAttained: System config loaded
2024-04-08 18:37:56.515+0000 [id=33] INFO jenkins.InitReactorRunner$1onAttained: System config adapted
2024-04-08 18:37:56.516+0000 [id=33] INFO jenkins.InitReactorRunner$1onAttained: Loaded all jobs
2024-04-08 18:37:56.517+0000 [id=35] INFO jenkins.InitReactorRunner$1onAttained: Configuration for all jobs updated
2024-04-08 18:37:56.534+0000 [id=61] INFO hudson.util.Retrier$start: Attempt #1 to do the action check updates server
2024-04-08 18:37:56.864+0000 [id=37] INFO jenkins.Install.SetupWizard$init:

*****
*****
*****
*****

Jenkins initial setup is required. An admin user has been created and a password generated.
Please use the following password to proceed to installation:

5dfe9d8cd4bb498b824b484bfde3a8c47

This may also be found at: /var/jenkins_home/secrets/initialAdminPassword

*****
*****
*****
*****
```

open jenkins URL

Getting Started

Unlock Jenkins

To ensure Jenkins is securely set up by the administrator, a password has been written to the log ([not sure where to find it?](#)) and this file on the server:

`/var/jenkins_home/secrets/initialAdminPassword`

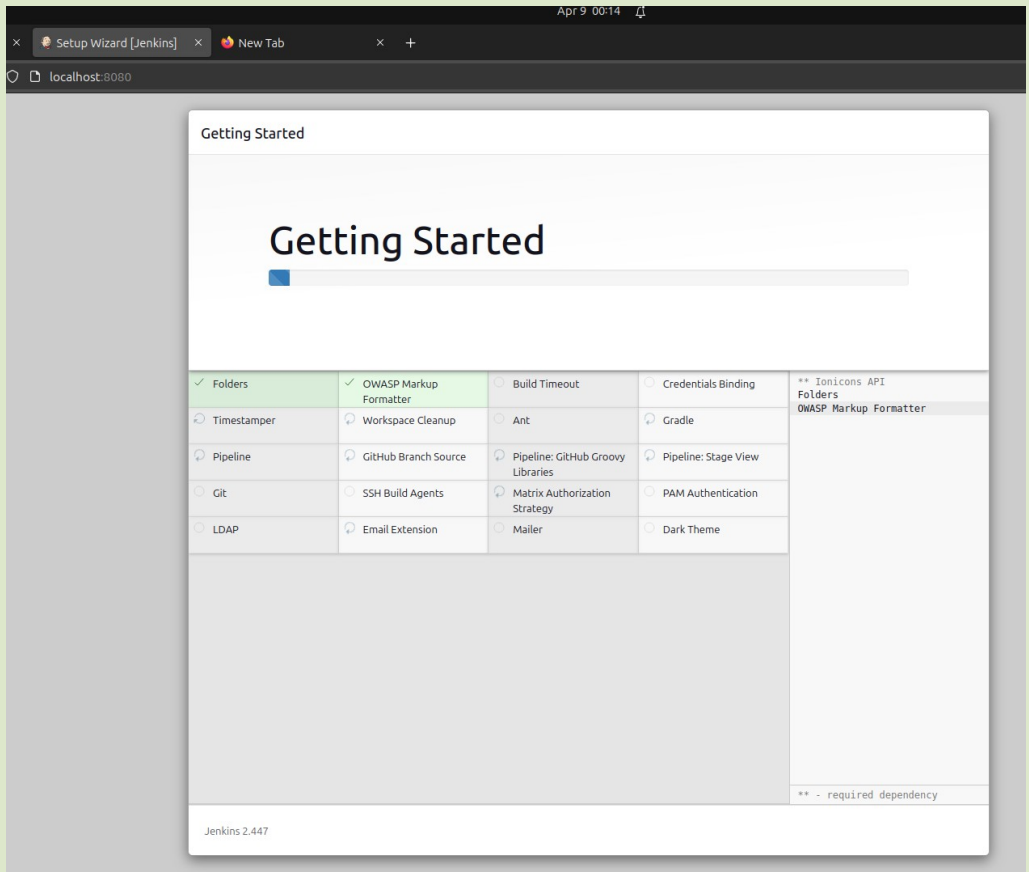
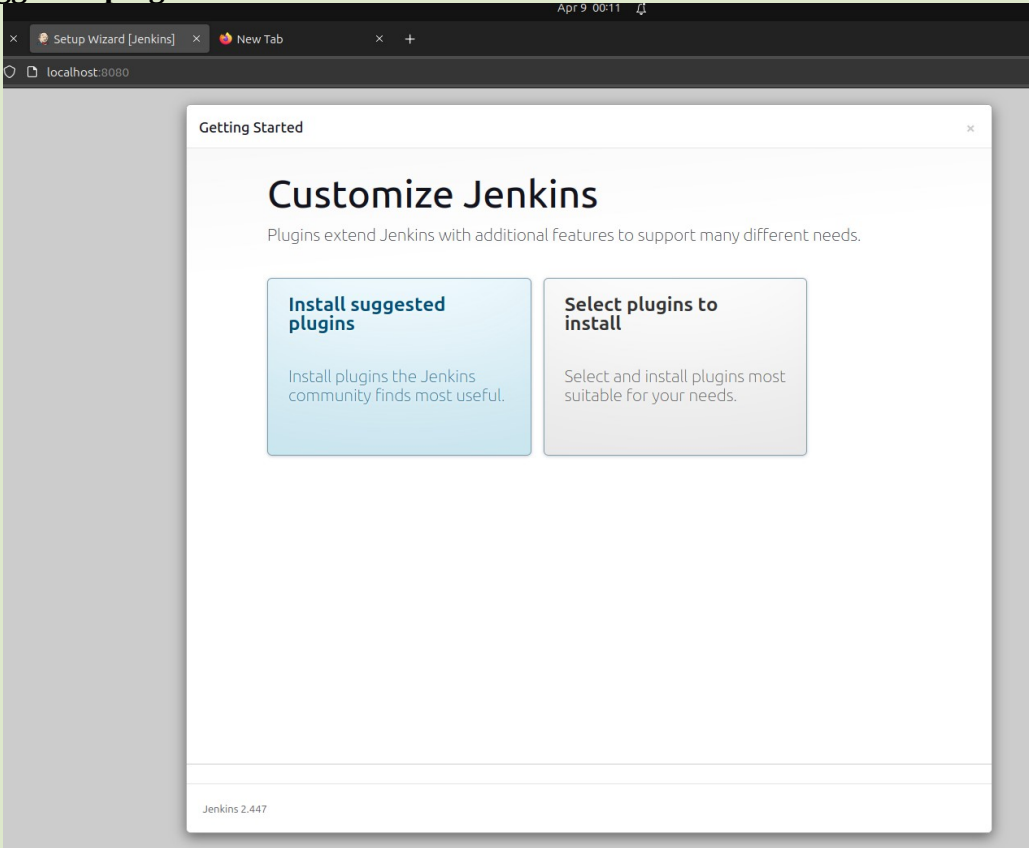
Please copy the password from either location and paste it below.

Administrator password

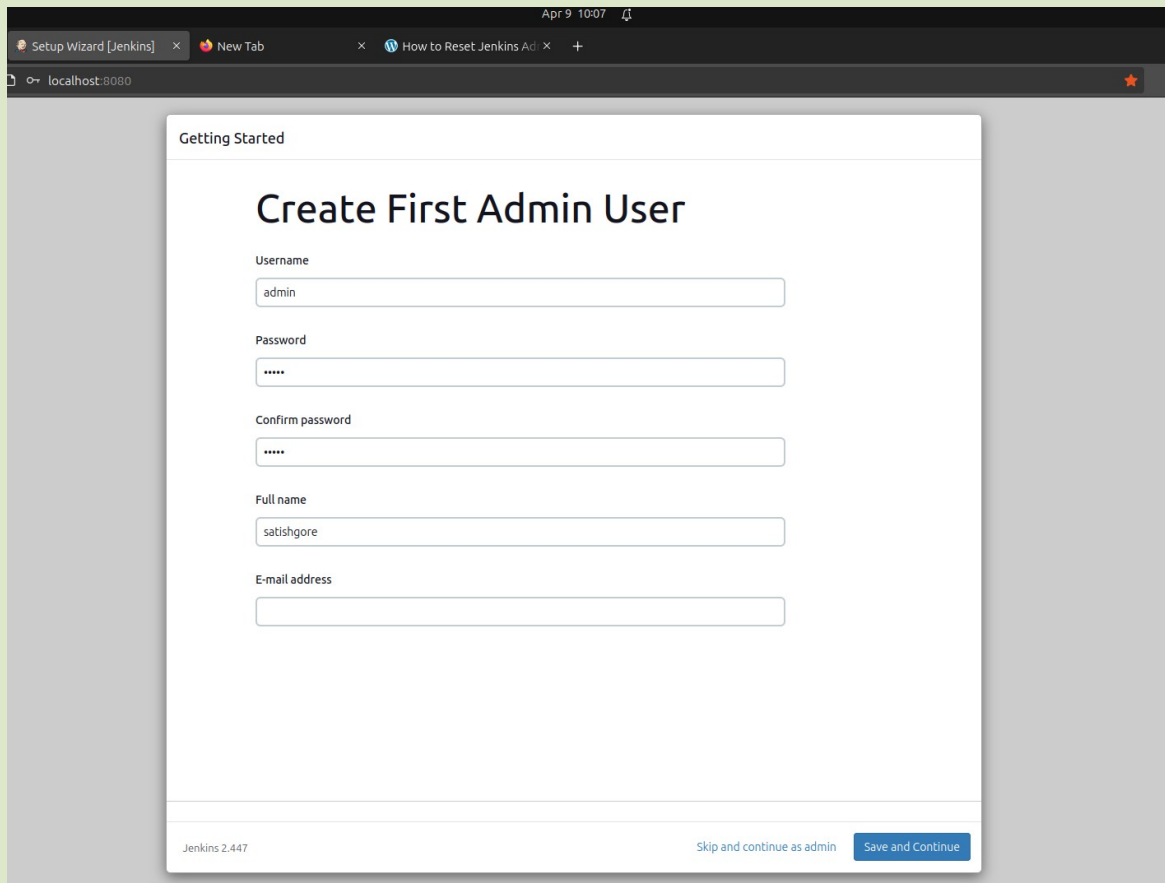
[Continue](#)

enter your password key and click on continue.

install suggested plugins



Create First USER



The screenshot shows a web browser window with the address bar displaying 'localhost:8080'. The page title is 'Getting Started'. The main heading is 'Create First Admin User'. The form contains the following fields: 'Username' (with 'admin' entered), 'Password' (with '*****' entered), 'Confirm password' (with '*****' entered), 'Full name' (with 'satishgore' entered), and 'E-mail address' (empty). At the bottom, there are two buttons: 'Skip and continue as admin' and 'Save and Continue'. The footer of the page indicates 'Jenkins 2.447'.

Getting Started

Create First Admin User

Username
admin

Password

Confirm password

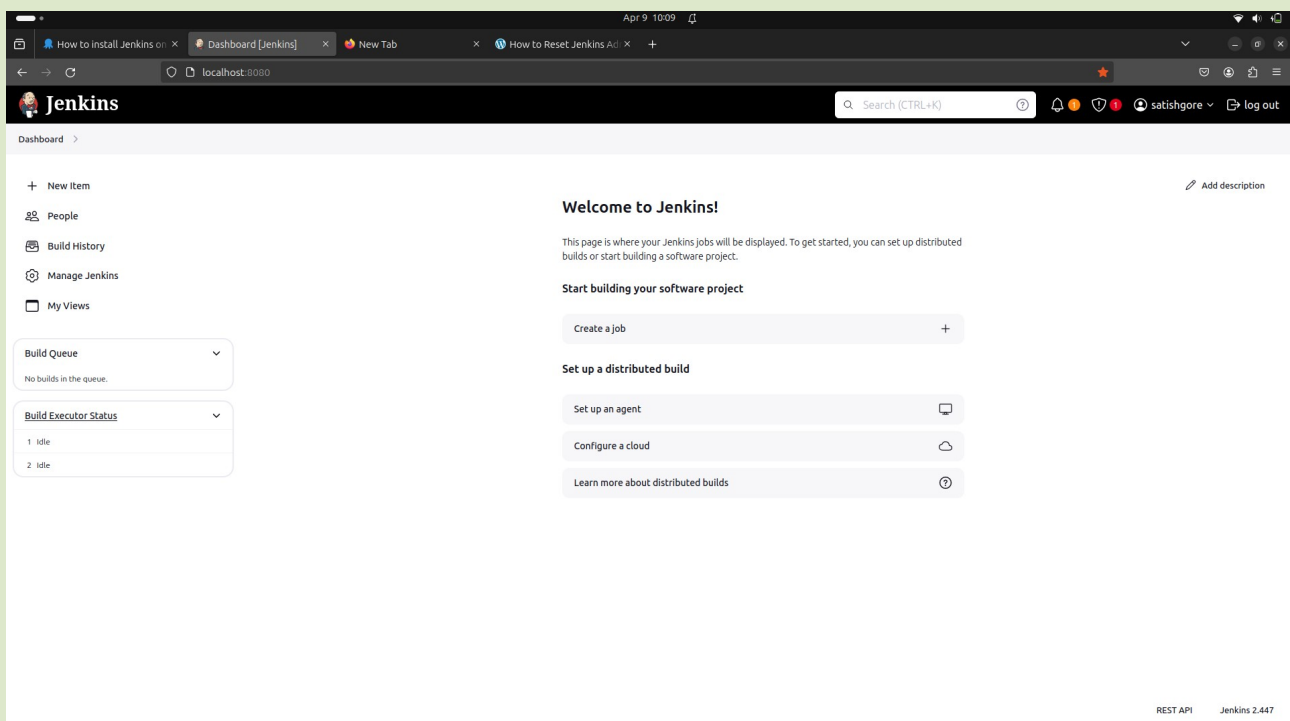
Full name
satishgore

E-mail address

Jenkins 2.447

[Skip and continue as admin](#) [Save and Continue](#)

Jenkins Dashboard



The screenshot shows the Jenkins Dashboard in a web browser. The top navigation bar includes the Jenkins logo, a search bar, and user information (satishgore) with a 'log out' link. The left sidebar contains a 'Dashboard' link and a list of items: 'New Item', 'People', 'Build History', 'Manage Jenkins', and 'My Views'. The main content area features a 'Welcome to Jenkins!' message, a description of the dashboard's purpose, and two sections: 'Start building your software project' with a 'Create a job' button, and 'Set up a distributed build' with buttons for 'Set up an agent', 'Configure a cloud', and 'Learn more about distributed builds'. The footer shows 'REST API' and 'Jenkins 2.447'.

Jenkins

Search (CTRL+K)

satishgore log out

Dashboard

- + New Item
- People
- Build History
- Manage Jenkins
- My Views

Build Queue
No builds in the queue.

Build Executor Status
1 Idle
2 Idle

Welcome to Jenkins!

This page is where your Jenkins jobs will be displayed. To get started, you can set up distributed builds or start building a software project.

Start building your software project

Create a job

Set up a distributed build

Set up an agent
Configure a cloud
Learn more about distributed builds

REST API Jenkins 2.447