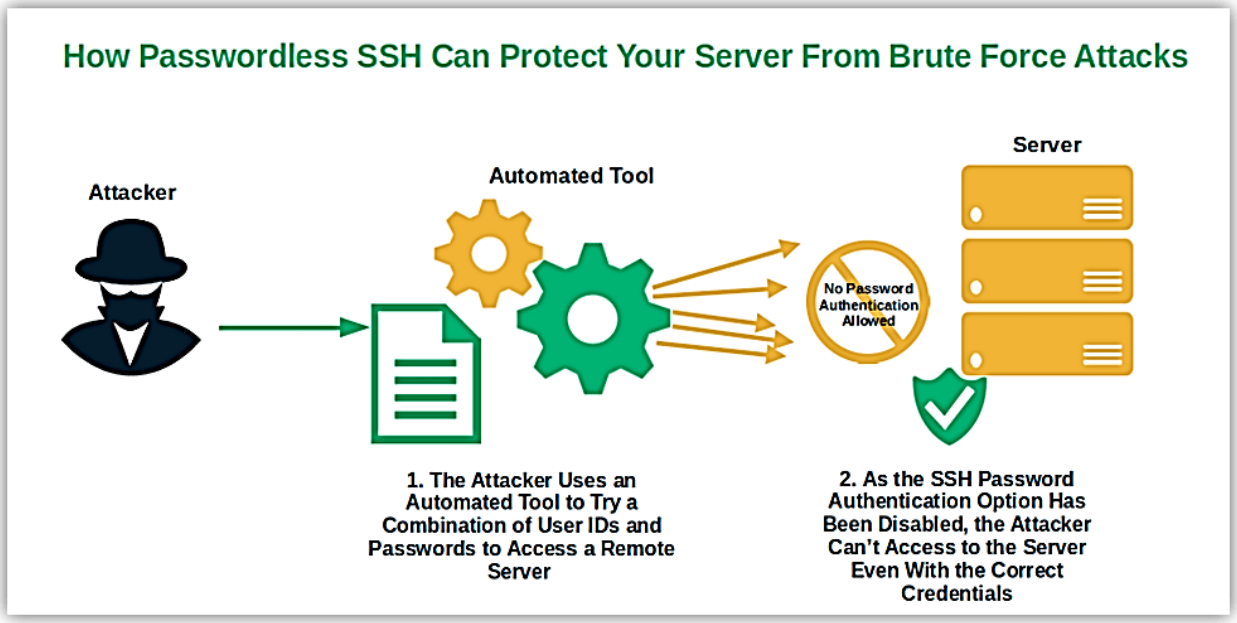
# Master Password-less SSH: Complete Guide to Secure Remote Access from Windows to Linux VMs

## 🔑 What is Passwordless SSH

Passwordless SSH (also known as key-based SSH authentication) is a secure method of logging into Linux systems without typing a password.

Instead of using traditional passwords, it relies on **cryptographic key pairs** (private key on the client and public key on the server) for authentication.

This approach eliminates the risk of brute-force password attacks and provides faster, automated, and more secure access to remote systems.

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## 🌎 Why Passwordless SSH

- **Security Upgrade:** Protects against weak passwords and brute-force attacks since no password is transmitted over the network.
- **Automation Friendly:** Ideal for scripts, DevOps pipelines, and system management tasks where manual password entry is not practical.
- **Faster Access:** No need to type a password every time, saving time when frequently logging into servers.
- **Centralized Trust Model:** Allows secure connection only if the client has the right private key.
- **Compliance & Best Practice:** Recommended in enterprise environments to meet security standards.

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## ⚡ Where we use Passwordless SSH

- **Server Administration:** Sysadmins/DevOps engineers connect to multiple servers quickly and securely.
- **Automated Deployments:** Tools like Ansible, Jenkins, or Kubernetes clusters rely on passwordless SSH for configuration and deployments.
- **Backup & File Transfers:** Secure, automated file transfer with rsync or scp without needing user intervention.
- **Cloud & Virtualization:** Widely used in AWS, GCP, and Azure environments for secure access to cloud servers.
- **Security Hardening:** Once keys are set, password login can be disabled, reducing attack vectors.

# Ubuntu

## Step 1: Verify SSH Client Installation on Windows.

```
PS C:\Users\UDDHAV> ssh -V
OpenSSH_for_Windows_9.5p1, LibreSSL 3.8.2
PS C:\Users\UDDHAV>
```

**Purpose:** Confirms that OpenSSH client is installed on your Windows machine and displays the version. This is essential before proceeding with SSH key generation and remote connections.

**Why this command:** Without SSH client installed, you cannot generate keys or connect to remote servers. This verification step ensures your Windows system is ready for SSH operations.

## Step 2: Generate RSA Key Pair

```
PS C:\Users\UDDHAV\.ssh> ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (C:\Users\UDDHAV/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in C:\Users\UDDHAV/.ssh/id_rsa
Your public key has been saved in C:\Users\UDDHAV/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:jc3XY2kfTNS7J/ztekQbInoK5yv0t0rOYvrB3HOoCTY uddhav@LAPTOP-462FPFKJ
The key's randomart image is:
+---[RSA 3072]----+
|               ..|
|              . .|
|               ..|
|         = . oo+.|
|        S = o.B++|
|      oo.o.o oo=+|
|     E.+==o.   ++|
|    . o+B+o.    +|
|     .++o=+.. .+.|
+----[SHA256]-----+
PS C:\Users\UDDHAV\.ssh>
```

**Why this command:** Creates a public/private RSA key pair. The private key stays on your Windows machine, while the public key will be copied to VMs for authentication without passwords.

## Step 3: Verify Generated SSH Keys

```
PS C:\Users\UDDHAV\.ssh> ls


    Directory: C:\Users\UDDHAV\.ssh


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a----         9/29/2025   9:46 AM           2610 id_rsa
-a----         9/29/2025   9:46 AM            577 id_rsa.pub
-a----         9/29/2025   9:26 AM           1476 known_hosts
-a----         9/29/2025   9:26 AM           1300 known_hosts.old
-a----         3/19/2025   9:15 PM           1462 new.ppk
-a----         4/10/2025   8:51 PM             98 windo.rdp
-a----         4/10/2025   8:57 PM             97 window.rdp
```

**Why this command:** (ls) Confirms that both the private key (id_rsa) and public key (id_rsa.pub) were successfully created. These are the essential files needed for passwordless authentication.

## Step 4: Edit sshd configuration (enable root & pubkey auth)

```
#LoginGraceTime 2m
PermitRootLogin yes
#StrictModes yes
#MaxAuthTries 6
#MaxSessions 10

PubkeyAuthentication yes

# Expect .ssh/authorized_keys2 to be disregarded by default in future.
#AuthorizedKeysFile     .ssh/authorized_keys .ssh/authorized_keys2

#AuthorizedPrincipalsFile none

#AuthorizedKeysCommand none
#AuthorizedKeysCommandUser nobody

# For this to work you will also need host keys in /etc/ssh/ssh_known_hosts
#HostbasedAuthentication no
# Change to yes if you don't trust ~/.ssh/known_hosts for
# HostbasedAuthentication
#IgnoreUserKnownHosts no
# Don't read the user's ~/.rhosts and ~/.shosts files
#IgnoreRhosts yes

# To disable tunneled clear text passwords, change to no here!
PasswordAuthentication yes
#PermitEmptyPasswords no
```

What to change / check inside the file (ensure these lines exist or are uncommented):

- PermitRootLogin yes
- PubkeyAuthentication yes
- (optionally while testing) PasswordAuthentication yes
- later set PasswordAuthentication no after keys work

**Why:**
You must tell the SSH daemon to allow root login and accept public-key authentication.
PermitRootLogin yes allows root to log in (required if you want direct root SSH).
PubkeyAuthentication yes enables using authorized_keys. Keep PasswordAuthentication yes while setting up so you can still login with password if something breaks; disable it after verifying keys.

## Step 5: Restart SSH to load new config

```
root@ubuntu:~# vi /etc/ssh/sshd_config
root@ubuntu:~# systemctl restart ssh
root@ubuntu:~# systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
     Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: enabled)
     Active: active (running) since Mon 2025-09-29 09:54:53 IST; 5s ago
       Docs: man:sshd(8)
             man:sshd_config(5)
    Process: 2202 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
   Main PID: 2203 (sshd)
      Tasks: 1 (limit: 5787)
     Memory: 1.0M
     CGroup: /system.slice/ssh.service
             └─2203 sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups

Sep 29 09:54:53 ubuntu systemd[1]: Stopping OpenBSD Secure Shell server...
Sep 29 09:54:53 ubuntu systemd[1]: ssh.service: Succeeded.
Sep 29 09:54:53 ubuntu systemd[1]: Stopped OpenBSD Secure Shell server.
Sep 29 09:54:53 ubuntu systemd[1]: Starting OpenBSD Secure Shell server...
Sep 29 09:54:53 ubuntu sshd[2203]: Server listening on 0.0.0.0 port 22.
Sep 29 09:54:53 ubuntu sshd[2203]: Server listening on :: port 22.
Sep 29 09:54:53 ubuntu systemd[1]: Started OpenBSD Secure Shell server.
```

**Why:**
Changes in sshd_config only take effect after the SSH service is reloaded/restarted.
Confirm sshd is running and there are no startup errors (you'll see active (running) if OK).

```
root@ubuntu:~# exit
logout
uddhav@ubuntu:~$ exit
logout
Connection to 10.46.111.114 closed.
PS C:\Users\UDDHAV>
```

## Step 6: Generate SSH keypair on Windows (if not already)

On Windows PowerShell (run as your normal user, not root):

```
PS C:\Users\UDDHAV\.ssh> scp C:\Users\UDDHAV\.ssh\id_rsa.pub root@10.46.111.114
        1 file(s) copied.
PS C:\Users\UDDHAV\.ssh>
```

Why:
You need a public/private keypair. The public key goes to the server (authorized_keys), the private key stays on your Windows machine and is used to authenticate you.

## Step 7: Copy the public key from Windows to the Ubuntu server

Using scp (as shown in your screenshots):
From PowerShell (example):

```
PS C:\Users\UDDHAV\.ssh> scp C:\Users\UDDHAV\.ssh\id_rsa.pub root@10.46.111.114:/root/.ssh/authorized_keys
root@10.46.111.114's password:
id_rsa.pub                                                    100%  577   187.8KB/s   00:00
PS C:\Users\UDDHAV\.ssh>
```

Why:
This copies your id_rsa.pub into /root/ on the Ubuntu server so you can append it to root's authorized_keys.

## Step 8: Verify authorized_keys contains your key

```
root@ubuntu:~# cat /root/.ssh/authorized_keys
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABgQC8Jah+ZF+fdq2KLMsiO4ohjm6zBiH8Yoj50Fn1EK0m043zaqDgvFLGcg7NdhEiTDqTc/NGxwBS
OqGSYe5lB1xZHL9rg31vtB5kD1Tzw+kIm3mXUTdHS4EWJee26n8Q60gsBwWQs/vXX6dmPBwiU3quWBxXRY/70t+NfmiDMBSBviczxPhDKv4H9UwZ
6GugXPhEFO4kPYy3WZ3gGvDsCS8+FpvqJ3hLed/We4GIUhB6et9NlqyvTgdnZ6lWjv29lMB8un4TRGCFQKi1M8fMtkAGDXdJ9G8SR6aQyr91iKuw
FqgL646TfcNS7wIOKnPr5Th25dNO/aNLzwM0b/DR+0Tdf5LGAYxRncRkSAM47Ym9g25eDrKLRcXuO8jqk2oBJEUxvm0A7/LIQyeCtYa2HmIoDTQy
9cG0C3P1+1kw+H+VX0fowu8yo+hU5Cj/IAAKHkVv3QrMm3463EwEEB3txwGKuFRdHkX7ckX4sHAWEx46CZmIVbHYQbRYCLcOMu6JrOE= uddhav@
LAPTOP-462FPFKJ
root@ubuntu:~#
```

## Set correct permissions (critical)

```
root@ubuntu:~# chmod 600 /root/.ssh/authorized_keys
root@ubuntu:~# chmod 700 /root/.ssh/
root@ubuntu:~#
```

Why:
OpenSSH is strict about permissions. The .ssh directory must be 700 (owner only), and authorized_keys must be 600 (read/write owner only). Wrong permissions will cause the SSH server to ignore authorized_keys.

## Step 9: Harden SSHD config after successful key login

```
root@ubuntu:~# vi /etc/ssh/sshd_config
root@ubuntu:~# root@ubuntu:~#
```

Change to:

PasswordAuthentication no # disable password auth entirely (if you're ready)

Then:

sudo systemctl restart ssh

```
#IgnoreRhosts yes

# To disable tunneled clear text passwords, change to no here!
PasswordAuthentication no
#PermitEmptyPasswords no

# Change to yes to enable challenge-response passwords (beware issues with
# some PAM modules and threads)
```

Why:
Once key-based auth works, disable password authentication to prevent brute-force password attacks. prohibit-password (or without-password on older OpenSSH) allows root with publickey only.

## Step 10: Take the SSH of VM from the Windows System.

```
PS C:\Users\UDDHAV> ssh root@10.46.111.114
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.15.0-139-generic x86_64)

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

 * Introducing Expanded Security Maintenance for Applications.
   Receive updates to over 25,000 software packages with your
   Ubuntu Pro subscription. Free for personal use.

     https://ubuntu.com/pro

Expanded Security Maintenance for Infrastructure is not enabled.

0 updates can be applied immediately.

Enable ESM Infra to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

New release '22.04.5 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Your Hardware Enablement Stack (HWE) is supported until April 2025.
root@ubuntu:~#
```

Why:
Look here we are able to login directly without entering the password.

This Password-Less Task has successfully done on the UBUNTU.

Now Let’s check for the OpenSUSE.

# OpenSUSE

Follow the all steps same as we did for the Ubuntu.

```
#LoginGraceTime 2m
PermitRootLogin yes
#StrictModes yes
#MaxAuthTries 6
#MaxSessions 10

PubkeyAuthentication yes

# The default is to check both .ssh/authorized_keys and .ssh/authorized_keys2
# but this is overridden so installations will only check .ssh/authorized_keys
AuthorizedKeysFile      .ssh/authorized_keys

#AuthorizedPrincipalsFile none

#AuthorizedKeysCommand none
#AuthorizedKeysCommandUser nobody

# For this to work you will also need host keys in /etc/ssh/ssh_known_hosts
#HostbasedAuthentication no
# Change to yes if you don't trust ~/.ssh/known_hosts for
# HostbasedAuthentication
#IgnoreUserKnownHosts no
# Don't read the user's ~/.rhosts and ~/.shosts files
#IgnoreRhosts yes

# To disable tunneled clear text passwords, change to no here!
PasswordAuthentication yes
#PermitEmptyPasswords no
```

```
PS C:\Users\UDDHAV> scp C:\Users\UDDHAV\.ssh\id_rsa.pub root@10.46.111.196:/root/.ssh/authorized_keys
(root@10.46.111.196) Password:
id_rsa.pub                                                    100%  577   187.8KB/s   00:00
PS C:\Users\UDDHAV>
```

```
opensuse:~ # systemctl restart sshd
opensuse:~ # systemctl status sshd
● sshd.service - OpenSSH Daemon
     Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; preset: disabled)
     Active: active (running) since Mon 2025-09-29 10:15:23 IST; 4s ago
    Process: 10680 ExecStartPre=/usr/sbin/sshd-gen-keys-start (code=exited, status=0/SUCCESS)
    Process: 10682 ExecStartPre=/usr/sbin/sshd -t $SSHD_OPTS (code=exited, status=0/SUCCESS)
   Main PID: 10685 (sshd)
      Tasks: 1
        CPU: 28ms
     CGroup: /system.slice/sshd.service
             └─10685 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Sep 29 10:15:23 opensuse systemd[1]: Starting OpenSSH Daemon...
Sep 29 10:15:23 opensuse sshd-gen-keys-start[10680]: Checking for missing server keys in /etc/ssh
Sep 29 10:15:23 opensuse sshd[10685]: Server listening on 0.0.0.0 port 22.
Sep 29 10:15:23 opensuse sshd[10685]: Server listening on :: port 22.
Sep 29 10:15:23 opensuse systemd[1]: Started OpenSSH Daemon.
opensuse:~ #
```

```
opensuse:~ # chmod 600 /root/.ssh/authorized_keys
opensuse:~ # chmod 700 /root/.ssh
opensuse:~ #
```

```
# Don't read the user's ~/.rhosts and ~/.shosts files
#IgnoreRhosts yes

# To disable tunneled clear text passwords, change to no here!
PasswordAuthentication no
#PermitEmptyPasswords no
```

```
PS C:\Users\UDDHAV> ssh root@10.46.111.196
Have a lot of fun...
Last login: Mon Sep 29 10:16:45 2025 from 10.46.111.68
opensuse:~ #
```

Here also it didn’t ask for the password…