

SVKM'S NMIMS Nilkamal School of Mathematics, Applied Statistics & Analytics
Master of Science (Statistics & Data Science)

Practical7: Creating and running virtual machines on BareMetal Hypervisors type 0

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1)Bare-Metal Hypervisors

A bare-metal hypervisor, also known as a Type 1 hypervisor, is virtualization software that runs directly on the host's hardware, without requiring an underlying operating system. This setup allows the hypervisor to have direct access to the hardware resources, resulting in improved performance, security, and efficiency. Bare-metal hypervisors are commonly used in data centers and enterprise environments where high-performance virtual machine (VM) hosting is essential.

2) Bare-Metal Hypervisors Type 0

Type 0 hypervisors are highly specialized, vendor-specific hypervisors built directly into the hardware (firmware or microcode) rather than as a separate software layer. Type 0 hypervisors are often found in large, specialized hardware systems where the hypervisor functions as a minimal layer that handles virtualization tasks, allowing for close integration with hardware resources. These hypervisors are generally more efficient but less flexible, as they are tailored for specific hardware use cases.

Examples: IBM PR/SM (Processor Resource/Systems Manager), Hitachi's Virtage.

3) Bare-Metal Hypervisors Type 1

Type 1 hypervisors, often simply called bare-metal hypervisors, are installed directly on the physical hardware. They control the hardware resources and allow

multiple virtual machines to run independently on the host. Type 1 hypervisors offer high performance, reliability, and security, as they are optimized for managing virtualized environments in production.

****Examples****: VMware ESXi, Microsoft Hyper-V, Citrix XenServer.

4)VMware

VMware is a company specializing in cloud computing and virtualization technology, and it is best known for its Type 1 hypervisor, VMware ESXi. VMware's suite of products includes both enterprise-level and desktop-level virtualization solutions. VMware ESXi is widely used in enterprise environments due to its reliability, performance, and rich feature set, including advanced management and automation tools.

VMware also offers VMware Workstation and VMware Fusion, which are desktop virtualization products (Type 2 hypervisors) that run on top of existing operating systems, such as Windows and macOS. These solutions are geared more towards individual users or developers rather than large-scale, production-grade virtualization.

5)VirtualBox

VirtualBox is an open-source Type 2 hypervisor developed by Oracle. It allows users to run multiple operating systems on a single machine by installing the hypervisor as an application on a host operating system. VirtualBox is popular among developers, testers, and students due to its flexibility, cross-platform support, and cost-effectiveness.

As a Type 2 hypervisor, VirtualBox runs on top of an existing operating system, which makes it easy to install and use but may have slightly lower performance and

security compared to Type 1 hypervisors. However, it provides an accessible entry point for running virtual machines on personal computers for testing, learning, and development.

Virtualisation

MOBAXTERM

Using Ubuntu Instance

Create EC2 instance on AWS for Ubuntu

Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.

Name and tags [Info](#)

Name

moba

Add additional tags

▼ Application and OS Images (Amazon Machine Image) [Info](#)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

Q Search our full catalog including 1000s of application and OS images

Recents | **Quick Start**

Amazon Linux

aws

macOS

Mac

Ubuntu

ubuntu

Windows

Microsoft

Red Hat

Red Hat

SUSE Li

SUS

Q

Browse more AMIs

Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

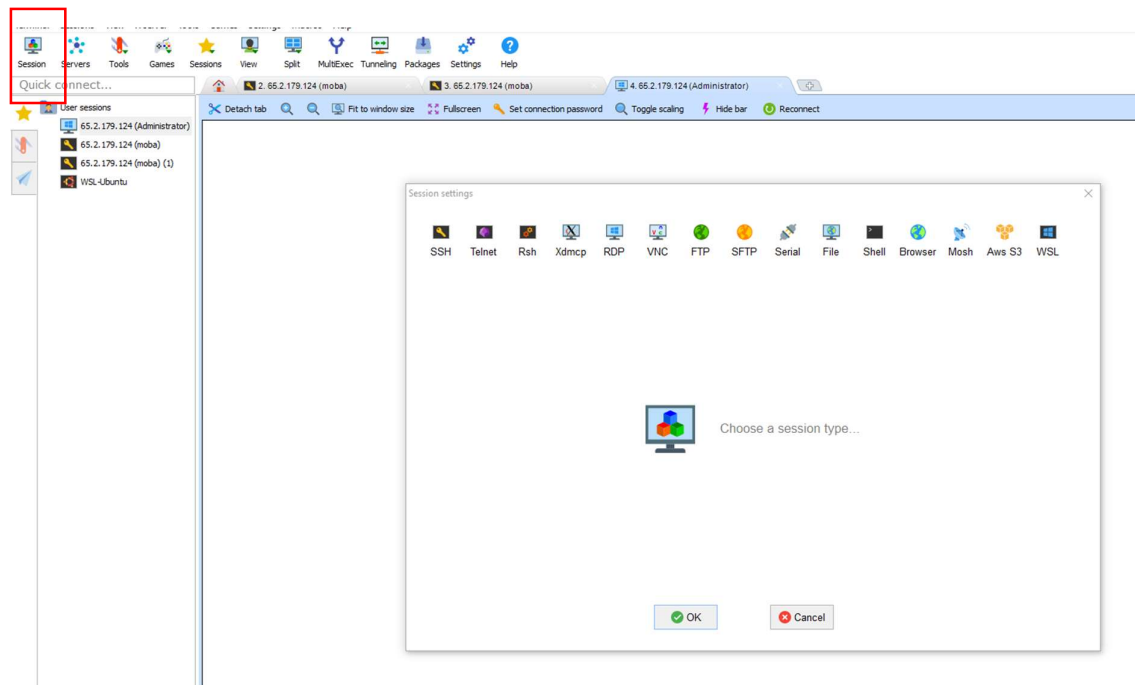
Ubuntu Server 24.04 LTS (HVM), SSD Volume Type
ami-0522ab6e1ddcc7055 (64-bit (x86)) / ami-0000791bad666add5 (64-bit (Arm))
Virtualization: hvm ENA enabled: true Root device type: ebs

Free tier eligible ▼

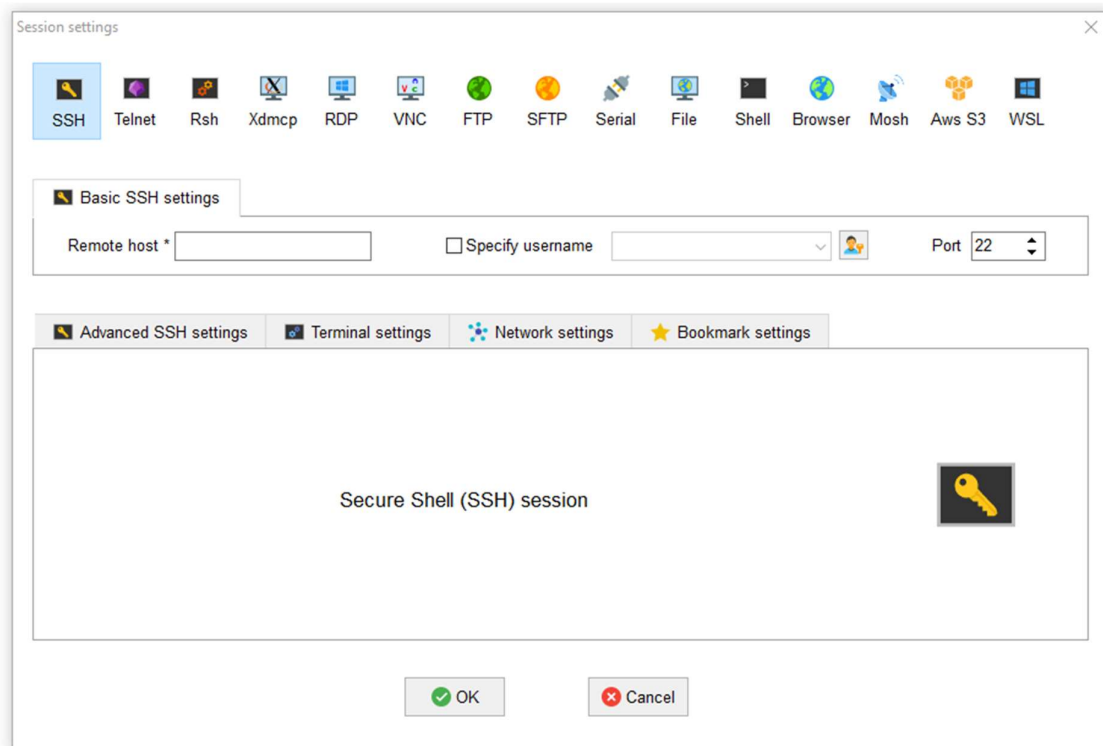
Create a new key pair and launch the instance.

Connect the instance once ready and copy the public IP address

Open MOBAXTERM and click on Session



Select SSH and insert public IP address in remote host



Choose specify username and insert instance's name

Select Advanced SSH settings

Advanced SSH settings

Terminal settings

Network settings

Bookmark settings

☒ X11-Forwarding
☒ Compression
Remote environment: Interactive shell

Execute command:
☐ Do not exit after command ends

SSH-browser type: SFTP protocol
☐ Follow SSH path (experimental)

☐ Use private key

Expert SSH settings

Execute macro at session start: <none>

Select use private key and attach the new key pair file created and press okay

Using Windows

Create an EC2 instance with windows server

Create new key pair and launch the instance.

While connecting the instance open the RDP client section for Username and password

EC2 Dashboard

EC2 Global View

Events

Instances

Instances

Instance Types

Launch Templates

Spot Requests

Savings Plans

Reserved Instances

Dedicated Hosts

Capacity Reservations

Images

AMIs

AMI Catalog

Elastic Block Store

Volumes

Snapshots

Lifecycle Manager

Network & Security

Security Groups

Elastic IPs

Placement Groups

Key Pairs

Network Interfaces

Load Balancing

EC2 > Instances > i-0025b9d4d87fd8a7a (mobawindow)

Instance summary for i-0025b9d4d87fd8a7a (mobawindow)

Updated less than a minute ago

Instance ID

i-0025b9d4d87fd8a7a (mobawindow)

Public IPv4 address

13.201.97.201 | [open address](#)

Private IPv4 addresses

172.31.44.38

IPv6 address

-

Instance state

Running

Public IPv4 DNS

ec2-13-201-97-201.ap-south-1.compute.amazonaws.com | [open address](#)

Hostname type

IP name: ip-172-31-44-38.ap-south-1.compute.internal

Private IP DNS name (IPv4 only)

ip-172-31-44-38.ap-south-1.compute.internal

Answer private resource DNS name

IPv4 (A)

Elastic IP addresses

-

Auto-assigned IP address

13.201.97.201 [Public IP]

AWS Compute Optimizer finding

Opt-in to AWS Compute Optimizer for recommendations. | [Learn more](#)

IAM Role

-

Subnet ID

subnet-0cb25aa91b94bd990

Auto Scaling Group name

-

VPC ID

vpc-0183f61466a34dc45

Instance type

t2.micro

Instance ARN

arn:aws:ec2:ap-south-1:058264326903:instance/i-0025b9d4d87fd8a7a

Details

Status and alarms

Monitoring

Security

Networking

Storage

Tags

Instance details

Platform

Windows

Platform details

Windows

Stop protection

Disabled

AMI ID

ami-055284fc22a2c3f82

AMI name

Windows_Server-2022-English-Full-Base-2024.09.11

Launch time

Sat Sep 28 2024 16:21:05 GMT+05:30 (India Standard Time) (13 minutes)

Monitoring

disabled

Termination protection

Disabled

AMI location

amazon/Windows_Server-2022-English-Full-Base-2024.09.11

Open mobaxterm and Select Sessions>RDP

Session settings

SSH

Telnet

Rsh

Xdmcp

RDP

VNC

FTP

SFTP

Serial

File

Shell

Browser

Mosh

Aws S3

WSL

Basic Rdp settings

Remote host *

Username

Port 3389

Advanced Rdp settings

Network settings

Bookmark settings

RDP (terminal services) session

OK

Cancel

Copy the Public IP address and username from Window instance :

Instance summary for i-0025b9d4d87fd8a7a (mobawindow) Info		
Updated 2 minutes ago		
<div>Instance ID</div> <div>i-0025b9d4d87fd8a7a (mobawindow)</div>	<div>Public IPv4 address</div> <div>13.201.97.201 open address</div>	<div>Private IPv4 addresses</div> <div>172.31.44.38</div>
<div>IPv6 address</div> <div>-</div>	<div>Instance state</div> <div>Running</div>	<div>Public IPv4 DNS</div> <div>ec2-13-201-97-201.ap-south-1.compute.amazonaws.com open address</div>
<div>Hostname type</div> <div>IP name: ip-172-31-44-38.ap-south-1.compute.internal</div>	<div>Private IP DNS name (IPv4 only)</div> <div>ip-172-31-44-38.ap-south-1.compute.internal</div>	<div>Elastic IP addresses</div> <div>-</div>
<div>Answer private resource DNS name</div> <div>IPv4 (A)</div>	<div>Instance type</div> <div>t2.micro</div>	<div>AWS Compute Optimizer finding</div> <div>Opt-in to AWS Compute Optimizer for recommendations. Learn more</div>
<div>Auto-assigned IP address</div> <div>13.201.97.201 [Public IP]</div>	<div>VPC ID</div> <div>vpc-0183f61466a34dc43</div>	<div>Auto Scaling Group name</div> <div>-</div>
<div>IAM Role</div> <div>-</div>	<div>Subnet ID</div> <div>subnet-0cb25aa91b94bd990</div>	
<div>IMDSv2</div> <div>Required</div>	<div>Instance ARN</div> <div>arn:aws:ec2:ap-south-1:058264326903:instance/i-0025b9d4d87fd8a7a</div>	

Details

Status and alarms

Monitoring

Security

Networking

Storage

Tags

Connect to instance [Info](#)

Connect to your instance i-0025b9d4d87fd8a7a (mobawindow) using any of these options

Session Manager

RDP client

EC2 serial console

Instance ID


 i-0025b9d4d87fd8a7a (mobawindow)

Connection Type

☒ **Connect using RDP client**

Download a file to use with your RDP client and retrieve your password.

☐ **Connect using Fleet Manager**

To connect to the instance using Fleet Manager Remote Desktop, the SSM Agent must be installed and running on the instance. For more information, see [Working with SSM Agent](#) 

You can connect to your Windows instance using a remote desktop client of your choice, and by downloading and running the RDP shortcut file below:

 **Download remote desktop file**

When prompted, connect to your instance using the following username and password:

Public DNS




ec2-13-201-97-201.ap-south-1.compute.amazonaws.com

Username [Info](#)



Administrator ▼

Password [Get password](#)

 If you've joined your instance to a directory, you can use your directory credentials to connect to your instance.

Now we need to decrypt the password by uploading the key pair file created.

[EC2](#) > [Instances](#) > [i-0025b9d4d87fd8a7a](#) > [Get Windows password](#)

Get Windows password [Info](#)

Use your private key to retrieve and decrypt the initial Windows administrator password for this instance.

Instance ID

 [i-0025b9d4d87fd8a7a](#) (mobawindow)

Key pair associated with this instance

 windowkeyy

Private key

Either upload your private key file or copy and paste its contents into the field below.

 Upload private key file

 windowkeyy.pem
1.678KB

Private key contents - *optional*

```
-----BEGIN RSA PRIVATE KEY-----
MIIEpAIBAAKCAQEA8oSBzjbAlu9u04HaGKTABxImyMpTnrXH/VxeNivn7gcGNDt
Hb+avqerPLfWVUjZp2gGyuodM7rbETFEccmS+5Eq52GBFJIZV7qZwOC6st7IqCpW
bvUrL2MUFwZPgLY6YP0ZgS9A5AHGK9U5MRCfB6WNCQjF1KOSABeebTnStDj5NXz
XiUPtux2tCA6VSVmp33WxE5uAKnIY024sb0BkaViFo5pnwTgiUjLupKQETSCgA1/
p0/GsA0PnNmLLXZCIWVuFNEh8orTdnICQ7dFI4BOyCMLy3DJhular4EqVH5Zne/g
N30JsMhdRc17qyk4dcMEC623WwwODEqqsvBzYQIDAQABAoIBABvVvZhPjHdGb+/y
vXeKoUdXgwn1VS5exwYyA54dMLsiRIdMo4qAjWBImkzTxNPxEpo2RGFR0Zw4XCBz
```

Cancel

Decrypt password

The password is decrypted

And now after entering the password the Virtual environment is created .