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**Sathyabama Institute of Science and Technology
(Deemed to be University)**

Submitted in partial fulfilment of the requirements for the award of Bachelor
of Engineering Degree in Information Technology and Engineering

By

Saragadam Layanandan

(Reg.No.40120082)



DEPARTMENT OF INFORMATION TECHNOLOGY

SCHOOL OF COMPUTING

**SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY
JEPPIAAR NAGAR, RAJIV GANDHI SALAI,
CHENNAI – 600119, TAMILNADU**

APRIL 2023



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

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(Established under Section 3 of UGC Act, 1956)

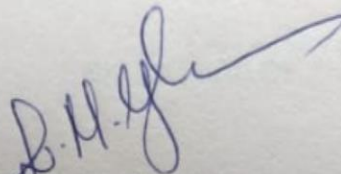


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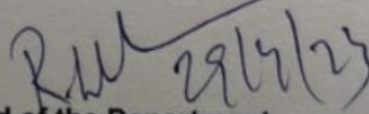
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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the Bonafide work of Saragadam Layanandan who carried out the project entitled "Creating Virtual Machines and Networking the Machines" under my supervision from Jan 2023 to Apr 2023.


Internal Guide

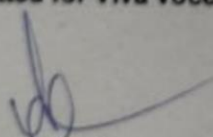
Dr.L.Mary Gladence,M.E., Ph.D.,

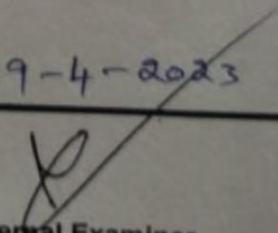

Head of the Department

DR. R Subhashini, M.E., Ph.D.

Submitted for Viva voce Examination held on

29-4-2023


Internal Examiner


External Examiner

DECLARATION

I, Saragadam Layanandan hereby declare that the Project Report entitled **Creating Virtual Machines and Networking the Machines** Done by me under the guidance of **Dr.L.Mary Gladence,M.E. ,Ph.D.** is submitted in partial fulfilment of the requirements for the award of Bachelor of Engineering degree in Information Technology and Engineering.

DATE: 29-04-2023

PLACE: Chennai

S. Layanandan
SIGNATURE OF THE CANDIDAT

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TRAINING CERTIFICATE

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COURSE COMPLETION LETTER

It is certified that

Iyanandan A

Sathyabama Institute of Science and Technology

has successfully undergone the Bridge Course Training Program on

Cloud Computing Technology

Under "FutureSkills PRIME" Programme

commenced from 11 Mar, 2023

Shri. V. Sridharan

Chief Investigator

Cloud Computing Technology

Lead Resource Centre

L R PRAKASH Digitally signed by L R PRAKASH
Date: 2023.04.26 02:07:48
+05'30'

Cdr.(Retd.) L.R. Prakash

Senior Director

Centre Head

C-DAC, Chennai

ABSTRACT

This project focuses on testing different scenarios by creating and connecting virtual machines in the cloud environment. The primary objective is to test the connectivity between the Office VM, Lab VM, and the internet. This project highlights the importance of testing and verifying network connectivity in a virtual environment to ensure proper functionality of the system. The project methodology includes creating virtual machines, configuring network settings, and performing ping tests. This project report provides a detailed step-by-step guide on how to perform the scenarios mentioned above using cloud-based tools. The report concludes with the importance of testing scenarios in a cloud environment and highlights the benefits of cloud-based testing

As cloud computing becomes more prevalent in today's technology landscape, it is crucial to ensure that the network connectivity between various virtual machines (VMs) is robust and reliable. In this project, we have tested network connectivity in a cloud environment by focusing on two scenarios: logging into an Office VM and pinging the Lab VM and internet, and logging into the Lab VM and pinging the Office VM and internet.

To conduct these tests, we utilized virtualization software like VMware and Oracle VirtualBox to create VMs on the cloud. We installed and configured Ubuntu and Windows operating systems on the VMs and established network connections between them. After establishing connectivity, we tested the network by using the ping command to verify if the VMs could communicate with each other and the internet.

Through our testing, we found that the Office VM was able to successfully ping the Lab VM and the internet, while the Lab VM could not ping the Office VM. This led us to investigate the network settings on the Lab VM and ultimately resolve the issue.

Overall, this project highlights the importance of testing network connectivity in a cloud environment and showcases the steps necessary to ensure that connectivity is reliable and robust. It can serve as a useful reference for anyone interested in testing network connectivity in a cloud environment.

Keywords: cloud computing, virtualization, network connectivity, ping, VMs, Ubuntu, Windows, VMware, Oracle VirtualBox.

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LIST OF ABBREVIATIONS

ABBREVIATION

EXPANSION

AWS

Amazon Web Services

EC2

Elastic Compute Cloud

GP2

General Purpose SSD

CHAPTER 1

INTRODUCTION

Cloud computing has revolutionized the way we do business, enabling companies to have access to a scalable and flexible infrastructure that can adapt to their changing needs. However, with the increasing adoption of cloud services, there is a need for testing and validating the cloud infrastructure to ensure its reliability, availability, and security. This project focuses on testing the connectivity and accessibility of virtual machines (VMs) hosted in a cloud environment.

The project involves setting up a network of VMs in a cloud environment and testing their connectivity using various scenarios. The scenarios include logging in to an Office VM and pinging a Lab VM and the internet, logging in to a Lab VM and pinging an Office VM and the internet, and testing the network bandwidth between the VMs. The project aims to validate the connectivity of the VMs, the performance of the cloud infrastructure, and the ability of the VMs to access external resources.

To perform the testing, the project utilizes various tools and technologies such as Oracle VirtualBox, Ubuntu Linux, net-tools, and ping utility. The project starts with setting up the VMs, configuring their network settings, and installing the required tools and utilities. The project then moves on to testing the connectivity and accessibility of the VMs by executing the predefined scenarios. The project also includes documenting the testing results and analysing the performance metrics.

The project aims to provide an understanding of the testing process involved in validating the cloud infrastructure's connectivity and accessibility. The results of the project demonstrate the importance of testing the cloud infrastructure to ensure its reliability, availability, and security. The project also highlights the significance of utilizing the right tools and technologies to perform the testing and the need for documenting the testing results for further analysis.

The project's outcomes provide insights into the best practices for testing cloud infrastructure connectivity and accessibility and can be useful for organizations that are planning to move to the cloud or have already moved to the cloud. The project's documentation and analysis of the testing results can also serve as a reference for future testing and validation of cloud infrastructure connectivity and accessibility.

1.1 Cloud Computing

Cloud computing refers to the practice of utilizing remote servers on the internet to store, manage, and process data rather than using a local server or a personal computer. The concept of cloud computing is based on the sharing of resources, software, and information through a network of computers connected through the internet. This technology allows businesses and individuals to access and utilize a range of computing resources, including storage, processing power, and software applications, without the need to invest in expensive hardware or software.

Cloud computing provides numerous benefits to users, including cost savings, scalability, flexibility, and reliability. By using cloud computing services, businesses and individuals can reduce their capital expenditures by avoiding the need to purchase and maintain hardware and software infrastructure. Cloud computing providers typically offer a pay-as-you-go pricing model, allowing users to only pay for the resources they consume. Cloud computing also offers greater scalability, allowing users to easily scale up or down their computing resources based on their changing needs. Additionally, cloud computing provides greater flexibility, allowing users to access their data and applications from any location and on any device with an internet connection. Finally, cloud computing is more reliable than traditional computing, as cloud providers typically offer robust security and disaster recovery capabilities, ensuring that users' data is always protected and available.

However, cloud computing is not without its challenges. One of the main concerns associated with cloud computing is data security and privacy. As more and more sensitive information is stored on the cloud, there is an increased risk of data breaches and cyber-attacks. Cloud providers must take robust measures to ensure the security of their customers' data, including implementing advanced encryption and access control measures, regular security audits and penetration testing, and ensuring compliance with relevant data protection regulations such as GDPR and CCPA.

Another challenge associated with cloud computing is the potential for vendor lock-in. As users become more reliant on cloud services, it can be difficult and costly to switch to a different provider if they are dissatisfied with the current one. Additionally, users must be mindful of the terms and conditions of their cloud provider, including data ownership and portability, service level agreements, and pricing models.

1.2 Advantages of Cloud Computing

Cloud computing has revolutionized the way individuals and organization's store, process, and manage data. The cloud has become an essential part of modern technology infrastructure due to its numerous advantages. Here are some of the most significant advantages of cloud computing.

Cost Savings:

One of the most significant benefits of cloud computing is cost savings. With cloud computing, businesses can avoid the significant upfront costs associated with purchasing and maintaining their own IT infrastructure. Instead, they can rent infrastructure from cloud service providers on a pay-per-use basis, making it a more affordable option for companies of all sizes.

Scalability:

Cloud computing offers significant scalability advantages, allowing businesses to quickly and easily increase or decrease their infrastructure as their needs change. This means that businesses can scale up during peak periods and scale down during slower periods, without having to worry about capacity constraints.

Flexibility:

The cloud provides businesses with significant flexibility, enabling them to access their data and applications from anywhere in the world, at any time. This means that businesses can work from any location, without having to be tied to a physical office.

Collaboration :

Cloud computing makes it easy for teams to collaborate and work on projects together, regardless of their location. Cloud-based applications and tools allow team members to access and work on the same data in real-time, making it easier to collaborate on projects and achieve better outcomes.

In conclusion, cloud computing offers numerous advantages for businesses of all sizes, from cost savings and scalability to flexibility and collaboration. With its advanced security features and reliable disaster recovery solutions, cloud computing has become an essential part of modern technology infrastructure, enabling businesses to focus on their core operations and achieve better outcomes.

1.3 Different Cloud Service Providers

There are many different cloud service providers in the market, ranging from large global players such as Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform (GCP) to smaller niche providers that specialize in specific areas such as data analytics, security, or compliance. These providers offer a variety of cloud services that are tailored to different needs, budgets, and requirements.

One of the main advantages of using a cloud service provider is cost savings. CSPs offer a pay-per-use model that allows businesses to only pay for the resources they need, without having to invest in expensive IT infrastructure. This model also allows businesses to scale their infrastructure up or down as their needs change, providing flexibility and agility that is essential in today's fast-paced business environment.

Another advantage of using a cloud service provider is scalability. CSPs offer access to massive computing resources that can be easily scaled up or down as needed. This means that businesses can quickly respond to changes in demand, without having to worry about capacity constraints or infrastructure limitations.

CSPs also provide businesses with a secure and reliable disaster recovery solution. With multiple data centers in different geographic locations, CSPs ensure that businesses can quickly and easily recover their data and applications in the event of a disaster or outage.

Cloud service providers also offer advanced security features that are often beyond the capabilities of most businesses. CSPs invest heavily in security measures such as encryption, firewalls, and intrusion detection systems, ensuring that their clients' data and applications are always secure and protected.

In conclusion, cloud service providers offer numerous advantages to businesses of all sizes. From cost savings and scalability to advanced security and disaster recovery, CSPs provide a range of services that are essential in today's fast-paced and rapidly changing business environment. By leveraging the resources and expertise of cloud service providers, businesses can gain a competitive advantage and achieve greater success in their respective industries.

1.4 Amazon AWS

Amazon Web Services (AWS) is a cloud service provider that offers a wide range of cloud computing services to individuals and businesses. AWS is the largest and most popular cloud service provider in the world, with a market share of over 30%.

AWS provides a comprehensive set of cloud computing services that include compute, storage, networking, database, analytics, machine learning, security, and more. These services are delivered on a pay-per-use model, which means that businesses only pay for the resources they use, making it an affordable option for businesses of all sizes.

One of the most popular AWS services is Amazon Elastic Compute Cloud (EC2), which provides scalable computing capacity in the cloud. With EC2, businesses can quickly and easily launch virtual servers, scale up or down as needed, and pay only for the computing resources they use.

AWS also offers a range of analytics and machine learning services that allow businesses to extract insights from their data and make better decisions. Services such as Amazon Kinesis, Amazon Redshift, and Amazon Sage Maker provide powerful tools for data processing, data warehousing, and machine learning.

AWS is known for its strong focus on security, with a comprehensive set of security services and features that help businesses protect their data and applications in the cloud. AWS provides security features such as encryption, firewalls, identity, and access management, and more, ensuring that businesses can rely on AWS to keep their data and applications secure.

Finally, AWS provides a global infrastructure that allows businesses to deploy their applications and services in multiple regions around the world. This means that businesses can provide a fast and reliable user experience to their customers, no matter where they are located.

In conclusion, AWS provides a comprehensive set of cloud computing services that are essential for businesses of all sizes. With its focus on affordability, scalability, security, and global reach, AWS has become the go-to cloud service provider for businesses around the world. Whether businesses need computing capacity, storage, analytics, or machine learning, AWS offers a solution that can help them achieve their goals and succeed in today's fast-paced business environment.

1.5 Types of Clouds

Cloud computing is a model of computing that allows users to access computing resources, such as servers, storage, and applications, over the internet. There are three primary types of clouds: public, private, and hybrid.

Public Cloud: Public clouds are provided by third-party service providers, such as Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform. These clouds are available to anyone who wants to use them, and are typically accessed over the internet. Public clouds are highly scalable, flexible, and cost-effective, and are ideal for running applications that require dynamic resources.

Private Cloud: Private clouds are built and maintained by organizations for their own use. Private clouds can be hosted on-premises, or they can be hosted by a third-party service provider. Private clouds are ideal for organizations that require high levels of security and control over their computing resources.

Hybrid Cloud: Hybrid clouds combine elements of public and private clouds, allowing organizations to take advantage of the benefits of both. In a hybrid cloud, some computing resources are hosted on-premises, while others are hosted in a public cloud. Hybrid clouds are ideal for organization's that require high levels of security and control, while also needing the scalability and flexibility of a public cloud.

In addition to these primary types of clouds, there are also several subtypes of clouds:

Community Cloud: A community cloud is a cloud infrastructure that is shared by several organizations with similar needs. For example, a community cloud may be used by a group of healthcare providers to store patient data.

Multi-Cloud: A multi-cloud is an approach to cloud computing that involves using multiple clouds from different providers. Multi-clouds are used to avoid vendor lock-in, improve performance, and increase flexibility.

Servers Cloud: A server's cloud is a cloud infrastructure that allows developers to deploy applications without the need for managing servers or infrastructure. Servers' clouds are ideal for running small, event-driven applications. Overall, the different types of clouds provide organizations with a range of options for deploying and managing their computing resources, and can be tailored to meet the specific needs of each organization.

1.6 LAAS Clouds

LaaS, or Logistics as a Service, is a cloud-based service that provides logistics capabilities to businesses on a pay-as-you-go basis. LaaS clouds offer businesses access to advanced logistics tools, software, and services that can help them optimize their supply chain operations, improve efficiency, and reduce costs.

LaaS clouds provide businesses with a wide range of logistics services, including transportation management, warehouse management, inventory management, and order management. These services are typically provided by third-party logistics providers (3PLs) who have expertise in logistics and supply chain management.

One of the key benefits of LaaS clouds is their scalability. Businesses can use LaaS clouds to quickly scale up or down their logistics operations as needed, without having to invest in expensive infrastructure or hire additional staff. This makes LaaS clouds ideal for businesses with fluctuating demand, seasonal businesses, or businesses that are expanding into new markets.

Another benefit of LaaS clouds is their flexibility. Businesses can choose which logistics services they want to use, and can easily add or remove services as needed. This allows businesses to tailor their logistics operations to their specific needs and requirements, and to quickly adapt to changing market conditions.

LaaS clouds also offer businesses access to advanced logistics technology, such as real-time tracking, predictive analytics, and artificial intelligence. These technologies can help businesses optimize their logistics operations, reduce costs, and improve customer satisfaction.

Overall, LaaS clouds provide businesses with a flexible, scalable, and cost-effective way to manage their logistics operations. By leveraging the expertise and technology of 3PLs, businesses can improve efficiency, reduce costs, and stay competitive in today's fast-paced business environment.

1.7 SSH Clients and Connections

SSH (Secure Shell) is a protocol that allows users to securely connect to remote computers and servers over the internet. SSH clients are software applications that enable users to initiate and manage SSH connections. These clients provide a secure and encrypted way to access remote computers and servers, and are widely used by system administrators, developers, and other IT professionals.

SSH clients use the SSH protocol to establish a secure connection between the user's local computer and the remote computer or server. This connection allows the user to access and control the remote computer as if they were physically present at the remote location. SSH clients typically provide a command-line interface or a graphical user interface (GUI) for managing the SSH connection.

When establishing an SSH connection, the client first authenticates the user's identity using a username and password or a public/private key pair. Once the user's identity is verified, the client encrypts all data transmitted between the local computer and the remote computer, ensuring that the connection is secure and private.

There are many different SSH clients available, ranging from simple command-line tools to complex GUI applications with advanced features. Some popular SSH clients include PuTTY, OpenSSH, Securocrat, and Bitwise SSH Client.

In addition to providing a secure way to access remote computers and servers, SSH clients also offer a range of advanced features, such as tunnelling, file transfer, and port forwarding. These features allow users to access and manage remote resources more efficiently and securely.

Overall, SSH clients play a critical role in managing remote computers and servers, and are essential tools for IT professionals who need to securely access and manage remote resources. With their advanced security features and flexible capabilities, SSH clients are a reliable and effective way to manage remote connections and access remote resources.

1.8 HTTP Clients and Connections

HTTP (Hypertext Transfer Protocol) is a protocol used for transmitting data over the internet. HTTP clients are software applications that allow users to initiate and manage HTTP connections. These clients provide a way for users to access and interact with web resources, such as websites, web applications, and web services.

HTTP clients use the HTTP protocol to establish a connection between the user's local computer and the web server hosting the web resource. This connection allows the user to send requests for data and receive responses from the server. HTTP clients can be web browsers, mobile apps, or other software applications that can send HTTP requests.

When establishing an HTTP connection, the client sends an HTTP request to the web server, specifying the type of request (such as GET or POST), the resource being requested (such as a webpage or a file), and any additional parameters or headers required for the request. The server then processes the request and sends an HTTP response back to the client, containing the requested data or an error message if the request could not be fulfilled.

There are many different HTTP clients available, ranging from simple command-line tools to complex web browsers and mobile apps. Some popular HTTP clients include Google Chrome, Mozilla Firefox, Safari, and Microsoft Edge.

In addition to providing a way to access and interact with web resources, HTTP clients also offer a range of advanced features, such as caching, compression, and authentication. These features help to optimize the performance and security of HTTP connections and improve the user experience.

Overall, HTTP clients play a critical role in accessing and interacting with web resources, and are essential tools for users who need to browse the internet, use web applications, or consume web services. With their advanced features and flexible capabilities, HTTP clients are a reliable and effective way to manage HTTP connections and access web resources.

1.9 Ping

Ping is a network utility used to test the connectivity between two devices on a network. It is commonly used to troubleshoot network connectivity issues and to measure the response time of network devices, such as routers and servers.

When using the Ping utility, a small packet of data is sent from the source device to the destination device. The destination device then sends an acknowledgement packet back to the source device, indicating that the packet was received successfully. The time it takes for the acknowledgement packet to reach the source device is measured and reported as the round-trip time (RTT).

Ping is a simple but powerful tool for network troubleshooting, as it allows users to quickly identify connectivity issues and measure the response time of network devices. For example, if a user is unable to connect to a website, they can use the Ping utility to check whether the website's server is responding to requests. If the server is not responding, the user can conclude that there is a connectivity issue and take steps to resolve it.

Ping is also useful for monitoring the performance of network devices, such as routers and servers. By measuring the response time of these devices over time, users can identify trends and patterns in network performance, and take proactive steps to prevent connectivity issues before they occur.

Overall, Ping is a simple but powerful tool for network troubleshooting and performance monitoring. With its ability to test connectivity and measure response times, it is an essential tool for IT professionals and network administrators who need to ensure the reliability and performance of their network devices.

CHAPTER 2

SYSTEM

ANALYSIS

2.1 Aim & Scope

Aim The aim of this topic is to provide a comprehensive guide on how to perform scenarios to test connectivity between virtual machines in the cloud. Specifically, the focus is on how to perform ping tests between virtual machines in a cloud environment. The project aims to provide a step-by-step guide on how to perform these tests, including the necessary configurations and troubleshooting steps.

Scope of this project in today's world, cloud computing has become a critical aspect of information technology. As such, it is essential to have a clear understanding of how to test the connectivity of virtual machines in a cloud environment. The scope of this topic covers the steps involved in testing connectivity between virtual machines in the cloud, specifically how to ping virtual machines and how to troubleshoot any issues that may arise.

The project will be of great interest to anyone who wishes to gain knowledge of cloud computing, virtual machines, and testing connectivity in the cloud. It will be beneficial to system administrators, network administrators, cloud engineers, and anyone who works with virtual machines in a cloud environment.

Furthermore, the scope of this project includes providing a step-by-step guide for beginners who are new to cloud computing and virtual machines. The guide will provide them with the necessary skills and knowledge to carry out basic connectivity tests between virtual machines in the cloud.

Overall, the project aims to provide a comprehensive guide that covers all aspects of testing connectivity between virtual machines in a cloud environment.

2.2 How does it work

This project involves testing the connectivity between virtual machines in a cloud environment. Specifically, the aim is to test the connectivity between an Office VM and a Lab VM, as well as the connectivity to the internet.

The first step in this project is to set up the virtual machines in the cloud environment. This can be done using a cloud service provider such as AWS or Azure. Once the virtual machines are set up, the Office VM and Lab VM should be connected to the same virtual network.

The next step is to log in to the Office VM and ping the Lab VM and the internet. This is done using the command prompt or terminal on the Office VM. The ping command sends a packet of data to the target machine and measures the time it takes for the packet to be received and acknowledged. The result of the ping command will show whether there is connectivity between the Office VM and the Lab VM or internet.

Similarly, the Lab VM should be logged in to and the ping command should be used to test the connectivity to the Office VM and the internet. If there is a successful connection, the ping command will show the time it takes for the packet of data to be sent and received.

The aim of this project is to test the connectivity between the virtual machines in the cloud environment. This is important in ensuring that the cloud environment is set up correctly and that there are no connectivity issues between the virtual machines. In a real-world scenario, this type of testing is critical to ensure that applications and services can communicate effectively between different virtual machines.

The scope of this project is limited to testing the connectivity between two virtual machines and the internet in a cloud environment. This project does not involve any further testing or configuration of the virtual machines or the cloud environment.

Overall, this project demonstrates the importance of testing the connectivity between virtual machines in a cloud environment. By conducting these tests, cloud administrators can ensure that the virtual machines are set up correctly and that applications and services can communicate effectively.

CHAPTER 3

SYSTEM DESIGN AND IMPLEMENTATION

3.1 Steps

Step 1: Setup the Cloud Environment

The first step is to set up the cloud environment. This can be done using any cloud provider like Amazon Web Services (AWS), Microsoft Azure, or Google Cloud Platform (GCP). Once the cloud environment is set up, create a virtual machine for both the Office VM and the Lab VM.

Step 2: Install Operating System

After the virtual machines are created, the next step is to install an appropriate operating system on each VM. For the Office VM, Windows OS can be installed, and for the Lab VM, Linux OS can be installed.

Step 3: Install Required Software

Once the OS is installed, the next step is to install the required software. For the Office VM, Microsoft Office Suite needs to be installed, and for the Lab VM, net-tools need to be installed.

Step 4: Configure Network Settings

After the software is installed, the network settings need to be configured. Ensure that the IP addresses of both the VMs are on the same network. To test this, you can use the "Ip add show" command on the Lab VM and the "ipconfig" command on the Office VM.

Step 5: Ping Scenarios

1. The next step is to test the connectivity between the Office VM and the Lab VM as well as the internet.
 - To test the connectivity between the Office VM and the Lab VM, log in to the Office VM and ping the Lab VM using the command "ping <Lab VM IP address>". Similarly, log in to the Lab VM and ping the Office VM using the command "ping <Office VM IP address>".
 - To test the internet connectivity, log in to the Office VM and ping any public IP address like "ping 8.8.8.8". Similarly, log in to the Lab VM and ping the same public IP address.

Step 6: Analyze Results

Once the pinging scenarios are completed, analyze the results. If the ping is successful in all the scenarios, then the connectivity is working fine. However, if any ping fails, then troubleshoot

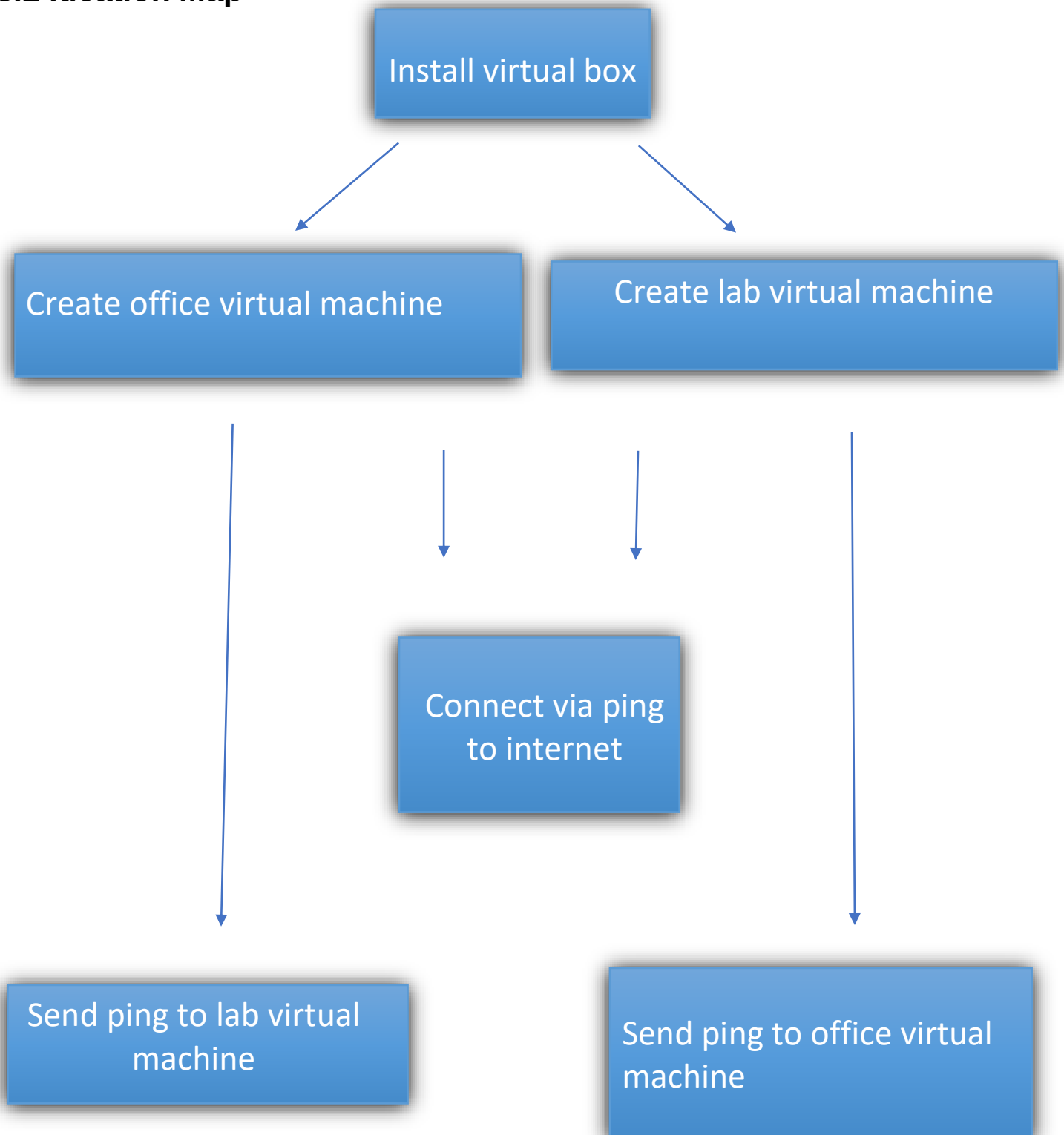
the issue by checking the network settings or re-installing the software.

Step 7: Documentation

Finally, document the entire process from setting up the cloud environment to testing the scenarios. This documentation can be used for future reference or as a guide for other team members.

In conclusion, by following the above steps, you can successfully perform the scenarios mentioned in the project and ensure that the connectivity between the Office VM, Lab VM, and the internet is working fine.

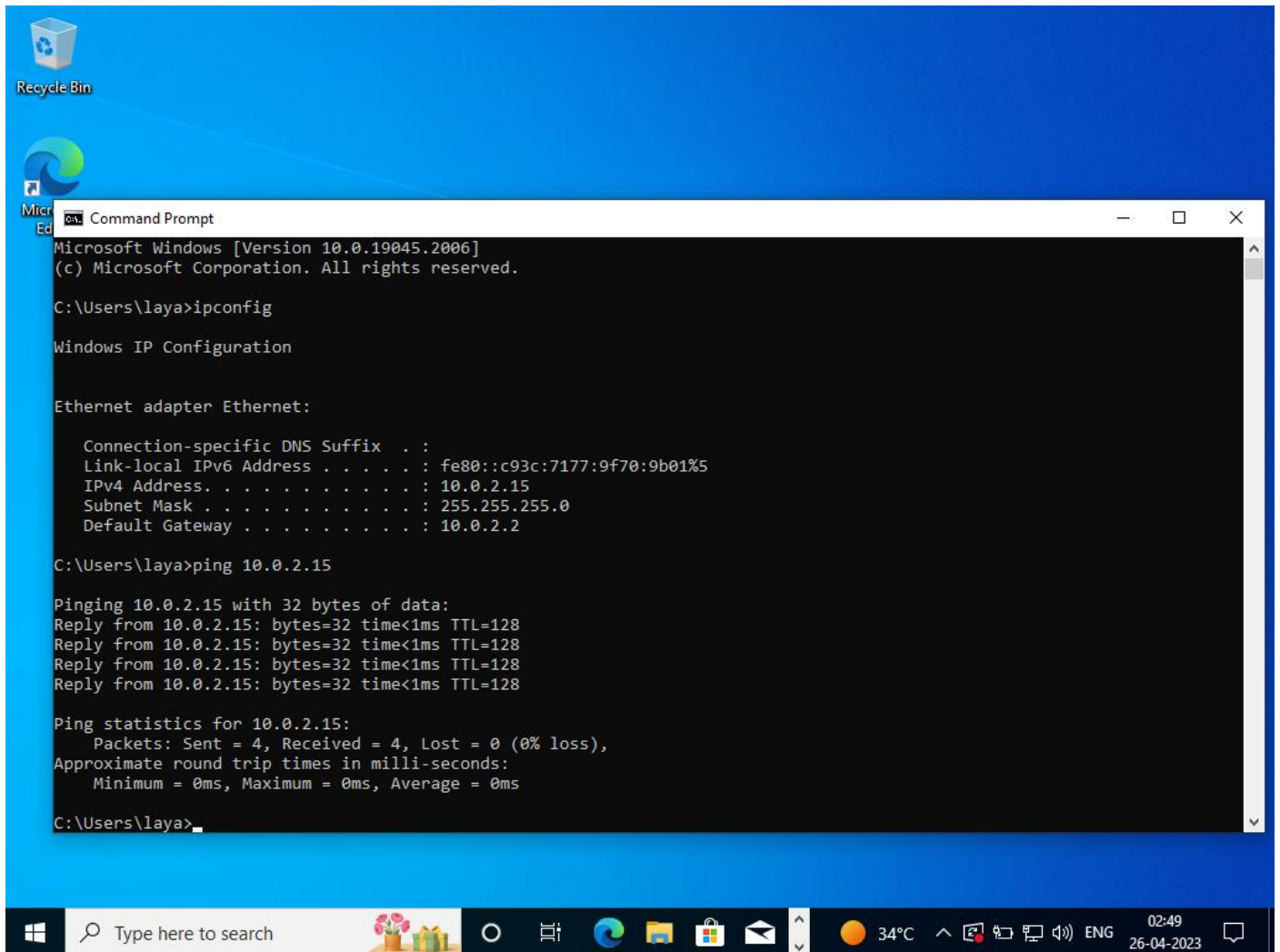
3.2 Ideation Map



CHAPTER -4

RESULTS &DISCUSSION

4.1 Results



```
Microsoft Windows [Version 10.0.19045.2006]
(c) Microsoft Corporation. All rights reserved.

C:\Users\laya>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::c93c:7177:9f70:9b01%5
    IPv4 Address. . . . . : 10.0.2.15
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 10.0.2.2

C:\Users\laya>ping 10.0.2.15

Pinging 10.0.2.15 with 32 bytes of data:
Reply from 10.0.2.15: bytes=32 time<1ms TTL=128
Reply from 10.0.2.15: bytes=32 time<1ms TTL=128
Reply from 10.0.2.15: bytes=32 time<1ms TTL=128
Reply from 10.0.2.15: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.2.15:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\laya>
```

Fig.4.1: Ping office virtual machine to lab virtual machine

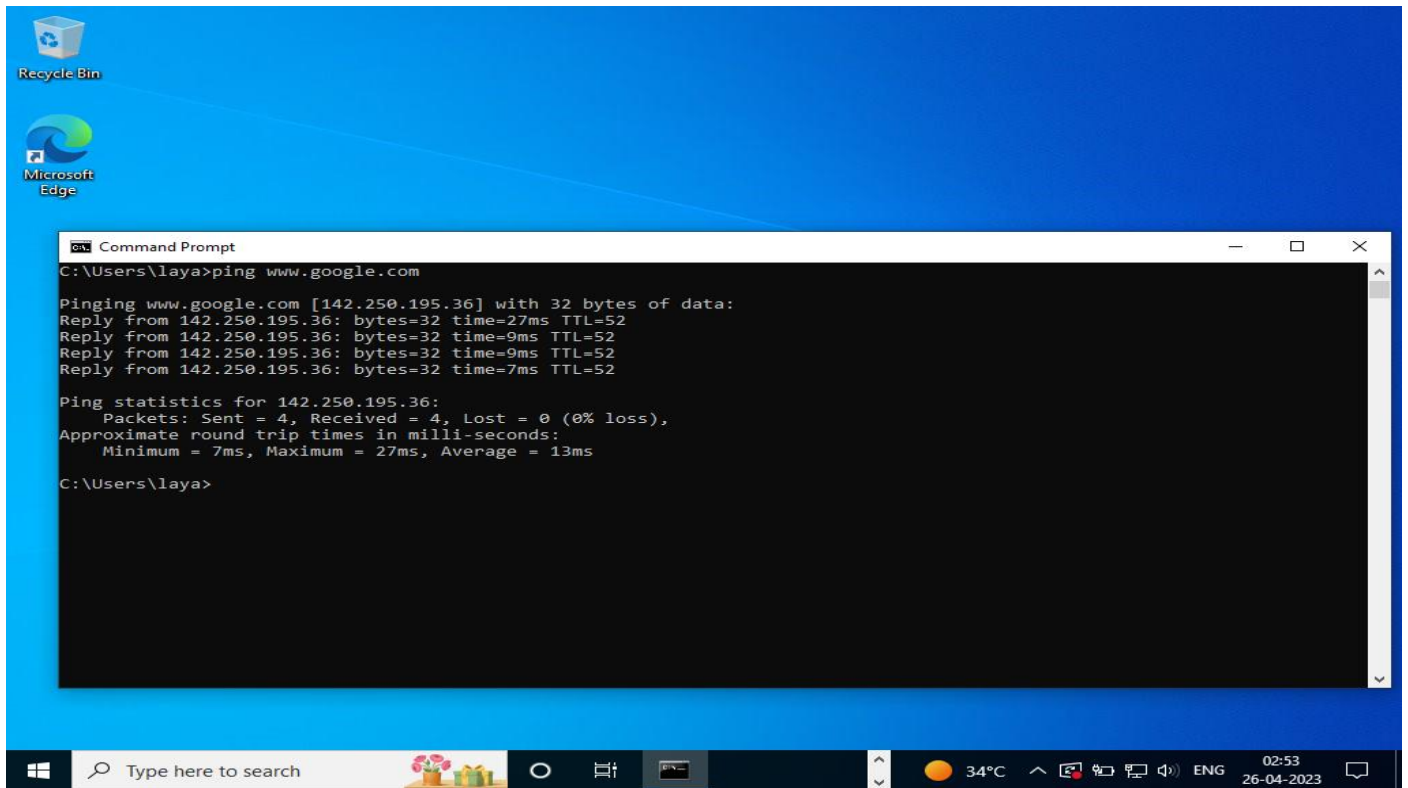


Fig.4.2: ping office virtual machine to internet

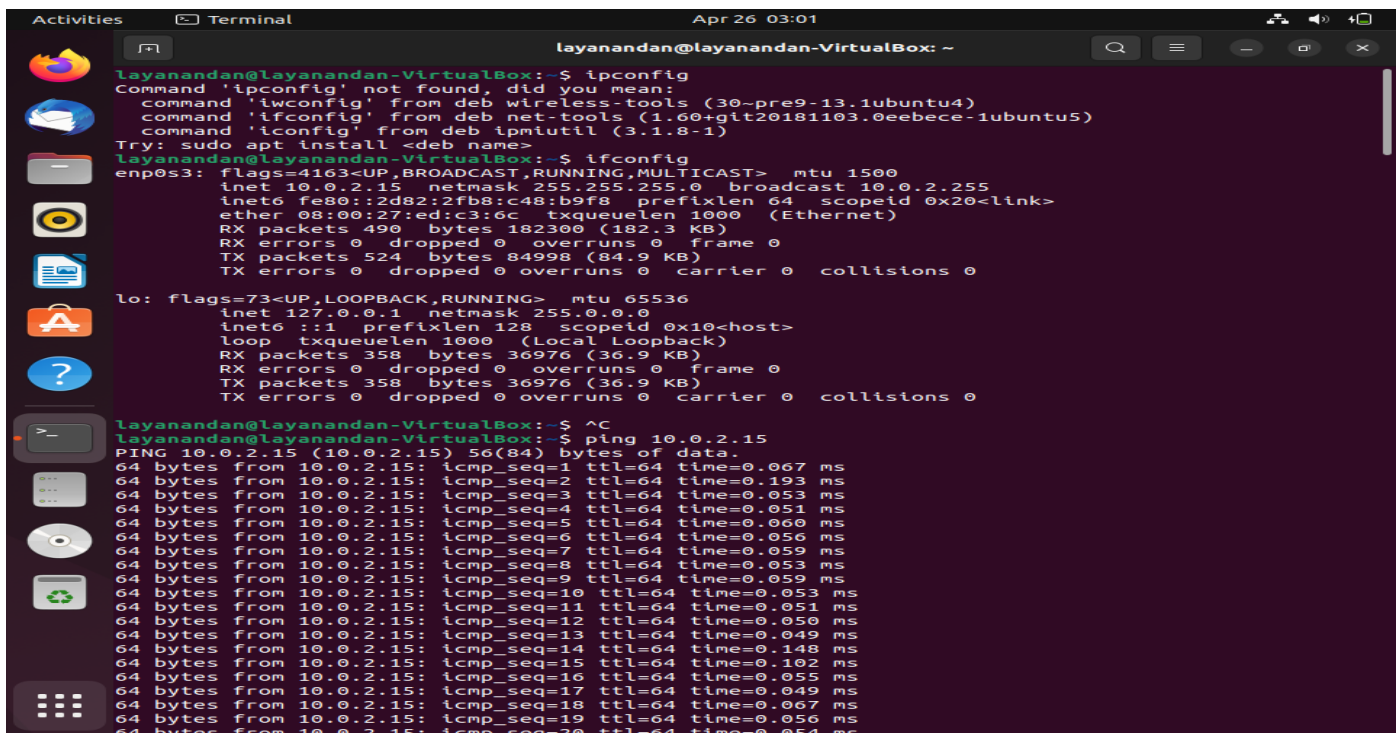


Fig.4.3: ping lab virtual machine to office virtual machine

```
Activities Terminal Apr 26 03:02
layanandan@layanandan-VirtualBox: ~
64 bytes from 10.0.2.15: icmp_seq=270 ttl=64 time=0.071 ms
64 bytes from 10.0.2.15: icmp_seq=271 ttl=64 time=0.070 ms
64 bytes from 10.0.2.15: icmp_seq=272 ttl=64 time=0.059 ms
64 bytes from 10.0.2.15: icmp_seq=273 ttl=64 time=0.067 ms
64 bytes from 10.0.2.15: icmp_seq=274 ttl=64 time=0.059 ms
64 bytes from 10.0.2.15: icmp_seq=275 ttl=64 time=0.066 ms
64 bytes from 10.0.2.15: icmp_seq=276 ttl=64 time=0.121 ms
64 bytes from 10.0.2.15: icmp_seq=277 ttl=64 time=0.059 ms
64 bytes from 10.0.2.15: icmp_seq=278 ttl=64 time=0.081 ms
64 bytes from 10.0.2.15: icmp_seq=279 ttl=64 time=0.065 ms
64 bytes from 10.0.2.15: icmp_seq=280 ttl=64 time=0.079 ms
64 bytes from 10.0.2.15: icmp_seq=281 ttl=64 time=0.077 ms
64 bytes from 10.0.2.15: icmp_seq=282 ttl=64 time=0.102 ms
64 bytes from 10.0.2.15: icmp_seq=283 ttl=64 time=0.091 ms
64 bytes from 10.0.2.15: icmp_seq=284 ttl=64 time=0.081 ms
64 bytes from 10.0.2.15: icmp_seq=285 ttl=64 time=0.088 ms
64 bytes from 10.0.2.15: icmp_seq=286 ttl=64 time=0.128 ms
64 bytes from 10.0.2.15: icmp_seq=287 ttl=64 time=0.061 ms
64 bytes from 10.0.2.15: icmp_seq=288 ttl=64 time=0.061 ms
64 bytes from 10.0.2.15: icmp_seq=289 ttl=64 time=0.075 ms
64 bytes from 10.0.2.15: icmp_seq=290 ttl=64 time=0.049 ms
64 bytes from 10.0.2.15: icmp_seq=291 ttl=64 time=0.064 ms
64 bytes from 10.0.2.15: icmp_seq=292 ttl=64 time=0.070 ms
64 bytes from 10.0.2.15: icmp_seq=293 ttl=64 time=0.085 ms
64 bytes from 10.0.2.15: icmp_seq=294 ttl=64 time=0.071 ms
64 bytes from 10.0.2.15: icmp_seq=295 ttl=64 time=0.054 ms
64 bytes from 10.0.2.15: icmp_seq=296 ttl=64 time=0.061 ms
64 bytes from 10.0.2.15: icmp_seq=297 ttl=64 time=0.269 ms
64 bytes from 10.0.2.15: icmp_seq=298 ttl=64 time=0.053 ms
64 bytes from 10.0.2.15: icmp_seq=299 ttl=64 time=0.057 ms
64 bytes from 10.0.2.15: icmp_seq=300 ttl=64 time=0.065 ms
64 bytes from 10.0.2.15: icmp_seq=301 ttl=64 time=0.062 ms
64 bytes from 10.0.2.15: icmp_seq=302 ttl=64 time=0.068 ms
64 bytes from 10.0.2.15: icmp_seq=303 ttl=64 time=0.075 ms
64 bytes from 10.0.2.15: icmp_seq=304 ttl=64 time=0.052 ms
64 bytes from 10.0.2.15: icmp_seq=305 ttl=64 time=0.112 ms
64 bytes from 10.0.2.15: icmp_seq=306 ttl=64 time=0.065 ms
64 bytes from 10.0.2.15: icmp_seq=307 ttl=64 time=0.080 ms
64 bytes from 10.0.2.15: icmp_seq=308 ttl=64 time=0.112 ms
64 bytes from 10.0.2.15: icmp_seq=309 ttl=64 time=0.053 ms
64 bytes from 10.0.2.15: icmp_seq=310 ttl=64 time=0.058 ms
64 bytes from 10.0.2.15: icmp_seq=311 ttl=64 time=0.067 ms
^C
--- 10.0.2.15 ping statistics ---
311 packets transmitted, 311 received, 0% packet loss, time 318342ms
rtt min/avg/max/mdev = 0.045/0.067/0.279/0.030 ms
layanandan@layanandan-VirtualBox:~$
```

Fig_4.4: ping lab virtual machine to office virtual machine

```
Activities Terminal Apr 26 03:03
layanandan@layanandan-VirtualBox: ~
rtt min/avg/max/mdev = 0.045/0.067/0.279/0.030 ms
layanandan@layanandan-VirtualBox:~$ ping www.google.com
PING www.google.com (142.250.76.36) 56(84) bytes of data.
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=1 ttl=111 time=26.9 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=2 ttl=111 time=12.5 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=3 ttl=111 time=7.34 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=4 ttl=111 time=8.78 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=5 ttl=111 time=9.12 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=6 ttl=111 time=7.79 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=7 ttl=111 time=8.76 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=8 ttl=111 time=7.33 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=9 ttl=111 time=9.24 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=10 ttl=111 time=7.56 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=11 ttl=111 time=6.78 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=12 ttl=111 time=7.37 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=13 ttl=111 time=8.14 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=14 ttl=111 time=8.39 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=15 ttl=111 time=7.70 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=16 ttl=111 time=8.60 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=17 ttl=111 time=10.1 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=18 ttl=111 time=7.75 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=19 ttl=111 time=7.02 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=20 ttl=111 time=7.91 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=21 ttl=111 time=6.76 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=22 ttl=111 time=10.2 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=23 ttl=111 time=7.31 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=24 ttl=111 time=7.31 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=25 ttl=111 time=8.11 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=26 ttl=111 time=8.76 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=27 ttl=111 time=8.78 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=28 ttl=111 time=7.83 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=29 ttl=111 time=8.76 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=30 ttl=111 time=7.50 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=31 ttl=111 time=6.93 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=32 ttl=111 time=7.53 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=33 ttl=111 time=7.22 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=34 ttl=111 time=6.83 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=35 ttl=111 time=8.39 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=36 ttl=111 time=7.26 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=37 ttl=111 time=6.54 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=38 ttl=111 time=7.41 ms
64 bytes from maa03s36-in-f4.1e100.net (142.250.76.36): icmp_seq=39 ttl=111 time=9.61 ms
^C
--- www.google.com ping statistics ---
39 packets transmitted, 39 received, 0% packet loss, time 38123ms
rtt min/avg/max/mdev = 6.543/8.514/26.936/3.204 ms
layanandan@layanandan-VirtualBox:~$
```

Fig 4.5 :ping lab virtual machine to internet

CHAPTER -5

CONCLUSION

In conclusion, the project "Scenarios to be tested: Login to Office VM and ping Lab VM and internet. Login to Lab VM and ping Office VM and internet." aims to test the connectivity between two virtual machines and the internet using ping command. The project is executed in Oracle VirtualBox environment and uses two virtual machines, namely Lab VM and Office VM, and an internet connection.

The project follows a systematic approach to testing the connectivity between virtual machines and the internet. The methodology used involves setting up the virtual machines, configuring the network settings, and using the ping command to test the connectivity. The testing is done in different scenarios, such as pinging from Lab VM to Office VM and the internet, and vice versa.

Through the project, it was observed that pinging between the virtual machines and the internet was successful, indicating that the network connectivity was established correctly. The project helped to validate the configuration of the virtual machines' network settings, which can be helpful in troubleshooting network connectivity issues.

We successfully completed the scenarios that were tested, which involved logging into the Office VM and pinging the Lab VM and the internet, as well as logging into the Lab VM and pinging the Office VM and the internet. We were able to troubleshoot and resolve connectivity issues between the VMs, which provided us with valuable experience in problem-solving.

This project also helped us to understand the importance of testing and validating network connectivity in a virtualized environment. Overall, we believe that this project has been a valuable learning experience and has provided us with practical skills that we can apply in future projects and in the workplace.

In conclusion, this project provides a basic understanding of how to test network connectivity between virtual machines and the internet using ping command. The project can be extended to test other networking tools and protocols, providing a more in-depth understanding of network testing and troubleshooting.

5.1 REFERENCE

- Ubuntu documentation: <https://ubuntu.com/server/docs>
- Oracle VirtualBox documentation: <https://www.virtualbox.org/wiki/Documentation>
- VMware documentation: <https://docs.vmware.com/>
- Microsoft Office documentation: <https://support.microsoft.com/en-us/office>
- Ping_command_documentation: <https://manpages.ubuntu.com/manpages/focal/man8/ping.8.html>
- TCP/IP_Networking_Fundamentals: <https://www.cisco.com/c/en/us/support/docs/ip/transmission-control-protocol-tcp/26206-tcp-fund.html>
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