

# Network and application virtualization



# Unit objectives

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**After completing this unit, you should be able to:**

- Explain the benefits of network virtualization
- Define VPN and VLAN
- Describe application virtualization and its benefits
- Identify application virtualization infrastructure and architecture



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# Network virtualization overview

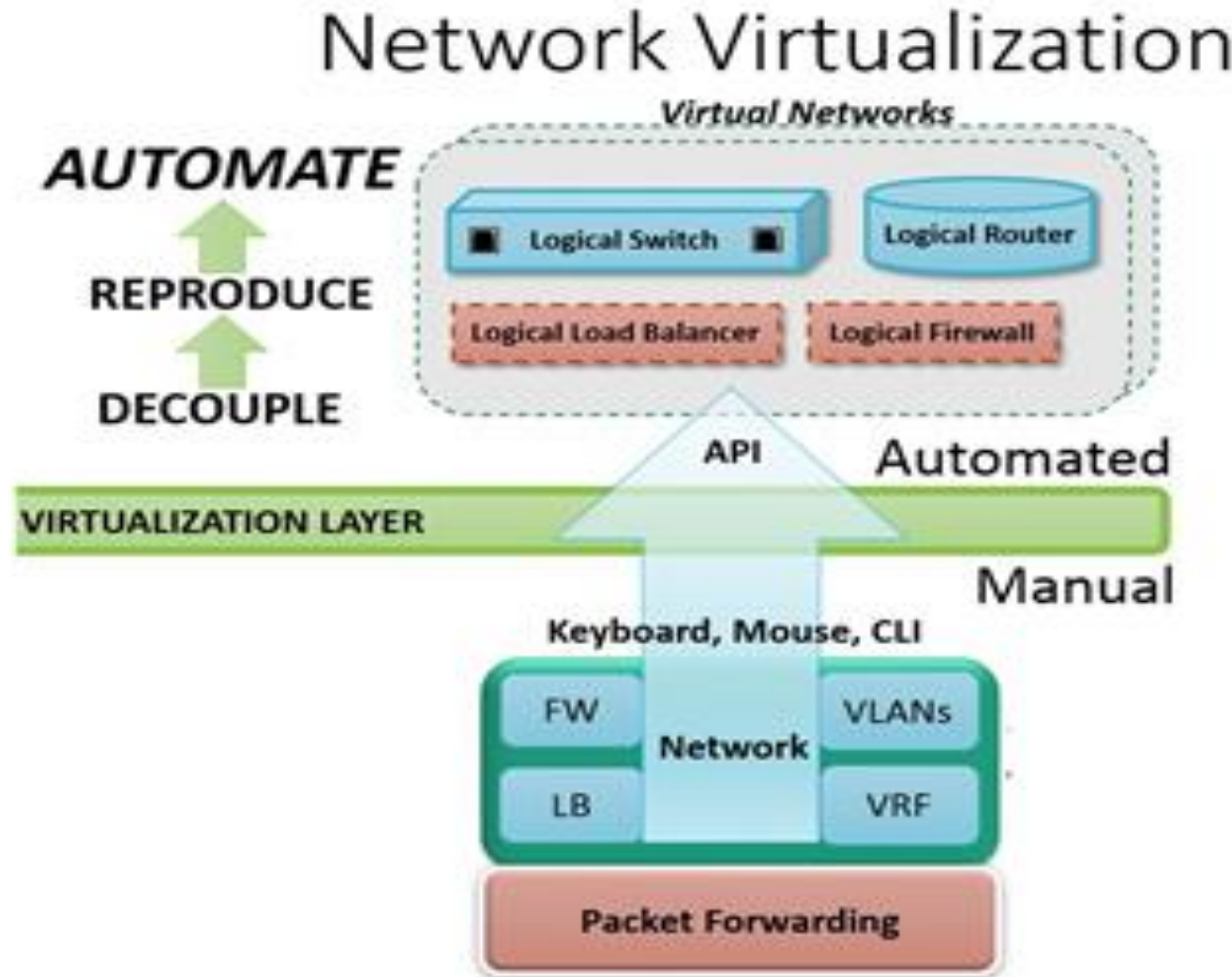


Figure: Network virtualization overview

# Virtual Private Network (VPN)

## Internet VPN



Figure: Virtual Private Network (VPN)

# How VPN works

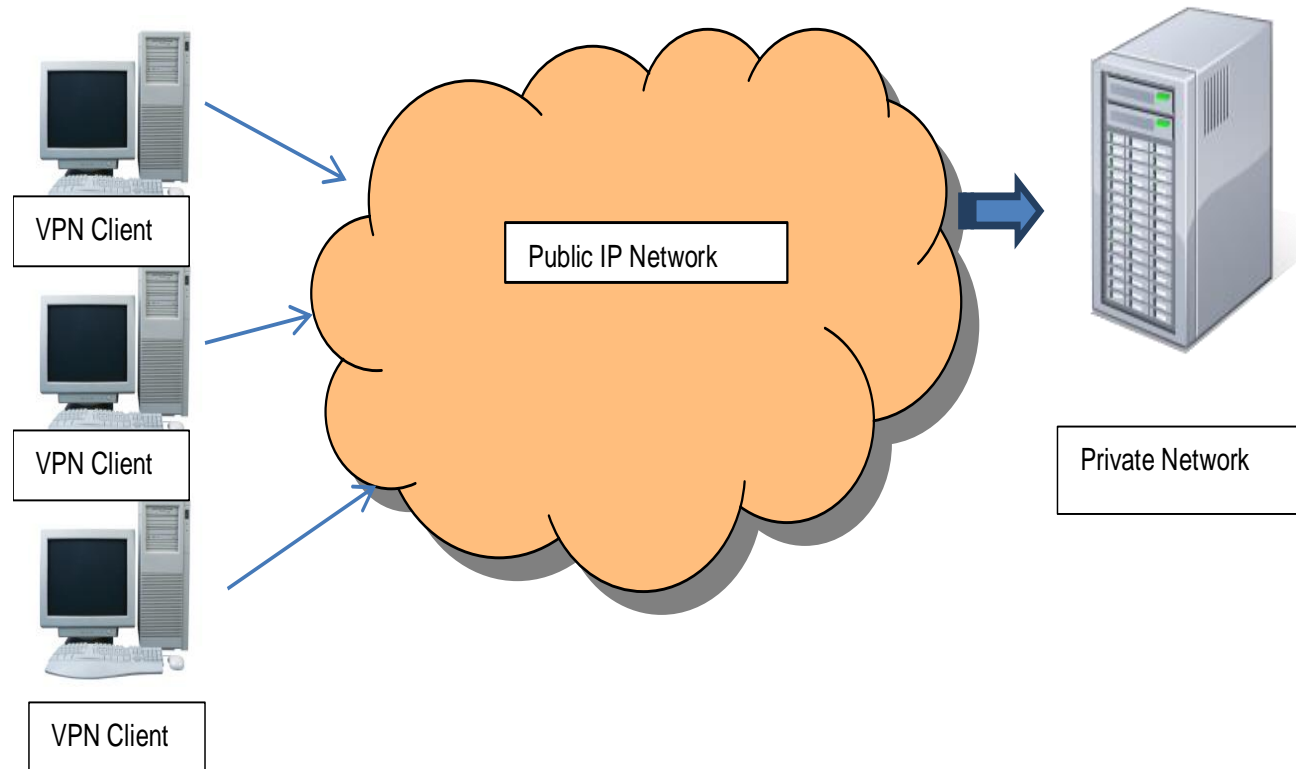


Figure: How VPN works

# Virtual LAN (VLAN)

- A traditional LAN is a collection of hosts that are physically placed together and connected to the same switch ports. The hosts in a LAN share a common broadcast domain, a gateway and a common subnet.
- One of the primary limitations of a LAN is that the machines must be placed and physically connected. Would not it be good if we could group the machines not by their physical location but by their function?
- Virtual LAN or VLAN provides a mechanism to achieve the goal of logically grouping the machines irrespective of their physical location in the network. This is a massive improvement over traditional LANs and many advantages.

# Advantages of VLAN

- Manageability.
- Data sharing.
- Tracking usage.
- Reduction of broadcast traffic on switch.
- VLANs are also used to share a high network bandwidth.
- Server virtualization and VLAN.

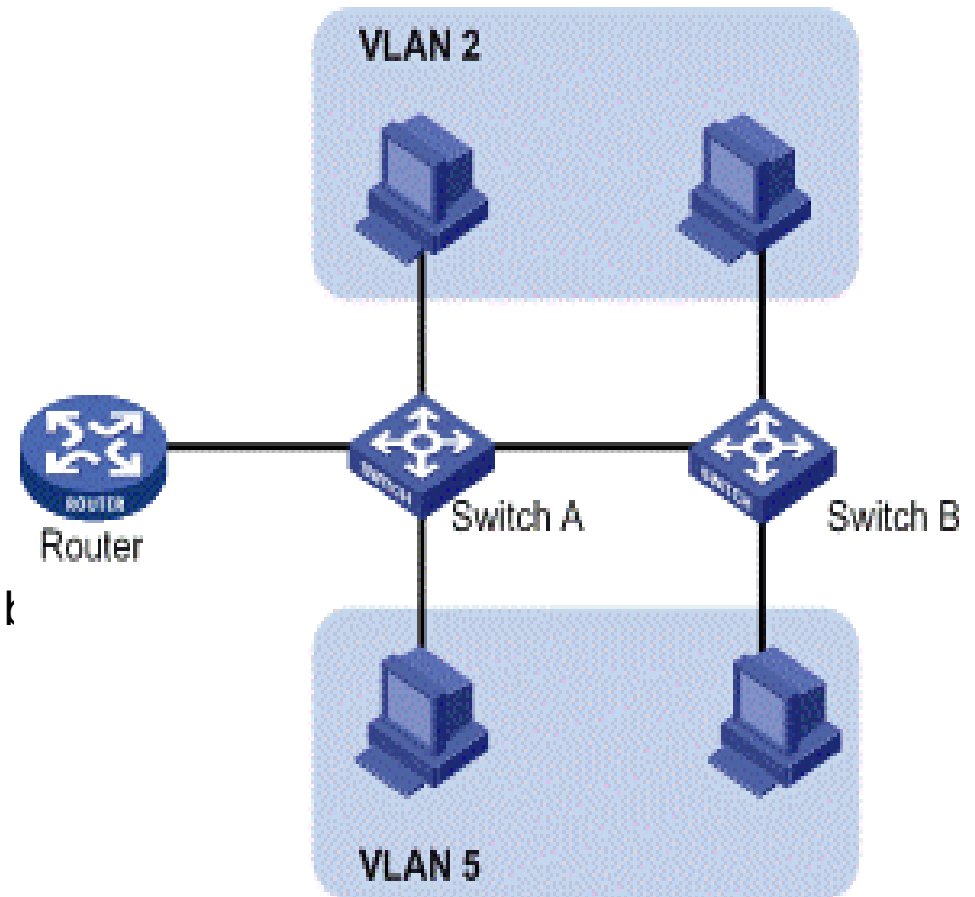


Figure: VLAN



# Application virtualization overview

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- What are the most common challenges faced by a user when moving an application from a system running an OS to another system running a different OS?
- The answer is “[Application Portability](#)”. It is not only difficult but sometimes almost next to impossible to move your applications without recompiling for a new platform or drastically changing the source code or moving to a new version of the application.
- The process requires re-compilation, patch-work, reinstallation and reconfiguration. All these steps take a considerable amount of time in an organization.

# Challenges in using applications in traditional install, use and update model



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- Applications with the correct version must be installed locally on machines with supported operating system and architecture. The same process must be repeated over many computers in an organization.
- In case, an application requires patch updates, the application needs to be patched separately on each machine.
- License usage tracking of applications is complex, as it involves special software tools that run on the individual desktop to check on the installation status and the usage metrics. Applications thus installed cannot be made available easily to users on travel. The process is cumbersome involving.
- Re-installation of the OS and transfer of licenses to the mobile equipment.
- During hardware refresh cycles, the applications require reinstallation and reboots.
- [Application dependency](#) on the underlying operating systems and platforms is a major reason behind the complexity of maintaining applications.

# Solution for challenges

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- If an application is made independent of the underlying platform, it is possible to do away with most of the difficulties and complexity of application lifecycle.
- An application can be made platform independent by building a logical layer over the target platform. This logical layer presents a consistent interface to the applications irrespective of the underlying platform.
- A very good example of the logical layer is the “[Java Virtual Machine \(JVM\)](#)”.
- This also opens opportunities for better license management and better usability tracking since the applications are hosted on the centralized server.

# Architecture

Application virtualization infrastructure can be designed in-line with desktop virtualization techniques and involves a server-client model for servicing applications. Steps involved in the application lifecycle are:

- User requests an application from the [remote server](#). Remote application server streams the application on request by the user.
- User desktop runs the application in a virtual environment which shields the application from the underlying platform.
- After completion of work, the application is removed from the user desktop. Application server updates the application usage counters and simultaneous counters for accounting purposes.
- The application is kept up-to-date with the latest patches and license renewals on the centralized server. End-users get relieved of license and patch management.
- New applications are added and configured on the central server and the information on these is propagated to the end-users. Which saves time proportionate to the number of end-users in the organization.
- Users on the move can establish a VPN connection to the central server to request and access the application.

# Benefits of application virtualization

- Application virtualization builds a virtual layer on the user-desktop which allows the applications to run and execute without any major dependency on the specifics of the OS and the platform.
- Provides streamlined migration of user- applications from one OS platform to another. With application virtualization, it is possible to mix and match heterogeneous OS platforms to run distributed applications.
- Logical isolation of applications from the operating system offers distinct advantages over native applications. This protects the applications from malicious or poorly written code that may hamper the system or degrade system's performance.
- When compared with VDI ([Virtual Desktop Infrastructure](#)), application virtualization is a lightweight solution since only the application code is virtualized. In case of VDI, the entire stack comprising of hardware, software, and applications are virtualized.
- Applications can be deployed on-demand and in seconds through application streaming techniques. Usage of the applications hosted on the central server can be easily tracked. Simultaneous use of application can also be tracked for license purposes.

# Checkpoint (1 of 2)

Multiple choice questions:

1. Which type of virtualization is used to solve business problems, but essentially it refers to the creation of a logical network layer over the physical network resources.
  - a) Storage
  - b) Server
  - c) Network
  - d) Application
  
2. By which we can build a virtual layer on the user-desktop which allows the applications to run and execute without any major dependency on the specifics of the OS and the platform.
  - a) Network virtualization
  - b) Server virtualization
  - c) Storage virtualization
  - d) Application virtualization
  
3. Mention the common examples of application virtualization?
  - a) Java virtual machine,
  - b) Microsoft .NET framework,
  - c) Linux emulation layer and etc.
  - d) All the above.

# Checkpoint solution (1 of 2)

Multiple choice questions:

1. Which type of virtualization is used to solve business problems, but essentially it refers to the creation of a logical network layer over the physical network resources.
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3. Mention the common examples of application virtualization?
  - a) Java virtual machine,
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  - c) Linux emulation layer and etc.
  - d) **All the above.**

# Checkpoint (2 of 2)

## Fill in the blanks:

1. \_\_\_\_\_ sets up a logical layer over the existing network using a secure tunneling protocol.
2. When compared with VDI, \_\_\_\_\_ is a lightweight solution since only the application code is virtualized.
3. \_\_\_\_\_ provides a mechanism to achieve the goal of logically grouping the machines irrespective of their physical location in the network.
4. \_\_\_\_\_ sets up a logical layer over the existing network using a secure tunneling protocol.

## True or False:

1. An application can be made platform independent by building a logical layer over the target platform. True/False.
2. Remote application server dose not allow to stream the application on request by the user. . True/False.
3. Application Portability is the most common challenges faced by a user when moving an application from a system running an OS to another system running a different OS. True/False.



# Checkpoint solution (2 of 2)

## Fill in the blanks:

1. VPN sets up a logical layer over the existing network using a secure tunneling protocol.
2. When compared with VDI, application virtualization is a lightweight solution since only the application code is virtualized.
3. VLAN provides a mechanism to achieve the goal of logically grouping the machines irrespective of their physical location in the network.
4. VPN sets up a logical layer over the existing network using a secure tunneling protocol.

## True or False:

1. An application can be made platform independent by building a logical layer over the target platform. **True.**
2. Remote application server dose not allow to stream the application on request by the user. **False.**
3. Application Portability is the most common challenges faced by a user when moving an application from a system running an OS to another system running a different OS. **True.**

# Question bank

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Two-mark questions:

1. Define Network virtualization.
2. Define Application virtualization.
3. Define Data sharing.
4. Define VLAN.

Four-mark questions:

1. Explain in brief the Application virtualization architecture.
2. Explain in brief Advantages of VLAN.
3. Explain in brief Virtual LAN (VLAN).
4. Explain in brief How VPN works.

Eight-mark questions:

1. Explain in detail Virtual Private Network (VPN).
2. Explain in detail Challenges in using applications in traditional install, use and update model

# Unit summary

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**Having completed this unit, you should be able to:**

- Explain the benefits of network virtualization
- Define VPN and VLAN
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