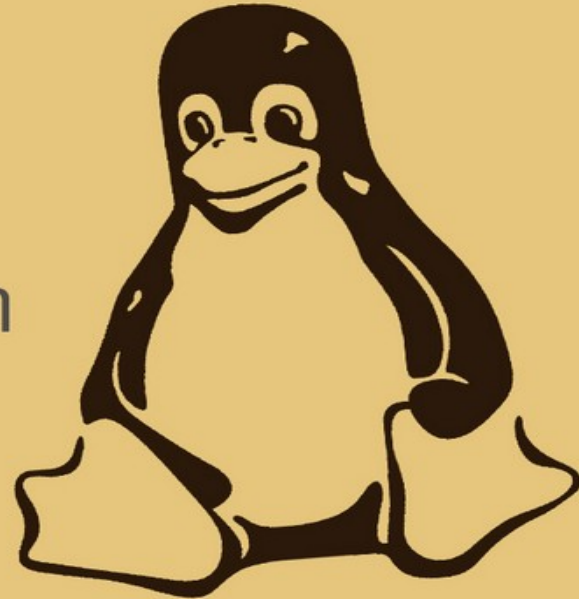


# Advanced Linux Administration

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# LINUX

Advance Administration



# Advanced Linux Administration

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This course specifically designed for students who have basic Linux Administration knowledge and looking for advance administration skills in Linux. This course will teach you everything you need to know to be an Advanced systems administrator.

This course is intended to help students broaden their ability to administer Linux systems at an enterprise level.

After the completion of the course the students will be familiar with the various advance topics of Linux Administration and will have exposure to all competencies tested by various Linux exams. You get hands-on experience with various practice Lab sessions.

# Advanced Linux Administration

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Course Outline

Introduction about the course module

# Advanced Linux Administration

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## Course Outline

### Linux Virtualization

- Overview of Linux Virtualization

- What is Hypervisor?

- Types of Virtualization

- KVM + QEMU + Libvirt Architecture

- Virtualization Requirements

- Packages, Configuration tool & Service Daemon

- Practice Lab Session

# Advanced Linux Administration

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## Course Outline

### Squid Proxy Server

Overview of Squid Proxy Server

Types of Proxy Server

Proxy Server Configurations & its packages

How proxy Server works

Practice Lab Session



# Advanced Linux Administration

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## Course Outline

LDAP (Light Weight Directory Access Protocol)

Overview of LDAP

Conceptual understanding about LDAP

Advantages of LDAP over NIS

LDAP Database Structure

Practice Lab Sessions

# Advanced Linux Administration

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## Course Outline

### Managing SELinux Security

Introduction - SELinux

SELinux Security Concepts

Changing SELinux Modes

Practice Lab Sessions

Changing SELinux Contexts

SELinux Booleans

Audit logs & troubleshooting SELinux

# Advanced Linux Administration

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## Course Outline

### Firewalld

Overview of firewalld in Linux

Features of firewalld & its advantages over iptables

firewalld components

how packet flows

Limiting network communications

Practice Lab Sessions



# Advanced Linux Administration

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## Course Outline

### Samba Server

- Overview of Samba Server
- Features of Samba Server
- How Samba Server Works
- Samba File sharing Server
- CIFS File System
- Practice Lab Sessions

# Advanced Linux Administration

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## Course Outline

### Automating Installation with kickstart

Overview of kickstart Server

Features & configuration of kickstart server

Graphical mode to configure the kickstart config file

Deploying a new virtual system with kickstart

Practice Lab Sessions

# Advanced Linux Administration

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## Course Outline

### Network Teaming

- Overview of Network Teaming

- Policies of Network Teaming

- Creating teaming virtual interface - (how to configure NIC Teaming as Active Backup (Failover))

- Managing Network Teaming

# Advanced Linux Administration

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## Course Outline

### Configuring iSCSI Targets & Initiators

About iSCSI

iSCSI fundamentals

iSCSI Components terminology

Practice Lab Sessions

# Advanced Linux Administration

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## Course Outline

### Access control Lists ACL's

- Overview of ACL
- Use of command getfacl & setfacl
- Default ACL
- Securing files with ACLs
- Practice Lab Sessions



# Advanced Linux Administration

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Working on Linux troubleshooting skill

**Understanding Boot Process**  
**Troubleshooting basic boot issues**

# Advanced Linux Administration Virtualization

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## Overview of Virtualization

Virtualization is technology that allows you to create multiple simulated environments or dedicated resources from a single, physical hardware system.

Virtualization is the ability for a computer system to share resources so that one physical server can act as many virtual machines or servers

Virtualization allows the sharing of resources such as hard disk space, memory, network card, CPU's etc

# Advance Linux Administration Virtualization

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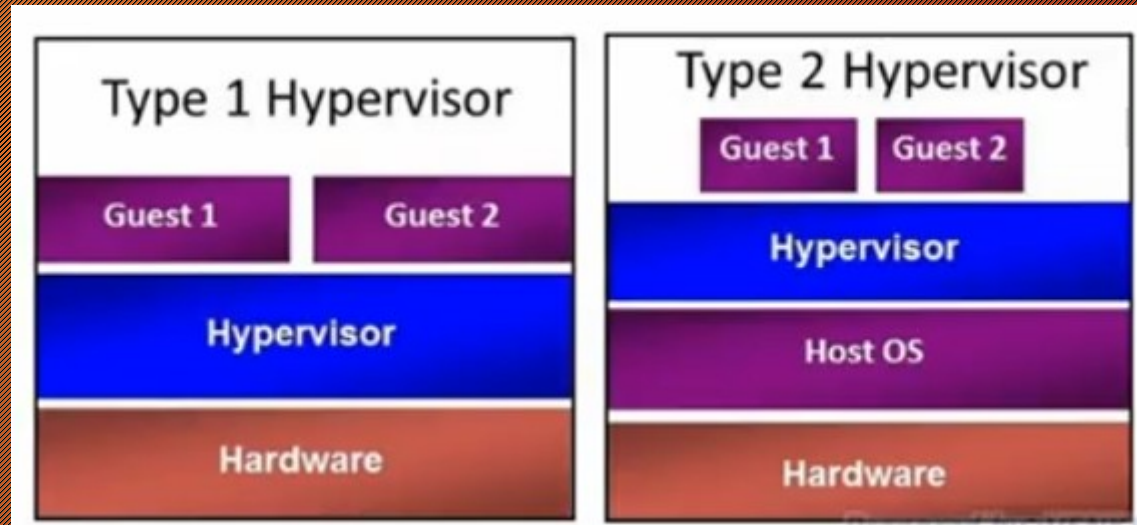
What is a hypervisor?

A hypervisor or Virtual Machine Monitor (VMM) is a computer software, firmware, or hardware that create and runs virtual machines. A computer on which hypervisor runs one or more virtual machines is called a host machine and each virtual machine is called a guest machine.

The hypervisor presents the guest operating systems with a virtual operating platform and manages the execution of the guest operating systems. Multiple instances of a variety of operating systems may share the virtualized hardware resources: for example, Linux, Windows, and macOS instances can all run on a single physical x86 machine.

# Advance Linux Administration Virtualization

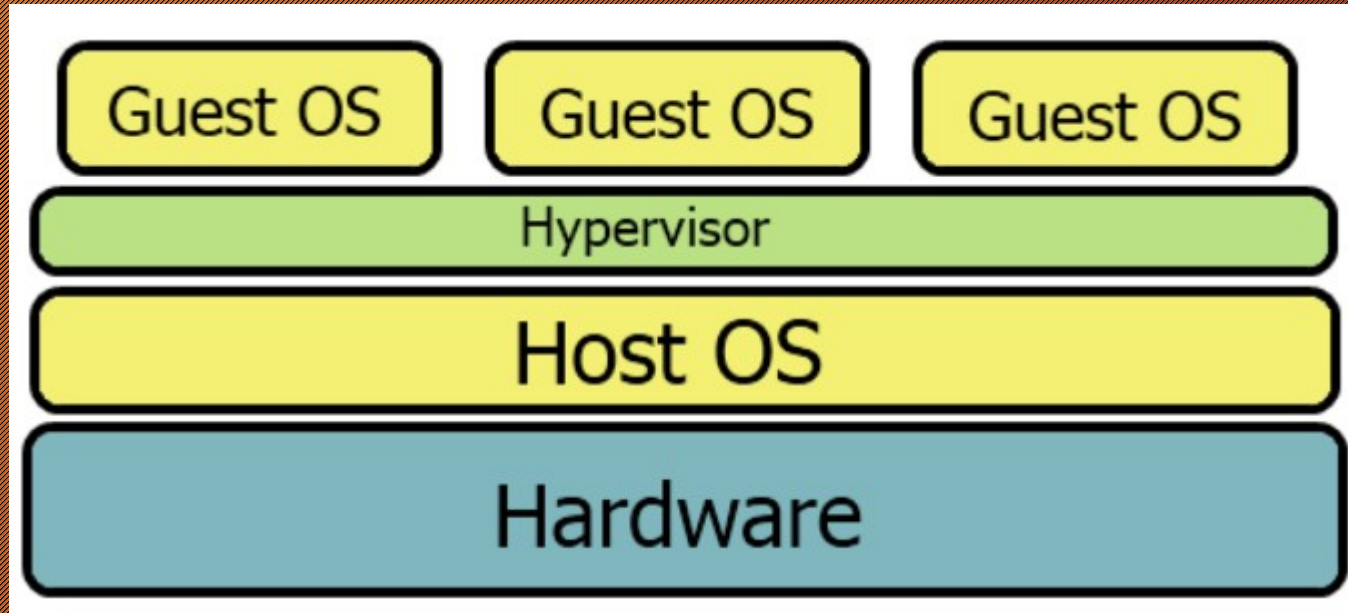
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# Advance Linux Administration Virtualization

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# Advance Linux Administration Virtualization

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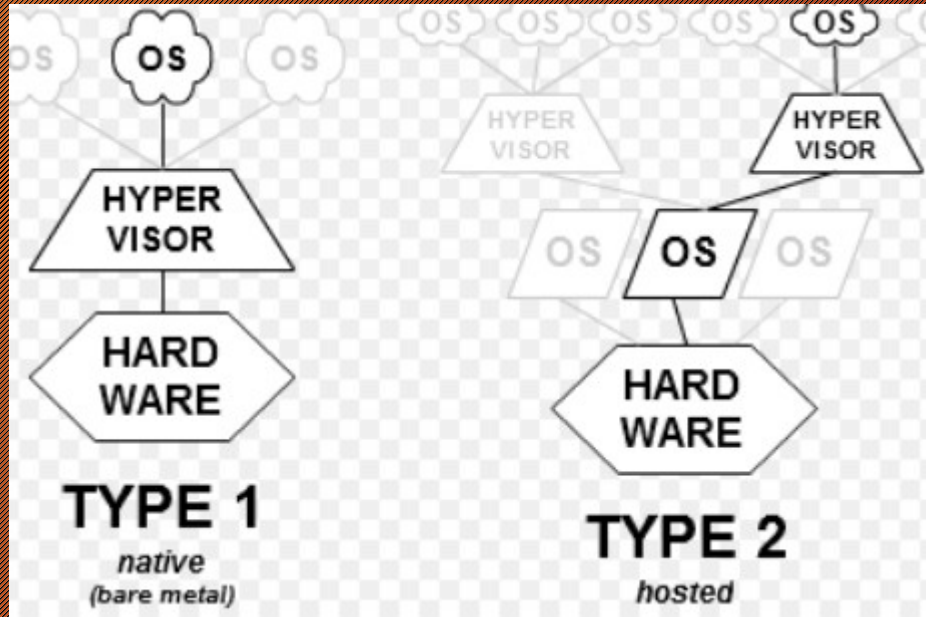
## Types of Virtualization

Para virtualization - Only Linux Operating system is supported as virtual machines.

Full virtualization - All operating systems are supported as virtual machines.

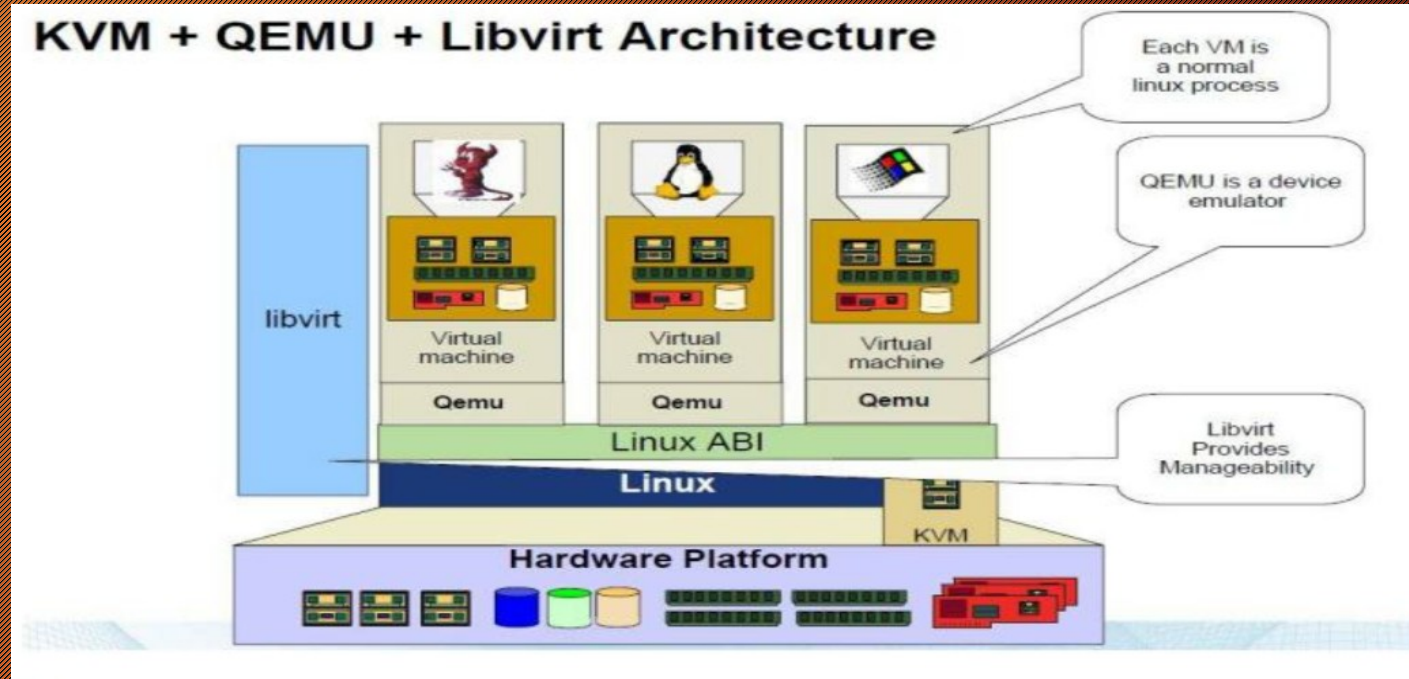
# Advance Linux Administration Virtualization

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# Advance Linux Administration Virtualization

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# Advance Linux Administration Virtualization

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qemu-kvm

A hypervisor is a virtual machine manager which creates virtual machines and manages it. A hypervisor where it is running is called a host machine and the virtual machines created by hypervisor are called guest machine.

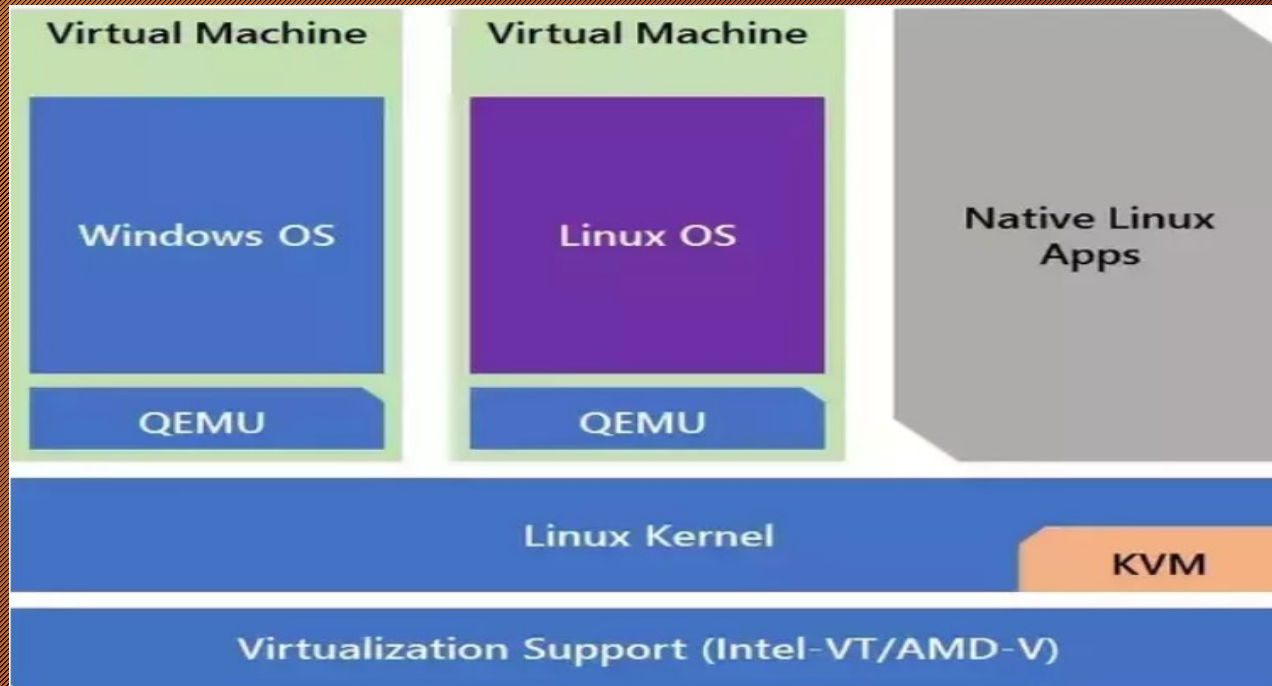
Since, Kernel based Virtual Machine(KVM) is just an accelerator. QEMU can exist without kvm, and qemu can manage all the virtual machines resources such as virtual CPU, virtual hardware. But, the processing of QEMU for communication between guest CPU and host CPU is extremely slow.

So, there arises a need to best utilize the communication between virtual machine CPU and host machine CPU. And, this acceleration part is done later separately through KVM, which only focuses on CPU part and doesn't handle other hardware at all.



# Advance Linux Administration Virtualization

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# Advance Linux Administration Virtualization

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## Virtualization Requirements

Packages - qemu\*.rpm, virtualization\*.rpm & libvirt\*.rpm

Configuration Tool - virt-manager &

Service/Daemon - libvirtd

# Advance Linux Administration Virtualization

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Practice Lab Session

# Advance Linux Administration

## Proxy Server (Squid)

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### Proxy Server

Proxy server are used to share an Internet connection with many clients.

A proxy server can be configured as :

- A simple proxy server => to share the internet connection.
- A caching web server => to store web pages locally to improve performance.
- A firewall => to control access to the internet .

A proxy server is simply a middle-man between client PCs (users) and the Internet (typically, websites). The purpose of the proxy server is to maintain a cache of commonly accessed Web sites in order to increase access speed and to reduce bandwidth usage. A squid proxy is the most widely used open source proxy.

# Advance Linux Administration Proxy Server (Squid)

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## Proxy Server

Proxy server are used to share an Internet connection with many clients.

A proxy server can be configured as :

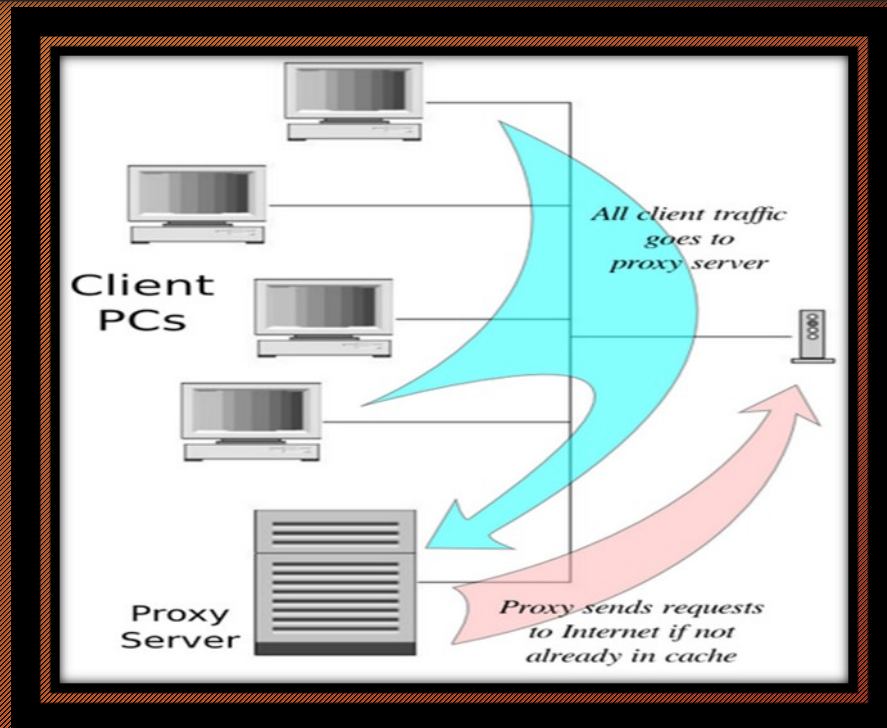
- A simple proxy server => to share the internet connection.
- A caching web server => to store web pages locally to improve performance
- A firewall => to control access to the internet



# Advance Linux Administration

## Proxy Server (Squid)

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# Advance Linux Administration Proxy Server (Squid)

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## Proxy Server Configuration

### Packages

- squid\*.rpm
- Port Number => 3128 (default)

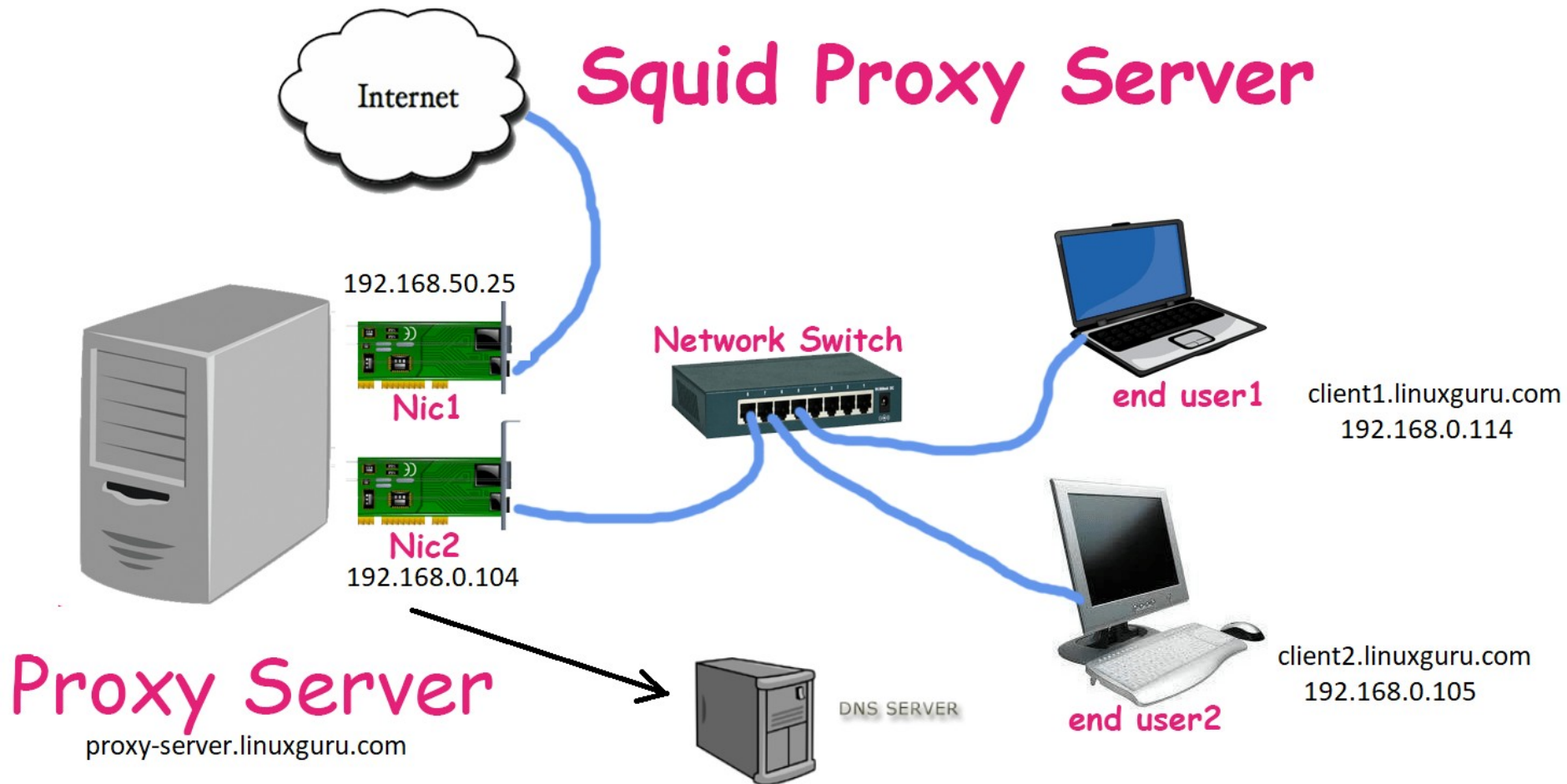
### Configuration file

- /etc/squid/squid.conf

### Service /Daemon

- squid

# Squid Proxy Server



# Light Weight Directory Access Protocol (LDAP)

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## Why we use LDAP

- Centrally manage the data of users and groups
- Distribute management of data to appropriate people
- Allow users to find data that they need
- Not locked into a particular server
- Ability to distribute servers to where they are needed
- It supports hierarchy structure database

**LDAP  
Server**

**User:-** tech, ali

**192.168.0.253**



**Linux Client 1**

**192.168.0.1**



**Win Client 2**

**192.168.0.2**



# Light Weight Directory Access Protocol (LDAP)

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- LDAP can be used as a centralized authentication server which provides centralized login to a user across different networks and systems.
- LDAP is called as Directory Server. It can be also known as DSA which stands for Directory Server Agent or Directory System Agent.
- The main purpose of DSA is to provide a systematic set of records, usually organized in a hierarchy structure.



# Light Weight Directory Access Protocol (LDAP)

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- DSA is a network database that stores information represented as trees of entries.
- It's similar to a phone directory that contains list of contact names with their contact number and address
- This is different from a relational database, which can maintain database using tables, columns and rows.
- LDAP servers store "directories" which are accessed by LDAP clients. LDAP is called lightweight because it is a smaller and easier protocol which was derived from the X.500 DAP (Directory Access Protocol) defined in the OSI network protocol stack

# Light Weight Directory Access Protocol (LDAP)

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## NIS (Network Information Service)

NIS is also an authentication service to give centralized login to users but there are some differences between NIS & LDAP

| 1 | NIS  | LDAP   |
|---|--|--|
| 2 | It is a dependent service.                     | It is an independent protocol.                               |
| 3 | It works on random port numbers.               | It works on standard port numbers.                           |
| 4 | Less secure.                                   | More secure.   |
| 5 | It is mostly used in private network.          | It is used in both the networks i.e. private as well public. |
| 6 | It maintains user's database in random format. | It maintains user's database in hierarchy format             |

# Light Weight Directory Access Protocol (LDAP)

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## Disadvantages of NIS

- Uses arbitrary ports
- No data encryption
- No access-control mechanism
- It provides only basic searching ability using single-key database
- Does not provide directory services for non name service applications.
- It can be used mostly in private network.



# Light Weight Directory Access Protocol (LDAP)

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LDAP uses fixed ports, 389 TCP for regular communication and 636 for encrypted communication.

LDAP Database can be controlled by DSA (Directory Server Agent) and can be create by BDB - Barkeley Dabase

# Light Weight Directory Access Protocol (LDAP)

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## LDAP Requirements

### Packages:

- ldap\*.rpm
- openldap\*.rpm
- migration\*.rpm
- nss\*.rpm

### Port Numbers

- 389 & 636



# Light Weight Directory Access Protocol (LDAP)

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## Configuration Files Directory

- /etc/openldap/slapd.d/cn=config

## Configuration Files

- olcDatabase=\{0\}config.ldif
- /etc/openldap/slapd.conf
- /usr/share/migration/migrate\_common.pl

## Service/Daemon

Slapd

# LDAP DATABASE STRUCTURE(BDB database application)

. (DN)

example.com(DC)

dn: dc=example,dc=com

People(ou)

dn: ou=People,dc=example,dc=com

staff = dn: ou=staff,dc=example,dc=com

hr = dn: ou=hr,dc=example,dc=com

windows = dn: ou=windows,dc=example,dc=com

UID(Users)

dn: uid=ravi,ou=staff,dc=example,dc=com

ravi

CNAME=Kumar  
UID=1000  
Password=\*\*\*\*\*  
SHELL=/bin/bash  
HOME=/home/ravi

Schemas of user

John

dn: uid=john,ou=hr,dc=example,dc=com

Schemas of user

Jack

dn: uid=jack,ou=windows,dc=example,dc=com

Schemas of user

# Light Weight Directory Access Protocol (LDAP)

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## Lab Session