Operating Systems

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Unit- 5

Linux System- Basic Concepts; System Administration-Requirements for Linux System Administrator, Setting up a LINUX Multifunction Server, Domain Name System, Setting Up Local Network Services; Virtualization- Basic Concepts, Setting Up Xen, VMware on Linux Host and Adding Guest OS.

<u>Linux Systems</u>

<u>Basic Concepts</u>

- ➤ User Concept
- ➤ User Roles
- ➤ Groups
- ➤ The Linux File System
- ➤ Key Features
  - - Specifying Paths
  - - Partitions, Drives/Devices and Directories
 - Mounting and Unmounting
 - Case-Sensitivity
   - File Extensions
- ➤ The Directory Structure
- ➤ Files and Folders

Components – Diagram
- ✓ Kernel
- ✓ System libraries.
- ✓ System utilities.

system-management programs	user processes	user utility programs	compilers

System Requirements

- Web server (Apache 2.0.x)
- A mail server (Postfix)
- A DNS server (BIND 9)
- An FTP server (ProFTPD)
- Mail delivery agents (POP3/POP3s/IMAP/IMAPs)
- Webalizer for web site statistics

Responsibilities of System Administrator in LINUX?

- Administer and manage large Linux server environment, with an emphasis on performance monitoring, tuning, and management.
- Oversee database physical design, administration, and documentation.
- Provide network troubleshooting, escalated service desk support, and proactive monitoring of mission-critical systems.
- Provide guidance and direction of technology solutions for the organization; train and mentor junior-level administrators.
- Install, configure, and troubleshoot all hardware, peripherals, and equipment necessary to meet integrated systems objectives; provide support functions on escalated issues.

Domain Name System

- ➢ Definition
- ➢ Need for DNS
- ➢ Four different types of DNS servers
- ➢ Advantages of Localized DNS Administration
- ➢ Setting Up a DNS Server
- ➢ The Distributed Method of Resolving Domain Names

Setting up Local Network Services.

- ✧ Configuring the Network
- ✧ DHCP
    Installing DHCP
Starting DHCP Service
    Providing Static IP Addresses

Assigning IPv6 Addresses with radvd
✧ Gateway Services

DHCP

Dynamic Host Configuration Protocol (DHCP) is used to solve a number of problems associated with local network environments, including IP address assignment problems and administration issues. Some of the issues that DHCP solves are:

- PCs and workstations require unique IP addresses, DNS information, and the locations of gateways.
- Manually tracking IP addresses causes excessive work.
- Accidental duplication of IP addresses creates conflicts on the network.
- Troubleshooting address problems (such as duplicate addresses) and changes in location creates unnecessary work.
- Changes in personnel usually mean that someone will have to check each computer to configure a new database of IP assignments.
- Frequent movement of mobile users creates a need to reconfigure networking on laptops.

Demilitarized zone (DMZ)

Demilitarized zone (DMZ) refers to a perimeter network, which is a subnet or network that sits between an internal network and the Internet. DMZs are used to contain servers that need to be accessible from the outside world, such as email, web, and DNS servers. Connections from the Internet to the DMZ are usually controlled using Port Address Translation (PAT).

Configuring the Network – E.g. Debian

DHCP is used during the Debian installation, then configure the server with a static IP address perform the testing required. If public IP address is configured as static, you can skip to the

next section.

If you installed Debian with a DHCP client from your router or Internet service provider, you need to reconfigure networking. This is a valuable lesson in its own right

for exploring Linux network configuration.

To change the settings to use a static IP address, the user should be a root user and edit the file */etc/network/interfaces* to suit your needs. As an example, we'll use the IP address 70.153.258.42.

The configuration file starts out looking like this:

\# /etc/network/interfaces -- configuration file for ifup(8), ifdown(8)

\# The loopback interface

auto lo
iface lo inet loopback
The first network card - this entry was created during the Debian
installation
(network, broadcast, and gateway are optional)
The primary network interface
iface eth0 inet dhcp
then search the servers
nameserver 70.153.258.42
nameserver 70.253.158.45
nameserver 151.164.1.8
Now, to set the hostname, enter these commands:
echo server1.centralsoft.org > /etc/hostname
/bin/hostname -F /etc/hostname
Then finally give service network restart.

Virtualization

Definition

Virtualization is the creation of a virtual (rather than actual) version of something, such as an operating system, a server, a storage device or network resources. Virtualization allows one computer to do the job of multiple computers. Virtual environments let one computer host multiple operating systems at the same time. Virtualization transforms hardware into software

Virtual machine monitor

The Virtualization layer is the middleware between the underlying hardware and virtual machines represented in the system, also known as *virtual machine monitor* VMM.

Levels of virtualization

- OS level Virtualization
- Server level Virtualization
- Storage level Virtualization
- Processor level Virtualization
- Network level Virtualization

Benefits of virtualization

- It replaces wasteful arrays of systems with fewer, better-utilized systems.
- It simplifies administration, because separate kernels with one application running on each are more secure and manageable than one kernel running many applications.
- It also maintains the environment in which documents were created, to meet regulatory requirements.
- Reduced hardware and complexity allows reduced staff.
- Virtualization may help reverse the trend of server sprawl.

Use of Virtualization

- Virtualization can be used to run multiple versions or multiple Linux distributions on one system, or to test untrusted applications in a sandboxed environment.
- Virtualization improves the utilization of servers and reduces over provisioning of hardware by consolidating system resources.

XEN - Hypervisor

Definition

A hypervisor is a hardware virtualization technique allowing multiple operating systems, called guests to run on a host machine.

XEN – Installation

Prerequisites for Xen installation

The following packages must be installed in order to proceed with the Xen installation.
·iproute
·bridge-utils
·udev
·gcc
·binutils
·make
·zlib1g-dev
·libncurses4-dev
·openssl
·python-dev

Steps for Xen Installation

1.Type " apt-get update" in your console in order to update your local repository

2. apt-cache search xen-hypervisor

3. Install the Xen hypervisor using the following command

apt-get install xen- hypervisor-3.2-1-i386

4.Installing the linux-system image.

apt-get install xen-linux-system-2.6.26-1-xen-686

5. Install xen-utils-3.2-1 & Xenstore-utils

apt-get install xen-utils-3.2-1

apt-get install xenstore-utils

6.Installing xenwatch

apt-get install xenwatch

7.Installing xen-shell

apt-get install xen-shell

8.Installing xen-tools

apt-get install xen-tools

After installing all the tools

1 Create a virtual machine using the following command

   $ xm create guestconfig

This command will start the DomU or VM . To list the VM issue command as follows

   $ xm list

Name	ID Mem(MiB)	VCPUs State	Time(s)
Domain-0	0 403	2 r-----	476.5
guestnode.grid	1 599	1 r-----	8243.0

2 Login Guest Domain

   To login to newly create VM (guestnode.grid) issue command as follows

   $ xm console 1

   You will be prompted for user name and password.

Types of virtualization.

- **Full virtualization.**
- **Para virtualization.**

Full virtualization

- Does not need to modify guest OS, and critical instructions are emulated by software through the use of binary translation.
- VMware Workstation applies full virtualization, which uses binary translation to automatically modify x86 software on-the-fly to replace critical instructions.

Diagram for Full virtualization
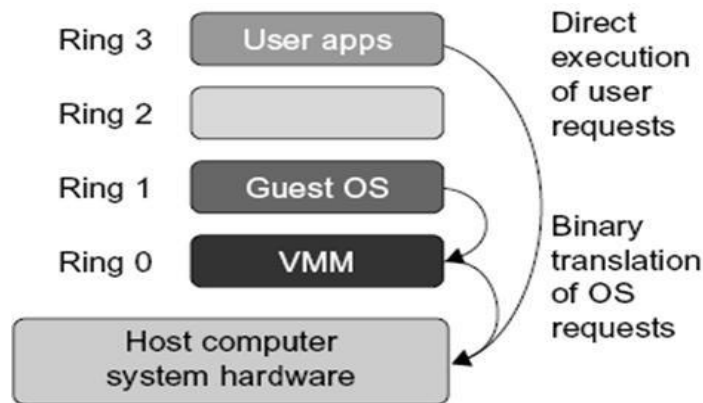
- Advantage: no need to modify OS.
- Disadvantage: binary translation slows down the performance.

Para virtualization

- Para virtualization must modify guest OS, non-virtualizable instructions are replaced by hyper calls that communicate directly with the hypervisor or VMM.
- *Para virtualization is supported by Xen, Denali and VMwa*re ESX.

Diagram for Para virtualization
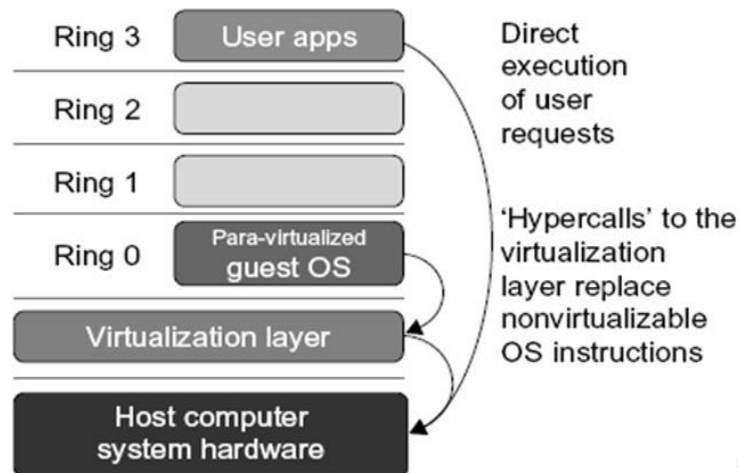
- Reduces the overhead, but cost of maintaining a para virtualized OS is high.
- The improvement depends on the workload.

Installing VMware

VMware has made its server available for free, and the code is even open source. *http://www.vmware.com/products/server*. VMware has also submitted its own open source contributions to the kernel developers, realizing that VMware will run better on Linux. VMware instances from an Ubuntu desktop using the VMware console. Creating a new installer database using the tar3 format.

Installing the content of the package. [/usr/bin]

VMware Server's installation begins based on the installation script's sniffing of the operating system and file layouts. The path "/usr/lib/vmware" does not exist currently. This program is going to create it, including needed parent directories. Toward the end of the installation, the script will inform the installation of the code has completed.

The following are the installation process:

Starting VMware services:

- Virtual machine monitor done
- Virtual Ethernet done
- Bridged networking on /dev/vmnet0 done
- Host-only networking on /dev/vmnet1 (background) done
- Host-only networking on /dev/vmnet8 (background) done
- NAT service on /dev/vmnet8 done

Starting VMware virtual machines done.

Thus the VM-ware will be installed.