Subject Code: IMT-103

Subject Name : LINUX ADMINISTRATION

Objective

To provide knowledge about architecture implementation and system administration of Linux

Contents

INSTALLING LINUX AS A SERVER
Linux and Linux distributions; Major Differences between Windows and Linux; Single users vs Multi-user Vs Network Users; Separation of the GUI and the Kernel; Domains; Active Directory;
INSTALLING LINUX IN A SERVER CONFIGURATION
Pre-requisites for Installing Linux; Server Design; Dual Booting Issues; Methods of Installation; Creating a Boot Disk; Starting the Installation; Welcome of Red; Hat Linux;
GNOME AND KDE
The History of X Windows; The Downside; Enter KDE and GNOME; About KDE; Licensing issues; KDE Basics; KDE Control Centre; About GNOME; GNOME Basics; Using the GNOME Icons; The GNOME Configuration Tool
INSTALLING SOFTWARE
The Red Hat Package Manager; Installing the Package; Querying a Package; Uninstalling a Package; GNORPM; Compilling Software; Getting and Unpacking the Package; Looking for Documentation; Configuring the Package; Compiling the Packa
MANAGING USERS
Home Directories; Passwords; Shells; Start up Scripts; Understanding Mail; User Databases; The /etc/passwd file; The /etc/shadow file; The etc/group file; User Management Tools; User LinuxConf to Manipulate Users and Groups; Set UID and set GID Programs;
THE COMMAND LINE
An Introduction to BASH; Job Control; Environment Variables; Pipes; Redirection; Command Line Shortcuts; Documentation Tools; File Listings; Ownerships and Permissions; File and Directory Types; Change Ownerships; Change Groups; File Management and Manipulation; Process Manipulation; Miscellaneous Tools
BOOTING AND SHUTTING DOWN
Lilo; Configuring Lilo; Additional Lilo Options; Adding A New Kernel To Boot; Running Lilo; The Steps For Booting; Enabling And Disabling Services
FILE SYSTEMS
The Make Up File Systems; Managing File Systems; Adding And Partitioning A Disk; N/W File System; Quota Management
CORE SYSTEM SERVICES
The Init Service; The Inetd And Xinetd Processes; The Syslogd Daemon;The /Etc/Syslog.Conf File; The Cron Program
PRINTING
the Basic of lpd; the basic of lprng; configuring /etc/printcap; the /etc/lpd.pans file; clients of lprng; configuring samba;

Main Reading :

IMT Study Material (SIM)

Additional Readings
1. LINUX documentation

Notes:

a. Write answers in your own words as far as possible and refrain from copying from the text books/handouts.
b. Answers of Ist Set (Part-A), IInd Set (Part-B), IIIrd Set (Part – C) and Set-IV (Case Study) must be sent together.
c. Mail the answer sheets alongwith the copy of assignments for evaluation & return.
d. Only hand written assignments shall be accepted.

A.	First Set of Assignments:	5 Questions, each question carries 1.5 marks.
B.	Second Set of Assignments:	5 Questions, each question carries 1.5 marks.
C.	Third Set of Assignments:	5 Questions, each question carries 1.5 marks. Confine your answers to 150 to 200 Words.
D.	Forth Set of Assignments:	Two Case Studies : 7.5 Marks. Each case study carries 3.75 marks.

ASSIGNMENTS

PART– A

1. What is LINUX. Discuss the main features of LINUX. Explain the Linux file system.

2. What is the most significant and real advantage of creating links to a file instead of copies of the file?

3. Write a command to find all of the files which have been accessed within the last 30 days. Output should be stored in a file “December.files”.

4. On a Red Hat LINUX Variant how do you control whether a service starts when the system boots. How do you tell the amount of free disk space left on a volume. Give an example of a recursively copying a directory from one location to another.

5. What are the various configuration methods of LINUX Kernel? Describe in detail.

PART– B

1. What is a user interface? What are the two basic kinds of operating system interfaces? What type of interface does Linux use?

2. Write script called hello, put this script into your startup file called, .bash profile, the script should run as soon as you logon to system, and it print any one of the following message in infobox using dialog utility, if installed in your system, If dialog utility is not installed then use echo statement to print message : -
   Welcome
   Good Afternoon
   Good Evening, according to system time.

3. Explain following commands in detail:

   i. init
   ii. ifconfig
   iii. shred

4. What is open-source software and how does this affect the Linux operating system?

5. Explain the following:
    a) GNOME icons
    b) Cron Program
    c) Running Lilo

PART – C

6. Explain how would you logout of your root user account and shut down your system.

7. How LINUX prints simple text. Explain lpd and lpr.

8. How would you delete an account with Linuxconf and userdel. Describe the use of Linuxconf to manipulate users.

9. Write a Linux command to find all lines in a file with words longer than 4 letters, assuming that words are separated by spaces except at the beginning or end of a line.

10. Explain the following:
    - Set UID and Set GID programs
    - Ownerships and Permissions

CASE STUDY-1

Orwell High School, in Felixstowe on the East Coast of England, is a school with some 1,000 students ranging in age from 11 to 18. The school has just received Specialist School for Technology status through a Government initiative.
Funding is never easy for schools in the UK public sector and John Osborne, the Deputy Head of the School responsible for for the Specialist School initiative, found himself faced with a difficult situation. When John contacted Total Solution Computing Limited to discuss his cabling and server requirements, Total Solution were able to propose a one-stop solution to Orwell's requirements, switching to Open Source for the software systems while simultaneously upgrading the networking infrastructure.
All staff at the school now have laptops, and the school wanted to link these to the network wirelessly. The school had specific software requirements for the teaching environment, nearly all of which are met and exceeded by standard Open Source software packages such as OpenOffice.org, MySQL and The Gimp. These have a huge advantage over their proprietary counterparts because the students can also run them at home on their PCs without needing to worry about software licensing.
Total Solution proposed a low-cost solution that fully met the objectives of Orwell High School at a fraction of the cost of the Windows-based proprietary equivalent. The solution has Linux at its core with a desktop based on KDE kiosk-ised to reduce administrative complexity and cost.

A crucial component of the Linux-based solution was a switch to thin-client workstations accessing software running on two central application servers. This allowed all of the existing PC hardware to be re-used without any upgrades. When the PCs boot they no longer use local hard drives, but download copies of the Linux Terminal Server software from a central server instead. Running that software, they become clients for the application servers. Instead of spending significant amounts of money on upgrading the hardware, this has prolonged the life of the workstations by several years at least (and as a consequence also reduces the load on the local landfill site). Since the workstations no longer need hard drives, their power consumption and their noise output is noticeably reduced. As discussed later, the thin-client model also slashes administration effort.

The Linux-based desktop uses a range of standard applications, amongst them OpenOffice.org which provides word processing, a presentation package and a spreadsheet; all of them are able to to save and import files in their native XML format whilst retaining compatibility with Microsoft formats. Quanta is used as the HTML editor, the KDE education package provides an assortment of educational software components, Scribus is the desktop publishing package and The Gimp is an excellent image manipulation tool with a wide range of capabilities.

Every student has a personal quota for file space and printer usage. Their personal FTP space is accessible both inside and outside the school and is used to share their files between home and school. There is additional shared FTP space administered by staff, used for setting assignments and sharing background documents. Email is provided to students and staff through Squirrelmail which gives a web interface very similar to Hotmail or Yahoo mail, this too is visible from home as well as from school. The shared-calendar features of Squirrelmail are also proving popular.

Overall, the project has been a resounding success. John Osborne said:
"I can't believe how easy it has been to move to Linux. The systems were installed and working within a week and it has been a revelation how simple and painless the process has been. I have saved thousands of pounds per year and got a brand-new ICT infrastructure at the same time.” He added:

"Without switching to Linux, I would have been forced to cut back on our ICT hardware and software provision. There simply wasn't the budget to upgrade to the latest versions of the software nor to keep replacing suites of PCs on a three or four year cycle. Now I have no licensing costs to worry about for the Open Source parts of the solution. We shall be moving to a complete Open Source basis as quickly as is practical and hope to start working with other schools interested in this type of development to share ideas and best practise".

The students have taken to the new system without any difficulty whatsoever. They much prefer it to the Windows systems they had been using before, commenting particularly on the reliability of the system and one observing that he was astonised to discover, having accidentally switched off his workstation

before logging out, that KDE's session-restore facility returned him back to where he had been previously when he logged in again.

The administration overhead of the previous Windows-based classrooms had kept the school's ICT technician working twelve hours a day. The new system has greatly reduced this workload. John Said "The significant amount of additional work that will arise as a result of our new status would have made his job impossible had we remained with our Windows based network, and we would have been looking to increase our technician staffing to cope. This would have been another significant ongoing cost which we now feel we can avoid. This funding can now be better spent on developing materials for the staff and students to use rather than on keeping the network running."

Questions:

1. Do you think implementing the low cost solution proposed by “Total solutions” was a success. Explain.
2. How selecting the Linux based solution technically helped the Orwell High School.

CASE STUDY-2

BFSI has long been among the biggest spenders on IT. Now it’s the turn of India’s leading insurer, Life Insurance Corporation of India, to join in by upgrading its IT infrastructure. To do this it plans to move to a complete Linux base not only at the server level but also at the desktop.

Interestingly, all of LIC’s software has been developed in-house at the Software Development Centre (SDC), starting from its back-end processing systems in the 1970s. In the ‘90s, LIC felt the need to develop a front-end package, which it named Front End Application Package (FEAP).

The problem started in 2001 when LIC networked its offices and shifted to Red Hat Linux for this. Once the centres were networked, concurrent requests for customer data began to turn up the heat on its aging systems. This led the company to re-examine its IT infrastructure. LIC decided to migrate to Red Hat Enterprise Linux .

D K Mehrotra, GM, LIC, explains: “With Unix, it was getting difficult to carry out other projects simultaneously.”

LIC also considered the cost effectiveness of the migration, which would help them migrate their mission-critical business applications to the new system while the SDC continues to produce 99 percent of the software.

In addition, the company’s primary application, FEAP, was also experiencing problems, which made them look for a faster operating system, and RHEL helped them in that. Unix, says Mehrotra, limited the number of FEAP units in use and there was no third party support.

B Venugopal, Chief, Information Technology adds that server emulation was a big problem with Unix whereas with RHEL, “We can simply convert a PC into a server by connecting terminals.” So, the migration seems to be a result of both business and technological needs.

LIC wanted to be sure about the vendor they would work with. Thus before finalising they tested both RHEL and SuSE. The former matched LIC’s requirements for expansion. “RHEL fitted well into the technical roadmap and IT policy at LIC, and that was the only reason to choose it,” says Venugopal.

All of LIC’s 2,048 branches, 100 divisional offices, seven zonal offices, head office and subsidiary offices will be covered by the deployment. Along with this all of LIC’s desktops will also simultaneously be converted to Linux. Approximately 60,000 users and five to six thousand servers will migrate to LINUX.

With such a huge deployment, ensuring that there's no downtime will be crucial. However, both Venugopal and Mehrotra are unfazed. They believe that their 100 training centres across the country should ensure that the project duration does not get extended and the migration is seamless.

As of now, LIC claims to be facing no problems in the migration process. Says Venugopal, "We don't see any problems arising in the near future either." Talking about the existence of a mental block against Linux systems, Mehrotra says that if LIC had functioned with blocks like that, they would be lagging behind not only in IT investments but also in the business they run.

The migration, according to Venugopal, will enable LIC to use almost all software and hardware available in the market. This is important as earlier the organisation was restricted to certain applications due to the proprietary platform. RHEL has also helped them to use applications such as Micro Focus COBOL, which was difficult on the earlier Unix systems.

The major benefit according to Venugopal and Mehrotra is the possibility of a larger number of concurrent users accessing the database.

Questions:

1. How LIC has benefited by shifting to Red Hat Linux System. Explain in detail.

2. What do you think how the system can be further improved in future.