COLLEGE OF ENGINEERING CHENGANNUR

# FREE AND OPEN SOURCE SOFTWARE LAB REPORT

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# Certificate

Name : Class :

Roll No : Exam No :

***This is certified to be the bonafide record of practical work done in Free and Open Source Software as per Syllabus of class ..... in the Lab during the academic year 20 /20***

..... .....

*Teacher In-charge* *Head of Dept.*

..... .....

*Examiner's Signature* *Principal*

*Date : .....* *Institution Rubber Stamp*

# Contents

# Linux Commands

*ls* - Used to list all files under a directory
*ls* - Long list all files

*pwd*- To know which directory you are in It gives us the absolute path, which means the path that starts from the root.

*cd* - Use the "cd" command to go to a directory. To go back from a folder to the folder before that, you can type “cd ..” .

*cat* - Use the cat command to display the contents of a file.

*mkdir & rmdir* - Use the mkdir command when you need to create a folder or a directory. Use rmdir to delete a directory.

*cp* - Use the cp command to copy files through the command line.

*alias* -An alias definition provides a string value that shall replace a command name when it is encountered.

*join* -Write a line for each pair of lines with identical join fields
join <file1> <file2>

*paste* -paste is used to write lines consisting of the sequentially corresponding lines from each files
Separated by TAB
paste <file1> <file2>

# CGPA Computation

The task is to compute cgpa of all students of S4D in S1 and S2.

Computing CGPA requires to download the PDFs of the results and the file containing register number and names of students in our class.

The pdf file is converted to text by pdftotext command.

Using grep command unwanted details are removed.

Using join command file containing name , grades and register number is created.

By using a c program the cgpa is calculated.

# Networking Task

The task is to setup networking using ifconfig , route

*ifconfig* - ifconfig stands ‘for interface configuration’.ifconfig is used to configure the kernel-resident network interfaces.s *ifconfig* command is used to assign ip address and netmask to an interface or to disable or enable a given interface.

Display details about all interfaces

ifconfig -a

Display details about interface

ifconfig <interface>

Set ip address for interface

ifconfig <interface> <ip>

To connect or disconnect from an interface

Ifconfig up/down

Route – route manipulates the kernel’s ip routing table. Its primary use is to set up static routes to specific c host or networks via an interface after it has been configured with the ifconfig.

# SSH

One essential tool to master as a system administrator is SSH. SSH, or Secure Shell, is a protocol used to securely log onto remote systems.It is the most common way to access remote Linux Server.SSH has remained popular because it is secure, light- weight, and useful in diverse situations.SSH uses the client server model.

ssh connects and logs into the specified destination, which may be specified as either [user@]hostname or a URI of the form ssh://[user@]hostname[:port].

Connect to a remote server ssh user@remoteip

Once you have connected to the server, you will probably be asked to verify your identity by providing a password.

## Commands used

*put* - This command is used to upload a file . use put –r to upload Directories.

*get* - This command is used to download files.

*mkdir* -This command is used to create a new directory.

To exit from the session simply type
$ exit

# SCP

This task is done to familiarize with the important scp commands. SCP (secure copy) is a command line utility that allows you to securely copy files and directories between two locations.

It uses the same kind of security mechanism like the ssh program. In fact it uses an ssh connection in the background to perform the file transfer.

The basic syntax of scp is
$scp source_file_path  destination_file_path

It can be used

To copy a file from a remote host to the local host:
$scp your_username@remotehost:file_name/path

To copy a file from the local host to a remote host:
$scp file_name your_username@remotehost:/path

Apart from it, there are a couple of extra options and functions that scp supports. By default scp will always overwrite files on the destination.

# RSYNC

Rsync (Remote Sync) is a most commonly used command for copying and synchronizing files and directories remotely as well as locally in Linux/Unix systems.

## Basic syntax

rsync [options]  <source> <destination>

Copy/Sync a file on a local computer

rsync -azvh <source> <destination>

Copy/Sync a directory on a local computer

rsync -azvh <source directory> <destination>

Copy/Sync a directory to a remote computer

rsync –azvh <source directory> user@serverip <destination>

Some common options used with rsync command are:

1. -v : verbose
2. -r : copies data recursively
3. -a : archive mode, archive mode allows copying files recursively and it also preserves symbolic links, file permissions, user & group ownerships and timestamps
4. -z : compress file data
5. -h : human-readable, output numbers in a human-readable format.

# FTP Usage

FTP is file transfer protocol. It is used to transfer files between to and from remote systems. FTP commands can be used to transfer files.

It is network protocol similar to HTTP, but for file transfer. ftp clients are used to connect to ftp servers. After connection tools provided by FTP can be used for file transfer.

## Usage

ftp <server> :-connect to server get

get <file>:-download file from server mget

mget<directory>:-download directories

put <file>:-upload file to server

mput<file>:-upload directories

lcd<directory> :-change local working directory

cd<directory>:-change remote working directory

Use *$exit* to exit from the session.

# OS Installation

This task is to install OS in a system. It is free to download and install on any computer.

## Steps

1.Insert the disc containing the OS(In my case ubuntu) and restart the device.

2.Boot into the Live CD: Most computers are set to boot into the hard drive first, which means you will need to change some settings to boot from your CD or USB.

3. Start the installation process.You can start the installation from the boot menu.

4. Create a username and password. You will need to create login information to install Linux. A password will be required to log into your account and perform administrative tasks.

5. Set up the partition. Linux needs to be installed on a separate partition from any other operating systems on your computer if you intend dual booting Linux with another OS.

6.Boot into Linux

Images:https://github.com/ceccs17d52/cs232/tree/master/os_installation

# HTTP & FTP Server

The task is to create http and ftp server

## HTTP

HTTP means HyperText Transfer Protocol.I used nginx HTTP server.The nginx HTTP server is also a frequently used web server in the world. It provides many powerful features, including dynamically loadable modules, robust media support, and extensive integration with other popular software.

## Commands

apt install nginx:- To install nginx server

nginx -s start :-To start nginx server

nginx -s stop:- To stop nginx server

nginx -s restart:- To restart nginx server

The most common server hosting directory (server root) is /var/www/html/. This can be changed in nginx configuration file located at /etc/nginx/nginx.conf. By creating an index.html at the server root directory and restart nginx will make nginx load the index.html file when the IP address of the server machine is accessed through the same machine or a machine connected to the same network.

# FTP

FTP or File Transfer Protocol is a commonly used protocol for transferring files between computers, one act as a client, the other act as a server.

## Commands

sudo apt install vsftpd

sudo vsftpd

ftp localhost

All files will be displayed

# Package Management

In this task we were able to study the various commands that is used to download , update and upgrade all apps in the system through the terminal.

A package manager deals with packages, distributions of software and data in archive files. Packages contain metadata, such as the software's name, description of its purpose, version number, vendor, checksum, and a list of dependencies necessary for the software to run properly. Upon installation, metadata is stored in a local package database.

## Commands

1.apt-get install package-name(s) - Installs the package(s) specified, along with any dependencies.
2.apt-get remove package-name(s) - Removes the package(s) specified, but does not remove dependencies.
3.apt-get autoremove - Removes any orphaned dependencies, meaning those that remain installed but are no longer required.
4.apt-get clean - Removes downloaded package files for software that is already installed.
5.apt-get purge package-name(s) - Combines the functions of remove and clean for a specific package, as well as configuration files.
6.apt-get update - Reads the /etc/apt/sources.list file and updates the system’s database of packages available for installation.
7.apt-get upgrade - Upgrades all packages if there are updates available.
8.apt-cache show package-name(s) - Shows dependency information, version numbers and a basic description of the package.
9.apt-cache depends package-name(s) - Lists the packages that the specified

packages depends upon in a tree. These are the packages that will be installed with the apt-get install command.

# PERL

Perl is a programming language that can be used to perform tasks that would be difficult or cumbersome on the command line. Perl is included by default with most GNU/Linux distributions. Usually, one invokes Perl by using a text editor to write a file and then passing it to the perl program.

Perl scripts can be named anything but conventionally end with ".pl". You can use any text editor to create this file.

## Program to print ‘Hello’

```
#! /usr/bin/perl

use strict;

use warnings;

print "Hello\n";
```

## Command used to run the program

```
$ perl filename.pl
```

# LAMP Stack

LAMP is an open source Web development platform that uses Linux as the operating system, Apache as the Web server, MySQL as the relational database management system and PHP as the object-oriented scripting language.

## Commands

```
#!/usr/bin/env bash
sudo apt update
sudo apt install apache2
sudo ufw app list
sudo apt install ufw
sudo apt install ufw app list
sudo ufw app info "WWW Full "
sudo ufw app allow in "WWW Full "
sudo systemctl enable apache2
cd /var/www/html/
rm index.nginx-debian.html
vim index.html
sudo apt install mariadb-server
sudo mysql_secure_installation
sudo mariadb
mariadb -u admin -p
sudo apt install php libapache2-mod-php php-mysql
sudo vim /etc/apache2/mods-enabled/dir.conf
sudo systemctl restart apache2
sudo systemctl status apache2
```

sudo vim index.php

Firefox http://localhost

# Kernel Compilation

Linux provides user with the ability to modify/ update Linux kernel. Every version of Linux kernel are available in their official website https://kernel.org/.

The process includes downloading the source file, extraction, verification, compilation, installation of compiled kernel and updating boot loader (grub) to recognise the new kernel.

Downloading kernel source files:

$ wget https://cdn.kernel.org/pub/linux/kernel/ v4.x/linux4.20.12.tar.xz

Extraction:

$ unxz -v linux-4.20.12.tar.xz

Verification of Linux kernel tartball with pgp:

$ wget https://cdn.kernel.org/pub/linux/kernel/v4.x/ linux-4.20.12.tar.sign

$ gpg --recv-keys <RSA_key>

$ gpg --verify linux-4.20.12.tar.sign

Installing required compiling tools:

$ sudo apt-get install build-essential libncurses-dev bison flex libssl-dev libelf-dev

Configuring the kernel

$ make menuconfig

Compiling Linux Kernel

$ make

Installing Linux kernel modules

$ sudo make modules_install

Installing Linux kernel

$ sudo make install

Updating GRUB

$ sudo update-initramfs -c -k 4.20.12

$ sudo update-grub

# Own Webpage

Task is to create your own webpage which can be accessed through
http://14.139.189.217/cs17d/cs17d52/

1.Create a html file namely index.html containing your lab experiments.

2.Upload this html file to your server using sftp.

# EXPERIMENT 5-DETAILED REPORT

Shell script to show various system configurations.

*#!/bin/sh*

*lsb_release -a*

*uname -r*

*cat /etc/shells*

*cat /proc/cpuinfo*

*cat /proc/meminfo*

*sudo hdparm -I /dev/sda*

*lscpu | grep cache*

*sudo fsck*

*lsb_release*

**OS, version, release number**

$ lsb_release –a

LSB – Linux Standard Base – is a joint project by a number of Linux vendors to standardize the OS environment. LSB participating Linux distributions share few commands. lsb_release is one of them, and it allows you to find out all the LSB information about your Linux distribution.

| | | |
|---|---|---|
| -v | --version | displays version |
| -r | --release | displays release number |
| -a | --all | displays all information |

Result:

No LSB modules are available.

Distributor ID: Ubuntu

Description: Ubuntu 18.10

Release: 18.10

Codename: cosmic

**Kernel version**

$ uname –r

uname command is one of the most useful commands when it comes to gathering basic information about your Unix/Linux system.

| | | |
|---|---|---|
| -a | --all | print all information |
| -r | --kernel-release | print the kernel release |
| -v | --kernel-version | print the kernel version |

Result:

4.20.12

**List of all available shells**

$ cat /etc/shells

The /etc/shells is a Linux / UNIX text file which contains the full pathnames of valid login shells. This file is used by various commands including chsh command.

Result:

# /etc/shells: valid login shells

/bin/sh

/bin/bash

/bin/rbash

/bin/dash

/usr/bin/rc

/usr/bin/tcsh

**Show CPU info**

cat /proc/cpuinfo/proc/cpuinfo is a virtual file identifies the type of processor used by your system. It includes information about include, number of cores, availability of hyper threading, architecture, cache size etc.

Result:

processor : 0

vendor_id : GenuineIntel

cpu family : 6

model : 78

model name : Intel(R) Core(TM) i3-6006U CPU @ 2.00GHz

stepping : 3

microcode : 0xc6

cpu MHz : 2000.007

cache size : 3072 KB

physical id : 0

siblings : 4

core id : 0

cpu cores : 2

apicid : 0

**Show memory info**

cat /proc/meminfo

/proc/meminfo virtual file that stores information about the RAM and swap of a device. Much of the information in /proc/meminfo is used by the free, top, and ps commands.

Result:

MemTotal: 8054144 kB

MemFree: 3430548 kB

MemAvailable: 5464980 kB

Buffers: 200016 kB

Cached: 2147824 kB

SwapCached: 0 kB

Active: 2533980 kB

Inactive: 1670068 kB

Active(anon): 1625312 kB

Inactive(anon): 387448 kB

Active(file): 908668 kB

Inactive(file): 1282620 kB

Unevictable: 88 kB

Mlocked: 88 kB

SwapTotal: 3999740 kB

SwapFree: 3999740 kB

Dirty: 12 kB

Writeback: 0 kB

AnonPages: 1854044 kB

Mapped: 541260 kB

Shmem: 394544 kB

KReclaimable: 137140 kB

Slab: 253576 kB

SReclaimable: 137140 kB

SUnreclaim: 116436 kB

KernelStack: 13708 kB

PageTables: 31616 kB

NFS_Unstable: 0 kB

Bounce:                0 kB

WritebackTmp:          0 kB

CommitLimit:     8026812 kB

Committed_AS:    7403520 kB

VmallocTotal:   34359738367 kB

VmallocUsed:           0 kB

VmallocChunk:          0 kB

Percpu:             2384 kB

HardwareCorrupted:     0 kB

AnonHugePages:         0 kB

ShmemHugePages:        0 kB

ShmemPmdMapped:        0 kB

CmaTotal:              0 kB

**Show harddisk info**

sudo hdparm -I /dev/sda

hdparm provides a command line interface to various kernel interfaces

supported by the Linux SATA/PATA/SAS "libata" subsystem and the older

IDE driver subsystem. It can set parameters such as drive caches, sleep mode,

power management, acoustic management, and DMA settings.

hdparm [options] [device ...]

-I Request identification info directly from the drive

/dev/sda is the first hard drive. The disk names in Linux are alphabetical, /dev/sdb corresponds to second harddrive. The numbers refer to partitions, so /dev/sda1 is the first partition of the first drive.

Result:

ATA device, with non-removable media

Model Number: ST1000LM035-1RK172

Serial Number: WDE5FYBD

Firmware Revision: RSM4

Transport: Serial, ATA8-AST, SATA 1.0a, SATA II Extensions, SATA Rev 2.5, SATA Rev 2.6, SATA Rev 3.0

Standards:

Used: unknown (minor revision code 0x001f)

Supported: 10 9 8 7 6 5

Likely used: 10

Configuration:

Logical max current

cylinders 16383 16383

heads 16 16

sectors/track 63 63

--

CHS current addressable sectors: 16514064

LBA user addressable sectors: 268435455

LBA48 user addressable sectors: 1953525168

Logical Sector size: 512 bytes

Physical Sector size: 4096 bytes

Logical Sector-0 offset: 0 bytes

device size with M = 1024*1024: 953869 MBytes

device size with M = 1000*1000: 1000204 MBytes (1000GB)

cache/buffer size = unknown

Form Factor: 2.5 inch

Nominal Media Rotation Rate: 5400

**Show cache info**

lscpu | grep cache

lscpu gathers CPU architecture information from sysfs and /proc/cpuinfo. The command output can be optimized for parsing or for easy readability by humans.

grep is used to separate cache info from entire cpuinfo.

Result:

L1d cache: 32K

L1i cache: 32K

L2 cache: 256K

L3 cache: 3072K

**Show mounted filesystem**

sudo fsck

fsck is used to check and optionally repair one or more Linux file systems. The fsck program will try to handle filesystems on different physical disk drives in parallel to reduce the total amount of time needed to check all of the filesystems.

Result:

fsck from util-linux 2.32

e2fsck 1.44.4 (18-Aug-2018)

/dev/sda9 is mounted.

e2fsck: Cannot continue, aborting.