ORGANIZATION PROFILE

1.About CDAC

Centre for Development of Advanced Computing (C-DAC) is the premier R&D organization of the Department of Electronics and Information Technology (DeitY), Ministry of Communications & Information Technology (MCIT) for carrying out R&D in IT, Electronics and associated areas. Different areas of C-DAC, had originated at different times, many of which came out as a result of identification of opportunities.

- The setting up of C-DAC in 1988 itself was to built Supercomputers in context of denial of import of Supercomputers by USA. Since then C-DAC has been undertaking building of multiple generations of Supercomputer starting from PARAM with 1 GF in 1988.
- Almost at the same time, C-DAC started building Indian Language Computing Solutions with setting up of GIST group (Graphics and Intelligence based Script Technology); National Centre for Software Technology (NCST) set up in 1985 had also initiated work in Indian Language Computing around the same period.
- Electronic Research and Development Centre of India (ER&DCI) with various constituents starting as adjunct entities of various State Electronic Corporations, had been brought under the hold of Department of Electronics and Telecommunications (now DeitY) in around 1988. They were focusing on various aspects of applied electronics, technology and applications.
- With the passage of time as a result of creative echo system that got set up in C-DAC, more areas such as Health Informatics, etc., got created; while right from the beginning the focus of NCST was on Software Technologies; similarly C-DAC started its education & training activities in 1994 as a spin-off with the passage of time, it grew to a large efforts to meet the growing needs of Indian Industry for finishing schools.

C-DAC has today emerged as a premier third party R&D organization in IT&E (Information Technologies and Electronics) in the country working on strengthening national technological capabilities in the context of global developments in the field and responding to change in the market need in selected foundation areas. In that process, C-DAC represents a unique facet working in close junction with DeitY to realize nation's policy and pragmatic interventions and initiatives in Information Technology. As an institution for high-end Research and Development (R&D), C-DAC has been at the forefront of the Information Technology (IT) revolution, constantly building capacities in emerging/enabling technologies and innovating and leveraging its expertise, caliber, skill sets to develop and deploy IT products and solutions for different sectors of the economy, as per the mandate of its parent, the Department of Electronics and Information Technology, Ministry of

Communications and Information Technology, Government of India and other stakeholders including funding agencies, collaborators, users and the market-place.

2.About CDAC Mohali

Center for Electronics Design & Technology of India (CEDTI), Mohali was setup in May 1989. Primarily with the mission to train manpower in electronic design & technology by offering a variety of training programmes in diverse aspects of electronics design, product development, production technology, maintenance engineering, information technology and quality control, etc. In December 2002, CEDTI Mohali merged with C-DAC with a primary mandate to promote high end R&D along with education and training.

The centre is engaged in design and deployment of world class IT and electronics solutions in the following domains:

- Health Informatics
- Multilingual Technologies
- Professional Electronics
- Software Technologies
- Cyber Forensics and Security
- Multimedia Technologies

Centre continues to play a leading role in human resource development and training in Information Technology (IT) sector in the northern region. Center offers high-end courses like M.Tech in VLSI as well as ME in Electronic Product Design Technology (EPDT). Short term value added courses and diploma are designed for knowledge based skill development. It also offers courses for foreign participants, sponsored by MEA under ITEC/SCAAP programs.

Centre operates from its own impressive building located in the ELTOP (Electronics Town of Punjab) Complex amidst a large number of industries, manufacturing electronic products relating to computers, peripherals, communication equipment and components, offering a great professional challenge to the faculty and staff of the Centre.

3.C-DAC: Vision, Mission and Values

VISION

To emerge as the premier R&D institution for the design, development and deployment of world class electronic and IT solutions for economic and human advancement.

MISSION

C-DAC's Mission statement has evolved after deep thought and in consultation with the members of C-DAC. The Mission Statement as defined below, reflects the fabric and character of C-DAC and integrates in the fulfillment of C-DAC's Vision.

- Expand the frontiers of Electronics and Information Technology.
- Evolve technology solutions - architectures, systems and standards for nationally important problems.
- Achieve rapid and effective spread of knowledge by overcoming language barriers through application of technologies.
- Share experience and know-how to help build advanced competence in the areas of Electronics and Information Technology.
- Bring benefits of Electronics and Information Technology to society.
- Utilize the Intellectual Property generated by converting it to business opportunity.

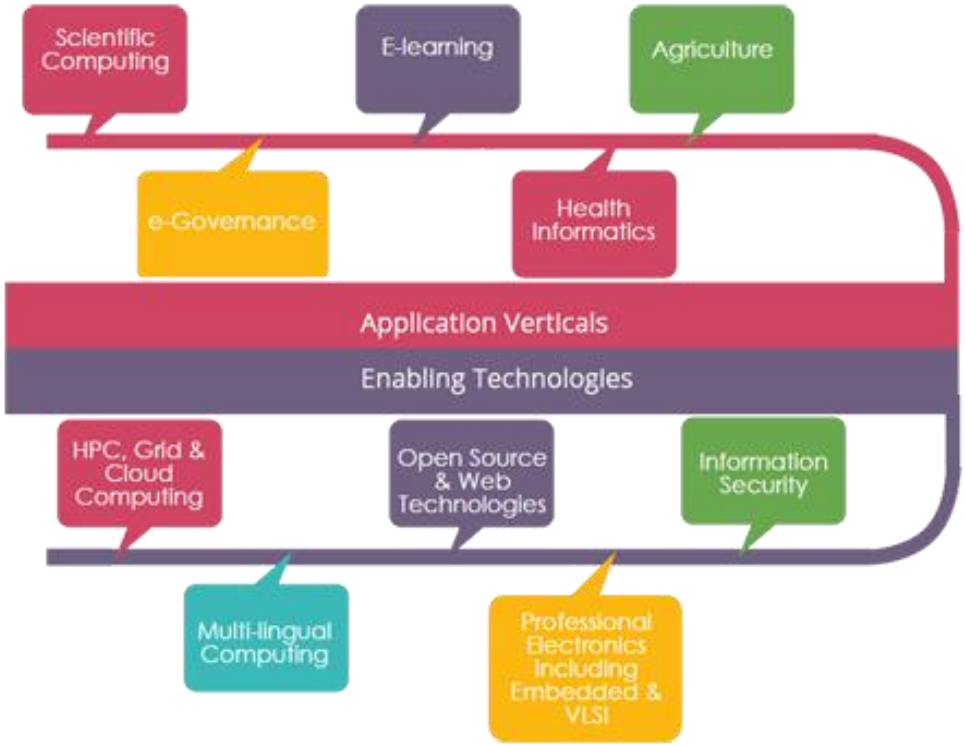
CORE VALUES

The essence of C-DAC's philosophy and the bed rock of our Corporate Culture...

- Innovation and pursuit of excellence in 'Applications', 'Research' and 'Technology' (ART).
- Integrity, transparency and openness in all our actions.
- Working with and through the 'Teams' is our way of life.
- Distributed Leadership across the organization at various levels.
- Strive to continuously improve our processes and quality.
- Address the needs of the society through user centric initiatives.

4.Research and Development

The primary activity in all centres of C-DAC is research and development in specific areas of information and communication technology and electronics (ICTE). Across all these centres, we span a wide range of topics in ICTE. Broadly, we can divide the R&D activities into two broad classes: the enabling technologies and application verticals. The research activities are usually driven by specific application areas, and hence mostly applied in nature.



Based on the vision charted by the parent ministry (MCIT), international trends, Indian requirements, etc CDAC identifies significant thrust areas for focus across the various centres. The thrust areas, at present, are:

- **High Performance Computing** including the series of supercomputers, Garuda national grid initiative, development of scientific computing applications on these platforms, and cloud computing.

- **Multi-lingual Computing** spanning the entire range from fonts and encoding to speech and language translation, which includes fonts for Indian languages, encoding standards, information extraction and retrieval, machine aided translation, speech recognition and synthesis, etc.

- **Professional Electronics** covering electronic devices and embedded systems. This area covers work such as underwater electronics, software radio, ubiquitous computing.

- **Information and Cyber Security** including intrusion detection and prevention, malware analysis, cyber forensics, network security, etc.

- **Health Informatics** including hospital information systems, electronic medical records, telemedicine, and cancer networks.

- **Software Technologies** including e-governance solutions, e-learning technologies, geomatics, open source software, accessibility, etc.

At present, most of the R&D activities in the various centers fall into these categories. You can gather more information about the specific projects and systems by clicking on these thematic areas on the left of the screen. We are building a more organized, searchable repository of such information - watch this space!

As mentioned earlier, most of the R&D work has a driving practical application of importance. Most of the works are, therefore, actually deployed and in use by concerned user agencies - which include the common people of India as well. The research focus has resulted in a number of publications in national and international conferences/journals. You can find a list of these in the publications page on the site. Many of these are downloadable from the page.

Introduction To

Linux System Administration

Training Objective: This training covers the basic and advanced topics of Linux. Installation and configuration of Linux server for mission-critical corporate services, Manage user accounts, file systems, networking and system logs, Configure Linux to provide network services like network settings and graphical interface configuration. Training covers the major portion of Red Hat Certified Engineer.

Course Contents:

1. Introduction and Installation of Linux
2. File And Directory Structure, Run Level
3. Basic Commands and Editor
4. User, Group administration
5. Package Management
6. Mounting and unmounting File Systems
7. Basic of TCP/IP, NFS
8. SSH, Telnet,FTP, DHCP, DNS, Web , Samba
9. LVM And RAID Management
10. Securing your Linux Server and IPtables Firewall

Introduction to Linux

What is Linux?

Linux is, in simplest terms, an operating system. It is the software on a computer that enables applications and the computer operator to access the devices on the computer to perform desired functions. The operating system (OS) relays instructions from an application to, for instance, the computer's processor. The processor performs the instructed task, then sends the results back to the application via the operating system.

Explained in these terms, Linux is very similar to other operating systems, such as Windows and OS X.

But something sets Linux apart from these operating systems. The Linux operating system represented a $25 billion ecosystem in 2008. Since its inception in 1991, Linux has grown to become a force in computing, powering everything from the New York Stock Exchange to mobile phones to supercomputers to consumer devices.

As an open operating system, Linux is developed collaboratively, meaning no one company is solely responsible for its development or ongoing support. Companies participating in the

Linux economy share research and development costs with their partners and competitors. This spreading of development burden amongst individuals and companies has resulted in a large and efficient ecosystem and unheralded software innovation.

Over 1,000 developers, from at least 100 different companies, contribute to every kernel release. In the past two years alone, over 3,200 developers from 200 companies have contributed to the kernel--which is just one small piece of a Linux distribution.

This article will explore the various components of the Linux operating system, how they are created and work together, the communities of Linux, and Linux's incredible impact on the IT ecosystem.

Where is Linux?

One of the most noted properties of Linux is where it can be used. Windows and OS X are predominantly found on personal computing devices such as desktop and laptop computers. Other operating systems, such as Symbian, are found on small devices such as phones and PDAs, while mainframes and supercomputers found in major academic and corporate labs use specialized operating systems such as AS/400 and the Cray OS.

Linux, which began its existence as a server OS and Has become useful as a desktop OS, can also be used on all of these devices. “From wristwatches to supercomputers,” is the popular description of Linux' capabilities.

The Future of Linux

Linux is already successful on many different kinds of devices, but there are also many technological areas where Linux is moving towards, even as desktop and server development continues to grow faster than any other operating system today.

Linux is being installed on the system BIOS of laptop and notebook computers, which will enable users to turn their devices on in a matter of seconds, bringing up a streamlined Linux environment. This environment will have Internet connectivity tools such as a web browser and an e-mail client, allowing users to work on the Internet without having to boot all the way into their device's primary operating system--even if that operating system is Windows.

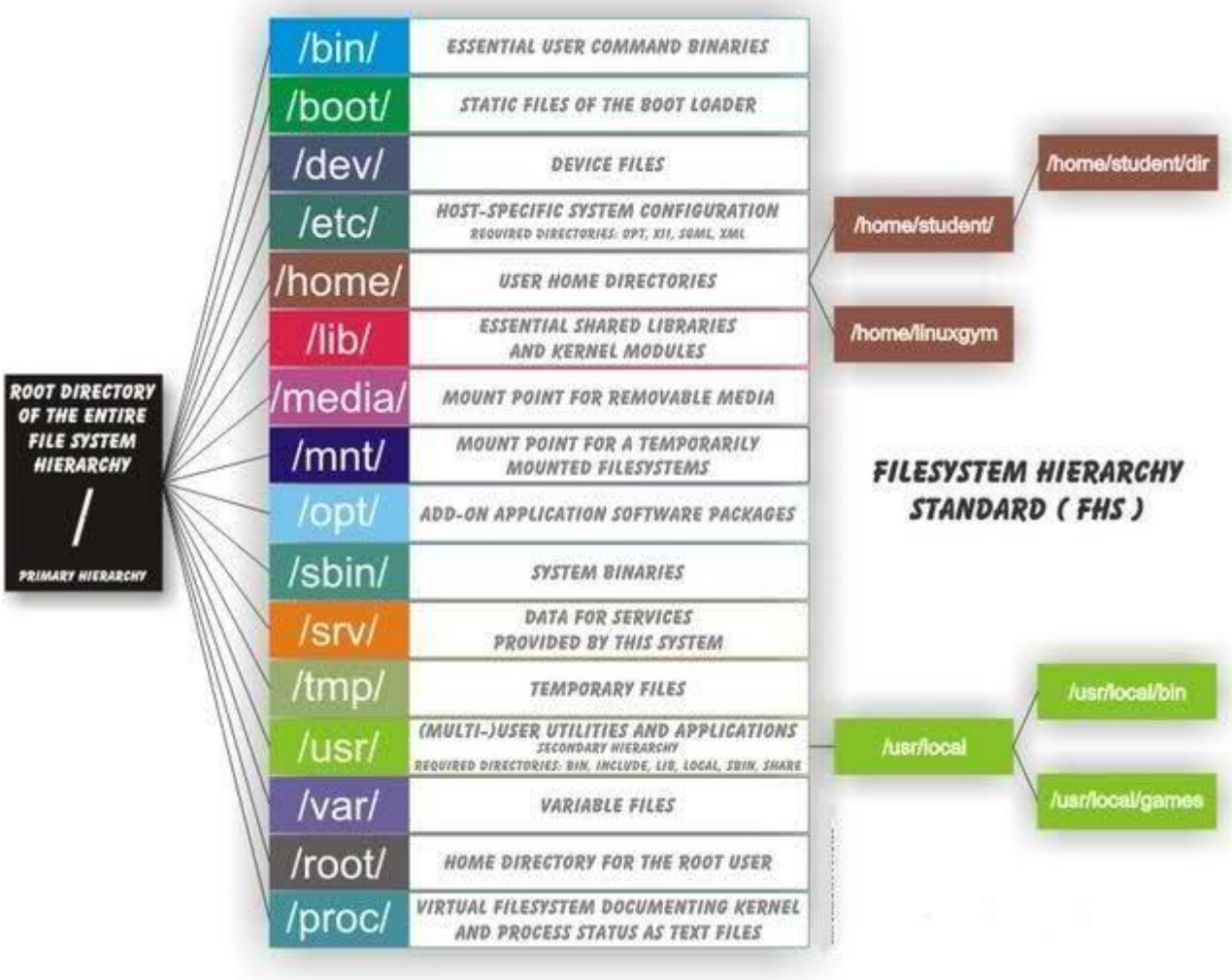
At the same time, Linux is showing up on mobile Internet devices (MIDs). This includes embedded devices such as smartphones and PDAs, as well as netbook devices--small laptop-type machines that feature the core functionality of their larger counterparts in a smaller, more energy-efficient package.

The growth of cloud computing is a natural fit for Linux, which already runs many of the Internet's web servers. Linux enables cloud services such as Amazon's A3 to work with superior capability to deliver online applications and information to users.

Related to Linux' growth in cloud computing is the well-known success of Linux on supercomputers, both in the high-performance computing (HPC) and high-availability (HA) areas, where academic research in physics and bioengineering, and firms in the financial and energy industries need reliable and scalable computing power to accomplish their goals.

Many of the popular Web 2.0 services on the Internet, such as Twitter, Linked In, YouTube, and Google all rely on Linux as their operating system. As new web services arrive in the future, Linux will increasingly be the platform that drives these new technologies.

Linux Directory Structure Diagram



Basic Commands

cd	ls	su	touch	cat	cp
mkdir	mv	rm	man	info	ifconfig
chkconfig	setup	du	history	df	fdisk
free	tail	head	whatis	who	tar
pwd	ping	chmod	find	less	grep
mount	umount	date	passwd	reboot	clear

User and Group Management

Permission Groups

Each file and directory has three user based permission groups:

- **owner** - The Owner permissions apply only the owner of the file or directory, they will not impact the actions of other users.
- **group** - The Group permissions apply only to the group that has been assigned to the file or directory, they will not effect the actions of other users.
- **all users** - The All Users permissions apply to all other users on the system, this is the permission group that you want to watch the most.

Permission Types

Each file or directory has three basic permission types:

- **read** - The Read permission refers to a user's capability to read the contents of the file.
- **write** - The Write permissions refer to a user's capability to write or modify a file or directory.
- **execute** - The Execute permission affects a user's capability to execute a file or view the contents of a directory.

YUM Server

YUM stands for "*Yellow dog Updater, Modified*" because it is based on *YUP*, the *Yellow dog Updater*. Yellow Dog is a version of Linux for the Power Architecture hardware. YUP, and later YUM, were written by the Linux community as a way to maintain an RPM-based system.

Yum is the primary tool for getting, installing, deleting, querying, and managing Red Hat Enterprise Linux RPM software packages from official Red Hat software repositories, as well as other third-party repositories. yum is used in Red Hat Enterprise Linux versions 5 and later. Versions of Red Hat Enterprise Linux 4 and earlier used up2date.

SSH (*Secure Shell)*

basic command line usage of the ssh client.

1. Identify SSH client version
2. Login to remote host
3. Transfer Files to/from remote host
4. Debug SSH client connection
5. SSH escape character usage: (Toggle SSH session, SSH session statistics etc.)

FTP Server

FTP stands for "file transfer protocol." FTP powers one of the fundamental Internet functions and is the prescribed method for the transfer of files between computers. It is also the easiest and most secure way to exchange files over the Internet.

An FTP address looks a lot like an HTTP or web site address except it uses the prefix ftp:// instead of http://.

DHCP Server

DHCP, or Dynamic Host Configuration Protocol, allows an administrator to configure network settings for all clients on a central server.

The DHCP clients request an IP address and other network settings from the DHCP server on the network. The DHCP server in turn leases the client an IP address within a given range or leases the client an IP address based on the MAC address of the client's network interface card (NIC). The information includes its IP address, along with the network's name server, gateway, and proxy addresses,including the netmask.

- Subnet and netmask should be 192.168.0.0 255.255.255.0
- Gateway Should be 192.168.0.254
- DNS Sever Should be 192.168.0.254
- Domain Name should be example.com
- Range from 192.168.0.10-50

DNS Server

A DNS server, or name server, is used to resolve an IP address to a hostname or vice versa. You can set up four different types of DNS servers:

- A master DNS server for your domain(s)**,** which stores authoritative records for your domain.
- A slave DNS server, which relies on a master DNS server for data.

- A caching-only DNS server, which stores recent requests like a proxy server. It otherwise refers to other DNS servers.
- A forwarding-only DNS server, which refers all requests to other DNS servers.

Web Server

When you view a web page over the Internet, the code to create that page must be retrieved from a server somewhere on the Internet. The server that sends your web browser the code to display a web page is called a web server.

There are countless web servers all over the Internet serving countless websites to people all over the world. Whether you need a web server to host a website on the Internet a Red Hat Enterprise Linux server can function as a web server using the **Apache HTTP server**. The Apache HTTP server is a popular, open source server application that runs on many UNIX-based systems as well as Microsoft Windows.

Samba Server

Samba is a suite of Unix applications that speak the Server Message Block (SMB) protocol. Microsoft Windows operating systems and the OS/2 operating system use SMB to perform client-server networking for file and printer sharing and associated operations. By supporting this protocol, Samba enables computers running Unix to get in on the action, communicating with the same networking protocol as Microsoft Windows and appearing as another Windows system on the network from the perspective of a Windows client. A Samba server offers the following services:

- Share one or more directory trees
- Share one or more Distributed filesystem (Dfs) trees
- Share printers installed on the server among Windows clients on the network
- Assist clients with network browsing
- Authenticate clients logging onto a Windows domain
- Provide or assist with Windows Internet Name Service (WINS) name-server resolution

The Samba suite also includes client tools that allow users on a Unix system to access folders and printers that Windows systems and Samba servers offer on the network.

Security Features of Linux

SELinux *(Security-enhanced Linux)*

SELinux is an acronym for Security-enhanced Linux. It is a security feature of the Linux kernel. It is designed to protect the server against misconfigurations and/or compromised daemons. It put limits and instructs server daemons or programs what files they can access and what actions they can take by defining a security policy.

SELinux is set in three modes.

- **Enforcing** – SELinux security policy is enforced. IF this is set SELinux is enabled and will try to enforce the SELinux policies strictly
- **Permissive** – SELinux prints warnings instead of enforcing. This setting will just give warning when any SELinux policy setting is breached
- **Disabled** – No SELinux policy is loaded. This will totally disable SELinux policies.

IPTables

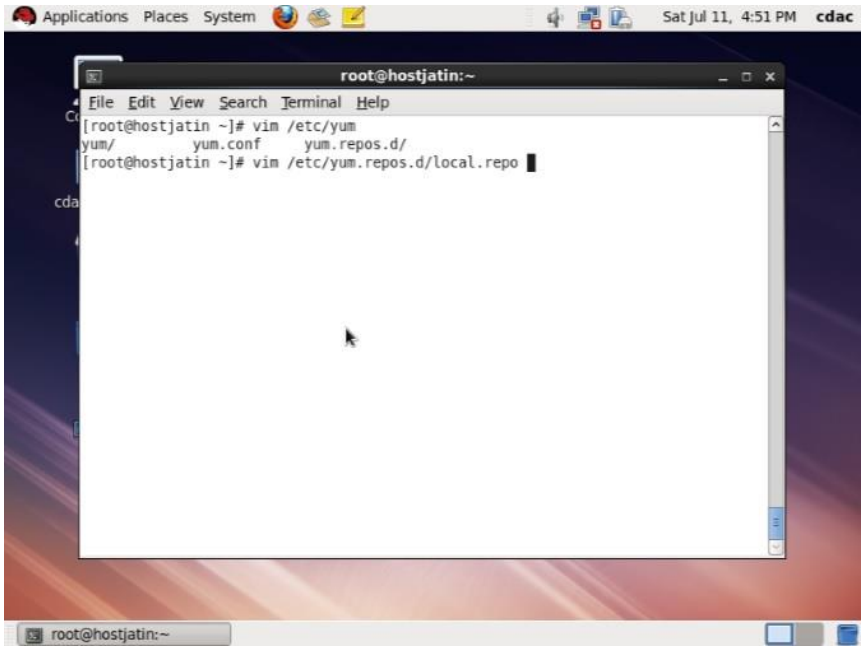
We can call it is the basics of Firewall in Linux. Iptables is a rule based firewall system and is normally pre-installed on a Unix operating system which is controlling the incoming and outgoing packets. By-default the iptables is running without any rules, we can create, add, edit rules to it. Here I am trying to list some common as well as the basics of iptables.

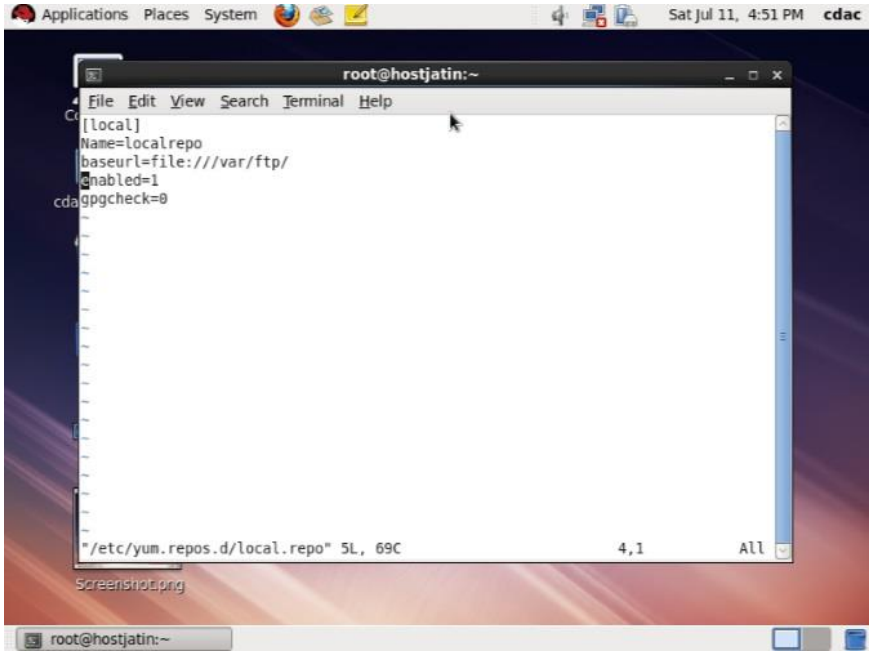
Basic structure of iptables.

The structure for the iptables is like, Tables which has chains and the chains which contains rules.

Tables —> Chains —> Rules. The rules are defined to control the packets for Input/Output.

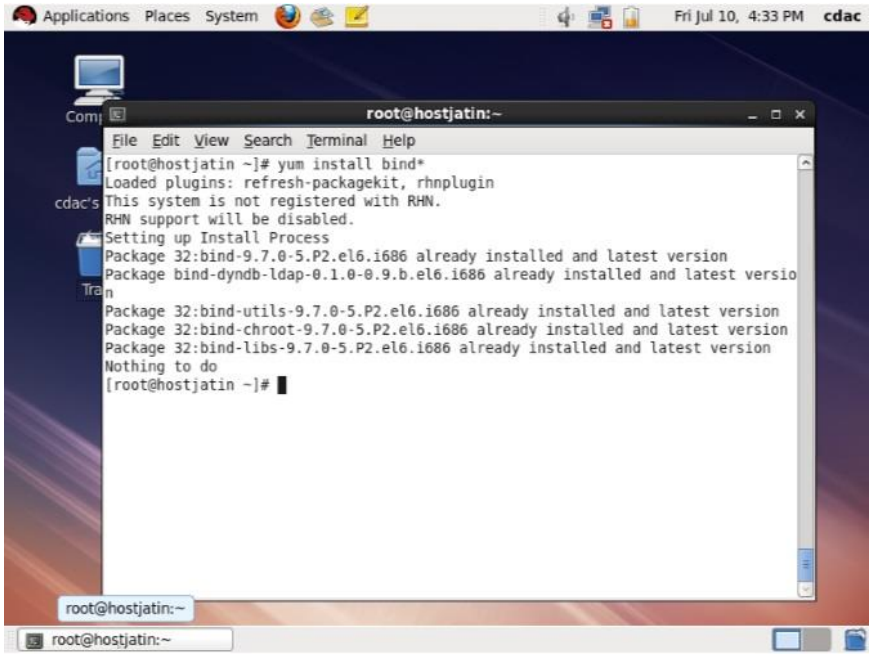
Configuration of YUM Server in RHEL 6



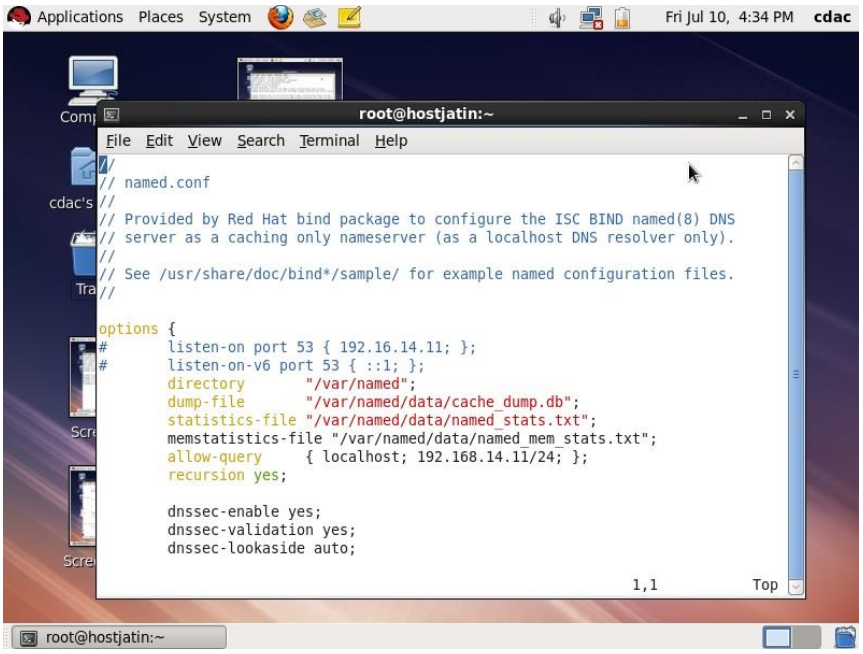


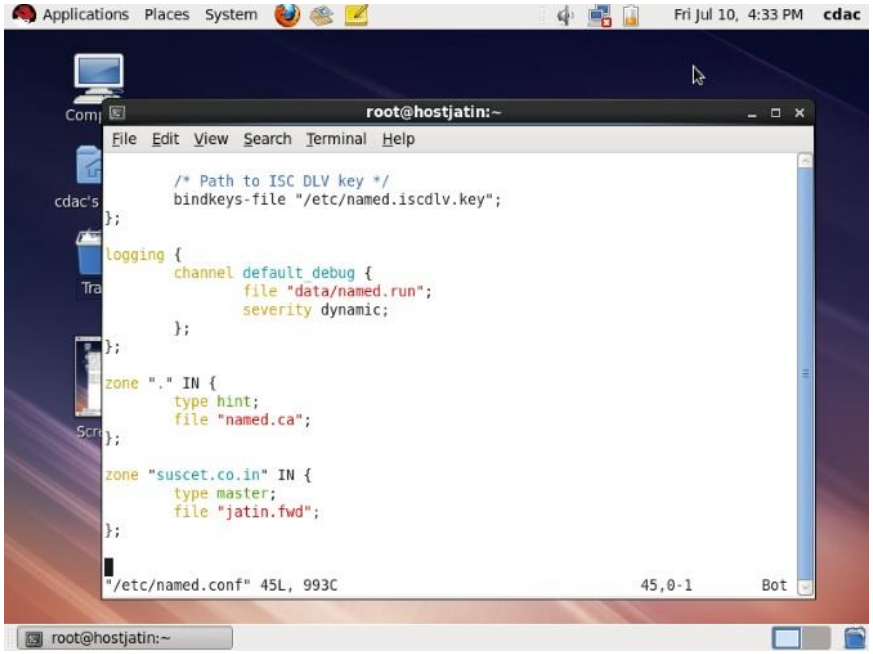
Configuration of DNS Server

A.Installation of BIND

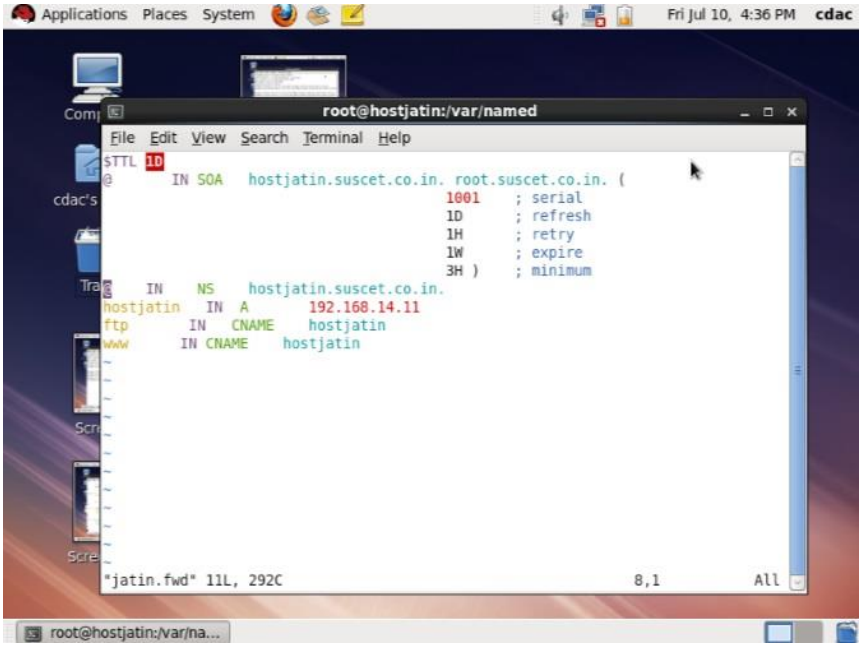


B.Configuration of file named.conf



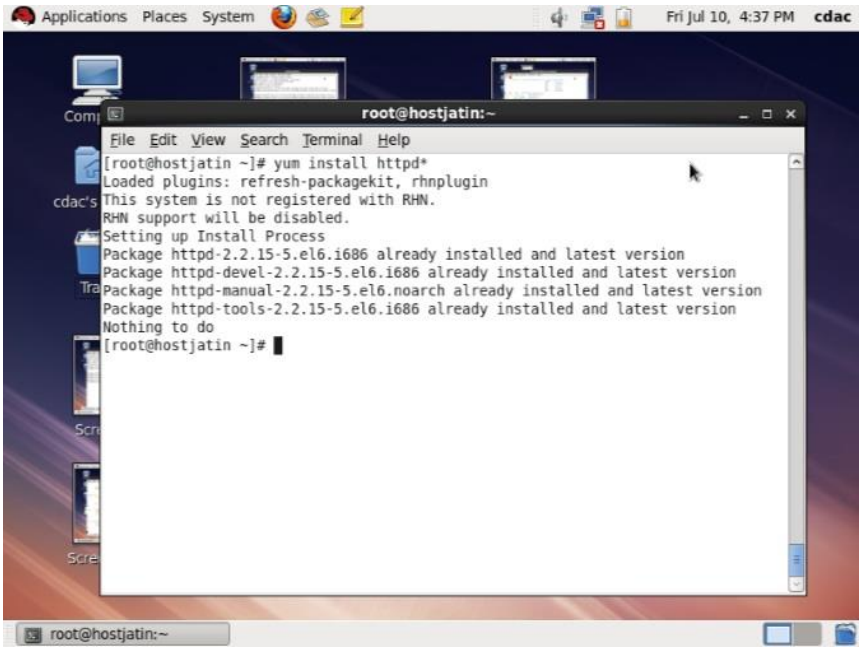


C.Configuration of forward DNS file

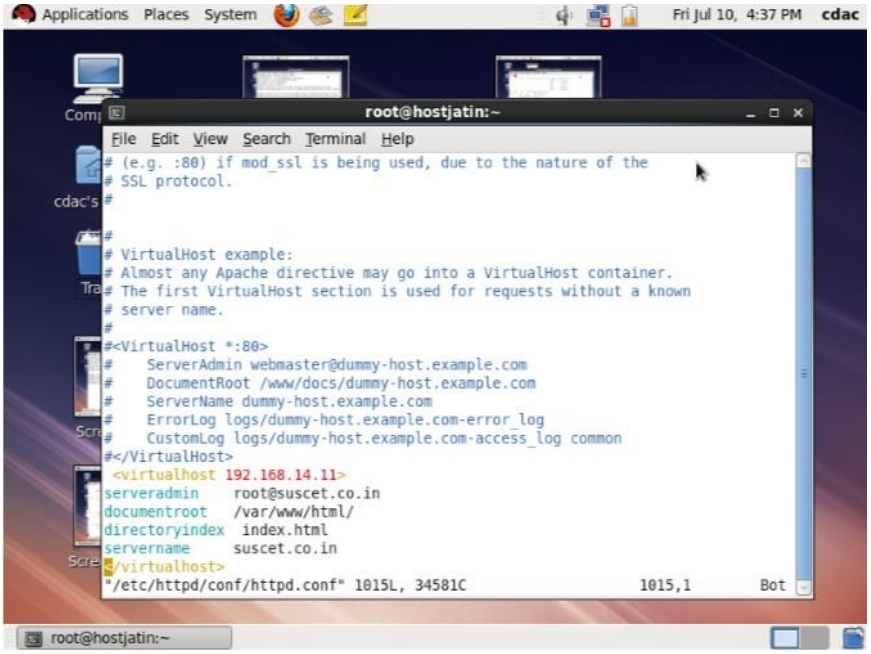


Configuration of WEB Server

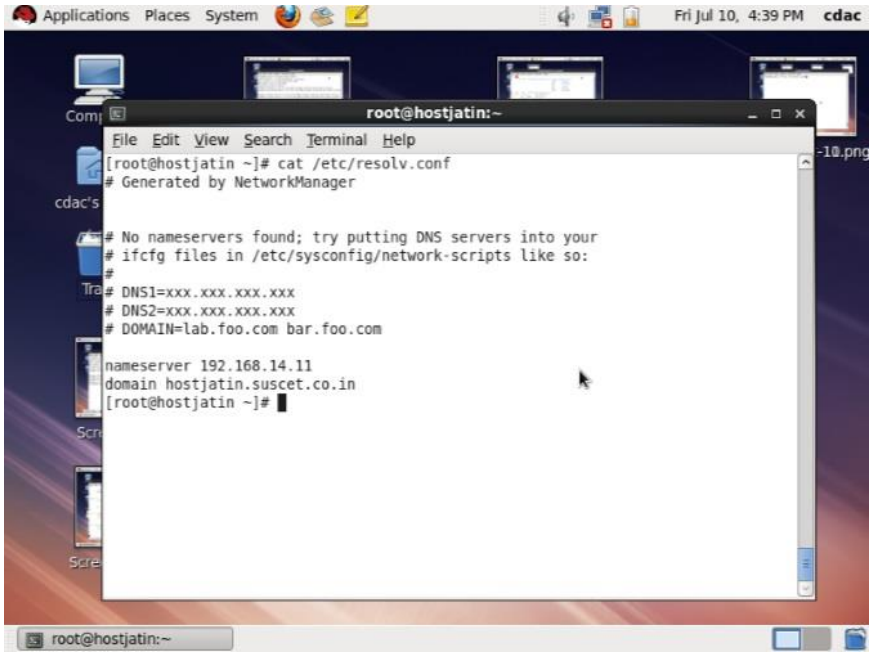
A.Installation of HTTP



B.Configuration of httpd.conf file



Modify resolv.conf



Restart Services