Linux Administration

1. Important Commands

Basic

Commands	Cent OS	Ubuntu
Calendar	**cal**	**cal**
Clear screen	**Ctrl + L**	**Ctrl + L**
Close terminal	**Ctrl + D**	**Ctrl + D**
Date	**date**	**date**
Hostname	**hostname**	**hostname**
Update packages	**yum update**	**apt-get update**

System Info

Check OS version	**cat /etc/system-release**	**NA**
	lsb_release -a (**yum install redhat-lsb**)	**lsb_release -a**
Full info (Hardware & Software)	**inxi -Fxz** (yum install epel-release and **yum install inxi**)	**inxi -Fxz**
Check the kernel	**uname -r**	**uname -r**

Monitoring

Check IP	**ip a s**	**ip a s**
	ifconfig	**ifconfig**
To check routing table	**netstat -nr**	**netstat -nr**
Check open port status	**lsof -i**	**lsof -i**
System log	**/var/log/ messages**	**/var/log/messages**
Check logged in user	**w, who, who -a, last -a**	**w, who, who -a, last -a**
Fail login attempts	**lastb**	**lastb**
Recent Login	**lastlog**	**lastlog**
Listing of running processes	**top**	**top**
vmstat (virtual memory statistics) is a system monitoring tool that collects and displays summary information about **system**, **memory** and **processes**.	**vmstat**	**vmstat**

Check free memory	**free** [free -m ->free memory available in MB, free -g ->free memory available in GB]	**free** [free -m ->free memory available in MB, free -g ->free memory available in GB]
Create an alias to 'free -m' Memory in KB Memory in MB	ashir@client-01:~$ **free** total used free Mem: 1017852 729932 287920 ashir@client-01:~$ **alias free='free -m'** ashir@client-01:~$ **free** total used free Mem: 993 713 280	ashir@client-01:~$ **free** total used free Mem: 1017852 729932 287920 ashir@client-01:~$ **alias free='free -m'** ashir@client-01:~$ **free** total used free Mem: 993 713 280
Check host processor	**lscpu**	**lscpu**
Kill any user's all process	**killall -u <username>**	**killall -u <username>**
Check disc partitions	**lsblk**	**lsblk**
Show local file system	**df -h**	**df -h**
Status of processes	**ps aux**	**ps aux**

2. Commands in detail:

	Cent OS	Ubuntu
Basics		
Change Hostname	hostnamectl set-hostname your-new-hostname	sudo vi /etc/hostname & sudo vi /etc/hosts
Calendar	cal [cal -3 -> Calender for 3 months]	
Calendar for a particular date and time	cal 7 2018	
Close terminal	Ctrl + D [Ctrl+D+ Change the size of terminal window]	
Changing User Passwords First sign in as root user Then type, ``passwd user'' (where user is the username for the password you are changing). The system will prompt you to enter new password	Eg:- [root@localhost /]# passwd ashir Changing password for user ashir. New password: BAD PASSWORD: The password contains the user name in some form Retype new password:	

	passwd: all authentication tokens updated successfully.	
Cron Listout running cron jobs Edit cron job Delete cron job	[ashir@localhost /]$ sudo vi etc/crontab [ashir@localhost /]$ crontab -l [ashir@localhost /]$ crontab -e [ashir@localhost /]$ crontab -r	
DPKG List out all installed packages To check specific package	 yum list installed yum list installed | grep -i php	 sudo dpkg -l sudo dpkg -l | grep -i apache
Network		
Network Configuration file	/etc/network/interfaces	/etc/network/interfaces
DNS Configuration file	/etc/resolve.conf	/etc/resolve.conf
Firewall Stop Start Status Restart To list all open ports or currently running ports Check Port Status Add the port Open firewall ports	 systemctl stop firewalld systemctl start firewalld systemctl status firewalld systemctl restart firewalld sudo netstat –lntu -l –> prints only listening sockets -n –> shows port number -t –> enables listing of tcp ports -u –> enables listing of udp ports -a -> show all sockets [root@localhost /]# netstat -na | grep 5666 Add the test port in /etc/services file and allow the port to accept packets. Test port can be added by editing /etc/services file in below format: [root@localhost /]# vi /etc/services service-name port/protocol [aliases ...] [# comment] nagios 5666/tcp # To connect nagios server [root@localhost /]# firewall-cmd --zone=public --add-port=5666/tcp --permanent success	 ufw disable ufw enable ufw status ufw reload sudo netstat –lntu -l –> prints only listening sockets -n –> shows port number -t –> enables listing of tcp ports -u –> enables listing of udp ports -a -> show all sockets ufw allow <port number>

Check Port Status in IP Tables	[root@localhost /]# firewall-cmd --reload Success [root@localhost /]# iptables-save | grep 5666 -A IN_public_allow -p tcp -m tcp --dport 5666 -m conntrack --ctstate NEW -j ACCEPT	If you want to allow 203.0.113.4 to connect to port 22 (SSH), use this command: sudo ufw allow from 203.0.113.4 to any port 22
File		
Long listing files	ls -l	
Calculate the size of a folder	du -sh <folder name	
Touch : Used to create file	touch <file name>	
Install text editor	sudo yum install -y nano	
Show local file system	df -hlT	
zcat	The **zcat** utility allows you to examine the contents of a compressed file much the same way that cat displays a file.	
Listing File Permissions	[ashir@localhost ~]$ ls -l hello.sh -rwxr-xr-x. 1 root root 32 Sep 12 15:03 hello.sh [ashir@localhost ~]$ sudo stat -c %A hello.sh -rwxr-xr-x [ashir@localhost ~]$ sudo stat -c %a hello.sh 755	
Managing File Ownership <user id> <user name> <primary group name> <secondary group name> <Change the group of a file> -- Now the group name of hello.sh has been changed to wheel	[ashir@localhost ~]$ id -u 1000 [ashir@localhost ~]$ id -un Ashir [ashir@localhost ~]$ id -gn Ashir [ashir@localhost ~]$ id -Gn ashir wheel [ashir@localhost ~]$ ls -l hello.sh -rwxr-xr-x. 1 root root 32 Sep 12 15:03 hello.sh [ashir@localhost ~]$ chgrp wheel hello.sh [ashir@localhost ~]$ ls -l hello.sh -rwxr-xr-x. 1 root wheel 32 Sep 12 15:03 hello.sh	

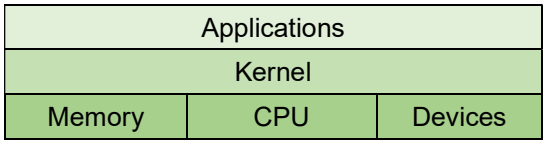
<Change the ownership of a file> -- hello.sh owner is root -- The file ownership name has been changed to ashir	[ashir@localhost ~]$ ls -l hello.sh -rwxr-xr-x. 1 root wheel 32 Sep 12 15:03 hello.sh [ashir@localhost ~]$ sudo chown ashir hello.sh [ashir@localhost ~]$ ls -l hello.sh -rwxr-xr-x. 1 ashir wheel 32 Sep 12 15:03 hello.sh	
Monitoring		
Monitor Linux Performance Check the PID of process Kill the running process List of all running process Check the current running process Check all running services Check the memory utilization of particular process. check uptime and remote login details	[ashir@localhost /]$ **pgrep ssh** 1135 1466 2767 [ashir@localhost /]$ **pkill ssh** [ashir@localhost /]$ **ps -l** F S UID PID PPID C PRI NI ADDR SZ WCHAN TTY TIME CMD 4 S 1000 2219 2218 0 80 0 - 29053 do_wai pts/0 00:00:00 bash 0 R 1000 7166 2219 0 80 0 - 38300 - pts/0 00:00:00 ps [ashir@localhost /]$ **echo $$** 2219 [ashir@localhost /]$ **pmap $$** [ashir@localhost /]$ **pmap 2219** [ashir@localhost ~]$ **uptime** 23:42:19 up 40 min, 3 users, load average: 0.00, 0.01, 0.08 [ashir@localhost ~]$ who ashir :0 2018-09-24 23:04 (:0) ashir pts/0 2018-09-24 23:05 (:0) ashir pts/1 2018-09-24 23:06 (lt1a059) [ashir@localhost ~]$ **w** 23:44:17 up 42 min, 3 users, load average: 0.00, 0.01, 0.07 USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT ashir pts/0 :0 23:05 38:41 0.10s 0.10s bash ashir pts/1 lt1a059 23:06 1.00s 0.15s 0.03s w	
Kill any user's all process	**killall -u <username>**	**killall -u <username>**

Using **Sysstat** to Monitor Performance **check disk activity** Run 3 times, but with a 5 second gap in between. Check the individual processes with CPU utilization (Run 3 times, but with a 5 second gap in between.) Check the processor information	[ashir@localhost /]$ **sudo yum install -y sysstat** [ashir@localhost /]$ **sudo iostat** Linux 3.10.0-862.11.6.el7.x86_64 (localhost.localdomain) 09/25/2018 _x86_64_ (1 CPU) avg-cpu: %user %nice %system %iowait %steal %idle 9.30 0.00 12.45 0.01 0.00 78.24 Device: tps kB_read/s kB_wrtn/s kB_read kB_wrtn sda 0.18 1.80 1.76 776304 758360 dm-0 0.16 1.71 1.73 737111 746162 dm-1 0.00 0.01 0.00 3356 0 dm-2 0.00 0.02 0.02 8757 10114 ashir@localhost /]$ sudo iostat -m 5 3 [ashir@localhost /]$ sudo pidstat -p $$ 5 3 [ashir@localhost /]$ sudo mpstat -P ALL	
To check the **activity log** **CPU Utilization** **MemoryUtilization** **Network** **Avg Load**	[ashir@localhost /]$ **sudo sar –u** [ashir@localhost /]$ **sudo sar –r** [ashir@localhost /]$ **sudo sar -n DEV** [ashir@localhost /]$ **sudo sar -q**	
Logs Check last login users Still logged in users Last 10 activities	[ashir@localhost /]$ **lastlog | grep -v "Never"** Username Port From Latest root pts/0 kws1a045.ushuste Thu Sep 20 11:56:59 +0530 2018 gdm :0 Thu Sep 20 11:56:48 +0530 2018 ashir pts/0 kws1a045.ushuste Tue Sep 25 16:27:09 +0530 2018 [ashir@localhost /]$ **last | grep "still"** ashir pts/0 kws1a045.ushuste Tue Sep 25 16:27 still logged in ashir :0 :0 Thu Sep 20 12:26 still logged in [ashir@localhost /]$ **last -n 10**	

	ashir pts/0 kws1a045.ushuste Tue Sep 25 16:27 still logged in ashir pts/0 kws1a045.ushuste Tue Sep 25 10:37 - 13:07 (02:30) ashir :0 :0 Thu Sep 20 12:26 still logged in root pts/0 kws1a045.ushuste Thu Sep 20 11:56 - 11:08 (23:11) reboot system boot 3.10.0-862.11.6. Thu Sep 20 11:56 - 11:48 (5+23:52) reboot system boot 3.10.0-862.11.6. Wed Sep 19 18:14 - 11:48 (6+17:33) ashir pts/0 kws1a045.ushuste Tue Sep 18 17:08 - 18:11 (1+01:02) ashir :0 :0 Mon Sep 17 18:47 - crash (1+23:27) root pts/0 kws1a045.ushuste Mon Sep 17 18:24 - 18:47 (00:22) reboot system boot 3.10.0-862.11.6. Mon Sep 17 18:22 - 11:48 (8+17:25)	
check reboot events	[ashir@localhost /]$ **last reboot** reboot system boot 3.10.0-862.11.6. Thu Sep 20 11:56 - 12:06 (6+00:09) reboot system boot 3.10.0-862.11.6. Wed Sep 19 18:14 - 12:06 (6+17:51)	
Last 10 events of the User	[ashir@localhost /]$ **last -n 10 ashir** ashir pts/0 kws1a045.ushuste Tue Sep 25 16:27 still logged in ashir pts/0 kws1a045.ushuste Tue Sep 25 10:37 - 13:07 (02:30) ashir :0 :0 Thu Sep 20 12:26 still logged in ashir pts/0 kws1a045.ushuste Tue Sep 18 17:08 - 18:11 (1+01:02) ashir :0 :0 Mon Sep 17 18:47 - crash (1+23:27) ashir pts/0 kws1a045.ushuste Mon Sep 17 15:19 - 16:27 (01:07) ashir pts/2 kws1a045.ushuste Mon Sep 17 12:08 - 14:37 (02:29) ashir pts/1 kws1a045.ushuste Mon Sep 17 12:02 - 12:08 (00:05) ashir pts/0 kws1a045.ushuste Mon Sep 17 12:02 - 14:37 (02:35) ashir pts/1 kws1a045.ushuste Thu Sep 13 09:48 - 10:59 (4+01:11)	
Last bad login attempts	[ashir@localhost /]$ **sudo lastb**	
MySQL		
Service Start Status Restart	service mariadb start service mariadb status service mariadb restart or systemctl start mariadb systemctl status mariadb systemctl restart mariadb	

Other		
Create a simple shell script	#!/usr/bin/bash FILE=/home/ashir/Lab/df.txt df -h > $FILE mail -s "df $(date +%F)" ashir < $FILE [To remove df.txt file -> mail -s "df $(date +%F)" ashir < $FILE && rm $FILE]	

3. **IQ:**

Q	A
About Linux and Linux Kernel	Linux is an open source operating system inspired by UNIX Linux is just a Kernel and a Linux distribution makes it a usable operating systems. **Linux Kernel** is a low-level systems software whose main role is to manage hardware resources for the user. It is the core of any OS and it is responsible for translating the user commands into equivalent language understood by the computer hardware. 
How to **upgrade Kernel** in Linux	We should never upgrade Linux Kernel, always install the new Kernel using rpm command. Because upgrading a Kernel can make your Linux box in an unbootable state.
Basic **components** of Linux OS	**1. Linux Kernel:-** It is a low-level systems software whose main role is to manage hardware resources for the user. It is the core of any OS and it is responsible for translating the user commands into equivalent language understood by the computer hardware. **2. Shell :-**

	The Shell is a program that takes commands from the keyboard and passess them to the OS (Kernel) for performing. **3. System Utilities :-** System utility programs are responsible for the execution of special and individual taskes.
Linux **boot process** :-	**BIOS** - Executes **MBR** **MBR** - Executes **GRUB** **GRUB** - Executes **Kernel** **Kernel** - Executes **/sbin/init** **Init** - Executes **Runlevel** programs **Runlevel** - **Runlevel** programs are executed from **/etc/rc.d/rc*.d/**
Runlevels in Linux	A run level is a state of **init** and define what processes or services to run automatically while the system boots up. This is defined in **/etc/inittab** file. Run levels are identified by numbers. The **init** process is the last step in the boot procedure and has **pid** of '**1'**.' "**init**" is responsible for starting **system processes** as per defined in the **/etc/inittab** file. "**init**" process checks which default run level is defined in **/etc/inittab** and starts the system in that run level which means all the services defined for that run level gets executed. There are **7** different run levels present (run level 0-6) in Linux system for different purpose. The descriptions are given below. 0: Halt System (To shut down the system) 1: Single user mode 2: Basic multi user mode without NFS 3: Full multi user mode (text based) 4: unused 5: Multi user mode with Graphical User Interface 6: Reboot System Most desktop Linux distributions boot into run **level 5**, which starts up the Graphical Login Prompt. Most servers boot into run **level 3**, which starts the text based login prompt as it is advisable not to install GUI in a server as lots of space goes waste and also it takes lot of resource to run.
Switching or **Changing** between different run levels:-	**Method-1:** Changing run level temporarily without reboot.

	We can use **init** command to change rune levels without rebooting the system. **Eg:-** if we are currently in **runlevel 3** and want to go to **runlevel 1**, just we need to execute # **init 1** Or if you want to **shutdown** a machine you can take help of **runlevel '0'** .Just you need to execute # **init 0** Remember this change is not permanent and on next reboot you will get your default run level. **Method-2**: Changing run level permanently If you want to change your default run level then Open the file /etc/inittab and edit entry initdefault: # **vi /etc/inittab** Let's set **initdefault** to **5**, so that you can boot to X next time when Linux comes up: **id:5:initdefault:** **Method-3:-** Change run level at boot time You can also change the run level at boot time. If your system uses LILO as the boot manager, you can append the run level to the boot command: **LILO: linux 3 or** **LILO: linux 5** If your system uses **GRUB**, you can change the **boot runlevel** by pressing the **`e'** key to edit the boot configuration. Append the run level (in our case 5) to the end of the boot command as shown: **kernel /vmlinuz-2.6.18-164.el5 ro root=LABEL=/ rhgb quiet 5**
Shell	The **Shell** is a program that takes commands from the keyboard and passess them to the **OS (Kernel)** for performing.
LILO (Linux Loader)	It is a **boot loader**, which loads the Linux operating system into main memory so that it can begin its operation. **/etc/lilo.conf**
What is **Swap Space**?	**Swap space** is a certain amount of space used by Linux to temporarily hold active programs. Swap space in Linux is used when the amount of physical memory (RAM) is full. If the system needs more memory resources and the RAM is full, inactive pages in memory are moved to the swap space. While swap space

	can help machines with a small amount of RAM, it should not be considered a replacement for more RAM. Swap space is located on hard drives, which have a slower access time than physical memory.
How much should be the **swap size**?	Twice the size of RAM if RAM is less than **2 GB** Size of RAM **+ 2 GB** if RAM size is more than **2 GB** i.e. 5GB of swap for 3GB of RAM
Symbolic Link or **Shortcut**:- Create shortcut for a directory.	ln -s <p/a/t/h> </p/a/t/h/shortcut file name>
Environmental Variable	Environmental variable are global settings that control the behavior of Shell, Software packages installed in Linux and other processes.
Redirection	Redirection is used to pass the output of one operation as input to another operation in the same command.
GREP	Used to search particular word in a file. **grep -n <word> <file name>** -n -> line number of word
Is Linux OS virus free?	No ! There doesn't exist any OS that is virus free. However Linux is known to have least number of Viruses, till date.