Linux Workshop'18 Main Points

Overview: The workshop consists of 5 sessions as follows:

1. **Session #1:** Introduction, Linux History, OS Basics, and Linux Installation.

2. **Session #2:** Basic Commands, Linux File System Architecture, Paths, Linux Documentation, and Dealing With Files and Directories.

3. **Session #3:** Package Manager, Manging Users and Groups, File Permissions, and Managing Processes.

4. **Session #4:** Networking.

5. **Session #5:** Shell Scripting.

Estimated time for each session: 3 Hours.

Open Source Community
Linux Moderators Committee

1. **Session #1:**

   - **Points to be covered:**

     ○ Workshop Introduction.

     ○ Open Source (Definition – Projects – Communities – Git/Github).

     ○ Linux History.

     ○ OS Basics:

       ▪ What is an operating system.

       ▪ Operating system layers.

       ▪ What is a distribution.

       ▪ Linux distribution main families.

     ○ Linux Installation:

       ▪ Partitions:

         • Primary, extended, and logical partitions.

         • Partition-naming (Windows Vs Linux).

         • Mount Points.

       ▪ Different file system formats.

       ▪ BIOS Vs UEFI.

       ▪ GPT Vs MBR.

       ▪ Linux Installation different scenarios:

         Linux-Installation-Workflow

       ▪ Common dual boot problems.

- **Labs:**
  - "Linux History and Open Source" Game.
  - "[LAB1]Set Up a Virtual Machine".

2. **Session #2:**

- **Points To Be Covered:**
  - How to open the terminal (3 ways).
  - You can open more than one terminal.
  - Terminal Vs Shell (tty2, tty3, tyy4, ...etc).
  - Terminal Layout (*user@hostname:working_Directory$*)
  - Command Line Format:

    1) *Command*   2) *[Option(s)]*   3) *[argument(s)]*
    - Command :
      - *who , whoami , cal, date, GUI-application,...etc.*
    - Option:
      - ex: *cal -h , ...etc.*
    - Argument:
      - ex: *gedit*   Vs   *gedit file.txt,* ...etc.
    - Basic Commands:
      - *pwd , clear , history,* ...etc.
      - *ls, ls -l , ls   -a*
      - What is '.' and '..'
      - Combine more than one option (ex: *ls -l -a -h,   ls -lah).*

- ▪ Linux File System Architecture (Directory Tree).

- ▪ Relative Vs Absolute Paths.

- ▪ Cd command (cd [destination], cd , cd .. , cd - , cd ~).

- ○ Linux Documentation:

  - ▪ man pages:

    - • *man [command]*

    - • *man -k [searching pattern]*

    - • *man -f [command]* → whatis command

    - • *man man* → man sections

    - • Searching in man using '/pattern' and 'n'.

  - ▪ info.

  - ▪ --help

  - ▪ Official online documentations.

- ○ Dealing with files :

  - ▪ Take care of file extensions.

  - ▪ Create, copy, move, rename, and delete files → *touch, cp, mv, rm.*

  - ▪ Read from files → *cat.*

  - ▪ *Echo*

- ○ Dealing with directories:

  - ▪ Create directories and parent directories → *mkdir, mkdir -p.*

  - ▪ Copy and delete non-empty directories recursively → cp -r, rm -r.

  - ▪ Delete empty directory → *rmdir*.

- **Labs:**
  - "[LAB2]Linux Basic Commands".

3. Session #3:

- **Points To Be Covered:**
  - Package Manager:
    - Install, remove, update, upgrade, list, and search for software packages.
    - Understand dependencies.
    - Debian Family:
      - Low-level package management → dpkg.
      - High-level package management → apt.
    - Red-Hat Family:
      - Low-level package management → rpm.
      - High-level package management → yum.
  - Downloading from terminal → *wget.*
  - *SU* Vs *Sudo*
  - Managing Users and Groups:
    - Create and delete users and groups.
    - Change password for user.
    - Switching between users.
    - Set password for root user.
    - Add user to group.

- Create home directory for new user.

- Add user to sudoers file.

- List existing users and groups.

- Configuration files:
  - */etc/passwd*
  - */etc/shadow*
  - */etc/group*

- Configure ownership (change user and group owners for files)

○ File Permissions:

- What is 'rwx' for files and directories.

- Default permissions for files and directories.

- Change permissions using both octal and symbolic notations.

○ Managing Processes:

- Monitor processes using *'ps'* and '*top'*.

- Signals : numbers and shortcuts.

- Jobs:
  - List running jobs.
  - Sending jobs to background or foreground.

- Terminating a process using PID or job ID.

- Scheduling Future Processes:
  - *at*
  - *cron*
  - *sleep*

- **To Be Prepared:**
  - Lab 3
  - Lab 4
  - Lab 5

4. Session #4:

- **Points To Be Covered:**
  - Introduction to how Internet works.
  - What is IP address.
  - What is data packets.
  - IPv4 Vs IPv6.
  - Local IP address Vs Public IP address.
  - Subnet masking.
  - Network addresses classes (class A, B, C, D, and E).
  - Gateway and how data packets are sent.
  - IP addresses allocation (Static or DHCP).
  - Broadcasting.
  - DNS :
    - What is DNS server.
    - DNS Server Hierarchy.
    - Change your DNS server from ISP to 8.8.8.8 or 8.8.4.4.
  - What is "Open Systems Interconnect" (OSI) Model.
  - What are network protocols.

- TCP Vs UDP.

- Ports and well-known ports.

- SSH and SCP.

- Network Configuration on Linux (Apply above concepts using Linux network utilities and network configuration files during the whole session) :

  - Linux Network utilities:

    - *ifconfig* or *ip addr*

    - *host < www.domainName.com >*

    - *dig < www.domainName.com >*

    - *nslookup < www.domainName.com >*

    - *ping   <hostName>*

    - *route* or *ip route*

    - *traceroute <address>*

    - *mtr <address>   →* combines ping & traceroute and gives continuously updated display.

    - *Wget -c <url>*

    - *sudo /etc/init.d/network-manager [stop] [restart] [start]*

    - *ssh [port] user@host*

    - scp [port] [from] [to]

  - Linux Network Configuration Files:

    - /etc/resolv.conf

    - /etc/hosts

    - /etc/network/interfaces

- It is highly recommended to use GUI in network configurations.

- **Labs:**

  ○ Try bandit: http://overthewire.org/wargames/bandit/

5. Session #5:

- **Points To Be Covered:**

  ○ What is "Shell Scripting".

  ○ Write commands in file and execute it.

  ○ Difference between compiler and interpreter.

  ○ Compile C++ file and execute it.

  ○ Standard I/O streams and redirection.

  ○ Use *cat* interactively in redirection.

  ○ Grep tool.

  ○ Piping.

  ○ Perform multiple commands in one line using ';' and '&&'.

  ○ Environment Variables:

    ▪ *echo $HOME*

    ▪ *echo $PATH*

    ▪ *echo $BASH*

  ○ Important Utilities:

    ▪ *less*

    ▪ *head*

- *tail*

- *sed*

- *awk*

- *wc*

- *cut*

- Regular Expressions ('.', '$', '*', '|').

- **<u>Labs:</u>**

  ○ Solve hackerrank Bash Challenges:
    https://www.hackerrank.com/domains/shell

- **<u>To Be Prepared:</u>**

  ○ Lab 6.

  ○ Lab 7 (Dealing with compressed/tar files).

<u>Additional Sessions:</u>

- Setting up a web server.

- Git/Github Session.