

Hosting Linux Lab based on web-based interactive terminal



AIM

The aim of this lab is to build a interactive web-based terminal. This interaction is not just to see the output of executed command on browser but to hover over the command outputs to see the info about that command i.e what are the arguments? and how many are them?.

Moreover, one can also see what that command does and how it can be used with different flag just by hovering over that command. It will use javascript framework over the gateone to achive this.

INTRODUCTION

Linux Lab is a tool for learning command-line interface in an innovative way. The main motives behind this lab are :-

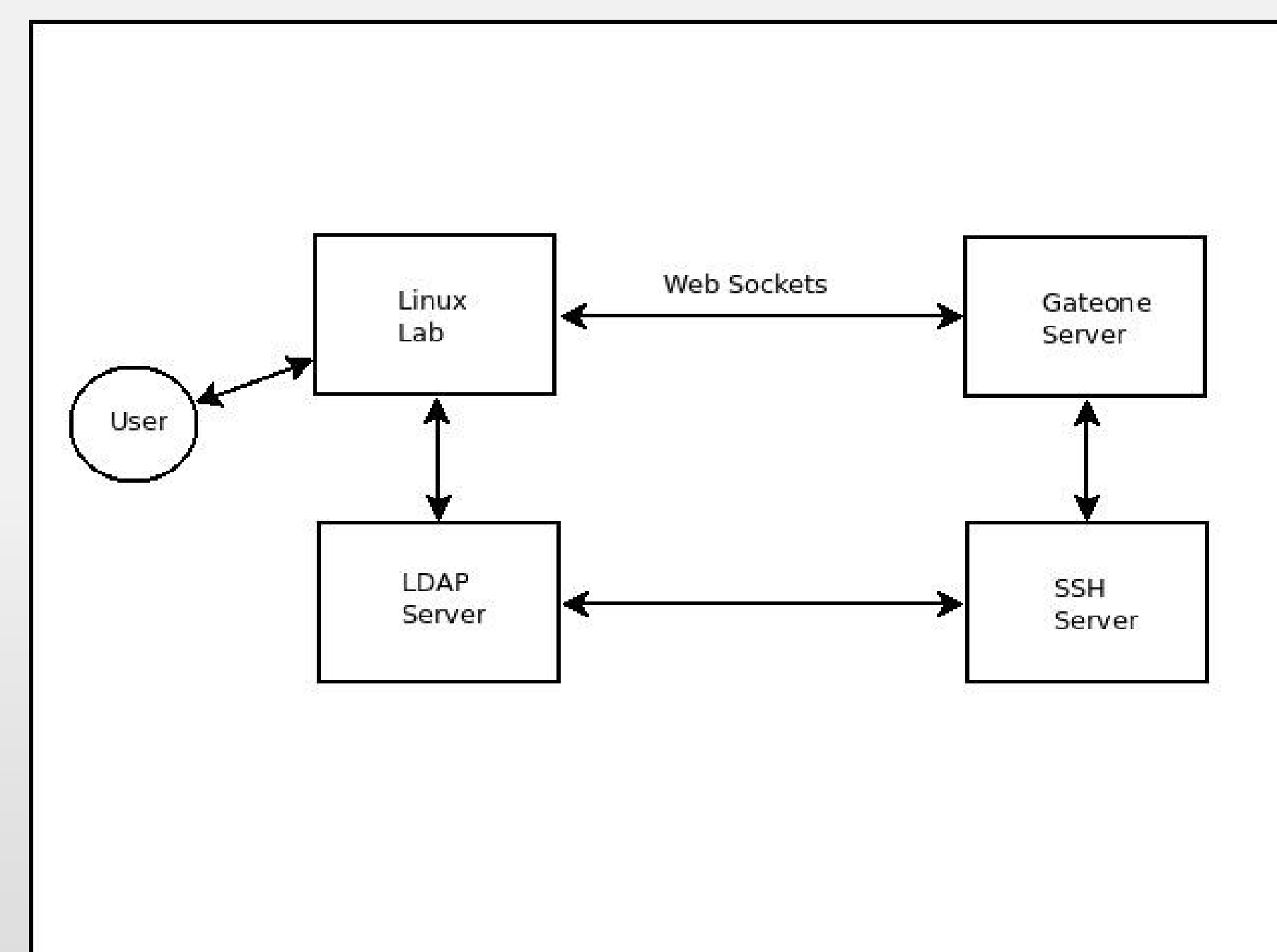
- To save time and learn efficiently as usually it takes a good deal of time and experience to learn command-line.
- With this Lab, one can learn Linux without damaging his system as this Lab uses a **web-based terminal emulator**.
- One can learn Linux without installing Linux operating system.
- For many CSE related virtual labs, it is a fundamental requirement to provide a way for the user to interact with a computer. This interaction could be the execution of system command to observe the output, the execution of a program to see the result or the execution of a program by an evaluation mechanism. It is desirable to make this interaction imitate a real system interaction as closely as possible. Hence, providing a terminal emulator on the user's browser while taking care of security considerations would be a good solution.

METHOD

This lab is a combination of many servers put together to achive the desired goal.

Here is the list of the servers and brief info about each of them :-

1. L.D.A.P server :- Lightweight Directory Access Protocol (**LDAP**) is a standard protocol designed to manage and access hierarchical directory information over a network. In linux lab, it is used as a centralized authentication system.



This diagram explains the working of the Linux Lab. It shows how all servers are connected together to achive the goal of the Lab.

2. Gateone server :- Gateone is an open source, web-based terminal emulator with a powerful plugin system. In linux lab, gateone is used to run a terminal application on user's browser.

3. SSH server :- As gateone server is an amazing SSH client. So, here SSH is used with gateone server to server the purpose of the lab.

RESULTS

Linux lab is ready to be integrated with virtual labs. The Lab is ready with a web-based terminal emulator for ubuntu 14.04. The whole process of setting the Linux Lab on ubuntu 14.04 is automated with a bash script.

The following is the current architecture of the lab :

1. User visits the virtual lab webpage.
2. The webpage loads some scripts.
3. The script makes a connection to backend 'Gateone' gateway server using WebSockets.
4. The gateway server then connects to a backend SSH server via the SSH protocol.
5. The gateway server also emulates a terminal to the SSH server.
6. The contents of the emulated terminal are sent to the user's web page and get displayed.
7. All the user's input is forwarded via the gateway the SSH server.
8. The user account information comes from an OpenLDAP server setup separately.
9. Accounts on the OpenLDAP server get created when the user registers for virtual labs.
10. Home directories for the user's are created on the local machine on which this lab has been setted.

Future works :-

1. Captcha in register.
2. Restricting user root privileges.
3. The idea of javascript framework on gateone for hovering over the command outputs to get information is still to be implemented.

CONCLUSIONS

It is a lot easier to learn linux command line interface in this way. It gives opportunity to users for experimenting on web-based terminal which they can't do on their systems.

It is lot easier to get info about commands just by hovering rather than exploring man-pages.



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