SSH Tutorial

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Aim

- The aim of this tutorial is to show the basics of SSH. In particular, we are going to see the connection to a remote server with the ssh protocol and the transfer of files from our laptop to the server and vice-versa, using the get and put commands of sftp.

- In addition, we shall see some auxiliary commands of sftp; finally we shall show how to start-up a graphics application such as Firefox, running on the server for safety.
How to use this tutorial

We have tried to make this a hands-on tutorial. Try to execute the commands on your own; you can copy the text and modify it using your data [IP address, usernames].

- Underlined words provide links to theoretical articles on selected topics from Wikipedia. Click to read more about them.
- Bibliography in the end provides you with more information on specific topics.
Prerequisites

Essential prerequisites:
Linux/Unix commands [ls, pwd, cd, nano, ping, etc.]
Basic Networking concepts [IP address, NAT, RTT, public and private keys].

Desirable prerequisites [will help better understanding]:
cryptography [key fingerprint, RSA, key's random art image].

This tutorial may be used in a Networking, cryptography or Linux course/ lab in tertiary education.
Installation

If the ssh client and/or server are not installed:

To install the ssh client:

$ sudo apt-get install openssh-client

To install the ssh server:

$ sudo apt-get install openssh-server

To install both ssh client and server at once:

$ sudo apt-get install openssh-server openssh-client

To test your local ssh server type in a terminal:

$ ssh localhost

Answer “yes” to allow connection for the first time
Enable local SSH server to access the Internet

Open your browser & connect to your **NAT** - capable **ASDL modem-router**. You can find its local IP address in the manual. Usually it looks like 192.168.1.0 or something similar. Search for a setting containing “SSH server”.

### Assigned Games & Applications

The table below shows the games and applications that are allowed to be initiated from the Internet.

You need to configure such games or applications if you like to act as a game server or share a server located on your local network with other people.

If you are simply a player or simply accessing the Internet, you don’t need to configure games or applications.

<table>
<thead>
<tr>
<th>Game or Application</th>
<th>Device</th>
<th>Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSH Server - Secure Shell</td>
<td>Amilo-S1</td>
<td>On</td>
</tr>
</tbody>
</table>

**Pick a task...**

- Assign a game or application to a local network device
- Create a new game or application
- Modify a game or application
## Assumptions

<table>
<thead>
<tr>
<th></th>
<th>LOCAL</th>
<th>REMOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer name</td>
<td>Amilo-Si</td>
<td>Ubuntu1</td>
</tr>
<tr>
<td>Username</td>
<td>antony</td>
<td>user</td>
</tr>
<tr>
<td>IP address</td>
<td>178.59.212.84</td>
<td>62.217.112.67</td>
</tr>
</tbody>
</table>

- You need to know both local and remote passwords.
- SSH server will be installed on both machines.
- Note: each time you switch on the DSL modem-router, you are assigned a different external IP address.
The simple picture

SSH tunnel
The real picture: Home network with **NAT**

- **Internal IP addr**: 192.168.1.1
- **External (public) IP addr**: e.g., 138.76.29.7

The NAT-capable ADSL router connects the home network (192.168.1.0/24) to the rest of the Internet (192.168.1.0). A SSH tunnel allows access to external services.

192.168.1.0/24 is the private IP address block used for internal networking.
Procedure

- We shall present the ssh commands in simple steps.
1/ Check connection

antony@Amilo-SI:~$ ping -c 4 62.217.112.67
PING 62.217.112.67 (62.217.112.67) 56(84) bytes of data.
64 bytes from 62.217.112.67: icmp_req=1 ttl=58 time=116 ms
64 bytes from 62.217.112.67: icmp_req=2 ttl=58 time=33.6 ms
64 bytes from 62.217.112.67: icmp_req=3 ttl=58 time=266 ms
64 bytes from 62.217.112.67: icmp_req=4 ttl=58 time=31.3 ms

--- 62.217.112.67 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3003ms
rtt min/avg/max/mdev = 31.388/111.988/266.291/95.475 ms
antony@Amilo-SI:~$
2/ Find your real **IP Address**

The easiest way: open [www.whatismyip.com](http://www.whatismyip.com):
Alternative way

Open your browser & connect to your **NAT**-capable **ASDL modem-router**. You can find the IP address in the manual. Usually it looks like 192.168.1.0 or something similar. Check for info about your broadband or DSL connection.
3/ Connect to the remote server

antony@Amilo-SI:~$ ssh user@62.217.112.67
Welcome to Ubuntu 11.04 (GNU/Linux 2.6.38-11-generic x86_64)

* Documentation:  https://help.ubuntu.com/

38 packages can be updated.
13 updates are security updates.

Last login: Sun Oct  9 18:35:44 2011 from 178-212-84.dynamic.cyta.gr
user@snf-916:~$
4/ Connect from server to laptop w. sftp

- Now we are connected to the server.
- Next we connect from server to laptop.
- Laptop IP address is: 178.59.212.84.
- Hence, now server is the local and laptop is the remote machine.
sftp connection

sftp antony@178.59.212.84

user@snf-916:~$ sftp antony@178.59.212.84
antony@178.59.212.84's password:
Connected to 178.59.212.84.
sftp>
Helpful sftp commands

- **ls**: list contents of remote dir
- **cd**: change dir in remote machine
- **pwd**: print [show] working dir
- **lls**: local ls
- **lcd**: local cd
- **lpwd**: print local working dir
5/ Download file from laptop to server

sftp> lpwd

*Local working directory [server]: /home/user*

sftp> get /home/antony/images/boats1.jpg /home/user/Pictures/

Fetching /home/antony/images/boats1.jpg to /home/user/Pictures/boats1.jpg

/home/antony/images/boats1.jpg

100%  48KB  48.0KB/s  00:01

sftp>
Verification

sftp> lcd Pictures
sftp> ll
a.jpg boats1.jpg
sftp>

File “boats1.jpg” has been copied to server's “Pictures” dir.
6/ Upload file from server to laptop

put /home/user/Pictures/a.jpg /home/antony/images/

sftp> put /home/user/Pictures/a.jpg /home/antony/images

Uploading /home/user/Pictures/a.jpg to /home/antony/images/a.jpg

/home/user/Pictures/a.jpg 100% 44KB
44.1KB/s 00:00

sftp> pwd

Remote working directory: /home/antony/images

sftp> ls

a.jpg  boats1.jpg  brain.gif

sftp> quit
Open

user@snf-916:~$ firefox &
The easy way

- Some Linux distros like Ubuntu provide option “Connect to Server” in menu “Places”.
- Open this menu and select Service type=SSH, insert the server's IP address in the “Server” textbox, insert your username in the appropriate box and click “Connect”.
As a result...

... a folder with the contents of the server root dir opens on your desktop
...and now you can just...

drag and drop files to the “networked” folder on your desktop,

- in order to upload or download files to the server!
Bibliography


- Kimmo Suominen, Getting started with SSH. http://kimmo.suomininen.com/docs/ssh/

Downloaded from: http://t-h.wikispaces.com/Linux

A. Andreatos, Oct. 2011