SSH

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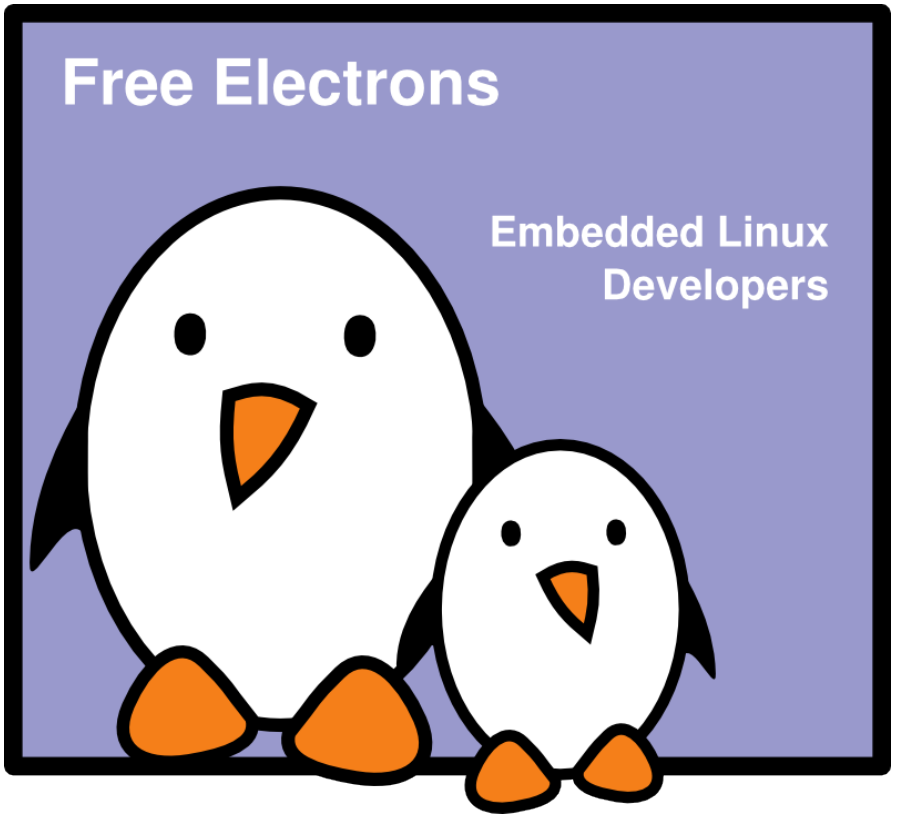
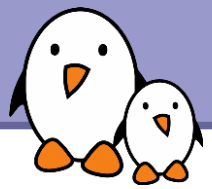
Free Electrons





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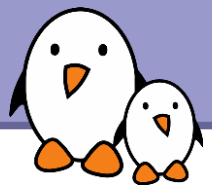
Document sources, updates and translations:
http://free-electrons.com/docs/ssh

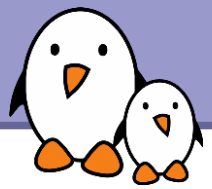
Corrections, suggestions, contributions and translations are welcome!

Latest update: Jan 29, 2009



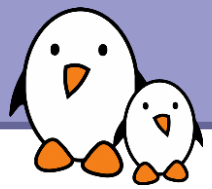
Introduction

- SSH stands for *Secure SHell*
- SSH is a secure communication protocol that allows remote login, file transfer and port tunneling, normalized by RFC 4251, 4252, 4253 and 4254.
- Replacement for telnet, rlogin, rsh, etc.
- On Linux, the main implementation is **OpenSSH**, with both the server and client programs
- A smaller implementation for embedded systems called **Dropbear** is also available
- On Windows, **Putty** is one of the free SSH client available.



Installation and basic usage

- OpenSSH is available as a package in all GNU/Linux distributions
- On Ubuntu, two packages are available
  - openssh-client, the client programs
  - openssh-server, the server program
- Connecting to an SSH server is as simple as `ssh username@hostname`
- ssh will prompt for the user password and log in to the remote system.

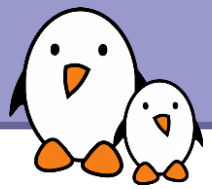


File transfer and X forwarding

- Files can be transferred using the scp client program

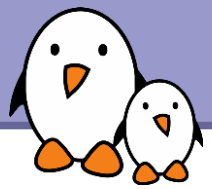
```
scp myfile1 myfile2 \
username@hostname:~/dest/directory/
scp -r mydirectory user@host:~/dest/
```

- With ssh `-X` option, one can tell ssh to enable X11 forwarding
  - It allows graphical applications run on the remote host to be displayed on the local screen
  - On the server, `X11Forwarding` must be enabled in the configuration file `/etc/ssh/sshd_config`.



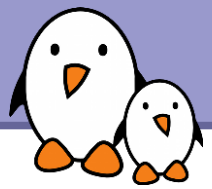
Remote execution

- ssh not only allows to connect to a remote host, but also allows remote execution of commands
  - `ssh user@host ls`
  - This is very useful in shell scripts, for example
- ssh is also used by other programs as a transport layer
  - rsync, the synchronisation tool, can work over ssh
    `rsync -e ssh ~/work user@workhost:~/work`
  - CVS, Subversion and most of the version control tools can work over SSH



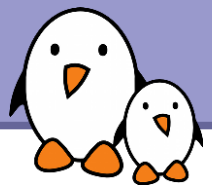
Skipping the password with keys

- An interesting feature of SSH is that you can bypass the password step by using cryptographic keys
- First, generate a private and public SSH key using `ssh-keygen -t dsa`
- It will prompt you for a passphrase, which will be required to «unlock» your private key everytime you use time
- The key has been generated in
  - `~/.ssh/id_dsa`, the private key, that no one should have access to
  - `~/.ssh/id_dsa.pub`, the public key, that you can transfer publicly to everybody



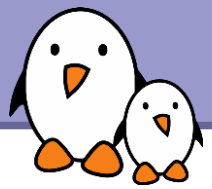
Skipping the password with keys (2)

- Now, you need to transfer the public key to the hosts you want to connect to
  - `ssh-copy-id user@host`
- The public key has been transferred to the remote host, and you should see it in `~/.ssh/authorized_keys` on the remote host
- Trying to login to the remote host should ask you the passphrase of the private key
- This allows to replace our dozens of different passwords by a single passphrase, which is easier to remember.



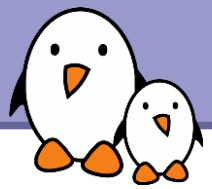
Skipping the password with keys (3)

- `ssh-agent` allows to avoid giving the passphrase at every login. It keeps the passphrase in memory, either forever or for a limited time
- Run the agent: `$(eval ssh-agent)`
  - Will run the `ssh-agent` program
  - Will set a few environment variables so that the other ssh programs can connect to the agent
- Give the passphrase to the agent: `ssh-add`
- The other ssh programs can now login to remote hosts that know about your public key without entering the password



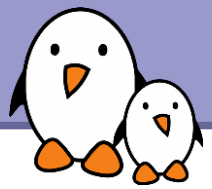
Skipping the password with keys (4)

- The environment variables set by ssh-agent disappear when you exit the current shell
- The best solution is to start the ssh-agent before starting the X server so that all your applications will have access to these environment variables
- This is usually done by default on most distributions, including Ubuntu
  - The file `/etc/X11/Xsession.options` sets the `use-ssh-agent` option
  - A script in `/etc/X11/Xsession.d/` starts the agent if the `use-ssh-agent` option is set



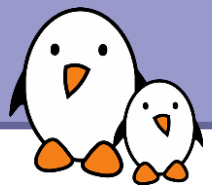
Skipping the password with keys (5)

- The process of telling the agent your passphrase can be further improved by
  - Installing a graphical ssh-add program: ssh-askpass-gnome for Gnome or ksshaskpass for KDE (only available in the next Ubuntu version)
  - Running ssh-add automatically when the graphical environment starts. The exact configuration depends on your window manager.



Port tunneling

- SSH can also be used to tunnel ports
- Create a local port that connects to a remote host through a SSH connection to another host
  - `ssh -L 12345:localhost:25 user@host`
  - Any connection on the local port 12345 will in fact reach port 25 on the destination, through an encrypted tunnel
- Create a remote port that connects to a host through a SSH connection to localhost
  - `ssh -R 4242:kernel.org:80 user@host`
  - Any connection on the remote host port 4242 will in fact reach port 80 of kernel.org through an encrypted tunnel



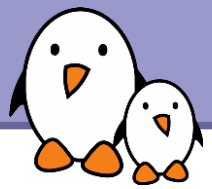
Configuration file

- SSH stores a configuration file in `~/.ssh/config`
- It can be used to set global options, but also per-host options, like
  - `Host openmoko`
  - `HostName 192.168.0.202`
  - `User root`
- Using these options, running "`ssh openmoko`" will connect automatically to IP 192.168.0.202 with the root login.

Practical lab – Using SSH

Time to start `Lab` !

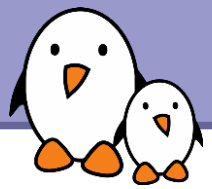
- Ask your neighbor to create an account for you
- Login to your neighbor system using ssh
- Set up the keys to login without entering any password



Thanks

To people who sent corrections, suggestions or improvements

- Guillaume Lelarge



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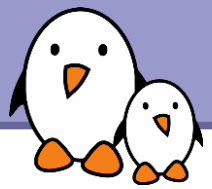

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