

Build customized Ubuntu CD

Linux Live CD is a good way to use Linux OS without the need to installing it. This way, users can experiment with different distributions without the need to install any of them. Most of the existing live CDs come with a pre-defined set of software applications and tools. Some of them are general-purpose distributions where they include general-purpose tools and applications (e.g. LibreOffice) like the case of Ubuntu. Others instead are more specialized distributions that have been built to be used in specialized contexts such as BlackTrack which is a distribution intended to be used by security testers.

So what about creating your own customized Ubuntu distribution?? Have you ever thought about that??

Your customized distribution means creating a Live CD with all the tools and applications that you need and probably customizing the background images, logos ... and you can install it or give it to your friends to install it.

In this tutorial we are going to walk through the steps that allows you to so exactly this. Our customization will be to do the following changes to **Ubuntu 11.04 (Natty Narwhal)** Live CD

- Remove the game package
- Keep only the English language package and remove the other languages
- Install skype
- Enable universe and multiverse repositories
- Add Firefox flash-nonfree plugin.
- Add a network tool: wireshark
- Change the default desktop background

Once we are done with the changes we will create a CD image and try it in our virtual machines

1. Starting

1- Open your Vmware

2- Create a new Virtual Machine

3- Load Ubuntu 12.04

4- Start the machine

From now on all the instructions need to be performed inside the Virtual Machine

CAUTION! Manually write commands in the shell, copy and paste commands from this document to the shell may result in errors!

5- Download **Ubuntu 12.04 (Precise)** Live CD image from
(<http://releases.ubuntu.com/precise/ubuntu-12.04.3-desktop-i386.iso>)
and save it in ~/Download

6- we need to install additional applications that are not normally installed by default under Ubuntu. To do this Ubuntu provides an utility called apt-get that helps downloading and installing applications automatically.

The syntax of apt-get is: `sudo apt-get install <package-name>`

It might happen that sometimes apt-get does not find the packages we are looking for. In that case 3 reasons might be the causes:

1. The apt-get database is not updated. To solve this we need first to call `sudo apt-get update`
2. The package we are looking for has no repository from where we can download it. This means that we need to download it and install it manually
3. Apt-get does not have the repository of the package. We need to add the repository of that package to apt-get using one of the 2 ways
 - a. `add-apt-repository <repository link>`
 - b. edit the `/etc/apt-get/sources.list` and adding the address of the repositoryp.s: it is important to find the repository that matches the distribution version that you have

The two packages we need to install are

squashfs-tools : it is a compressed read-only filesystem for Linux

chroot: Run a command with a different root directory // probably is installed by default

7- Once this is done. Let's start setting our environment.

We first mount our `ubuntu-12.04-desktop-i386.iso` image file to `/tmp/liveubuntu`

What is mounting?? Every time an operating system needs to connect and use a storage device, it needs to mount it. Mounting gives the operating system the ability to understand how to read and/or write data to that particular device(e.g. what filesystem the device is using)

To do so:

- create a folder called `liveubuntu` under the `/tmp`

to mount the iso file use the command

```
$ sudo mount -o loop <your iso image> /tmp/liveubuntu
```

`-o loop`: fake file as a disk and read the filesystem

8- Create a directory where we are going to put our extracted CD image in our working directory (`~/liveubuntu/cd`)

9- Copy all the mounted cd content except `casper/filesystem.squashfs` in our `~/liveubuntu /cd` directory:

=> To copy the content and exclude the `filesystem.squashfs` you can use the utility `rsync`
`rsync` has an option called `--exclude` to exclude the files you don't want to copy

Syntax: `rsync --exclude=<excluded file> -a <sourceDir> <destinationDir>`

example: `rsync --exclude=/casper/filesystem.squashfs -a /tmp/liveubuntu/ ~/liveubuntu/cd`

This command copies all but the `squashfs` file, which is the compressed file containing our live CD filesystem.

Now we need to do the same thing with `squashfs.squashfs`. This means that we need to mount it and copy its content

10- Create another directory under `~/liveubuntu/` call it `squashfs`

11- Create again under `~/liveubuntu/` another folder called `custom`. This will be our actual customized file system

12- In order to read and copy the content of `squashfs` we need a special kernel module called `squashfs`

=> To load the kernel module we use `modprobe`

Use `$ sudo modprobe squashfs`

13- Now mount the `/tmp/liveubuntu/casper/filesystem.squashfs` to `~/liveubuntu/squashfs/` using the mount command with the following parameters

```
$ sudo mount -t squashfs -o loop /tmp/liveubuntu/casper/filesystem.squashfs ~/liveubuntu/squashfs/
```

14- copy the whole content of ~/liveubuntu/squashfs to ~/liveubuntu/custom using the command `cp`

example: `sudo cp -a ~/liveubuntu/squashfs/* ~/liveubuntu/custom` (3 min)

15- And finally, copy /etc/resolv.conf and /etc/hosts to our ~/liveubuntu/custom/etc so we will be able to access network from within the image we are going to customize

2. Getting into our future image:

Till now all the operations we have performed are done on the host operating system. For example when we execute `apt-get install` it will install the packages we choose and install them on the host operating system. However, from now on we want to give control to the guest operating system that will be customized. So all the commands that will be executed from now on will be executed inside the ~/liveubuntu/custom folder

Using the following commands we do so

```
$ sudo chroot ~/liveubuntu/custom //we change temporarily the root folder of the operating system
# mount -t proc none /proc/ // mounting the /proc to manage the processes
# mount -t sysfs none /sys/ // mounting the /sys/ to manage the system calls
# export HOME=/root // the actual home is your home folder (/home/username), we change it to /root
```

Now we are ready, let's customize...

- Removing the game package

1- to see the installed packages use

```
# dpkg --get-selections | grep games
```

2- to delete the game package use

```
# apt-get remove --purge gnome-games*
```

3- check if the games still exist

- Remove the other languages

1- check the language packages that you have using

```
# dpkg-query -W --showformat='${Package}\n' | grep language-pack | egrep -v '\-en'
```

2- Remove all the other languages using

```
# apt-get remove --purge `dpkg-query -W --showformat='${Package}\n' | grep language-pack | egrep -v '\-en'`
```

3- check if the command worked correctly

- Installing skype

1- we need to install some dependencies.

```
# apt-get install libqt4-dbus libqt4-network libqt4-xml libasound2
```

2- we need to download skype using the command `wget`

```
# wget http://download.skype.com/linux/skype-ubuntu_2.2.0.35-1_i386.deb
```

3- we install skype using the `dpkg` command with the option `-i` (install)

```
# dpkg -i /tmp/skype-ubuntu_2.2.0.35-1_i386.deb
```

=> If some dependencies are missing Ubuntu will complain and will not install the package. To solve this problem `apt-get` gives you a way to find and install dependencies

```
# apt-get install -f
```

- Enable universe and multiverse repository

=> There are some repositories that are not enabled by default. So we want to have them enabled

1- Open and edit /etc/apt/sources.list

```
# vim /etc/apt/sources.list
```

=> It might happen that you do not have vim installed. So go ahead and install it (using apt-get install)

2- uncomment all the commented repositories

3- save and close using Esc, then :wq

4- to update the apt-get list use

```
$ sudo apt-get update
```

- Add Firefox flashplugin-nonfree (apt-get)

- Add a network tool: wireshark (apt-get)

- Change the default desktop background

1- download a jpg image and save it in /usr/share/backgrounds. This is the folder where all the fault background images are stored (use wget that was used before)

2- use the command gconftool-2 to make the default background point to your file as follows

```
gconftool-2 --direct --config-source xml:readwrite:/etc/gconf/gconf.xml.defaults --set -t string  
/desktop/gnome/background/picture_filename /usr/share/backgrounds/yourfile.jpg
```

We are done.

3. Cleaning up

```
# apt-get clean  
# rm -rf /tmp/*  
# rm -f /etc/hosts /etc/resolv.conf  
# umount /proc/  
# umount /sys/  
# exit
```

4. Setup the new ISO file

1- give write access to the manifest file

```
$ chmod +w ~/liveubuntu/cd/casper/filesystem.manifest
```

2- Generate the manisfest file which contains the list of all the packages installed within the squashfs

```
$ sudo chroot ~/liveubuntu/custom dpkg-query -W --showformat='${Package} ${Version}\n' >  
~/liveubuntu/cd/casper/filesystem.manifest
```

```
$ sudo cp ~/liveubuntu/cd/casper/filesystem.manifest ~/liveubuntu/cd/casper/filesystem.manifest-desktop
```

3- Regenerate the squashfs

```
$ sudo mksquashfs ~/liveubuntu/custom ~/liveubuntu/cd/casper/filesystem.squashfs
```

4- update the md5 sums

```
$ sudo rm ~/liveubuntu/cd/md5sum.txt
```

```
$ sudo -s
# (cd ~/liveubuntu/cd && find . -type f -print0 | xargs -0 md5sum > md5sum.txt)
# exit
```

5. Creating the ISO file

```
$ cd ~/liveubuntu/cd
$ sudo mkisofs -r -V "Ubuntu-Live-<username>" -b isolinux/isolinux.bin -c isolinux/boot.cat -cache-inodes -J -l
-no-emul-boot -boot-load-size 4 -boot-info-table -o ~/Downloads/ubuntu-11.04-<yourname>-i386.iso .
```

6. Testing the ISO

- 1- Copy the iso outside the virtual machine
- 2- Set the virtual machine to boot from the iso
- 3- Check if the changes have been applied

Done.