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Chapter 1: Basics

I often come across people who don't know anything about dual booting. Of course, I didn't know it at first. But now I'm often having more than one OS in my laptop. So here is an effort to describe it, and how it is done.

What is Dual Booting?

Dual-booting means having two operating systems on a computer at the same time. You can call it multi-booting if you have more than two operating systems. For example, I've Windows 7, Kubuntu and Fedora installed in 3 different partitions in my laptop. When you dual-boot, you can choose what operating system to choose when you start your computer.

How it works?

Dual booting requires a program called bootloader. Most operating systems include a bootloader. Windows uses its “Windows Bootloader” while many Linux distros use “GRUB” and “GRUB 2”. There exist many other bootloaders such as Lilo etc. When you start your PC, bootloader is the first program that runs. It then displays the list of operating systems installed to choose from. Some bootloaders also have advanced features like terminal access and recovery tools.

What is the need?

Well, it depends upon your needs. Some like to use Linux, but there might not be a Linux alternative of their favourite Windows software and vice-versa. Some cannot leave Windows due to the fact that his office website or banking websites require Internet Explorer. Some also do it just for fun. There are many reasons, different for different persons.
What are the differences from Virtual Machine?

Using a virtual machine can be helpful as you can install another operating system within your current operating system without changing your partition structure. But it limits the power of both the systems as the resources are divided. A dual-boot ensures that the operating system can get the most of your hardware.

What are the disadvantages?

Particularly, I don't see any disadvantage of dual booting. One disadvantage may be that dual-booting takes more space on your hard drive. Also you are changing the bootloader configuration, so any errors might make the system unusable. But that's unlikely to happen as most systems handle the dual-boot efficiently and you don't have anything to do manually that would cause error.

What are the advantages?

• Your operating system can use all your hardware unlike virtualization, so no performance loss.
• Even if one operating system fails, you have the other system for recovery purposes and data backup.
• You can enjoy the operating system you like without having to completely uninstall the system you need.

Which distro to choose?

So, the problem here is there are literally thousands of choices. But not every distro (Linux based distribution) will suit your test. Different distros have different principles. Not every distro is newbie friendly. Choosing the wrong distro could make you forget the idea of using Linux. What should we do then?

The most user friendly distro so far is Linux Mint, based on the popular distro Ubuntu. Linux Mint or Ubuntu can give you a good start
into the world of Linux, primarily because of the great effort put into making them as easy as possible to set up and not to mention its large user base and software available.

But, there are other alternatives such as Fedora, Open Suse and much more. Personally I think they are not really ready for a person coming straight from the world of Windows.
Chapter 2: Installing Windows

So, we discussed some basic things about dual booting in the previous article. Here, we'll see the installation process of Windows. Windows doesn't detect any other operating systems such as Linux. So, to achieve a dual boot configuration, you should install Windows first, so that Linux can easily setup a dual boot environment when it detects previous Windows installation. If you already have Windows installed, you can skip it. But if you have Linux installed, fear not, you can proceed installing Windows as we would later describe the procedure to add Linux to Windows boot menu.

Prerequisites

To install windows, you need to check if your hardware meets the requirements of the version of Windows you are installing. You must have the installation disc or ISO file of Windows. We've shown here, how to install Windows 7 Ultimate. But the other versions should be similar, and if you have ever installed Windows, then you know this already!
Installing Windows

Installing Windows is fairly easy. You first need to burn the Windows 7 ISO file to a DVD or create a bootable pen drive. Then insert the disc and restart to boot from it. You might need to change the boot order in the BIOS settings accordingly if you want to boot from CD/DVD or Pen drive.

When you boot from the Windows 7 disc, you'll be prompted to select the language and the country. After choosing appropriate values, click “Next”.

![Windows 7 installation screen](image-url)
Then click “Install Now”.

![Windows 7 installation screen](image)
If the disc contains multiple versions of Windows 7, you'll be asked to choose a version. Generally 32-bit versions are referred as x86 and 64-bit versions as x64. So choose accordingly. If your RAM is less than 3GB, there is no reason to choose 64-bit and it is always safer to go with 32-bit as most hardware and software are compatible with it.
The next step would require you to select the Partition in which you want to install Windows. You can click “Drive Options (Advanced)” if you want to create, delete, extend and format partitions. Now choose the desired partition and click “Next”. You should assign around 50 GB to that partition in my opinion. You can increase or decrease it according to your needs.
After you click “Next”, the installation will begin. It can take some time and the computer will restart many times. I recommend removing the DVD when the first restart occurs.
Then it will initialize services, configure drivers and so on.
The next step is to ask for a Host name. It is not the same as username, so don't get confused.
Now you have to choose the Windows update settings.
When it asks for your time zone, select your appropriate time zone from the dropdown list.
Now after some dialog boxes like asking for username, password etc., and the installation will finish. You might be prompted to Activate Windows. You can skip the step if you don't have an internet connection or want to activate it later. If you don't activate, Windows will expire in 30 days.

Now after the installation finishes, you can start using Windows normally.
Chapter 3: Installing Ubuntu

In the previous article, we saw how to install Windows. Now the next step is to install a Linux distro. We'll see how to install Ubuntu. Installing Linux Mint is basically the same.

Installing Ubuntu

First, you have to download the Ubuntu ISO image from its website. Then either burn it to a DVD or create a bootable pen drive using Unetbootin. Then boot from the disc or pen drive. Then you'll be given options to Try Ubuntu or Install Ubuntu. So let's choose "Install Ubuntu" and proceed.
If you choose to try Ubuntu, you can experience Ubuntu from the CD even without installing. But expect loss in performance and support for graphics drivers in the Live CD environment. When you try Ubuntu, you can install from the Live session by clicking on the “Install Ubuntu” icon present on the desktop. It is recommended to first try if Ubuntu works well on your hardware before installing.
In the next step, you can check the boxes to automatically download and install updates and multimedia codecs during the installation process. This would require internet and can take longer if you have a slow connectivity. You can absolutely skip installing and install them after Ubuntu installation is complete. But without multimedia codecs, you won’t be able to play proprietary media files like mp3.
The next screen will give you different partition schemes. They may vary according to your condition. For example we had only two options. Generally, the options are,

1. Install Ubuntu Alongside Windows
2. Replace Windows 7 with Ubuntu
3. Use Entire Hard Disk
4. Something Else

To have more control over our partition scheme, we will choose “Something Else”.

![Ubuntu Partition Schemes](image)
The next screen will list all your partitions. You can create, edit, delete and format your partitions here. Choose a partition to install Ubuntu. Ensure that the partition has no data on it as we are going to format it.
Select your partition and click “Change”. In the “Use as” field, choose “Ext4 journaling file system”. Check the box “Format the partition” and choose “Mount point” as “/”.

Linux was made in days when RAM was expensive and was designed to be able to run in limited RAM. So if your RAM is less, says less than 1GB, you should create a SWAP partition in order to better utilise you Hard Disk memory in limited RAM. You need another partition to use as SWAP partition. You normally need a SWAP partition approximately of size twice of your physical RAM. Say 2 GB in case of 1 GB RAM. Select the partition you want to use as SWAP partition and click “Change”. In the “Use as” field, choose “SWAP”. Remember that you cannot store any data in the SWAP partition.
Now click “Ok”. Then click “Install now” to begin installation.
The next screen prompts you to choose the time zone. You can conveniently click on the map to set your time zone.
You'll be asked more information like keyboard layout and username, password etc. while the installation continues in the background.
After providing the required information, you'll be presented with a slideshow describing some best aspects of Ubuntu.
After the installation completes, you'll see an “Installation Complete” dialog. Click “Restart Now” to restart your system.
Now after restart, you'll be presented with the GRUB 2 boot menu listing all your installed operating system. You'll find your previous Window installation at the bottom.

![GRUB 2 Boot Menu]

Congratulations, you have set your dual boot configuration successfully.
Chapter 4: Installing Fedora

Installing Fedora is little different from Ubuntu. Fedora uses “Anaconda Installer” whereas Ubuntu uses “Ubiquity”. But the steps are essentially the same. We are using the Live CD of the KDE Spin of Fedora here to demonstrate the installation, but others are exactly the same as they use the same installer.

Installing Fedora

After booting from the Live CD, you are taken to the normal desktop session where you will find a “Install to Hard Drive” icon. Click on it and you are ready to install.
The installer will first ask you to choose your appropriate Keyboard. For most international laptops and desktops, the U.S. English should be selected. After selecting your keyboard, click next.
The next screen will ask you to select the storage devices type. For home setups, the “Basic Storage Devices” option should be correct. Let’s select it and proceed.
The next step will ask you to set the host name and domain name. They are similar to your computer’s address and will be used to identify your computer in a network.
In the next screen, select your time zone either from the Map or from the long list and click “Next”.

[Image of a time zone selection screen showing a world map and a list of cities and time zones, with a selected city highlighted.]

**Selected city: New York, America (Eastern Time)**

- Adak
- Anchorage
- Antigua
- Aruba
- Asuncion
- Attokan: Eastern Standard Time - Attokan, Ontario and Southampton, Nunavut

*System clock uses UTC*
Now you will be asked to enter a root password. Note that the root password is different from the login password and will only be used for administrative purposes.

In Ubuntu, there is no password set for the root account initially.
Now let’s select the partition scheme. There are different options which can be suitable in case of different situations. Choose a predefined setup or go ahead and choose “Create Custom Layout”. If you select any of the predefined options, by default Fedora will use LVM (Logical Volume Management) for installation. LVM has more features, but you have to do more work if you want to access LVM from another distro which doesn’t support LVM out of the box, e.g. – Ubuntu. You can also create a LVM in the custom option, but we will use the simple ext4 partition to maintain compatibility with other systems and for the sake of simplicity.
It’s a good practice to create separate partitions for boot, home and root. Having a different boot partition will ensure that you have access to your other Operating Systems even if the root partition becomes corrupt.

The method is similar to that of Ubuntu, but here we are just creating additional partitions for boot, home and root. If your RAM is less, says less than 1GB, you need to create a SWAP partition in order to better utilise you Hard Disk memory in limited RAM. To create a SWAP partition, select the file System as SWAP.
Here is how our setup looks after creating all necessary partitions.
In the next step, you’ll be presented with the bootloader setup. Here you can see, add, edit and delete any other Operating Systems Entries and also select your default Operating System. Note that Fedora uses the old GRUB instead of GRUB 2 because of some lacking features in GRUB 2. You can skip installing a bootloader if you already use GRUB 2 or any other bootloader. But if you choose LVM based partition for Fedora, GRUB 2 doesn’t support it yet. So you need to use GRUB.

You should leave the bootloader installation location as is. It’s better not to install the bootloader in any partition instead of MBR.
The next screen will start the installation. Wait a couple of minutes for the installation to finish. After completion of installation, you will get an installation finish screen. Close it and restart the computer.
User Setup

When you start Fedora for the first time, you will see the welcome screen. Click forward to go to the next screen.
Now you will see the create user screen. Enter the details and click forward.
The next screen will let you set the date and time. You can also synchronize the time with a network server.
Now after a couple of more dialogs, the login screen will appear. Now you can start playing with Fedora.
Chapter 5: Last Bits
Now we will see those last bits you need to know when you dual boot.

Add Linux to Windows Bootloader
The Linux bootloaders (e.g. - GRUB 2) offer much more features. But you might want to use Windows bootloader as default. Or if you installed/reinstalled Windows after installing Linux, the Windows bootloader overwrites GRUB. So you need to add Linux to the bootloader again.
There is a nice software available called EasyBCD by Neosmart Technologies, which is perfect for the task. First, download and install EasyBCD. Run EasyBCD and go to the “Add New Entry” section. Here in the “Linux/BSD” tab, select the bootloader type (“GRUB 2” in case of latest versions of Ubuntu) and give it a name. Then click “Add Entry”.

Now, when you restart, you will have the boot entries displayed in Windows Bootloader. Remember that this will only work if your default bootloader is Windows bootloader.

Making Windows Bootloader Default

It is fairly easy. In EasyBCD, go to the “BCD Deployment” section. Here under the “MBR Configuration Options”, select the type of Windows bootloader and click “Write MBR”.

44 funsurf-blog.blogspot.com
EasyBCD 2.1 Community Edition - NeoSmart Technologies

Create Bootable External Media
EasyBCD can automate the process of creating bootable media. Select a partition below to begin.
Partition: Partition 1 (C:\ as NTFS - 30 GiB)

Install BCD

MBR Configuration Options
- Install the Windows Vista/7 bootloader to the MBR
- Install the Windows XP bootloader to the MBR

Write MBR
Restoring GRUB as Default

If you want to restore GRUB, first add GRUB to Windows bootloader with EasyBCD following the procedure given above. Then after you login to Ubuntu, open Terminal from Applications > Accessories > Terminal or Applications > System Tools > Terminal depending on your distribution. Then issue the following command to install GRUB 2 to MBR (GRUB in case of Fedora),

```
sudo grub-install /dev/sda
```

GRUB 2 cannot handle LVM that Fedora uses by default. So if you didn’t use LVM and installed Fedora according to this guide, you can use GRUB 2 in Fedora. In case of Fedora, you should give the following command to install GRUB 2 to MBR,

```
sudo grub2-install /dev/sda
```
Restoring GRUB in an Unbootable Condition

If you screw up things, and your system becomes unbootable, fear not. Linux comes to rescue. You can use a Linux live CD to boot your computer. Then you can install GRUB from there. But it is a bit complicated and you will often not face such situation. So I’ll not explain it here. You can find the solution in the internet. But one thing I would like to mention that you have to first mount /dev by `sudo mount --bind /dev dev` or similar, then `chroot` to the installed system and restore GRUB as mentioned here. But really don’t go too deep here. I mentioned it here because it was the thing I was doing wrong when I was new.
Updating GRUB 2

If your boot options are different than that displayed in GRUB 2, you might need to update the GRUB 2 configuration. You can update GRUB 2 simply by issuing the following command in Terminal,

```
sudo update-grub
```

In Fedora, you have to use the following command instead,

```
grub2-mkconfig -o /boot/grub2/grub.cfg
```
Removing Windows

If you ever want to remove Windows completely from your system, you just need to format the Windows partition and then Update GRUB. Remember that you should have GRUB as default bootloader.

If you don't see the “Format” option, you need to install “Disk Utility”. Simply give the command in Terminal,

```
sudo apt-get install gnome-disk-utility
```

In case of Fedora you have to use,

```
su -c "yum install gnome-disk-utility"
```
Removing Linux

Removing Linux completely is also easy. First you have to make Windows bootloader default, if you don't, you won't be able to boot after deleting Linux. Then just delete the Linux partition. To delete the partition, go to Control Panel > System and Security > Administrative Tools > Create and format hard disk partitions in Windows.
When the Disk Management window opens, look for the Linux partition and delete it.

Access Linux Partition in Windows

Windows, by default, uses NTFS file system, while Linux uses ext4 file system. Linux can successfully detect NTFS file systems. But Windows doesn't recognize ext4. You can use the ext2fsd driver for Windows to be able to access Linux partitions from within Windows.
Linux is Not Windows

Remember that Linux is not Windows. So don't expect it to be like Windows. There would be a lot of differences which I’m not supposed to explain here. If you have a will, you will automatically explore and discover new things. And it will take you some time to learn. You might need to search the internet for hours to tackle a problem; you might need to do dirty command line stuffs. But all these will only make you more efficient and productive. You might end up writing small scripts to automate your tasks and show them off to your friends! You'll be surprised when you know how much control Linux gives to you. So enjoy dual booting.