

Xubuntu 8.10 Live CD

Wellcome Trust Mix

Document version 1.01

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Using the Training CD

What is Xubuntu?

Xubuntu is a free distribution of the Linux/GNU operating system, developed by a community of developers all across the world. It is a variant of the widely used Ubuntu distribution.

Your CD is a "Live CD" - you can boot your PC with it and use the operating system without having to remove your existing operating system. Alternatively, if you like the software you can also use this CD to temporarily or permanently install Xubuntu onto your PC's hard disk to turn your PC into a Linux workstation. You can have both Microsoft Windows and Xubuntu on your computer at the same time, although you cannot run them both at the same time - you choose one or the other when you boot your computer.

What is the Wellcome Trust Mix?

The "Wellcome Trust Mix" is a modified version of Xubuntu for use in Wellcome Trust Open Door workshops. In most respects, this is a normal Xubuntu CD, the only differences are:

- it is supplied with additional bioinformatics applications as required by the course
- the CD has had support for all languages other than English removed¹

What scientific applications are supplied?

The CD is supplied with:

- Artemis/ACT
- ATV
- BLAST
- BioPerl
- BioSquid
- ClustalX
- dialign
- EMBOSS
- exonerate
- FASTA
- hmmer
- mummer
- phylml

There are many other scientific applications available for Ubuntu, which you can add to the system after installing it to your computer's hard disk.

¹ This was to make space for the bioinformatics tools. If you install Xubuntu onto your hard disk permanently, it is easy to re-enable support for many other languages than English. The system will automatically download the required files from the Internet.

Getting support

This Live CD is not an official product of either the Wellcome Trust or Canonical, the company which makes Xubuntu.

Xubuntu itself has a thriving support community through mailing lists and IRC channels; see <http://www.ubuntu.com/> for more details.

If you require it, you can purchase support for the Ubuntu operating system from Canonical.

Some additional software on the CD, all of which is located in `/usr/local`, is not part of Xubuntu, and for help with it you should contact the authors of those individual programs. Usually, documentation and contact details can be found in `/usr/share/doc/package`. For example, to find details for the Artemis suite of programs, the contact details are in:

```
/usr/share/doc/artemis
```

For questions about the use of the CD in the context of the Wellcome Trust Open Door Workshops, you can send e-mail to imt-help@sanger.ac.uk. Please put "Wellcome Trust Live CD" in the subject line of your message.

These non-Xubuntu applications are:

- Artemis and ACT
- ATV
- ClustalX
- FASTA

All other applications on the CD are provided by Xubuntu, and you can get support for them and file bug reports through normal Ubuntu channels.

Hardware requirements

The Live CD will work on most reasonably recent computers with Intel processors:

	PC Compatible	Apple Macintosh
CPU	800 MHz Pentium III or greater	Any Intel-based Macintosh
RAM	512 MB minimum, 1GB recommended	
Peripherals	CD-ROM drive and USB port required	
Network	Some parts of the course require a connection to the Internet	

	PC Compatible	Apple Macintosh
Disk space (only required when installing onto your computer permanently)	At least 16GB of free space	A spare disk partition at least 16GB in size

Using the CD in Live Mode

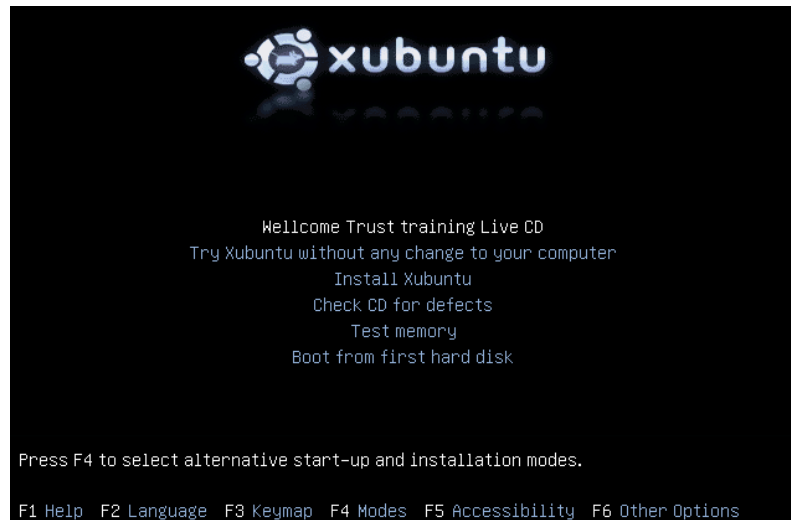
This is a method we have not yet used in a training course, but it is available.

During the course, the trainee **must not** use the CD to install Xubuntu on the training room computers, unless instructed to do so by a course instructor. Instead, she will be using it in its "live CD" mode, and she will be keeping her data on the USB memory stick that she will have been given with the CD. To do this, do the following:

1. Insert the USB stick into a spare USB socket on your computer. Windows and Mac OS X will not recognise it properly, but do not worry about this.

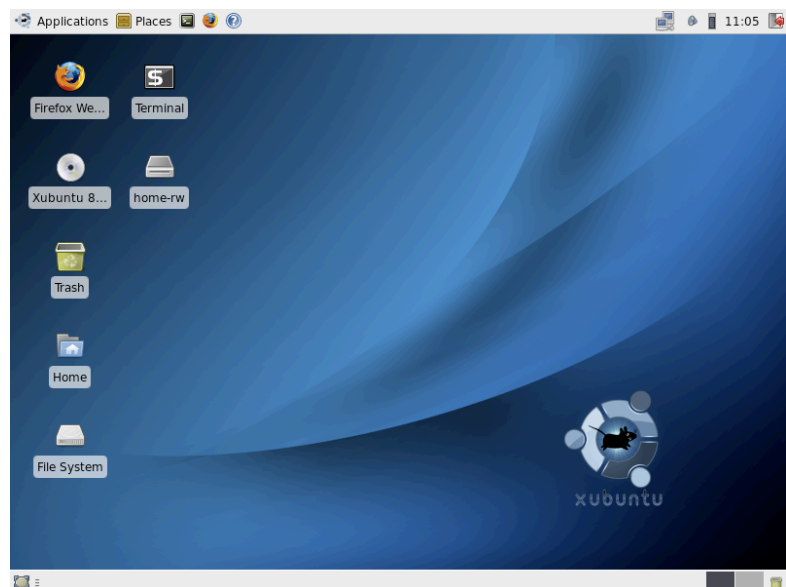
2. Reboot the computer, and boot from the CD. PC-compatibles usually do this automatically. On Macintoshes, hold down the C key after you hear the power-on chime.

3. At the screen shown on the right, choose the first option "Wellcome Trust training Live CD". **Do not** choose to install Xubuntu.



4. After a minute or so the machine should boot to the screen shown below right. If you are using a USB stick and cannot see the "home-rw" icon, then check that your USB drive is plugged in, and start again.

If you don't have a USB stick you can still use the CD, but you won't be able to save anything permanently.



5. You are now ready to start the course.

6. **Important: Do not remove the course USB stick while the computer is switched on.**

Your USB stick is not formatted in the "normal" way and cannot be removed while the computer is switched on; you should only remove it when the computer is switched off.







Transferring information to another USB stick

If you want to transfer files to another USB stick, you can plug an additional USB stick into another USB port on your computer, and Xubuntu will make it available to you.

Getting started

The top panel

The panel at the top of the screen is where you will find most common tasks. Some of them are as follows:

Icon	Purpose
 Applications	Menu of installed software
 Places	Menu of locations you might which to search for files
	Starts the Firefox web browser
	Starts a terminal window
	Get help on using Xubuntu
	Log out or shut down the computer

Most of the programs you will be using in the course will be typed in using Terminal windows, but other software such as e-mail, a word-processor, a spreadsheet and much more can be accessed through the Applications menu.

Setting the correct keyboard map

The default keyboard map in the live CD is for a United States keyboard layout. To change this,

Part 2 - Administrative Tasks

Preparing the USB sticks for a course

This part of the instructions is for course administrators who want to prepare new USB sticks for the users. This section is for fairly experienced Linux users only who are familiar with editing partition tables and formatting filesystems.

Create the golden master USB stick

1. Boot the machine with the Live CD, but without a USB stick in it
2. Start a Terminal window, and use **cat /proc/partitions** to note the current disk devices in the system
3. Insert the USB disk, and use **cat /proc/partitions** again to see which new disk device has appeared. Often, this will be **/dev/sdb** with a single partition, **/dev/sdb1**. But this might be different on your system. In the following commands, replace **/dev/sdb1** with the device name suitable for your system.
4. If desired, repartition the USB disk. Most disks come from the factory with a single partition filling the entire disk, and this will be fine.
5. Unmount the filesystem, if Xubuntu has automatically mounted it, and format the device with an **ext2** filesystem, 4096 byte block size and a filesystem label of **home-rw**:

```
sudo umount /dev/sdb1
sudo mke2fs -b 4096 -L home-rw /dev/sdb1
```

6. At this point, reboot your system from the CD, and choose the Wellcome Trust training Live CD boot option again.
7. Once you have logged in, start a Terminal window and check with **df** that the USB stick is mounted as the **/home** filesystem.
8. Populate **/home/ubuntu** with the training data they need for the course (such as **Module_1_Artemis** and its friends)
9. Populate **/home/databases** with all the BLAST and FASTA databases that you require. Make sure that the various index and alias files in the directory are correct.
10. Type **sync** to make sure all data is committed to the USB disk.

Re-initialise a USB stick with data downloaded from Sanger

1. Boot the machine with the Live CD, but without a USB stick in it
2. Start a Terminal window, and use **cat /proc/partitions** to note the current disk devices in the system
3. Insert the USB disk, and use **cat /proc/partitions** again to see which new disk device has appeared. Often, this will be **/dev/sdb** with a single partition, **/dev/sdb1**. But this might be different on your system. In the following commands, replace **/dev/sdb1** with the device name suitable for your system. **Be very sure you have the right disk device - making a mistake with this can result in you reformatting your main computer's hard disk in step 5! If in doubt, consult a local Linux expert to help you.**
4. If desired, repartition the USB disk. Most disks come from the factory with a single partition filling the entire disk, and this will be fine.

5. Unmount the filesystem, if Xubuntu has automatically mounted it, and format the device with an **ext2** filesystem, 4096 byte block size and a filesystem label of **home-rw**:

```
sudo umount /dev/sdb1
sudo mke2fs -b 4096 -L home-rw /dev/sdb1
```

6. Remount the filesystem and download the files to it:

```
sudo mount /dev/sdb1 /mnt
cd /mnt
url=ftp://ftp.sanger.ac.uk/pub/tjrc/Hinxton_2009
wget -O - $url/ubuntu.tar.gz | sudo tar zxvzf -
```

If your site needs you to set a proxy server in order to access our FTP site, consult your local system administrator for help, since the last command above will not work in such cases.

If you want the BLAST/FASTA databases as well as the exercise materials, you will then need to type:

```
wget -O - $url/databases.tar.gz | sudo tar zxvzf -
```

This is a very large download, and will take a long time.

7. Make sure the data is flushed to the disk, and then unmount it:

```
sync
sudo umount /mnt
```

8. You can now reboot the machine and use the new USB stick.

Making copies of the USB stick

1. Insert a second USB stick into another USB socket on your machine.
2. Format it analogously to step 5 above. Remove it and re-insert it. It should be automatically mounted by Xubuntu as **/media/home-rw**
3. Copy the golden master data onto it:

```
sudo rsync -av /home/ /media/home-rw/
sync
```

4. Eject the second USB stick
5. Repeat steps 1-4 as many times as required to create as many trainee USB sticks as you require.

Installing Xubuntu permanently onto your computer

WARNING: Installing Xubuntu incorrectly on your system could destroy data already present on your system. Make sure you have a valid backup of your data before you proceed.

If you decide you want to continue using Xubuntu and these bioinformatics applications in your research, the CD supports installing the system permanently onto your computer. There are a number of advantages to this:

- The software runs considerably faster from the hard disk than it does from the CD
- The system will support multiple user accounts, so that several people can use the system simultaneously without interfering with each others' work
- You will be able to add more software to the system; there are many thousands of applications available for Xubuntu, and from the scientific community beyond, which we did not have the space to include on the CD. With an internet connection, you can download and install many of these on your computer
- You will be able to install support for other spoken languages, if you are not comfortable with English. Xubuntu has been translated into many languages, although in many cases the translations are not complete, and some programs do not have translated versions at all.

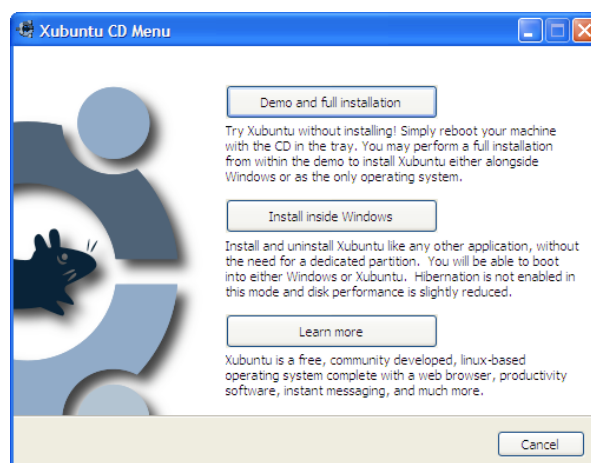
There are a number of alternative ways to install Xubuntu on your system:

- As an application inside Windows. This method allows you to easily remove Xubuntu again later. It also does not require you to repartition your hard disk.
- Install Xubuntu as the main operating system on your computer
- Install Xubuntu onto a second hard disk on your computer, or onto a separate partition on your computer

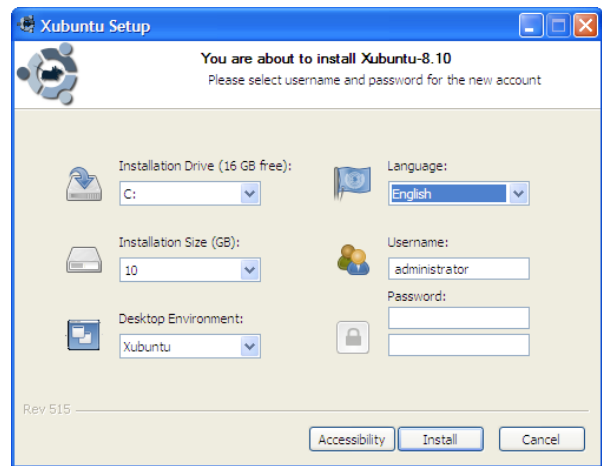
Installation within Windows

This method allows you to install Xubuntu from within Windows, in such a way that you do not need to re-format your hard disk. Nevertheless, you should still make a backup of your data before performing this installation procedure, just for safety!

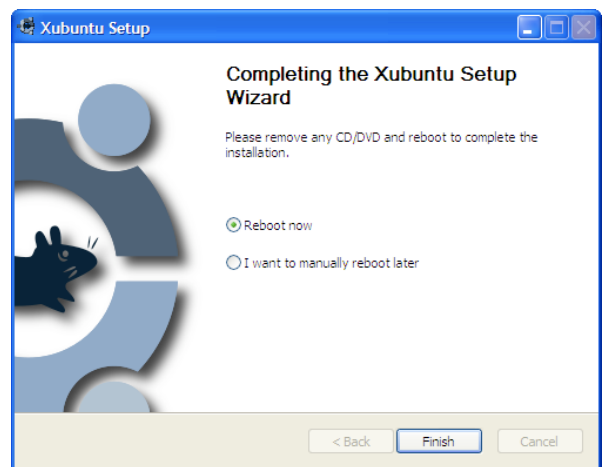
1. Boot your computer into Windows
2. Insert the Live CD, and you should see a window like that on the right.
3. Click on **Install inside Windows**



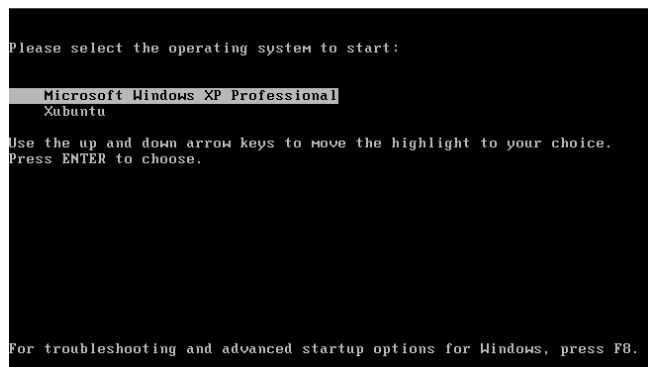
4. At the next screen, enter how much disk space to use - you need at least 15GB, more if you intend to add lots of BLAST databases - and enter the account details for the first account you want to create.
5. Click on the **Install** button
6. Wait a few minutes as the program copies the CD to your hard disk



7. Once it has completed, select **Reboot now** and press the **Finish** button. Your computer will reboot.



8. When the computer reboots, you will be presented with a menu similar to this. Your machine will still boot Windows by default. To boot Xubuntu, use the cursor keys to select it and then press the **Return** key.



9. Xubuntu will now complete its installation and initial configuration of the system. Do not be alarmed by the messages about formatting partitions - it is only formatting space that was reserved for it when you told it how much space to use on the previous page. When the installation has completed, the system will automatically reboot for a second time, after which it will be ready for use.

Installing Xubuntu onto its own partition

1. Back up your computer's data! The following procedure can easily erase your data if anything goes wrong, so be safe and make a backup of everything important before you proceed. Part of the procedure involves repartitioning your hard disk, which is a potentially destructive task.

2. Boot the computer from the CD. From the CD menu, choose **Install Xubuntu**
3. Follow the step-by-step instructions. For more detail on installing Ubuntu (Xubuntu is just a variety of Ubuntu) please go to the Ubuntu web site <http://www.ubuntu.com/>

Installing Xubuntu as a guest virtual machine

A final option for you is to run Xubuntu as a guest operating system under virtual machine software, such as VMWare, Parallels or Xen. This works very well (indeed, it is how the CD was developed and tested). Please note the Wellcome Trust does not endorse any particular products. Any virtualisation product should work.

Installing the databases from your USB stick

Once you have installed the operating system to the hard disk of your computer, you need to transfer the BLAST and FASTA datasets to your computer.

1. Insert the USB stick into your computer
2. Open a **Terminal** window, and run the following command:

```
sudo rsync -Pav /media/home-rw/databases /home
```

3. Eject and remove the USB stick once the transfer is complete.

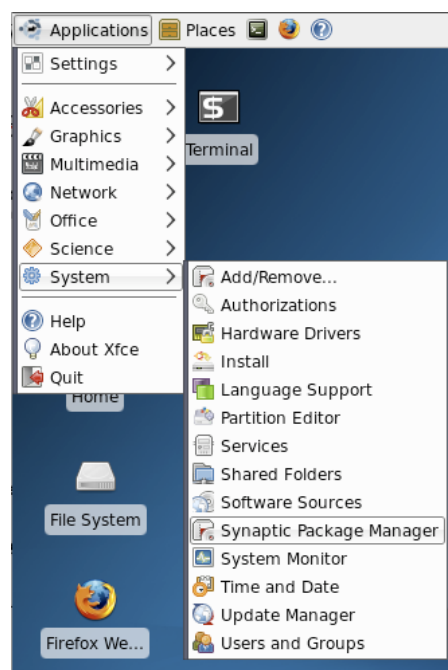
Installing additional applications

A huge variety of applications, both scientific and others, are available for Ubuntu, and you can use the **Synaptic Package Manager** to download and install them. This is reachable from the main system menu as shown on the right. You can also use this program to remove unwanted packages if you are running out of disk space.

If you have downloaded source code for applications which are not available in Ubuntu directly, a comprehensive range of programming languages and compilers are available within Ubuntu. Your CD already contains support C, C++, Perl, Java and Python, but you can also download and install many others.

Keeping your system up to date

While the CD itself cannot be updated, if you have installed the system onto your computer, you should keep the Xubuntu components up to date to ensure your system is safer from hackers, and has fewer bugs. Xubuntu regularly checks to see whether it needs to update itself. Keep an eye on the notification icons it creates at the top right of the screen. Alternatively, you can check for updates manually by choosing **Update Manager** from the menu shown in the above screenshot.



Updating biological data sets

All the database datasets for running BLAST and FASTA go in **/home/databases** by default.

For FASTA

1. Put the FASTA format file in **/home/databases**
2. Create a file *database.nam* describing the database and where the file is. For example, *uniprot_eukaryota.nam* looks like this:

```
</home/databases/  
uniprot_eukaryota 0
```

3. Put an entry for the database in **/home/databases/pubseqgbs** for this file. For example, *uniprot_eukaryota* is listed by default as:

```
UNIPROT_EUKARYOTA$0E@/home/databases/uniprot_eukaryota.nam 12
```

Documentation for this format can be found at
<http://biowulf.nih.gov/apps/fasta3x.txt>

For BLAST

1. If you already have BLAST index files, you can just copy them into **/home/databases**
2. If you do not have the BLAST index files, but do have FASTA format, then you can create the BLAST index files with **formatdb**. For example, for a protein database like *uniprot_eukaryota*:

```
formatdb -i uniprot_eukaryota -p T
```

3. Artemis sometimes refers to these databases by the same name but prefixed with a % sign. To make this work, you need to make a database alias file in **/home/databases**. For example, *%uniprot_eukaryota.pal* looks like this:

```
#  
# Alias file created Sat Nov 1 18:47:01 2008  
#  
#  
TITLE uniprot_eukaryota  
#  
DBLIST uniprot_eukaryota  
#  
#GILIST  
#  
#OIDLIST  
#
```