

LEARNIX

Getting Started

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1 About

Thank you for downloading LEARNIX [2]. LEARNIX is produced by LEARN, the Low Energy Architecture Research Unit of the London Metropolitan University. It is a modification of KNOPPIX that has been modified to include the ESP-r [6] and RADIANCE [7, 5] building simulation packages.



Illustration 1: The KNOPPIX logo

ESP-r and RADIANCE are part of the syllabus of our UK Masters in Architecture, Energy and Sustainability and the European Masters in the Integration of Renewable Energies into Buildings. The packages are the best-of-breed and both are available under an Open Source license [9].

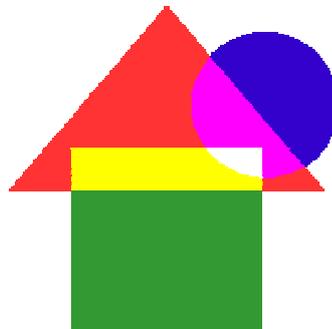


Illustration 2: The LEARN logo

2 First Steps

LEARNIX enables you to use state-of-the art UNIX software on your personal computer without having to install UNIX or GNU/LINUX on your hard disk. Just put the CD-ROM into your drive and boot from it. A few minutes later, you will find yourself in a KDE desktop environment, very similar to the one you will be used from MS Windows.

2.1 System Requirements

- Intel-compatible CPU (i486 or later),
- 20 MB of RAM for text mode, at least 96 MB for graphics mode with KDE (at least

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- 128 MB of RAM is recommended to use the various office products),
- bootable CD-ROM drive, or a boot floppy and standard CD-ROM (IDE/ATAPI or SCSI),
- standard SVGA-compatible graphics card,
- serial or PS/2 standard mouse or IMPS/2-compatible USB-mouse. From [3].

KNOPPIX has a compressed file system and contains just under 2GB of applications.

2.2 Security First

When you first boot from the CD, don't be worried about damaging your existing Windows installations. The default behaviour of KNOPPIX/LEARNIX is to not touch your hard disk at all unless you tell it otherwise.

This also means that whenever you shut down KNOPPIX, all data that you have created will be lost since it is only kept in RAM and not written to the hard disk. Because this is most certainly not what you want, please read on about how to change this.

2.3 Exploring your System

On booting the CD, you will be left in the LEARNIX KDE desktop environment. The application displaying the welcome screen is called konqueror. It is a file manager and can also be a web-browser, although there is also a dedicated web-browser available name Mozilla which is available through this icon  on the panel bar along the bottom of the screen.

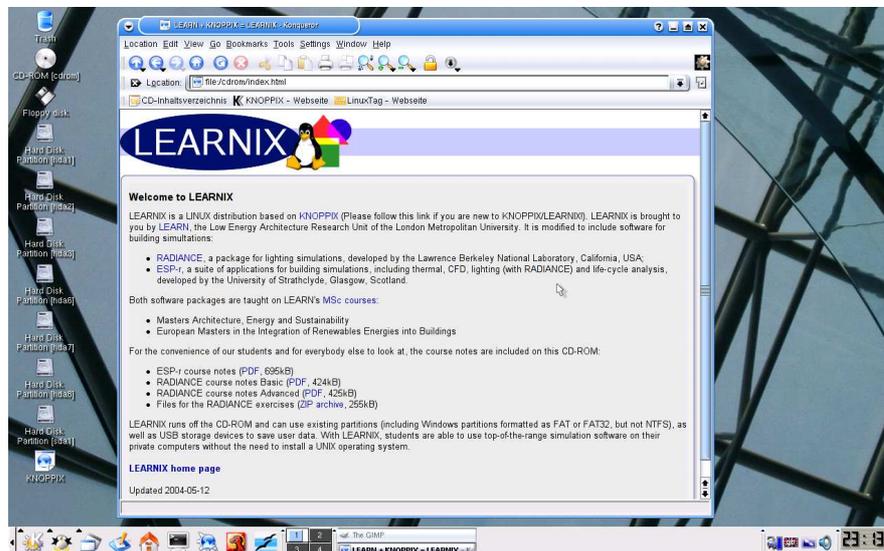


Illustration 3: The opening screen of LEARNIX

KNOPPIX auto-detects all partitions on you hard disk and attached USB and FireWire devices and creates icons  on the desktop. In the example screen shot above, it found 6 useable partitions on the local IDE hard disk (hda1-3, 6-8) and one partition on a SCSI device (sda1).

While `hdx` devices are always IDE drives, `sdx` drives may be one of the following:

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- True SCSI drives (if you don't know what this is, you don't have one),
- USB drives such as memory sticks,
- FireWire devices (aka i-link, IEEE 1394).

If you have a 'normal' computer with only one hard disk and don't have a USB device plugged-in, you will most likely only find `hdaX` partitions. `hda1` is the first partition on the first (or only) IDE drive which is usually the Windows system partition. In case you split your Windows installation into separate partitions for the system and the user data (which is really what you should do, because this way, a corrupted or crashed Windows installation will not affect the integrity of your personal data), you'll find something like `hda1` and `hda2`.

If you are unsure what the partitions are, just single-click on them. The system will mount them and open `konqueror` for you to look at the data. All this will happen read-only, so you really can't do anything wrong. A drive that is mounted is indicated by a little green corner in the icon like this .

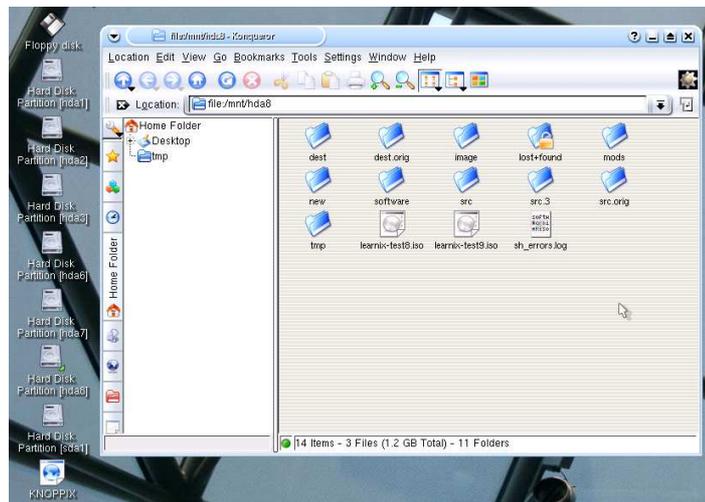


Illustration 4: konqueror displaying the contents of a mounted partition

Because Microsoft keeps the specifications of their file system very close to their chest, the free software community hasn't fully figured out the exact format of the NTFS file system yet. This means that while you may safely read and write to FAT (e.g. floppies) or FAT 32 file systems (e.g. Windows 95/8 partitions), the same is not true for NTFS partitions. Those are read-only for the moment.

2.4 Mounting read-write

Once you found out what partition you would like to write to, close all instances of `konqueror`. Now right-click on all icons that are mounted and have a little green corner. Select `Unmount` from the context-menu.

Right-click on the partition that you would like to write to and select `Properties`, then click on the `Device` tab and un-tick the `Read-only` box.



Illustration 5: Making a partition writeable

Once this is done, simply single-click on the partition's icon again to mount it. Konqueror will pop up again showing the files and folders (aka directories) on the partition.

If you change a partition that is mounted to read-write, you need to unmount and mount it. The changes will not be there immediately (when you untick the box), but only when the drive is mounted the next time.

2.5 Power Saving Features

The majority of PC and laptop BIOSes is rather bug-ridden when it comes to power saving features such as APM or ACPI. While this is dealt with under Windows with proprietary drivers, going into a power saving state might cause LINUX to crash.

We have personally worked on a laptop that had the user data on a USB stick. Trying to go into a power saving mode caused that computer to crash. On its way out, it wiped all the data off the memory stick.

There are a number of approaches to this problem:

- 1) Boot LEARNIX and read-write mount a partition that doesn't contain any data you couldn't live without (such as an empty USB stick) and go for lunch. If the computer still works when you come back, you're lucky. Go back to the pub and raise a pint to the manufacturer of the computer
- 2) Disable all power saving features in the PC's BIOS
- 3) Pass the `noapm` and `apci=off` boot option (more on this later, we haven't tested this one yet).

Always make sure the partition you are writing to is fully backed up, so it won't matter if you lose all your data on that partition. We can not be held responsible for any data loss through the use of LEARNIX. When in doubt, get yourself a USB memory stick for saving your data under LEARNIX.

2.6 Selecting your Keyboard Layout

If your computer does not come with a UK keyboard layout, you may click on the

country icon at the bottom right-hand corner of the screen to change the keyboard setting. If it cycles through without showing your particular country's flag, try right-clicking on it and select *Configure...* to get more options.



Illustration 6: The keyboard configuration is to the right of the panel.

2.7 Passing Boot Options

When booting KNOPPIX, you can pass options to the system that enable, disable or change certain features. Pressing F2 or F3 will show you a limited selection of available options. A full list of those 'cheat codes' is available from [11]. Here are the most important ones:

2.7.1 Screen resolution

If KNOPPIX can't detect the maximum resolution of your display, it uses rather conservative setting to prevent damaging your screen. Override the default with the `screen=` option:

```
knoppix screen=1280x800
```

2.7.2 Language and keyboard layout

The default system language is UK English, override with `lang=`

```
knoppix lang=pt
```

2.7.3 Splash screen

If you like penguins, you'll love this one. Just try it out:

```
knoppix splash
```

2.7.4 CD and RAM Integrity Check

When you download the ISO image from our server [2] and burn it, run this to verify the integrity of the image:

```
knoppix testcd
```

If you experience frequent crashes, check the computer's memory (let this run over night):

```
memtest
```

2.7.5 Slimming Down

Once you are more familiar with KNOPPIX and want a faster window manager (KDE is nice but rather big and slow), try `xfce` for a change:

```
knoppix desktop=xfce
```

You may have more than one options on the command line. This is what I use on you laptop which as a wide-aspect screen:

```
knoppix screen=1280x800 desktop=fluxbox splash
```

2.8 Saving your Configuration

While it is designed to be run off the CD, KNOPPIX can actually be installed on your hard disk (even into a Windows partition) which make it faster and frees up the CD-ROM drive.

It is also possible to use a USB memory stick as a permanent home.



Illustration 7: Advanced configuration option can be found in the 'penguin menu'.

Most of those options are available from the KNOPPIX menu and work in combination with boot options as shown in section 2.7. If you would like to use them please go over to [12] and read up on it BEFORE you attempt to do anything. And don't say we didn't warn you!

3 Using the Building Simulation Software

3.1 Using the Command Line

When you boot KNOPPIX, you are operating as user `knoppix`. Your default home directory sits under `/home/knoppix`. However, this directory exists only in RAM and will be lost once you log out. In section 2.3, you identified a usable Windows partition and mounted it read-write.

Most of the RADIANCE tools are launched from the command line and assume that they are called from the directory that contains the files you are working on. Let's assume that you have decided to work on the 8th partition of the first IDE hard disk, `hda8`. `hda8` should be made read-write (in the pop-up Properties window) and mounted (indicated by the green corner). The Properties window also tells you the mount point. This is where the partition is accessible from.

Before you go any further, it might be a good idea to read the first pages in the RADIANCE course notes (Basic) covering the basic UNIX commands. They are included on the CD under `/cdrom/LEARNIX` as `radcourse2004a.pdf`. Just click on them in `konqueror` to open them up in Acrobat Reader.

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Bring up a shell window (aka command window, console) by clicking on this icon  on the panel bar. Type

```
# cd /mnt/hda8
```

You are now in the directory `/mnt/hda8`. The `ls` command will reveal the same files as konqueror does.

It is probably a good idea to create a new directory for your radiance and esp-r exercises:

```
# mkdir radiance
# mkdir esp-r
```

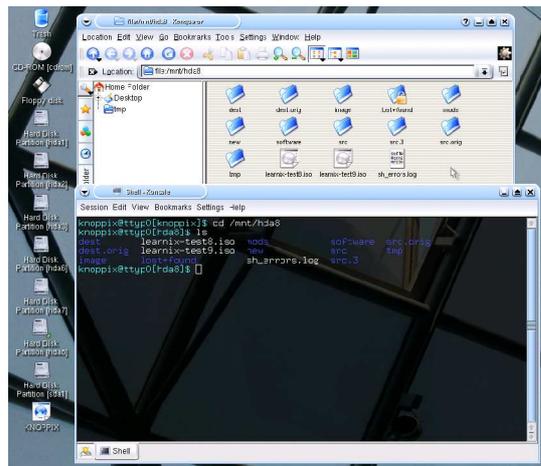


Illustration 8: Accessing a partition from the command line

3.2 File Names

Because on the command line, the command, options and file names are separated by spaces, you should try to only use the letters 'a-z', numbers '0-9' and the characters '+', '-' and underscore '_'. This will save you a lot of time trying to figure out why a particular command will not run with a file that has a space in it: It appears to the system as if it was two files.

If you do have to deal with a file containing spaces, you need to type the command line like this:

```
# command -options "file name with spaces.extension"
```

or like this:

```
# command -options file\ name\ with\ spaces.extension
```

Now use konqueror to copy `rad_files.zip` from `/cdrom/LEARNIX` to `/mnt/hda/radiance` (change this to your path!) and start following the exercises from the RADIANCE or ESP-r course notes.

All files and course notes are accessible from the opening page in konqueror and from the home page of Mozilla. They are situated under `/cdrom/LEARNIX`.

While RADIANCE consists of more than 100 small command, ESP-r is more

monolithic and is controlled through the Project Manager that you get by typing

```
# esp-r
```

on the command line.

RADIANCE comes with some example scene. They are on the CD under `/usr/local/share/doc/radiance/examples`. To use them, copy them to your home directory and run `make`. `make` is not a RADIANCE command, but rather a list of instructions that call RADIANCE command in a particular order. The dot, separated by a space in the line below is part of the command.

```
# cp -R /usr/local/share/radiance/examples/cabin/ .
# cd cabin
# make
```

Please note that there is lots of documentation for RADIANCE under `/usr/local/share/radiance/`, such as the reference manual `pdf/ray.pdf`. Have a look once you've read the RADIANCE course notes (Basic) on the LEARNIX CD.

3.3 RADIANCE add-ons

3.3.1 *DaySim*

DaySim [10] allow you to take a RADIANCE scene and a weather file to assess daylight autonomy and energy savings amongst others. It's a Java program written by the Indoor Environment Research Group of the Canadian National Research Council.

DaySim comes with a nice tutorial and sample files. Just launch the software by typing

```
# daysim
```

and follow the menu items from left to right. Additional information is available in the RADIANCE course notes (Advanced) which are included on this CD and on the LEARNIX web site [2].

We have included additional weather files for major European cities from [12] for your convenience.

3.3.2 *radmap*

Written by Francesco Anselmo [8], this is a Python script for producing irradiation and illumination maps. To see what it does, follow the steps below:

```
# cp -R /usr/local/share/doc/radmap/examples/ .
# cd examples
# make
```

This will take some time to complete. So go and have a cup of tea. For more information, please refer to the RADIANCE course notes (Advanced) on this CD and on the LEARNIX site [2].

3.3.3 *RADview*

I wrote this many years ago and came across it again the other day, so I thought I might as well throw it in. RADview is just a simple file browser written in Tcl/Tk.

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Double-click on an image file, and it will be opened with `ximage` if it has a `.pic`, `.unf` or `.raw` extension. For all other image formats (`.tif`, `.jpg`, `.png`), the ImageMagick `display` program is used.

I use RADview when dealing with directories full of images. The tick boxes along the top filter what files are displayed, double-clicking or highlighting and then hitting View will fire off `ximage` or `display`.

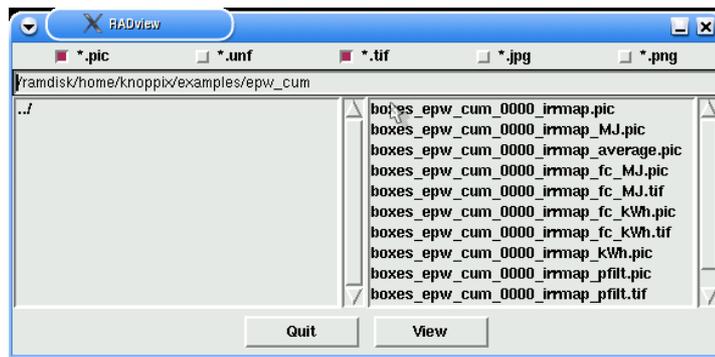


Illustration 9: The RADview file browser

It's so basic that it doesn't even refresh the listing when new files are created. A refresh only happens when you change into a different directory or select different filter options. I usually double-click slowly on one of the selector boxes. It also won't allow you to remove any images.

Having said all this, I hope you'll still find some use for it. Please let me know.

4 References

- [1] Low Energy Architecture Research Unit (LEARN):
<http://www.learn.londonmet.ac.uk>
- [2] LEARNIX:
<http://luminance.londonmet.ac.uk/learnix>
- [3] KNOPPIX:
<http://www.knopper.net/knoppix/index-en.html>
- [4] KDE:
<http://www.kde.org>
- [5] RADIANCE-Online:
<http://www.radiance-online.org>
- [6] ESP-r:
<http://www.esru.strath.ac.uk/Programs/ESP-r.htm>
- [7] RADIANCE:
<http://radsite.lbl.gov/radiance>
- [8] Francesco Anselmo's radmap
<http://www.dream.unipa.it/dream/pub/dot/anselmo/radiance/05.php>
- [9] GNU:
<http://www.gnu.org/licenses/licenses.html>
- [10] DaySim (Dynamic Daylight Simulations):
<http://irc.nrc-cnrc.gc.ca/ie/light/daysim.html>
- [11] KNOPPIX cheat codes:
<http://download.linuxtag.org/knoppix/knoppix-cheatcodes.txt>
- [12] EnergyPlus weather data:
http://www.eere.energy.gov/buildings/energyplus/cfm/weatherdata_int.cfm
- [13] KNOPPIX.net:
<http://www.knoppix.net>