

The FSM Labs, Inc.
RTLinux 3.0 CD
Installation Guide

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Chapter 1

Thank You!

Dear Customer:

Thank you for your recent purchase of the RTLinux 3.0 CD and welcome to a whole new world in realtime control! In your hands is the installation manual for the world's premiere hard realtime operating system. You are about to unlock a powerhouse via which you will be able to solve some of the world's most challenging control problems. This installation guide is designed to guide you through the install process step by step.

The installation process is quite straightforward and should give you no problems. If you find that you need assistance, help is available from several sources:

- *Free, 24/7, world-class support is available from the RTLinux community via the RTLinux mailing lists: `rtl@rtlinux.org` . You can access these browseable and searchable lists via:*

`http://www.rtlinux.org/mailing_lists.html`

- *Your purchase of RTLinux v3.0 includes 30 day email support with help installing your CD and running the supplied RTLinux examples. For support, send email to `cd_support@rtlinux.com` . Include your hardware and software configuration and explain your problems as completely as possible. Be sure to include the product identification code which you can find on the invoice that accompanied this CD at the time of purchase.*
- *FSMLabs can provide additional training, development and first- and second-tier support on a contractual basis. If you would like further information about these and other products and services, please contact us via email at `business@fsmllabs.com` or visit our website at `http://www.fsmllabs.com` . An overview is available in at `http://www.fsmllabs.com/products.html` .*

We hope that RTLinux v3.0 will meet all your realtime software needs, and we trust that your experience with RTLinux will be successful. We hope you'll contact us with any problems, or if you're unsatisfied in any way with this product.

Once again, thank you.

Sincerely,

The FSMLabs Team

Chapter 2

Before You Begin: An Overview

This manual gives a brief guide to the installation process for the *RTLlinux 3.0 CD*. The *RTLlinux 3.0 CD* is based on the Red Hat 6.2 distribution—thus users can find a more thorough set of instructions at <http://www.redhat.com>. (Also, Red Hat's installation guide can be found on the *RTLlinux 3.0 CD* in html format at `/doc/install-guide`.)



*This install guide was written under the assumption that you are installing RTLlinux from scratch. You will be installing a brand new operating system into your machine, and therefore **all data and programs on your hard drive will be lost**. Refer to the Red Hat Installation Manual at <http://www.redhat.com> if this is NOT what you want to do.*

Your *RTLlinux 3.0 CD* contains everything necessary to run FSMLabs RTLlinux v3.0 on X86 based platforms, and includes a base set of development tools which will allow you to compile and execute your own RTLlinux programs. It also includes the state-of-the-art desktop managers GNOME and KDE.

In addition, the realtime-related packages found in your *RTLlinux 3.0 CD* include:

- Documentation: installed under `/usr/rtlinux/doc`
- The RTLlinux-3.0 source code: installed under `/usr/src/rtlinux-3.0`
- A prepatched RTLlinux kernel version 3.0 running atop of Linux kernel 2.2.18. The source tree is installed in `/usr/src/linux-2.2.18-rt13.0`
- MiniRTL, a version of RTLlinux that fits on a single floppy disk
- RTIC-Lab, a graphical front-end controller for RTLlinux

The next section describes the installation process that is necessary to get RTLlinux working in your computer.

Chapter 3

The Installation Process

The installation process is divided into three part. First, you choose the boot media and boot your machine. Next, you answer a set of questions that tell your *RTLlinux 3.0 CD* the features you want installed on your RTLinux workstation, and let the installer install the selected packages. Finally, you reboot your machine. These steps are discussed in more detail in the following sections.

3.1 Step 1: Selecting the Boot Media and Booting

There are several ways to boot your machine with your new *RTLlinux 3.0 CD*. For simplicity, we'll only discuss two in detail. Your CD can be booted via two methods¹:

1. *From CD-ROM*: This is the preferred method.
2. *From floppy*: Use this method if the CD-ROM boot method fails, or if your hardware does not support bootable CD-ROM media.

These two schemes are discussed below.

3.1.1 Booting from CD-ROM (Recommended)

The install CD is bootable, so to start the installer you should:

1. Make sure that the "CD-ROM" option is selected as the first boot-media in your computer's system BIOS,
2. Put the CD into your CD-ROM drive, and
3. Restart your computer.

¹Okay, three. The third install method uses NFS. See Appendix B if you wish to use NFS.

Your computer should begin reading your new *RTLlinux 3.0 CD*. If it does not, verify items 1 through 3 above.



If you still are unable to boot off of your CD-ROM after verifying the above information, don't panic. Simply move on to Section 3.1.2.

Once your computer boots up from the CD-ROM, you are ready to move on to Step 2 in Section 3.2.

3.1.2 Booting from Floppy

To boot from a floppy disk, do the following:

1. Create a bootable floppy disk as described in Appendix A.
2. Make sure that your computer's BIOS is set to boot up from the floppy drive.
3. Insert the boot-floppy.
4. Put the *RTLlinux 3.0 CD* in your CD-ROM drive.
5. Restart the computer.

Your machine should immediately locate the floppy drive and begin booting off the floppy. This will take some time, as floppy drives are a lot slower than CD-ROM drives. Be patient—in a few minutes you'll be ready to move on to the next step.

3.2 Step 2: The Installation Process

Now it's time to configure the *RTLlinux 3.0 CD* installation for your particular environment. At this point, you should see the LILO boot prompt:

boot:


If you do, proceed with the installation. If not, go back and try again. Don't worry, we'll wait.

1. *Select Type of Installation:*

At the boot prompt, you select whether you want to use the graphic or the text installation method:

- For the default installation method, press ENTER, or

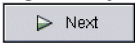
- at the boot prompt, type:
boot: text
to force text-based installation.


 *The installation procedure is the same whether you use text or graphics mode. The only difference is the appearance of the installation tool.*

During the boot process, your *RTLlinux 3.0 CD* attempts to detect all installed hardware. If you have chosen option **1** above, and a mouse and recognized video driver are detected, the X11-based (graphical) installer will launch. Otherwise, text mode will be used.


The graphics installer is mouse-based. To select an item, simply single-click on it. If you use text mode, use both arrow keys and the tab key to move around, and the space bar to select.

2. *Language Selection:*


Next, you are asked to select the language to be used during the install process and as the default language for your RTLlinux installation. Make your choice from the list and then click on .

 *If you select a language other than English, buttons and menu items will all be displayed in the selected language. Help texts, however, will still be displayed in English.*

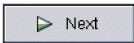
3. *Keyboard selection:*

The keyboard selection menu should detect the correct keyboard hardware. Verify that the auto-detected selection is correct before clicking on .

4. *Mouse selection:*

The mouse selection menu should detect the correct mouse hardware selection. However, it may not have detected the correct number of buttons. In many cases the system will detect a two-button mouse when you have a three-button mouse, or vice versa. Correct the mouse and button settings, if necessary, and click on .

5. *Welcome Screen*

The next screen welcomes you to RTLlinux v3.0 and points out some sources of help for your installation. Read the text at the left, then click .

6. *Pre-configured Installation Packages:*

The next selection screen displays four predefined installation packages and a *custom install* option. You will most likely want to choose one of the four pre-configured packages. Only select the *custom install* option if you really know what you are doing. This Installation Guide assumes that you will choose one of the preconfigured packages.

The four prepackaged workstation installation packages are:

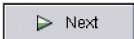
GNOME-RT Workstation
GNOME-Workstation
KDE-RT-Workstation
KDE-Workstation

The KDE-RT and GNOME-RT Workstation options install both RTLinux version 3.0 and a virgin non-realtime kernel. This gives you the option to choose between kernels at boot time (from the LILO prompt). The GNOME and KDE Workstation options install a non-realtime system only. (GNOME and KDE are the two most popular desktop environments for Linux. If you are unsure which one to choose, we recommend that you select GNOME; Red Hat tends to favor GNOME in their installation CDs.

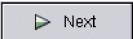
After you make your selection, click on  .

7. *Partitioning:*

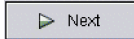
If you have chosen one of the preconfigured workstation choices, the next screen will confirm your choice and remind you that all current data on your hard drive will be destroyed if you continue. The default choice is “Remove data,” which will automatically partition your hard drive. The other choice “Manually partition,” *should only be chosen if you have a good reason for doing so, and if you really know what you are doing.*

The “Remove data” option will create a swap partition, a /boot partition and a “/” partition. In this Guide we assume you choose the “Remove data” automatic partitioning. After you have done so, click  .

8. *Network Configuration:*

The next screen gives you the option of setting up your network connection. If you want to set up the connection now, ask your network administrator for the information requested on this screen. If you want to put off network configuration until later, just click  .

9. *Time Zone Selection:*

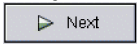
The next screen allows you to set your system clock. Follow the instructions on the left for choosing your location. If you like, you can have your system use UTC (also known as GMT). When you’re done, click  .

10. *Account Configuration:*

You need to create accounts for the superuser (*root*) and at least one regular user. This is done on the next menu screen.


First, enter a password for the *root* account. You need a password that is at least five (5) characters long, and preferably one that uses a combination of alphanumeric (0-9, a-z) and non-alphanumeric (!#\$%^&) characters. You must enter this password twice, to make sure that it has been entered correctly. If they are not exactly the same, the installer will not allow you to proceed.

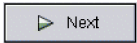
After you have successfully entered the root password, create a regular user account.

Afterwards, click on  .

11. *Monitor selection:*


Select your monitor from the available list. If your monitor is not correctly autodetected then you can either manually enter your horizontal sync (Hsync) and Refresh rate (check your monitor manual) or select “Generic Monitor.”

 *Choose carefully. Selecting the wrong monitor hardware could damage your hardware.*

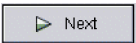
Afterwards, click on  .

12. *Video Card Selection:*

The next menu will display the settings of the detected video card hardware. Once again, verify these settings before proceeding.

 *Do not select a video card that does not match the installed hardware, since it can damage the hardware. Leaving the default memory detected, however, is generally OK.*


If you want to enable a graphical login each time your computer boots up, select “Use Graphical Login.” If you select “Customize X Configuration,” you will be taken to a screen where you can set the default resolution and bit depth of your display.

When you are finished, click on  .

13. *RTLinux License Agreement*

Use of RTLinux is governed by the Open RTLinux Patent License. In essence, the license allows you to use RTLinux without royalty payment if you release your software

under the GPL or if you use an unmodified version of RTLinux. Other use requires a specific license. For a full understanding of your rights and responsibilities under the License, it is included at the end of the Install Guide you are now holding. It also appears at the left side of the Install screen entitled “RTLinux License Agreement.”

Read the License carefully. By clicking the  button on this screen, you signify your understanding of the License and your willingness to be bound by its terms.

14. *Package Installation:*

At this point, the installer is ready to begin installation of your *RTLinux 3.0 CD* packages. It will ask if you want to proceed.

Click on  and the installation will begin immediately.

The installation process is as follows: First, the system partitions and formats the hard drive. Second, it begins the package installation. This can take a while. (You can gauge how long the entire installation will take by observing the progress bars. You may want to run out and grab a cup of coffee.)

After the installation is complete, you will be prompted to create a bootable floppy. If you booted your installation from a floppy, remember to remove the install-boot floppy before creating your boot floppy. Otherwise, it will be overwritten.



This floppy contains the image necessary to “kickstart” your computer in case of trouble. It is strongly recommended that you create a boot floppy. This will permit you to boot your computer if the hard disk boot fails.

Once you complete this step, proceed to Step 3 (Section 3.3).

3.3 Step 3: Rebooting the Computer

Congratulations! You have now finished installing all the software into your hard drive. You are now ready to restart your machine and try out your *RTLinux 3.0 CD* distribution. Now, all that is left is the following:

1. The computer will inform you that it has completed, and tell you that it is going to reboot. Say yes.
2. The computer will automatically eject the CD-ROM and restart itself. Be sure to remove the CD from the CD-ROM drive.

At this point, your computer will restart, and if everything goes well, within seconds you will be facing the log-in screen to your brand new *RTLinux 3.0 CD* installation!

Appendix A

Creating an Installation Floppy

There are two ways to create an install floppy:

1. Using an existing Red Hat Linux box:

- Put the CD into the drive of an already installed Linux computer
- Mount the CD:

```
mount -t iso9660 /dev/cdrom /mnt/cdrom
```

- Change to the images directory in the CD:

```
cd /mnt/cdrom/images
```

- Put a blank floppy into the floppy drive
- Issue the following command:

```
dd if=boot.img of=/dev/fd0
```

- Wait until the light from the drive turns off
- Eject the floppy

2. Using a Windows/DOS machine: From a DOS or Windows machine, do the following:

- Put the CD into the drive
- Open up a DOS terminal
- In the DOS terminal, go into the directory `dosutils`
- Execute the command `rawrite.exe` in the DOS terminal
- When prompted, specify that the input image is `images/boot.img`
- Wait until completion
- Eject the floppy

Appendix B

Installing via NFS (experts only)

Installing via NFS is supported, though recommended only for those who really know what they are doing. To do an NFS install, build a boot-floppy using the `bootnet.img` on the RTLinux CD (see Appendix A). Make sure that the NFS-Server's CD-ROM is exported for your IP address, and that it is mounted on the NFS-Server.

Use the bootnet floppy to start up the computer on which you want to install RTLinux. When you reach the "Installation Method" screen, choose "NFS image." You will then be prompted for the network information the system will use to find the CD you've made available over the network. Once the network connection is made, installation proceeds much as outlined above.

After the installation is complete, don't forget to remove the entry for the CD-ROM on the NFS-Server (unless you want to make the CD-ROM permanently available via the NFS-Server).

Installation via NFS can cause substantial network traffic. Check with your network administrator before starting an NFS install.